Managing critical care - Can we afford not to get it right?

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Colours of Sepsis, Ostrava. 8Feb2016
The Intensive Care Unit

Accounts for less than 10% of hospital beds

But accounts for more than 20% of hospital costs

Costs can be managed more efficiently by reducing the length of stay in the ICU
Key Question

If we could apply *guideline based care*, what impact could we have on the *economics of critical care*?
### Critical Care guidelines compared

<table>
<thead>
<tr>
<th>Guideline and year</th>
<th>Scope and purpose, %</th>
<th>Stakeholder involvement, %</th>
<th>Rigour of development, %</th>
<th>Clarity of presentation, %</th>
<th>Applicability, %</th>
<th>Editorial independence, %</th>
<th>Overall recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence-Based Guidelines for Nutritional Support of the Critically Ill: Results of a B-National Guideline Development Conference, 2005 [33]</td>
<td>69</td>
<td>13</td>
<td>51</td>
<td>70</td>
<td>33</td>
<td>22</td>
<td>Recommended with modifications</td>
</tr>
<tr>
<td>ESPEN Guidelines on Enteral Nutrition: Intensive care, 2006 [34]</td>
<td>89</td>
<td>54</td>
<td>70</td>
<td>87</td>
<td>8</td>
<td>78</td>
<td>Recommended</td>
</tr>
<tr>
<td>Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.), 2016 [27]</td>
<td>100</td>
<td>72</td>
<td>84</td>
<td>89</td>
<td>22</td>
<td>78</td>
<td>Recommended</td>
</tr>
<tr>
<td>Critical Illness: Evidence-Based Nutrition Practice Guideline, 2012 [29]</td>
<td>87</td>
<td>72</td>
<td>85</td>
<td>91</td>
<td>78</td>
<td>64</td>
<td>Recommended</td>
</tr>
<tr>
<td>Nutrition artificielle en réanimation.Guidelines for nutrition support in critically ill patient, 2014 [31]</td>
<td>44</td>
<td>37</td>
<td>41</td>
<td>56</td>
<td>7</td>
<td>0</td>
<td>Not recommended</td>
</tr>
</tbody>
</table>

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Key Question

If we could apply guideline based care, what impact could we have on the economics of critical care?
Health Economics

The demand for healthcare exceeds every country's healthcare system capacity.

We are forced to make choices on which healthcare should be publicly funded.

The objective is to maximise health within available budget.

Being guided by cost effectiveness and social value judgements.

Considering the most effective package of integrated care.
Cost Impact

HEALTHCARE INTERVENTIONS
- Pharmaceuticals, medical devices, diagnostics, consumables, medical nutrition

HOSPITAL CARE
- A&E, ICU, Wards, Surgeons, Specialists, Nurses, Dieticians.....

REHABILITATION / CARE CENTRES

PRIMARY CARE – GPs, nurses, dieticians

SOCIAL IMPACT – Social care, time off work, family and carers.

What is relevant to the specific decision maker?
We know about the costs of the ICU in Europe

Intensive care = Expensive care
<10% of hosp beds....>20% of hospital costs

**SPECIALISED HCPs**

<table>
<thead>
<tr>
<th>Category</th>
<th>%</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour</td>
<td>61%</td>
<td>(ICU specialists /nurses + consulted specialists)</td>
</tr>
<tr>
<td>Consumables</td>
<td>22%</td>
<td>(drugs, fluids, disposables)</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>14%</td>
<td>(imaging, labs)</td>
</tr>
<tr>
<td>Hotel &amp; Nutrition</td>
<td>4%</td>
<td></td>
</tr>
</tbody>
</table>

€1400 Average daily cost across 7 German, UK, Italian and Dutch ICUs

Effectiveness – The patient impact

Whatever outcome is relevant
Weight gain / Muscle gain / reaching nutritional targets
Number of complications avoided
Speed of recovery / time in hospital
Hospital discharge destination / readmissions
Impact on ability to perform normal activities
Lives saved / life years gained
Quality of Life – general / disease specific
Quality adjusted life years \( \rightarrow \) ,quality adjusted life years gained

What is relevant to the patient and the decision maker?
The Health Economist prefers the QALY
Quality Adjusted Life Years

QALY = a measure of health status between 0 and 1

Comparable between treatments

1 year in perfect health

Death

Current treatment

New treatment

Gain in quality & length of life
Cost Effectiveness
Informing the decision

Cost per extra...
- Successful outcome
- QALY

HELPs inform the ‘Why?’ question
Our focus is medical nutrition....

