Using non-commercial meal replacement strategies for the treatment of obesity and how to adapt them for patients with obesity and diabetes

Professor Nick Finer
Therese Coleman, Dietitian
Supplemented Fasting

- Developed by Genuth, 1970s
- Attempt to spare the health risks of a complete fast by introducing the minimum amount of protein necessary to prevent muscle-wasting effects, while still eliminating fats and carbohydrates
- Others developing the field
  - Alan Howard, Cambridge Diet
  - Fleming Qaade, Arne Astrup, NUPO diet
  - George Blackburn, Protein Sparing Modified Fast

Protein-sparing, Modified Fast

Nitrogen Metabolism and Insulin Requirements in Obese Diabetic Adults on a Protein-Sparing Modified Fast

Bruce R. Bistrian, M.D., Ph.D., George L. Blackburn, M.D., Ph.D., Jean-Pierre Flatt, Ph.D., Jack Sizer, M.D., Nevin S. Scrimshaw, Ph.D., M.D., and Mindy Sherman, B.A., Boston and Cambridge, Massachusetts

...applied to seven obese adult-onset diabetics who were receiving 30-100 units of insulin per day, insulin could be discontinued after 0-19 days (mean, 6.5)
Material obtained from slaughterhouse carcass material
Amino acids extracted from skin, horn etc
Incomplete amino acid solution lacking essential aas
Manufacturers of VLCD are advised that their preparations should provide a minimum of 400 kcal/day for women, and 500 kcal/day for men and taller women (>1.73 m), with 40-50 g of good quality protein and sufficient vitamins and minerals to meet the RDAs. The ensure that consumers take all the components of the diet at each meal it should be presented in a single package. The package should carry the warning: “You should consult your doctor before starting to use this product”, and should indicate the maximum period for which the product should be used as a sole source of nourishment. It is suggested that manufacturers of VLCD should formulate a voluntary Code of Practice concerning product labelling, the training of advisors and the reporting and collation of reports of adverse side effects.
Commentary on the report of the Committee on Medical Aspects of Food Policy

Many of these wonder cures are obviously bogus, and those who regulate advertising and trading standards are vigilant to protect the public from charlatans. However, the new Very Low Calorie Diets (VLCD) are a different phenomenon; they offer rapid and easy weight loss, and back up their claim with an impressive scientific bibliography to show that these claims are indeed valid. The proponents of VLCD dismiss criticism from the nutritional Establishment as sour grapes; they say their results speak for themselves. In such a situation the public is entitled to authoritative guidance from the DHSS, and the DHSS turns to COMA (the Chief Medical Officer’s Committee on Medical Aspects of Food Policy) for an impartial scientific assessment.

SCOOP- European Report On Use Of Very Low Calorie Diets

• EU report from 2001: Definitions, legislation, inventory of available products, scientific review, advice to the consumer, recommendation for future research (= profile of VLCD consumer)

http://ec.europa.eu/food/fs/scoop/7.3_en.pdf
RCT of outpatient weight reducing diets

- **Control**—A conventional balanced diet composed of a variety of normal foods designed to supply about 3.4 MJ daily with at least 36 g protein
- **Milk only**—A variable combination of full cream or semi-skimmed milk and unsweetened yoghurt to provide the energy equivalent of the control diet
- **Milk plus** - milk only diet with the addition of an unlimited amount of a single food daily to 5.6 MJ

