Dietetic Outcomes in Home Parenteral Nutrition

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St Mark’s Hospital
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The Dietetic Outcomes Model

Biochemical Domain

Psychological Domain

Symptom Change Domain

Patient Focused Measures Domain

Behaviour Change Domain

Physical Domain

OUTCOME IS:

ACHIEVED

PARTIALLY ACHIEVED

NOT ACHIEVED
St Mark’s HPN Clinic

**History**
- Medical illness & QoL
- Incl drug history
- Fluid & nutrition: oral & parenteral

**Examination**
- CVC
  - Exit site, integrity, (tip position)
- Anthropometrics
  - Weight, BMI, MAC, TSF, MAMC, grip strength

**Investigations**
- Haem & biochem
  - FBC, ESR, U&E, LFT, Ca, Mg, PO4, CRP
- Micronutrients
  - Ferritin, Zn, Se, Cu, Mn
- Vitamins
  - A, E, D, B12, folate
- Urine sodium
- Urine sodium

**Symptom**
- Thirst, SOB, oedema, urine frequency, diet

**Psychological**
- Behaviour change

**Behaviour change**
Chronic Intestinal Failure (CIF)

- Intestinal failure results from obstruction, dysmotility, surgical resection, congenital defect, or disease-associated loss of absorption and is characterised by the inability to maintain protein-energy, fluid, electrolyte, or micronutrient balance”\(^1\)

- Appropriate dietary advice can help:
  - maximise intestinal absorption
  - ↓ severe diarrhoea or unmanageable stoma/fistula output
  - ↓ dehydration and oxalate kidney stone formation
  - maintain or improve nutritional status
  - ↓ dependency on home parenteral nutrition (HPN)/fluids\(^2\)

- Previous work has shown patients have a poor knowledge\(^3\)
Aim

- To evaluate the effectiveness of an information booklet on patient’s knowledge of the intestinal failure regime
Methods

Patients with CIF were recruited to the study.

A series of baseline assessments were undertaken:

- knowledge
- nutritional intake (oral & HPN)
- intestinal output
- nutritional status
- quality of life
Patients

Inclusion criteria
• aged ≥18 years
• clinically stable
• living at home
• able to take diet orally

Exclusion criteria
• unable to complete food, fluid & output diary
• intestinal obstruction
• planned surgery
• other diet modifications
• previously received booklet
Assessment of Knowledge

- A questionnaire was devised to assess knowledge of the intestinal failure regimen
Assessment of Nutritional Intake

- Patients kept a 3-day diet diary recording food & fluid in household measures
- Energy, protein, fat, carbohydrate & fibre intake was determined and values expressed as mean intake per day
- Volume & nutritional content of HPN recorded
Assessment of Intestinal Output

a) Patients with intestinal continuity

<table>
<thead>
<tr>
<th>Description</th>
<th>&lt; 100 g</th>
<th>100 – 200 g</th>
<th>&gt; 200 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard &amp; Formed</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>- has hard or firm texture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- retains a definite shape</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- e.g. a banana, cigar or marbles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft &amp; Formed</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>- retains some general shape</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- consistency like peanut butter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loose &amp; Unformed</td>
<td>G</td>
<td>H</td>
<td>I</td>
</tr>
<tr>
<td>- lacking any shape of its own</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>- may spread easily</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- consistency like porridge or a thick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>milkshake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid</td>
<td>J</td>
<td>K</td>
<td>L</td>
</tr>
<tr>
<td>- runny</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- like water</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Actual scale: 0 cm to 10 cm
Assessment of Intestinal Output

b) Patients with an intestinal stoma

**The Bristol Stool Form Scale**

- **Type 1**: Separate hard lumps, like nuts (hard to pass)
- **Type 2**: Sausage-shaped but lumpy
- **Type 3**: Like a sausage but with cracks on its surface
- **Type 4**: Like a sausage or snake, smooth and soft
- **Type 5**: Soft blobs with clear-cut edges (passed easily)
- **Type 6**: Fluffy pieces with ragged edges, a mushy stool
- **Type 7**: Watery, no solid pieces ENTIRELY LIQUID
Assessment of Nutritional Status

The following were determined by a single observer using standard techniques⁷:

- Weight
- Height
- Body mass index (BMI)
- Mid arm circumference (MAC)
- Triceps skin fold thickness (TST)
- Mid-arm muscle circumference (MAMC)
Quality of Life in HPN

- Assessment problematic - hard to differentiate between issues caused by underlying disease & HPN.
- Systematic review\textsuperscript{8} found QoL comparable with or lower than patients on dialysis. Fatigue common (42-58%) and linked with poor sleep due to overnight infusion inducing nocturia. Patients report a desire for ↓ infusions and quality of life reduces with ↑ frequency of infusions.
- Common symptoms included loss of strength, weight loss, nausea & pain with a third experiencing anxiety and a quarter suffering clinically significant depression\textsuperscript{9}
- Qualitative study found that a lack of education & knowledge regarding dietary advice was associated with poor compliance. Difficulty in obtaining information due to the lack of a dietitian as part of the care team\textsuperscript{10}
Assessment of Quality of Life