Pioneering nutritional discoveries that help people live longer, healthier lives
….specifically oral/enteral medical nutrition

Regulated in Europe as Foods for Special Medical Purposes (FSMPs)
Providing benefits across the lifespan

- **Early development**: Improve overall intake
  - Cerebral palsy
  - Congenital heart disease

- **Adult**: Avoid specific nutrients
  - Critical care
  - Oncology

- **Older people**: Provide specific nutrients
  - Stroke
  - Neurology
  - Multi-morbidity

- **Avoid specific nutrients**: Cow’s milk allergy
  - Inherited metabolic disorders

- **Provide specific nutrients**: Epilepsy

- **Additional conditions**: Alzheimer’s disease

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Images of medical nutrition products are displayed for different stages of development and various medical conditions.
Our ambition

To establish advanced medical nutrition as an integral part of healthcare
Key Question

If we could apply guideline based care, what impact could we have on the economics of critical care?
Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.)

Stephen A. McClave, MD; Beth E. Taylor, RD, DCN; Robert G. Martindale, MD, PhD; Malissa M. Warren, RD; Debbie R. Johnson, RN, MS; Carol Braunschweig, RD, PhD; Mary S. McCarthy, RN, PhD; Evangelia Davanos, PharmD; Todd W. Rice, MD, MSc; Gail A. Cresci, RD, PhD; Jane M. Gervasio, PharmD; Gordon S. Sacks, PharmD; Pamela R. Roberts, MD; Charlene Compher, RD, PhD; and the Society of Critical Care Medicine and the American Society for Parenteral and Enteral Nutrition

Keywords
nutrition; critical care; intensive care unit; enteral; parenteral; evidence-based medicine; Grading of Recommendations, Assessment, Development, and Evaluation criteria; guidelines
The target of these guidelines is intended to be the adult (≥ 18 years) critically ill patient expected to require a length of stay (LOS) greater than 2 or 3 days in a medical ICU (MICU) or surgical ICU (SICU).

Traditionally, nutrition support in the critically ill population was regarded as adjunctive care designed to provide exogenous fuels to preserve lean body mass and support the patient throughout the stress response.

Recently, this strategy has evolved to represent nutrition therapy, in which the feeding is thought to help attenuate the metabolic response to stress, prevent oxidative cellular injury, and favorably modulate immune responses. Improvement in the clinical course of critical illness may be achieved by early EN, appropriate macro- and micronutrient delivery, and meticulous glycemic control.

Delivering early nutrition support therapy, primarily by the enteral route, is seen as a proactive therapeutic strategy that may reduce disease severity, diminish complications, decrease LOS in the ICU, and favorably impact patient outcomes.
A1: [Nutritional Assessment]

Based on expert consensus, we suggest a determination of nutrition risk (eg, nutritional risk screening [NRS 2002], NUTRIC score) be performed on all patients admitted to the ICU for whom volitional intake is anticipated to be insufficient. High nutrition risk identifies those patients most likely to benefit from early EN therapy.
How to assess Nutritional status and Nutritional needs

Weight loss and BMI
- May be difficult to obtain given critical condition
- May reflect fluid loss

Risk measures
NUTRIC scoring system quantifies risk of adverse events that can be modified by aggressive nutritional therapy.
- Age APACHE II, SOFA, NO. Comorbidities, admission to ICU from hospital
- Interleukin 6 (optional)
How to assess Nutritional status and needs

Weight loss and BMI
- May be difficult to obtain given critical condition
- May reflect fluid loss

Risk measures
Subjective Global Assessment
*Doesn’t require patient interaction, however relies on detailed patient history*
- Weight, dietary intake, GI symptoms, functional capacity, metabolic stress, physical state.
Why is it important to assess nutritional status and needs?

Which tool predicts the greatest hospital costs?

CHICAGO, USA 302 patients admitted to the medical, surgical and neuroscience ICUs
Screened within 24 hours of admission

Why is it important to assess nutritional status and needs

IMPORTANCE OF NUTRITIONAL ASSESSMENT

BOSTON, USA  Review of 6823 critical care patients alive at hospital discharge
Malnutrition as assessed by a registered dietician

- Malnutrition absent: 55.2%
- Specific malnutrition: 33.4%
- Non-specific malnutrition: 11.4%

Mortality in 30 days post discharge – Adjusted* Odds ratio relative to patients without malnutrition

- 2.68 (95% CI 1.99-3.59; P<.001)
- 1.60 (95% CI 1.27-2.02; P<.001)

*Mortality data adjusted to account for: Age, race, gender, charlson index, sepsis, med v sugical, organ failure


“Malnutrition may be a prognostic and potentially modifiable for patients who are at a high risk of post hospital discharge mortality.”
A1: [Nutritional Assessment]
Based on expert consensus, we suggest a determination of nutrition risk (eg, nutritional risk screening [NRS 2002], NUTRIC score) be performed on all patients admitted to the ICU for whom volitional intake is anticipated to be insufficient. High nutrition risk identifies those patients most likely to benefit from early EN therapy.