Summerbell et al. BMJ 1998
RCT of outpatient weight reducing diets

<table>
<thead>
<tr>
<th>Group</th>
<th>Control</th>
<th></th>
<th>Milk only</th>
<th></th>
<th>Milk plus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Randomised (n=14)</td>
<td>Completed (n=9)</td>
<td>Randomised (n=14)</td>
<td>Completed (n=11)</td>
<td>Randomised (n=17)</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>3/11</td>
<td>1/8</td>
<td>3/11</td>
<td>2/9</td>
<td>4/13</td>
</tr>
<tr>
<td>Age (years)</td>
<td>39.5 (13.9)</td>
<td>38.1 (15.0)</td>
<td>45.2 (14.8)</td>
<td>46.0 (14.3)</td>
<td>41.1 (11.5)</td>
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<tr>
<td>Weight (kg)</td>
<td>122 (38)</td>
<td>118 (33)</td>
<td>116 (17)</td>
<td>114 (17)</td>
<td>129 (26)</td>
</tr>
<tr>
<td>Body mass index</td>
<td>43.0 (9.2)</td>
<td>41.4 (9.0)</td>
<td>43.1 (7.7)</td>
<td>42.6 (8.1)</td>
<td>46.6 (9.1)</td>
</tr>
<tr>
<td>Weight loss at 4 weeks (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>0.9 (2.7)</td>
<td>1.4 (3.4)</td>
<td>6.4 (3.5)</td>
<td>7.4 (2.4)</td>
<td>2.8 (3.3)</td>
</tr>
<tr>
<td>Range</td>
<td>-3.7 to 7.9</td>
<td>-3.7 to 7.9</td>
<td>0.0 to 11.5</td>
<td>3.3 to 11.5</td>
<td>-0.7 to 10.5</td>
</tr>
<tr>
<td>Weight loss at 16 weeks (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>1.7 (3.5)</td>
<td>2.6 (4.1)</td>
<td>9.4 (6.1)</td>
<td>11.2 (5.2)</td>
<td>7.0 (8.4)</td>
</tr>
<tr>
<td>Range</td>
<td>-0.9 to 10.7</td>
<td>-0.9 to 10.7</td>
<td>-0.4 to 18.6</td>
<td>-0.4 to 18.6</td>
<td>0.0 to 25.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milk only v control</th>
<th>Milk plus v milk only</th>
<th>Milk plus v control</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Randomised</td>
<td>Completed</td>
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<tr>
<td>4 weeks</td>
<td>5.5 (3.1 to 7.9)</td>
<td>6.1 (3.2 to 8.9)</td>
</tr>
<tr>
<td>16 weeks</td>
<td>7.7 (3.8 to 11.6)</td>
<td>8.6 (4.2 to 12.9)</td>
</tr>
</tbody>
</table>

Summerbell et al. BMJ 1998
District General Hospital low energy liquid diet programme audit

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Mean (SD)</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Stat. signif. Between start and end of programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance (out of 7 sessions over 12 weeks)</td>
<td>115</td>
<td>5.77 (1.83)</td>
<td>7.00</td>
<td>1.00</td>
<td>7.00</td>
<td></td>
</tr>
<tr>
<td>Height, metres</td>
<td>114</td>
<td>1.65 (0.08)</td>
<td>1.65</td>
<td>1.46</td>
<td>1.90</td>
<td></td>
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<tr>
<td>Initial weight (kg)</td>
<td>115</td>
<td>119.8 (23.2)</td>
<td>116.2</td>
<td>79.9</td>
<td>189.0</td>
<td></td>
</tr>
<tr>
<td>Initial BMI (kg/m²)</td>
<td>114</td>
<td>43.9 (7.5)</td>
<td>42.6</td>
<td>30.1</td>
<td>66.9</td>
<td></td>
</tr>
<tr>
<td>End weight (kg)</td>
<td>91</td>
<td>104.9 (19.7)</td>
<td>101.1</td>
<td>66.0</td>
<td>152.3</td>
<td>***</td>
</tr>
<tr>
<td>Weight lost (kg)</td>
<td>91</td>
<td>14.4 (5.7)</td>
<td>13.8</td>
<td>−0.4</td>
<td>31.5</td>
<td></td>
</tr>
<tr>
<td>% Body weight lost</td>
<td>91</td>
<td>12.1 (4.1)</td>
<td>11.8</td>
<td>−0.3</td>
<td>22.0</td>
<td></td>
</tr>
<tr>
<td>End BMI (kg/m²)</td>
<td>91</td>
<td>38.7 (6.6)</td>
<td>38.0</td>
<td>28.4</td>
<td>55.9</td>
<td>***</td>
</tr>
<tr>
<td>BMI units lost</td>
<td>91</td>
<td>5.3 (1.9)</td>
<td>5.2</td>
<td>−0.2</td>
<td>11.6</td>
<td></td>
</tr>
</tbody>
</table>

