A fully evaluated model for managing obesity in primary care

The Counterweight Programme

Professor J Broom
Chair of Counterweight Programme
CORE, The Robert Gordon University, Aberdeen
Australia 2014
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The Counterweight Programme

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Chair of Counterweight Programme
CORE, The Robert Gordon University, Aberdeen
Agenda

- Counterweight model
- Phase 1 (2000-2005)
  - Summary of audit data
  - Weight change
  - Economic evaluation
- Continuous improvement
- Phase 2 (2006-2010)
- Aberdeen
- Bath
- Birmingham
- Glasgow
- Leeds
- London
- Luton
Counterweight Model

Audit/Needs Assessment
setting priorities

Evaluation
improving performance

Intervention Programme
measuring performance

Practice
Training
setting guidelines

References:

J Hum Nutr Dietet. 2004; 17: 191-208
Detailed Patient Audit

- 6000 obese (BMI $\geq 30$) adults
- 1150 overweight adults (age and sex matched)
- 1150 normal weight adults (age and sex matched)
- 18 month retrospective audit of medical records: Co-morbidities : Prescribing : Primary and secondary care appointments : Admissions : Obesity management practices
Prevalence of Co-morbidities

- Hypertension
- Type 2 Diabetes
- CVD
- Dyslipidaemia
- Back Pain
- Arthritis
- Gallstones

BMI >= 30 vs BMI 18.5 -< 25

n=1150 Obese + 1150 Normal Weight Age and Sex Matched, All p<0.001
Int. J Obesity, 2003; 27 (suppl. 1): S83
BMI distribution in obese sub sample compared across Counterweight regions

Aberdeen Bath Birmingham Glasgow Hammersmith Leeds Luton National Aggregate

BMI distribution in obese sub sample compared across Counterweight regions.
Prevalence of diabetes in obese sample compared to total practice population and across Counterweight regions.

![Bar chart showing prevalence of diabetes in obese sample compared to total practice population and across Counterweight regions.](chart)

- Aberdeen: 17.3%
- Bath: 10.8%
- Birmingham: 13.6%
- Glasgow: 13.1%
- Hammersmith: 13.1%
- Leeds: 2.1%
- Luton: 2.8%
- National Aggregate: 11.4%
- Total Practice: 2.1%
The Counterweight Model

Audit/Needs Assessment

Evaluation

Practice Training

Intervention Programme
Training & Support In Practice

- 6 hours of practice nurse training
- 1-2 meetings each month for 6/12
  - clinical support
- On-going support after 6/12
  - to support data collection
  - provide patient education materials
  - provide up-skilling as required
Programme Materials

- Patient Information Leaflets: ongoing supply
- Desk flip chart for practices
- CHANGE Group Programme
**AUDIT**

- Preparation of combined audit database (7300 patients)

<table>
<thead>
<tr>
<th></th>
<th>Normal weight</th>
<th>Obese</th>
<th>No. of Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>-</td>
<td>4000</td>
<td>40</td>
</tr>
<tr>
<td>Phase II (not Aberdeen)</td>
<td>1150</td>
<td>1150</td>
<td>23</td>
</tr>
<tr>
<td>Phase II (Aberdeen)</td>
<td>-</td>
<td>1000</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>1150</td>
<td>6150</td>
<td></td>
</tr>
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</table>

- Development of a drugs database
### BMI BANDS - Numbers of patients

<table>
<thead>
<tr>
<th>Normal weight</th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1150</td>
</tr>
<tr>
<td>30.0 -</td>
<td>2804</td>
</tr>
<tr>
<td>32.5 -</td>
<td>1425</td>
</tr>
<tr>
<td>35.0 -</td>
<td>875</td>
</tr>
<tr>
<td>37.5 -</td>
<td>442</td>
</tr>
<tr>
<td>40.0 -</td>
<td>595</td>
</tr>
</tbody>
</table>

Compare with JAMA (Must et al) who had 2512, 922 & 545 in WHO obesity classes 1, 2 & 3 spread across 4 heterogeneous race/ethnic groups.
CO-MORBIDITIES

• Largest contemporary study of obesity in UK
• Wide range of co-morbidities
• Precise estimates of prevalence with increasing obesity
• Able to test for linear/non-linear trends
• Ability to project trends in co-morbidity prevalence consequent on changes in levels of obesity with very good precision
CO-MORBIDITIES

