Evidence-based weight loss and maintenance with formula diet

Aim: To examine the evidence for the effectiveness of formula diet weight loss and maintenance programmes
Evidence-based weight loss and maintenance with formula diet

- **Slim for surgery: why and how** - ARLeeeds
  - Case Study: Weight loss before bypass surgery in an immobile super-obese woman (case-study) Ruth Sebastian

- **Diabetes reversal with formula diet** - Naomi Brosnahan
  - Case Study: Effective weight loss in a man with type 2 diabetes

- **Suppressing inflammatory disease: weight loss in osteoarthritis** – ARLeeeds

- ....and psoriasis - Nina Geiker
  - Case Study: Transforming quality of life in an obese man with psoriasis
Slim for surgery: why and how

Anthony R Leeds

Faculty of Science, University of Copenhagen;
Faculty of Health and Medical Sciences, University of Surrey;
North London Obesity Surgery Service, Whittington and Central Middlesex Hospitals, London;
Medical Director, Cambridge Weight Plan.

ASO 17th September 2014

anthony.leeds@nhs.net
How do VLCD, LCD, Total diet replacement programmes work?

- **Larger energy deficit**
  - 1000 – 2000 kcal/d
  - (compare to 500-600 kcal/d of usual reducing diet)

- **Greater rate of weight loss** – linked to better 6/12 maintenance (DIOGENES) See: [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3359496/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3359496/)

- **Facilitate portion control** (American Dietetics Association)
  ‘For people who have difficulty with self selection and/or portion control, meal replacements (eg, liquid meals, meal bars, or calorie-controlled packaged meals) may be used as part of the diet component of a comprehensive weight management program.’ On open access at: [http://andevidencelibrary.com/files/Docs/WM%20Position%20Paper.pdf](http://andevidencelibrary.com/files/Docs/WM%20Position%20Paper.pdf)

- Ketosis – appetite suppression?
Is there a place for weight loss with formula diet before surgery?
Pre-op management issues

- Is preoperative dietary treatment (to achieve ‘liver shrinkage’ and reduction of visceral fat) necessary?
- What type of diet? Food-based/Liquid?
- What dietary energy level is appropriate?
- What is the minimum duration?
- Is the effect predictable so that booking of date for surgery can result in efficient use of space and surgical team resources?
- Does shape and size of the patient matter?
Weight loss before bariatric surgery and postoperative complications: Data from Scandinavian Obesity Registry
Anderin C et al Annals Surgery doi: 10.1097/SLA.0000000000000839

- 22,327 patients 2008 - 2012 (4.5 years)
- Variable pre-op regimen: 2-3 week low-calorie or very low calorie diet (VLCD)
- Median pre-op weight change: -4.8% (25th percentile: 0.5%; 75th percentile: 9.1%)
- Comparing 75th with 25th percentile:
  - Anastomotic leakage down 24%
  - Deep infection/abcess down 37%
  - Minor wound complications down 54%
- Effects were greater at higher BMI (>46 vs <40)
‘It seems as if approximately **10% of total weight loss** is to be recommended to achieve a more pronounced effect (on complications within 6 weeks after surgery) compared with a modest preoperative weight loss in the range of 5%.’

‘…data suggest that **patients in the higher range of BMI could be expected to benefit more** from preoperative weight loss…’
Preoperative weight loss with a very low-energy diet: quantitation of changes in liver and abdominal fat by serial imaging Colles SL et al Am J Clin Nutr 2006; 84: 304-11

Change in total body weight, visceral adipose tissue and liver volume* during 12 weeks VLED  n=9  (* p<0.001 at 2,4,8,12 weeks)
Efficacy of a Liquid Low Calorie Formula Diet in Achieving Preoperative Target Weight Loss Before Bariatric Surgery
Nielsen MS, Nielsen, LV, Schmidt JS, Pedersen SD, Sjödin A.

Denmark:
Pre-operative weight-loss target of 8% of initial body weight
  – To reduce operation time
  – To reduce perioperative complications
Efficacy of a Liquid Low Calorie Formula Diet in Achieving Preoperative Target Weight Loss Before Bariatric Surgery

Nielsen MS, Nielsen, LV, Schmidt JS, Pedersen SD, Sjödin A.