A4: [Nutritional Assessment]
A4. Based on expert consensus, we suggest an ongoing evaluation of adequacy of protein provision be performed.
Provision of higher protein saves lives

The RIGHT NUTRITION strategy

Optimal Nutritional Therapy Improves survival

**Higher** provision of protein is associated with increased survival

113 ICU patients

Provision of higher protein saves lives

The RIGHT NUTRITION strategy

Optimal Provision of both Protein & Energy Decreases 28-day mortality in critically ill patients

886 Mechanically ventilated Medical/surgical ICU patients

28-day mortality hazard ratio with 95% confidence interval for protein and energy target (PET) group and energy target (ET) group. Model 0 is unadjusted. Model 1 adjusted for sex, age, BMI, diagnosis, hyperglycemic index and Acute Physiology and Chronic Health Evaluation II score. Model 2 additionally adjusted for time to energy target and use of parenteral nutrition.

Weija PJ et al., JPEN J Parenter Enter Nutr 2012;36:60-68.
Provision of higher protein saves lives

Optimal Nutritional Therapy Improves survival

Optimal Protein and Energy provision is associated with a 50% decrease in 28-day mortality

A1: [Nutritional Assessment]
Based on expert consensus, we suggest a determination of nutrition risk (eg, nutritional risk screening [NRS 2002], NUTRIC score) be performed on all patients admitted to the ICU for whom volitional intake is anticipated to be insufficient. High nutrition risk identifies those patients most likely to benefit from early EN therapy.

A4: [Nutritional Assessment]
Based on expert consensus, we suggest an ongoing evaluation of adequacy of protein provision be performed.

B1: [Initiate EN]
We recommend that nutrition support therapy in the form of early EN be initiated within 24–48 hours in the critically ill patient who is unable to maintain volitional intake.
The RIGHT time – Early Enteral nutrition

Limit the consequences of poor nutritional status

Reduced GI tolerance
Immune dysfunction
Weakened respiratory muscles
Lower ventilation

Ventilator dependence
Reflux, Esophagitis, pulmonary aspiration
Sepsis, Multi-organ failure, death
Delayed recovery

When should you start...

Hemodynamically stable
Functioning GI tract

Early Enteral nutrition Within 24-48 hours of the ICU

Observational (US) data - nonsurgical ICU patients receiving mechanical ventilation (MV) and whose hemodynamic condition was unstable at the time MV was started. Early = within 48hrs of start of MV

Khalid I et al, Early Enteral nutrition and outcomes of critically ill patients treated with vasopressors and mechanical ventilation. American Journal of Critical Care, May 2010, Vol. 19, no. 3 261-268,

Why 24-48 hours?

Comparison of clinical outcomes in early and late enteral nutrition groups after matching for propensity score

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Early (n = 357)</th>
<th>Late (n = 357)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive care unit mortality, No. (%) of patients</td>
<td>77 (21.6)</td>
<td>95 (26.6)</td>
<td>.12</td>
</tr>
<tr>
<td>Hospital mortality, No. (%) of patients</td>
<td>121 (33.9)</td>
<td>152 (42.6)</td>
<td>.01</td>
</tr>
<tr>
<td>Ventilator-associated pneumonia, No. (%) of patients</td>
<td>39 (10.9)</td>
<td>35 (9.8)</td>
<td>.63</td>
</tr>
<tr>
<td>Days in intensive care unit, mean (SD)</td>
<td>12.4 (8.6)</td>
<td>11.1 (7.7)</td>
<td>.39</td>
</tr>
<tr>
<td>Ventilator-free days, mean (SD)</td>
<td>16.0 (9.2)</td>
<td>15.2 (10.3)</td>
<td>.29</td>
</tr>
</tbody>
</table>

3 Ventilator-free days are the number of days (among the first 28 days after intubation) that the patient spends breathing independently of the ventilator.

Figure 2 Survival of patients in early and late enteral nutrition groups in matched analysis.
Early EN associated with reduced mortality

Early EN vs withholding early EN (delayed EN or STD) was associated with a significant reduction in a) mortality (RR = 0.70; 95% CI, 0.49−1.00; P = .05) and

Figure 1. Early enteral nutrition (EN) vs delayed EN, mortality.
Improved survival in critical care patients delivers more QALYs

- **Nutritional status** influences survival
- **Protein** intake influences survival
- **Timing** of feeding influences survival

The right nutritional management can save lives

![Diagram showing the relationship between effectiveness and costs]
Early EN associated with decreased infection risk

Figure 2. Early enteral nutrition (EN) vs delayed EN, infectious complications.