*** Significantly different at P < 0.01 (t-test) from initial weight and initial BMI.

P. Barrett, N. Finer, C. Fisher and G. Boyle. Journal of Human Nutrition and Dietetics (1999), 12 (Suppl. 1), 43-52
University teaching hospital low energy liquid diet programme audit*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Age yrs</th>
<th>Gender</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Completers</strong></td>
<td>47</td>
<td>46.9 ± 15.1</td>
<td></td>
<td>121.0 ± 15.1</td>
</tr>
<tr>
<td>Mean + SD</td>
<td></td>
<td>18-78</td>
<td></td>
<td>82.4 - 228</td>
</tr>
<tr>
<td>Range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Non-completers</strong></td>
<td>38</td>
<td>40.1 ± 14.4*</td>
<td></td>
<td>114.4 ± 22.5</td>
</tr>
<tr>
<td>Mean + SD</td>
<td></td>
<td>19-68</td>
<td></td>
<td>72.4 - 159.4</td>
</tr>
<tr>
<td>Range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18 patients did not start

*P<0.05

* Includes patients referred for surgery that was not available
Feasibility and indicative results from a 12-month low-energy liquid diet treatment and maintenance programme for severe obesity

Patients with a BMI $\geq 40$ kg/m$^2$ commenced a micronutrient-replete 810–833 kcal/day low energy liquid diet (LELD), delivered in primary care, for a planned 12 weeks or 20 kg weight loss (whichever was the sooner), with structured food reintroduction and then weight-loss maintenance, with optional orlistat to 12 months.
Counterweight: low energy liquid diet in10

<table>
<thead>
<tr>
<th>Weight-change categories</th>
<th>All, % (n)</th>
<th>Patients who continued to food reintroduction/weight maintenance, % (n)</th>
<th>Patients who withdrew before food reintroduction, % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>During LELD, kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥5 to &lt;10</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>&gt;0 to ≤5</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>&gt;–5 to ≤0</td>
<td>19 (17)</td>
<td>5 (3)</td>
<td>42 (14)</td>
</tr>
<tr>
<td>&gt;–10 to ≤–5</td>
<td>18 (16)</td>
<td>10 (6)</td>
<td>30 (10)</td>
</tr>
<tr>
<td>&gt;–15 to ≤–10</td>
<td>15 (14)</td>
<td>17 (10)</td>
<td>12 (4)</td>
</tr>
<tr>
<td>&gt;–20 to ≤–15</td>
<td>21 (19)</td>
<td>29 (17)</td>
<td>6 (2)</td>
</tr>
<tr>
<td>&gt;–25 to ≤–20</td>
<td>22 (20)</td>
<td>34 (20)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>&gt;–30 to ≤–25</td>
<td>1 (1)</td>
<td>2 (1)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>≤–30</td>
<td>2 (2)</td>
<td>2 (1)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Patients, % (n)</td>
<td>100 (91)</td>
<td>64 (58)</td>
<td>36 (33)</td>
</tr>
<tr>
<td>Mean weight change, kg [SD]</td>
<td>−13.1 (8.0)</td>
<td>−16.9 (6.0)</td>
<td>−6.6 (6.3)</td>
</tr>
<tr>
<td>Mean % weight change (SD)</td>
<td>−10.0 (6.0)</td>
<td>−12.6 (4.5)</td>
<td>−5.1 (5.3)</td>
</tr>
</tbody>
</table>