- n=30
- BMI 46
- Low calorie diet (1000 kcal/d) for 7 or 11 weeks
Efficacy of a Liquid Low Calorie Formula Diet in Achieving Preoperative Target Weight Loss Before Bariatric Surgery

Nielsen MS, Nielsen, LV, Schmidt JS, Pedersen SD, Sjödin A.

Danish bariatric surgeons request an 8% body weight loss before surgery

<table>
<thead>
<tr>
<th></th>
<th>achieved target (n=28)</th>
<th>achieved target (ITT n=30)</th>
</tr>
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<tbody>
<tr>
<td>Week 7</td>
<td>82%</td>
<td>77%</td>
</tr>
<tr>
<td>Week 11</td>
<td>96%</td>
<td>90%</td>
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<table>
<thead>
<tr>
<th></th>
<th>Week 0</th>
<th>Week 7</th>
<th>weeks 0-7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bodyweight kg</td>
<td>135.1±19.2</td>
<td>122.4±16.6</td>
<td>-12.7±4.2**</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>1.8 kg/week</td>
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Conclusions and comments drawn from several sources including Nielsen et al above and from practice

- Target weight loss (8%) achieved in 7 weeks in ~80% of severely obese patients booked for bariatric surgery. Liver shrinkage 2 weeks
- Associated metabolic improvements.
- In compliant patients weight loss is predictable and patient can be booked for surgery at the time of starting the diet.
- Reduces surgery time, avoids abandoned procedures, shortened recovery time, reduced peri and post-op risks [OSA risks]
The aim of this study was to compare the effect of 3 pre-operative diets on intra-hepatocellular lipid content (IHCL), body composition, and surgery outcomes in morbidly obese patients undergoing RYGB:

- A 2-week liquid formula LCD (810kcal/day) (2W LCD)
- A 6-week liquid formula LCD (810kcal/day) (6W LCD)
- A conventional food diet (800-1000kcal/day) (CONTROL)
Abdominal subcutaneous and visceral adipose tissue

** p<0.05; *** p<0.001

** p<0.05; *** p<0.001
Liver fat content and ‘difficulty of procedure’

** p<0.05; *** p<0.001

Fig 6: Difficulty of procedure mean score
Weight loss and neck circumference

Asking the wrong person?

Research need:
- Assess anaesthetic procedure time
- Intubation
- Recovery time
- Time in HDU
- Cost implications

** p<0.05; *** p<0.001
Pre-op management issues

- Is preoperative dietary treatment (to achieve ‘liver shrinkage’ and reduction of visceral fat) necessary? **YES (in some cases)**
- What type of diet? Food-based/Liquid?
- What dietary energy level is appropriate? ?
- What is the minimum duration? ?2 weeks?
- Is the effect predictable so that booking of date for surgery can result in efficient use of space and surgical team resources? **Yes**
- Does shape and size of the patient matter??
Knee replacement surgery
The influence of Obesity on the complication rate and outcomes of total knee arthroplasty: meta-analysis and literature review

- 726 publications screened – 20 included
- BMI 30 threshold
- Any infection (14 studies, >15,000 patients) OR 1.9
- Deep infection requiring surgical debridement (9 studies, ~5,000 patients) OR 2.38
- Any revision (9 studies, ~2,000 patients) OR 1.30