- SF-36 examines 8 aspects of life:
  - Health perception
  - Physical function
  - Role-physical
  - Role-emotional
  - Social functioning
  - Mental health
  - Body pain
  - Energy/fatigue

- ED-5Q (EuroQoL) measures health using:
  - descriptive statements which generate a single numeric index
  - a visual analogue scale (VAS) from 0 (worst) to 100 (best imaginable)

- Both have been used to assess quality of life in patients on HPN
- Validated HPN questionnaire devised after study completed
Education

- An information booklet was given & explained with guidance tailored to individual patients, depending on clinical & nutritional status, intestinal anatomy & current oral intake.
- Follow-up assessment was undertaken 3-6 months later.
## Patient Population (n=48)

<table>
<thead>
<tr>
<th>Mean age (years)</th>
<th>56.1 ± 13.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (M:F)</td>
<td>17:31</td>
</tr>
<tr>
<td>Time since CIF diagnosed (months)</td>
<td>82 ± 87 (0 - 367)</td>
</tr>
</tbody>
</table>

### Aetiology
- Crohn’s Disease: 25 (52%)
- Mesenteric infarction: 12 (25%)
- Surgical Complication: 5 (10%)
- Radiation enteritis: 3 (6%)
- Other: 3 (6%)

### Artificial nutrition - HPN
- Home parenteral fluids: 4 (8%)
- Subcutaneous fluids: 2 (4%)
- Oral nutritional supplements: 4 (8%)
- Diet alone: 5 (10%)

### Intestinal anatomy - Jejunostomy
- Ileostomy: 15 (31%)
- Colostomy: 5 (10%)
- Fistula: 1 (2%)
- No stoma: 16 (33%)
Results - Knowledge

- The mean knowledge score for patients increased significantly after receiving the booklet ($p<0.001$)
- Men increased knowledge score more than women ($p=0.068$)
- No significant association observed between knowledge score & age ($p=0.26$) or time since diagnosis ($p=0.22$)
# Results – Nutritional Intake

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before</th>
<th>After</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>Oral energy (kcal)</td>
<td>43</td>
<td>2129 ± 895</td>
<td>2341 ± 983</td>
</tr>
<tr>
<td>Oral fat (g)</td>
<td>43</td>
<td>93 ± 42</td>
<td>110 ± 52</td>
</tr>
<tr>
<td>HPN Energy (kcal)</td>
<td>33</td>
<td>1045 ± 391</td>
<td>948 ± 460</td>
</tr>
<tr>
<td>HPN Volume (ml)</td>
<td>33</td>
<td>2311 ± 880</td>
<td>2198 ± 950</td>
</tr>
<tr>
<td>HPN Frequency (days)</td>
<td>33</td>
<td>6.3 ± 1.3</td>
<td>5.9 ± 1.5</td>
</tr>
<tr>
<td>HPN Nitrogen* (g)</td>
<td>33</td>
<td>9.4 (8, 11)</td>
<td>9 (7.9, 11)</td>
</tr>
</tbody>
</table>

* Median (IQR)
## Results – Intestinal Output

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>Patients with intestinal continuity⁵</td>
<td>14</td>
<td>40.2 ± 31.4</td>
<td>38.6 ± 28.8</td>
</tr>
<tr>
<td>Patients with an intestinal stoma⁶</td>
<td>19</td>
<td>35.4 ± 27.4</td>
<td>27.3 ± 10.1</td>
</tr>
<tr>
<td>Actual volume (ml)</td>
<td>5</td>
<td>3503 ± 2560</td>
<td>3670 ± 2134</td>
</tr>
</tbody>
</table>
## Results – Nutritional Status

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before</th>
<th>After</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>48</td>
<td>62.1 ± 9.7</td>
<td>62.8 ± 9.4</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>48</td>
<td>22.3 ± 2.9</td>
<td>22.8 ± 2.6</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TST (mm)</td>
<td>31</td>
<td>17.63 ± 6.9</td>
<td>17.88 ± 7.1</td>
</tr>
<tr>
<td>MAMC (cm)</td>
<td></td>
<td>22.1 ± 2.6</td>
<td>22.3 ± 2.6</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TST (mm)</td>
<td>17</td>
<td>11.63 ± 3.9</td>
<td>11.1 ± 4.3</td>
</tr>
<tr>
<td>MAMC (cm)</td>
<td></td>
<td>24.4 ± 2.2</td>
<td>24.5 ± 2.2</td>
</tr>
</tbody>
</table>
Results – Quality of Life

- No significant improvement when all patients analysed
- In the subgroup of HPN patients improvements observed in ED-5Q index ($p=0.007$) & VAS ($p=0.001$)
- Patients who ↓ frequency of HPN infusions showed an improvement in ED-5Q index ($p=0.006$) & SF-36 physical functioning ($p=0.03$) compared to those who maintained frequency of infusions
Conclusion

- The study shows positive effect of ongoing education in stable CIF patients, which can result in clinical benefits including the reduction of HPN requirements.
Acknowledgements

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- Patients
Thank you
References