Lean et al. British Journal of General Practice, February 2013
Intensive Weight Control Programme (2011)

Pre-Start Clinical Psychology Sessions
- Goal Setting
- Long-term behavioural change
- Exploring cognitive issues

Phase 1
Rapid Weight Loss
- Energy prescription 900-1000 kcal daily using full liquid meal replacement
- Prescribe fibre and vitamin supplements
- Protocol driven adjustment of concomitant medications
  - Insulin/Oral hypoglycaemics
  - Hypotensives
  - Diuretics

Phase 2
Re-introduction of solid food
- Goal Setting
- Physical Activity
- Diet and Exercise monitoring
- Initiate Pharmacological support
  - Orlistat
  - Exenatide

Phase 3
Weight Stabilisation
- Individual dietetic counselling
- Healthy eating
- Review benefits obtained
- Long-term goals and planning
### UCLH Intensive Weight Management Programme

**% weight loss in completers at 6 months**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Age yrs</th>
<th>Gender</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Completers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean + SD</td>
<td>58</td>
<td>45.8 ± 14.64</td>
<td>46F:2M</td>
<td>121.0 ± 30.73</td>
</tr>
<tr>
<td>Range</td>
<td></td>
<td>18-78</td>
<td></td>
<td>82.4-228</td>
</tr>
<tr>
<td><strong>Non-completers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean + SD</td>
<td>38</td>
<td>40.1 ± 14.4*</td>
<td></td>
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</tr>
<tr>
<td>Range</td>
<td></td>
<td>19-68</td>
<td></td>
<td>72.4-159.4</td>
</tr>
</tbody>
</table>

**Completers**

- Mean weight loss (kg) 13.72
- Standard deviation 6.67
- Mean % weight loss 11.72
- St dev of % WL 4.94
INTERCEPT: Weight Loss and Bowel Cancer

- Protocol to investigate impact of weight loss on cancer gene expression in colonic mucosa
- Healthy volunteers
- Colonoscopy before and after 12 weeks LELD
- 27 subjects: 19 completers, 5 withdrew, 3 not completed
  - Age 35.2 ± 11.3 yr
  - Height 171.2 ± 8.03 cm
  - Weight 99.8 ± 12.67
  - BMI 34.1 ± 3.8
  - Weight Loss 13.6% ± 0.03 (19 completers)
Safety and efficacy of very low-calorie diet in treatment of NIDDM

- Observational metabolic unit study
- Six obese women [143 to 297% IBW] with T2DM diagnosed 10 to 20 years (av 13.3y)
- 8 days of iso-caloric food based diet [40kcal/kg, 15% protein, 50%carbohydrate, 35% fat] then
- 40 days of very low-calorie diet [420kcal/d, 45g protein, 54g carbohydrate, 3g fat]
- Medication [Insulin n=4 (diet only n=2), anti-hypertensives n=2] stopped on admission.

Safety and efficacy of very low-calorie diet in treatment of NIDDM

Fig 2.—Levels of plasma glucose (solid circles) and hemoglobin A1c (open circles) during control (days −8 to 0) and experimental (days 1 to 35) periods.

Fig 3.—Levels of urinary C-peptide (open circles) and plasma glucose (solid circles) at the end of control period (day 0) and during experimental period (days 1 to 40).

Reversal of type 2 diabetes: normalisation of beta cell function in association with decreased pancreas and liver triacylglycerol

E. L. Lim • K. G. Hollingsworth • B. S. Aribisala • M. J. Chen • J. C. Mathers • R. Taylor

Received: 22 March 2011 / Accepted: 5 May 2011
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### Appendix 2 – Diabetes Management

Patient has Type 1 Diabetes
- If YES, NOT eligible for this programme

Patient has Type 2 Diabetes
- If NO, this Appendix not needed

Patient able and willing to undertake CBGM at least 4 times daily?
- If NO, NOT eligible for this programme

Starting HbA1c

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>NOT KNOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Diabetes medication adjustment