<table>
<thead>
<tr>
<th></th>
<th>OR adjusted</th>
<th>95 % CI</th>
<th>p-value</th>
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<tr>
<td><strong>SHORT FORM 36 (SF-36)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Physical component score (PCS)</td>
<td>0.92</td>
<td>(0.88–0.97)</td>
<td>0.002</td>
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<tr>
<td>Mental component score (MCS)</td>
<td>0.98</td>
<td>(0.93–1.03)</td>
<td>0.5</td>
</tr>
<tr>
<td>Physical functioning (PF)</td>
<td>0.90</td>
<td>(0.85–0.95)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Role limitation, physical (RP)</td>
<td>0.96</td>
<td>(0.89–1.03)</td>
<td>0.2</td>
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<tr>
<td>Bodily pain (BP)</td>
<td>0.96</td>
<td>(0.91–1.01)</td>
<td>0.1</td>
</tr>
<tr>
<td>General health (GH)</td>
<td>0.94</td>
<td>(0.90–0.99)</td>
<td>0.03</td>
</tr>
<tr>
<td>Vitality (VT)</td>
<td>0.92</td>
<td>(0.87–0.97)</td>
<td>0.002</td>
</tr>
<tr>
<td>Social functioning (SF)</td>
<td>0.92</td>
<td>(0.86–0.99)</td>
<td>0.03</td>
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<tr>
<td>Role limitation, emotional (RE)</td>
<td>0.95</td>
<td>(0.87–1.04)</td>
<td>0.3</td>
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<tr>
<td>Mental health (MH)</td>
<td>0.95</td>
<td>(0.90–1.00)</td>
<td>0.04</td>
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<tr>
<td><strong>KNEE SOCIETY SCORE (KSS)</strong></td>
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<tr>
<td>Knee score</td>
<td>0.94</td>
<td>(0.90–0.99)</td>
<td>0.02</td>
</tr>
<tr>
<td>Knee score improvement</td>
<td>0.97</td>
<td>(0.92–1.02)</td>
<td>0.3</td>
</tr>
<tr>
<td>Function score</td>
<td>0.87</td>
<td>(0.82–0.93)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Function score improvement</td>
<td>0.90</td>
<td>(0.86–0.95)</td>
<td>&lt; 0.001</td>
</tr>
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The association between preoperative BMI and effect 3-5 years after TKA adjusted for age, sex, primary disease and surgical approach.
Overweight preoperatively impairs clinical outcome after knee arthroplasty
A cohort study of 197 patients 3–5 years after surgery

‘Our findings indicate that TKA patients’ operative BMI is a predictor of the clinical effect and … quality of life 3 – 5 years postoperatively.’

‘There is a need for studies to determine whether pre-operative weight loss would improve quality of life and functional capacity post operatively.’
Weight loss intervention before total knee replacement, a randomized controlled study

Aarhus - Sønderborg

- 78 patients booked for TKA
- Setting: secondary care, dietitian managed
- Baseline average weight 105kg (BMI 31.6)
- Randomised to
  - conventional guidance followed by conventional post-op care
  - or eight weeks of total diet replacement (Cambridge Weight Plan) with 800kcal/d liquid formula diet followed by weight maintenance with an option to use one meal replacement each day.
Weight loss intervention before total knee replacement, a randomized controlled study
Aarhus - Sønderborg

Primary hypotheses:

- The intervention group will achieve higher quality of life 12 months post-operatively, and achieve a greater quality of life from preoperatively to postoperatively, compared with the control group. [SF36]

- The intervention group will achieve a higher level of functioning 12 months postoperatively, and will achieve a larger improvement in functional level from preoperative to postoperative period, compared with the control group. [6 minute walk test]
Weight loss intervention before total knee replacement, a randomized controlled study
Aarhus - Sønderborg

Secondary hypotheses:

- The intervention group will achieve increased quality of life 2 weeks and 6 months postoperatively, compared with the control group.
- The intervention group will achieve increased functional capacity 2 weeks and 6 months postoperatively, compared with the control group.
- There will be fewer postoperative complications in the intervention group compared to the control group.
Weight loss intervention before total knee replacement, a randomized controlled study
Aarhus - Sønderborg

38 subjects in each group
- In 8 weeks:
  - Control group lost 1kg
  - 800kcal/d formula diet group lost 10.7kg

Full paper expected shortly
Research needs

**Bariatric Surgery:**
- Since complication frequency is low and since surgeons cope with difficult cases
  - Examine anaesthetic procedure time
  - Recovery time and cost implications
  - Focus on higher BMI ranges

**Orthopaedic Surgery:**
- Await the results of study from Jutland
  - Translate into routine care
  - Longer term observation – 10 years
  - Cost analyses
Weight loss before bariatric surgery: case presentation