- Diabetes
- Major
- Hypertension
- CHD
Hyperlipidaemia

BMI

O R
CO-MORBIDITIES

- Asthma
- Back pain
- Depression/anxiety
- Arthritis
RESOURCE USAGE

GP Appointments

PN appointments

O/P visits

I/P admissions

Dietary counselling & Obesity centre referral
Number of appointments for **obese** & **normal** subjects
(based on 6150 obese & 1150 normal patients)

- **GP appointments**
  - P<0.001

- **PN appointments**
  - P<0.001
Obesity increases primary care attendance over and above increasing age and co-morbidity

n=1150 Obese + 1150 Normal Weight Age and Sex Matched * p <0.001

*Int. J Obesity, 2004; 28 (suppl. 1): S116
Regular GP attendance by age group, number of co-morbidities and obesity

Age

Obese (60.2%)
Normal (46.8%)

Co-morbidity

obese
normal

Number of co-morbidities

<35 35-44 45-54 55-64 65+ 0 1 2 3+
GP visits – effect of adjustments
(probability of 4 or more visits)

Adjusted for:
Age group, sex, deprivation, country, phase
(standard set). OR=1.62, p<0.001; trend p<0.001

+ any co-morbidity, + major co-morbidity
OR=1.42, p<0.001; trend p=0.022

+ number of co-morbidities
OR=1.31, p=0.003; trend p=0.235
Frequent GP attendance

Odds ratio for BMI 40+

2.08 (1.64-2.65)

After adjustment for co-morbidities

1.48 (1.15-1.90)

Approx ½ of additional attendances are due to presence of co-morbidities
Prevalence of polypharmacy (4+ drug types) by BMI status, age group & number of co-morbidities

- **Obese (53.5%)**
- **Normal (37.9%)**
Prescribing per BNF Category

n=1150 Obese + 1150 Normal Weight Age and Sex Matched  All p<0.001 except = p<0.05

Int. J Obesity, 2003; 25 (suppl. 2): S27
Br J Gen Pract (In Press)
Impact of BMI on Cost of ‘Top Ten’ Drugs (males)

Journal of Health Services Research & Policy. 2008;Vol 13 No 3: 158–166
Summary of audit results

- 58% of males and 71% of females had a BMI recorded
- Obese patients were twice as likely to suffer from hypertension, CVD, dyslipidaemia and arthritis, and four times more likely to suffer diabetes
- Obese patients had higher rates of prescribing
- Obese patients attended general practice more frequently than normal weight patients
Risk of obesity related comorbidity by BMI for Males

Odds Ratio vs BMI (males)
Risk of obesity related comorbidity by BMI for Females

Odds Ratio vs BMI (females)

BMI band
OR
- Diabetes
- Hypertension
- Dyslipidaemia
- Vascular
- Asthma
- Depression/Anxiety

Risk of obesity related comorbidity by BMI for Females
Odds Ratios of obesity related comorbidity for all patients with and without diabetes

Counterweight data (obes.res.&clin.pract. 2: 15-27)
Change in Risk following 5 and 10% weight gain and loss (Counterweight data 2008)
Counterweight Model

- Patient Intervention

• BMI $\geq 28\text{kg/m}^2$ with co-morbidity or BMI $\geq 30\text{kg/m}^2$
• Evidence-based pathways*
• 6 sessions over 3-months
• Quarterly follow up for 1 year
• Annual review

*J Hum Nutr Dietet. 2004; 17: 191-208
Counterweight Model
- Programme Materials
Phase 1

- 56 practices
- 1906 eligible patients
- Mean BMI = 37
- Mean age 49 years
- 77% patients female
- 25% patients had BMI > 40
- 74% patients had at least one co-morbidity
Mean Weight Change (95% CI) in Attending Population


*Heitman BL & Garby L (1999) Int J Obes Relat Metab Disord
Weight change over time

- Weight change (kgs)
- Number of patients
  - 971
  - 672
  - 684
  - 391

- Months
- Non-completers
- Completers
- All
% Achieving ≥ 5% Weight Loss from Baseline

Br J Gen Pract. 2008; 58: 548-554
1:7 patients achieved >5% weight loss at 12/24m
12 month Intervention Outcomes