Plasma Insulin or C-Peptide compatible with insulin resistance? 
- If Yes use Column A

If NO or UNKNOWN proceed below

- Duration of type 2 diabetes < 10 years?
- Insulin dose (if any) > 0.5 units/kg Body weight
- No history of keto-acidosis

If ‘YES’ for all 3 use Column A
If ‘NO’ for 1 or more use Column B

C-Peptide > 1 nmol/L, Insulin > 15 mU/L

<table>
<thead>
<tr>
<th>Current Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin (total dose)</td>
</tr>
<tr>
<td>Metformin (total dose)</td>
</tr>
</tbody>
</table>

- Sulphonylurea  (Y/N)
- Glitazone  (Y/N)
- Glinide  (Y/N)
- DPP IV Inhibitor  (Y/N)
- Acarbose  (Y/N)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>STOP</td>
<td>HALVE</td>
</tr>
<tr>
<td>HALVE</td>
<td>HALVE</td>
</tr>
</tbody>
</table>

Ensure above medication changes communicated to patient, general practitioner and diabetes clinic (if attending). Circle action taken on this sheet.
Further Management

Fasting Blood Glucose at start of LELD
Fasting Blood Glucose Day 2 of LELD
If rise >1 mmol/L this predicts probable failure of insulin withdrawal at day 30

Later Management

Visit 5 – Week 8
Fasting Blood Glucose
If Starting HbA1c > 8.5% AND Fasting Blood Glucose > 8 mmol/L
Start Liraglutide 0.6 mg daily (UCLH Formulary 1st choice) and titrate (see Appendix 3 for C/I and alternatives)
(Increase Metformin or Add acarbose as necessary)

References:
NICE Clinical Guidelines for management of Obesity (CG43 revised)

- The long-term efficacy of VLCDs is currently unknown
- The potential increased use of VLCD in the NHS requires evidence of improved patient outcomes without compromising patient safety and quality of care
Using non commercial meal replacements in a clinical setting

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inexpensive</td>
<td>Adherence</td>
</tr>
<tr>
<td>Inclusive</td>
<td>Quality Control</td>
</tr>
</tbody>
</table>
Getting started on a non commercial meal replacement plan

• Referrals are reviewed by the MDT
• Suitable candidates invited for a screening consultation
• Screening typically includes the following:
  – Medical history
  – Inclusion and exclusion criteria
  – Assess motivation and readiness to change
  – Protocol discussed with client, palatability of milk only diet etc.
  – Client commitment to programme
  – Weight, Height and BMI
  – Baseline biochemistry
MDT Meeting

• Suitability for programme
• Changes to patient medication
• Client specific outcomes agreed
• Diet, calorie and meal replacement prescription
• Start date for client and plan future appointments
Calculating calorie deficit to support weight loss

- A deficit of 500-600kcal (Frost et al 1991) per day will result in weight loss of approximately 0.5kg (1lb) per week
  - 3500kcal = 0.5g body fat
  - 7000kcal = 1kg body fat
- To lose:
  - 0.5kg per week – Calorie deficit of 3,500 per week (or 500 each day for 7 days)
  - 1kg per week – Calorie deficit of 7,000 per week (or 1,000 each day for 7 days)
The calorie deficit approach

- Shown to be an effective strategy for some individuals with a review of 13 RCTs (Avenell et al 2004) showing a weight loss of 5.32kg compared with usual care at 12 months

BUT

Other considerations in obesity
Physiology of the Reduced Obese State

The metabolic handicap

Reduction in REE*: In a review of 90 Studies, mean daily decrease in REE: 15.4 ± 8.7 kcal/kg* body weight lost.