Ruth Sebastian
North London obesity surgery service, Central Middlesex and Whittington Hospitals, London.
Mrs GH aged 45 (London)

February 2013 Weight 201kg (BMI 76)

Excess weight 135kg

Wheelchair bound

Treated depression (citalopram 20mg od)

Asthma (ventolin ii tds; steroid inh int)

Osteoarthritis – knees and back (Co-codamol ii qds)

Cardiomegaly but no heart failure

Dyspepsia, hiatus hernia

‘Nothing to live for’
Mrs GH   aged 45  (London)
February 2013 Weight 201kg (BMI 76)
Surgeons requested pre-op weight loss
12/52 1500/1200/1000kcal/d formula diet
Delay in approval for surgery by cardiologists
Diet continued for 52 weeks

<table>
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<tr>
<th>Date</th>
<th>Weight kg</th>
<th>BMI</th>
<th>Excess Wt</th>
</tr>
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<tbody>
<tr>
<td>February 2013</td>
<td>201</td>
<td>76</td>
<td>135</td>
</tr>
<tr>
<td>Sept 2013</td>
<td>155</td>
<td>59</td>
<td>89 (34%▼)</td>
</tr>
<tr>
<td>Feb 2014</td>
<td>141</td>
<td>53</td>
<td>75 (44%▼)</td>
</tr>
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</table>
Mrs GH aged 45 (London)

February 2014

Weight 141 kg

60kg weight loss over 52 weeks

44% of ‘excess weight lost’

Walked into the office

No joint pains (knees & back) – no analgesic use

No breathlessness – no inhalers

Happy…looking forward to surgery
Mrs GH  aged 45  (London)

- Weight 141 kg
- 60kg weight loss over 52 weeks
- 44% of ‘excess weight lost’

She had also recovered her dignity:
  - attending to personal hygiene herself
  - shopping on foot
  - painting her toenails herself

RYGB on 5th March 2014
### Case

<table>
<thead>
<tr>
<th>Date</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb 2013</td>
<td>201</td>
</tr>
<tr>
<td>May 2013</td>
<td>175</td>
</tr>
<tr>
<td>Sept 2013</td>
<td>155</td>
</tr>
<tr>
<td>Feb 2014</td>
<td>141</td>
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<tr>
<td>March 2014</td>
<td>136</td>
</tr>
<tr>
<td>April 2014</td>
<td>132</td>
</tr>
<tr>
<td>Aug 2014</td>
<td>121</td>
</tr>
</tbody>
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Surgery 5\(^{th}\) March 2014
Ideally should have been done in May 2013 but the cardiological review was delayed

Normal liver – flexible, requiring only one retractor, very clear operative field
Summary

- Preop weight loss over 54 weeks of 65kg
- Represented 48% of excess body wt lost before surgery
- Medical conditions improved pre-op

<table>
<thead>
<tr>
<th>Date</th>
<th>Weight</th>
<th>Wt lost</th>
<th>Excess weight</th>
<th>% of excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb 2013</td>
<td>201</td>
<td></td>
<td>135</td>
<td></td>
</tr>
<tr>
<td>March 2014</td>
<td>136</td>
<td>65</td>
<td>70</td>
<td>48 preop</td>
</tr>
<tr>
<td>August 2014</td>
<td>121</td>
<td>15</td>
<td>55</td>
<td>11 postop</td>
</tr>
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**Figure 1. Weight Changes among Subjects in the SOS Study over a 10-Year Period.**
All data are for subjects who completed 10 years of the study. The average weight change in the entire group of surgically treated subjects was almost identical to that in the subgroup of subjects who underwent vertical banded gastroplasty. The I bars represent the 95 percent confidence intervals.
Research questions

- What are the benefits of pre-op weight loss in the morbidly obese and super-obese?
- Is 12 weeks optimal?
- Would this group show high compliance?
- Could such a pre-op diet be shown to be cost-effective?
UK Congress on Obesity 2014

University of Birmingham, Edgbaston Campus
Tuesday 16th September and Wednesday 17th September 2014