- 40% of Patients
- Wt Loss ≥ 5%
- 41% of Patients
- Wt Loss 0-<5%
- 78% of Patients
- Wt Loss (All)
- 53% of Patients
- Wt Gain
- 43% of Patients

n=446  All p <0.001
1 in 6 of all patients entering the programme will achieve ≥ 5% weight loss at 12 months.
Counterweight Outcomes
Health Economics II

% Drug Costs

- <25: 26.6
- 25-30: 36.6
- ≥ 30: 36.8

35% pop
23% pop

BMI

42% pop
Counterweight Outcomes
Health Economics III

Note: UK ‘Top Ten’ Drugs spend 2001 £1.55 Billion
## Factors Affecting Weight Change (kg)

<table>
<thead>
<tr>
<th>Diabetes</th>
<th>n</th>
<th>Mean (SD) weight change, kg</th>
<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td>Not present</td>
<td>510</td>
<td>-3.30 (6.98)</td>
<td>-3.91 to -2.70</td>
</tr>
<tr>
<td>Present</td>
<td>132</td>
<td>-1.63 (4.91)</td>
<td>-2.47 to -0.78*</td>
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</tbody>
</table>
### Factors Affecting Weight Change (kg)

<table>
<thead>
<tr>
<th>No. Visits</th>
<th>n</th>
<th>Mean (SD) weight change, kg</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>212</td>
<td>-0.65 (5.37)</td>
<td>-1.38 to -0.07*</td>
</tr>
<tr>
<td>6-9</td>
<td>200</td>
<td>-2.60 (6.06)</td>
<td>-3.45 to – 1.76*</td>
</tr>
<tr>
<td>10-15</td>
<td>148</td>
<td>-4.67 (6.13)</td>
<td>-5.66 to -3.67</td>
</tr>
<tr>
<td>16-20</td>
<td>49</td>
<td>-5.95 (6.74)</td>
<td>-7.88 to -4.01</td>
</tr>
<tr>
<td>&gt;20</td>
<td>33</td>
<td>-7.82 (11.62)</td>
<td>-11.94 to -3.70</td>
</tr>
</tbody>
</table>
Illustration of Scenarios

X = Baseline. Y = 12 months with Counterweight intervention

Base case scenario = Regain all 4 kg weight difference effect in 2 yrs
Best case scenario = Life-long maintenance of 4 kg weight difference
Illustration of Scenarios

- **No intervention - gain 1kg/y**
- **Base case scenario**
- **Best case scenario**
- **Observed 2-year mean weight loss**
  -2.3 kg (from baseline)

**X** = Baseline. **Y** = 12 months with Counterweight intervention

**Base case scenario** = Regain all 4 kg weight difference effect in 2 yrs

**Best case scenario** = Life-long maintenance of 4 kg weight difference
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Average weight loss at 1 year (kg)</th>
<th>Duration of weight loss (years)</th>
<th>Incremental cost per QALY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>3</td>
<td>2</td>
<td>Dominant*</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>3</td>
<td>Lifetime</td>
<td>Dominant*</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>3</td>
<td>0.5</td>
<td>£57.21</td>
</tr>
</tbody>
</table>
Some Context
- approx. costs/QALY for comparison

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Approx. Costs</th>
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<tbody>
<tr>
<td>Smoking cessation</td>
<td>£250-500</td>
</tr>
<tr>
<td>Hip replacement</td>
<td>£5,000-6,000</td>
</tr>
<tr>
<td>Breast cancer screening</td>
<td>£15,000-20,000</td>
</tr>
<tr>
<td>Renal dialysis</td>
<td>£30,000-50,000</td>
</tr>
<tr>
<td>β Interferon</td>
<td>&gt; £50,000</td>
</tr>
<tr>
<td><strong>Counterweight</strong> (worst case scenario)</td>
<td><strong>£57</strong></td>
</tr>
</tbody>
</table>
Continuous Improvement

• 8 hours training classroom based
• Increased focus on realistic goals for weight change
• Additional 4 hours training
• Lapse management moved session 5 to session 1
• New processes for patient recall
• Buddy Dietitian
Phase 2

- Scotland - 8 Health Boards 2006-2010
- England - 20 Primary Care Trusts each year
- Evaluation on-going
## Patient characteristics