Basal requirements
2000 Kcal/day vs.
1850 Kcal/day

100 kilos to 90 kilos
REE* = 1850 Kcal/24hr

90 kilos, weight stable
REE= 2000*Kcal/24hr

REE: Resting energy expenditure

Slide courtesy of Dr Donna Ryan
Estimating Individual Requirements

1. Estimate *Basal Metabolic Rate* using predictive equations – Oxford Henry, Schofield, Harris Benedict etc.

2. Incorporate patients *Physical Activity Level*

3. Subtract the calorie deficit required for weight loss
Example

1. 30 year old inactive male weighing 110kg
BMI 40kg/m2

1. Estimate BMR: Schofield equation
   \[11.5(110) = 873 = 2138\text{kcal}\]

1. Add Physical Activity Factor: Inactive PAL 1.4
   \[1.4 \times 2138 = 2993\text{kcal} \approx 3000\text{kcal}\]

3. Subtract calorie deficit to support weight loss:
   2000kcal to lose 2kg per week \(\approx 1000\text{kcal}\)
Getting Started

• Milk Prescription – Typically 3-5 pints (1.7-2.3L) per day of fortified semi skimmed milk

• 1 pint = 568ml

<table>
<thead>
<tr>
<th>BMI</th>
<th>Low activity level – Pints required daily</th>
<th>Energy content of milk (kcal)</th>
<th>Medium – High activity level</th>
<th>Energy Value of milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td></td>
<td>Female</td>
</tr>
<tr>
<td>35-40</td>
<td>3</td>
<td>4</td>
<td>800-1000</td>
<td>4</td>
</tr>
<tr>
<td>40-45</td>
<td>4</td>
<td>4</td>
<td>1000</td>
<td>4</td>
</tr>
<tr>
<td>50+</td>
<td>5</td>
<td>5</td>
<td>1300</td>
<td>5</td>
</tr>
</tbody>
</table>
Ensure adequate protein

• Weight loss has been shown to represent both fat and lean body mass, the usual ratio being about 75% fat and 25% lean mass (Hoie et al, 1993, Jebb et al., 1998).

• Some loss is likely but the amount of loss may be altered by protein intake.

• Protein intakes of at least 1g/kg IBW per day have been shown to help preserve lean tissue cell mass although higher amounts (1.2 to 1.4 g/kg IBW per day) may be necessary to maximise this preservation.
Estimating protein requirements

• Requirements: 0.75g-1g protein kg/BW/day
• 110kg male: 83- 110g protein per day
• To fortify semi skimmed milk add protein using skimmed milk powder
• 3 pints of skimmed milk (approx 1500ml) plus 6 tablespoons of skimmed milk powder will provide approximately 1075kcal, 93g protein
• Monitor and adjust if rate of weight loss too slow or too rapid
Other nutritional considerations

• Nutritional supplements are advised to ensure the liquid low calorie diet is nutritionally complete:
  – Multi-vitamin od (Centrum Advance/Boots A-Z, Sanatogen)

• In addition patients are recommended to drink a salty drink daily
  – Stock cube or stock pot in water or Marmite/Bovril or Miso Soup

• To prevent constipation commence patient on a bulking laxative (eg Fybogel)

• Adequate fluid intake – 2.5L per day
Issues that can arise

• Tolerance to a milk only diet for 8 weeks – diarrhoea, constipation, palatability, taste fatigue
• Ability of patients to make up the milk as prescribed – correct volume of milk, correct number of scoops of skimmed milk powder?
• Storage and transportation – can patients make it up at home and store in a fridge?
• Can they use a flask to take it to the office?
Issues that can arise

- Remembering to take the salty drink and adhering to the prescribed amount – maximum of 3 stock cubes per day
- Remembering to take daily multivitamin and fibre supplement
- Social pressure – partys, work functions, weddings during the programme
- Frequency of appointments – fortnightly
In Summary

• Liquid meal replacement strategies can support meaningful weight loss under clinical supervision
• Improvements in glycemic control
• Energy prescriptions are an estimate – review and monitor individually
• Non commercial meal replacements are inexpensive but ensure made up as prescribed to optimise nutritional status
• Data collection and outcome measurements
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