<table>
<thead>
<tr>
<th></th>
<th>Established practice 2006-2010</th>
<th>Original evaluation 2000-2005</th>
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<tbody>
<tr>
<td>Practices</td>
<td>184</td>
<td>56</td>
</tr>
<tr>
<td>Number of patients</td>
<td>6715</td>
<td>1906</td>
</tr>
<tr>
<td>Mean BMI (kg/m(^2)), (s.d.)</td>
<td>37.0 (6.2)</td>
<td>37.1 (6.0)</td>
</tr>
<tr>
<td>Mean age, (s.d)</td>
<td>53.0 (10.4)</td>
<td>49.0 (13.5)</td>
</tr>
<tr>
<td>% Women</td>
<td>74.3</td>
<td>77.0</td>
</tr>
<tr>
<td>% BMI&gt;40 kg/m(^2)</td>
<td>25.8</td>
<td>25.4</td>
</tr>
<tr>
<td>% BMI&gt;50 kg/m(^2)</td>
<td>3.9</td>
<td>3.0</td>
</tr>
</tbody>
</table>
Weight loss in Attenders

% patients

3 months 6 months 12 months
n=3071 n=1775 n=928

> 0% gain
0-5% loss
≥ 5-10% loss
≥ 10% loss

Family Practice 2012; 29:i139–i144
Counterweight Funding

• Research phase 2000-2006
  Unencumbered grant from Roche Products Ltd

• Scotland 2006 onwards
  Scottish Government

• England 2006 onwards
  Primary Care Trusts
  Unencumbered grant from Sanofi Aventis (2006)
Summary

• Clinically significant weight loss and maintenance achievable in primary care
• Counterweight shown to be clinically beneficial and cost effective
• Continuous Improvement Methodology enables on-going programme development

www.counterweight.org
Rationale for Counterweight Plus

- 5-10% weight loss target achieved for at least 24m by 30% attenders (1:6 all patients enrolled)
- Mean BMI = 37 kg/m^2
- 25% had BMI ≥ 40 kg/m^2
- Clinical requirement for greater weight loss
- Counterweight Plus aimed ≥ 15kg loss at 12m

Br J Gen Pract. 2008; 58: 548-554
Family Practice 2012; 29:i139–i144
Weight Management Pathway

- **Bariatric Surgery**
  - 30-40% weight loss
- **Counterweight Plus**
  - 15-20% weight loss
- **Counterweight Programme**
  - 5-10% weight loss
Counterweight low energy liquid diet in primary care

- Scottish Government funded
- Developed from Counterweight original programme
- Primary care delivered
- Practice nurse trained
- Practice nurse led
- Inner city, semi-rural and rural populations
Programme Structure

- **Screening**
  - (12 x Weekly Appointments over 3 months)

- **LELD Stage**
  - (6 x Fortnightly Appointments over 3 months)

- **Food Reintroduction + Weight Stabilization Stage**
  - (6 x Monthly Appointments)

- **Weight Loss Maintenance**
  - (6 x Monthly Appointments)
Counterweight LELD-Results

NHS Feasibility Study- Background

- 91 patients
- BMI ≥ 40kg/m²
- 78% women
- Mean weight 131kg
- Quantitative and qualitative evaluation
Counterweight LELD-Results

NHS Feasibility Study- 12weeks

• Mean duration of diet 12 weeks
• Mean weight loss was 13.3kg (10.1%)
• Mean weight loss completers 17.4kg (13%)
• 38% dropout rate
Individual patient weight change trajectories

% weight change

number of days on LELD

0 50 100 150
Cost Implications for Practice

- Cost per patient £861 entered or £2611 achieving ≥15kg weight loss at 12 months (64% cost is total diet replacement product)
- £1m will treat 1161 patients with CWT Plus, for 383 to achieve ≥15kg weight loss
- £1m will treat 133 with laparoscopic banding (assuming £7500/patient) for 110 to achieve ≥15kg weight loss
Counterweight Project Team

**Counterweight Team**
Hazel Ross, Louise McCombie, Sarah Haynes, Felicity Lyons, Maria McQuigg, Sarika Mongia, Paula Noble, Marney Quinn, Frances Thompson, Adri Vermeulen, Anna Bell-Higgs, Anne Clark, Paula Regan, Naomi Brosnahan

**National Counterweight Board**
Prof. Iain Broom, Dr Nick Finer, Prof Gary Frost, Dr David Haslam, Prof. Sudhesh Kumar, Prof. Mike Lean, Dr John Reckless, Dr Julian Hamilton-Shield

**IT and Statistics**
Billy Sloan, Dr David Morrison

**Health Economics**
Dr Paul Trueman