Early EN vs withholding early EN (delayed EN or STD) was associated with a significant reduction in
a) mortality (RR = 0.70; 95% CI, 0.49–1.00; P = .05) and
b) infectious morbidity (RR = 0.74; 95% CI, 0.58–0.93; P = .01),
A1: [Nutritional Assessment]
Based on expert consensus, we suggest a determination of nutrition risk (eg, nutritional risk screening [NRS 2002], NUTRIC score) be performed on all patients admitted to the ICU for whom volitional intake is anticipated to be insufficient. High nutrition risk identifies those patients most likely to benefit from early EN therapy.

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Based on expert consensus, we suggest an ongoing evaluation of adequacy of protein provision be performed.

B1: [Initiate EN]
We recommend that nutrition support therapy in the form of early EN be initiated within 24–48 hours in the critically ill patient who is unable to maintain volitional intake.

B1: [Initiate EN]
B2. We suggest the use of EN over PN in critically ill patients who require nutrition support therapy.
EU, US and Canadian guidelines endorse enteral feeding for patients who are critically ill and hemodynamically stable.

Enteral preferred over parenteral nutrition where there's a functioning GI tract.

Maintain gut barrier function and support immune response.

ICU IMPACT = ECONOMIC IMPACT

What are the health economic implications?
Fewer infections with EN vs PN, shorter ICU stays

12 studies included in review by the SCCM / ASPEN review committee (618 patients)

In the 9 studies reporting on infection..

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>EN Events</th>
<th>Total Events</th>
<th>PN Events</th>
<th>Total Events</th>
<th>Weight</th>
<th>Risk Ratio</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams 1986</td>
<td>15</td>
<td>23</td>
<td>17</td>
<td>23</td>
<td>25.0%</td>
<td>0.88 [0.60, 1.30]</td>
<td>1986</td>
</tr>
<tr>
<td>Young 1987</td>
<td>5</td>
<td>28</td>
<td>4</td>
<td>23</td>
<td>6.9%</td>
<td>1.03 [0.31, 3.39]</td>
<td>1987</td>
</tr>
<tr>
<td>Peterson 1988</td>
<td>2</td>
<td>21</td>
<td>8</td>
<td>25</td>
<td>5.1%</td>
<td>0.30 [0.07, 1.25]</td>
<td>1988</td>
</tr>
<tr>
<td>Moore 1989</td>
<td>5</td>
<td>29</td>
<td>11</td>
<td>30</td>
<td>10.2%</td>
<td>0.47 [0.19, 1.19]</td>
<td>1989</td>
</tr>
<tr>
<td>Kudsk 1992</td>
<td>9</td>
<td>54</td>
<td>19</td>
<td>45</td>
<td>15.0%</td>
<td>0.39 [0.20, 0.78]</td>
<td>1992</td>
</tr>
<tr>
<td>Kalfarentzos 1997</td>
<td>5</td>
<td>18</td>
<td>10</td>
<td>20</td>
<td>11.2%</td>
<td>0.56 [0.23, 1.32]</td>
<td>1997</td>
</tr>
<tr>
<td>Woodcock 2001</td>
<td>6</td>
<td>18</td>
<td>11</td>
<td>21</td>
<td>13.5%</td>
<td>0.72 [0.34, 1.52]</td>
<td>2001</td>
</tr>
<tr>
<td>Casas 2007</td>
<td>1</td>
<td>11</td>
<td>3</td>
<td>11</td>
<td>2.6%</td>
<td>0.33 [0.04, 2.73]</td>
<td>2007</td>
</tr>
<tr>
<td>Chen 2011</td>
<td>5</td>
<td>49</td>
<td>18</td>
<td>49</td>
<td>10.5%</td>
<td>0.28 [0.11, 0.69]</td>
<td>2011</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>249</td>
<td>247</td>
<td>100.0%</td>
<td></td>
<td></td>
<td>0.56 [0.39, 0.79]</td>
<td></td>
</tr>
<tr>
<td>Total events</td>
<td>53</td>
<td>101</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: $\tau^2 = 0.09; \text{Chi}^2 = 12.10, df = 8 (P = 0.15); I^2 = 34%$

Test for overall effect: $Z = 3.26 (P = 0.001)$

Figure 3. Enteral nutrition (EN) vs parenteral nutrition (PN), infectious complications.

**EN vs PN** was associated with a **significant reduction** (favouring EN) in

a) **Infections** ($\text{RR} = 0.56; 95\% \text{ CI}, 0.39–0.79; P <.00001$)

b) **ICU Length of stay** ($\text{LOS} -0.82 \text{ days}; 95\% \text{ CI}, -1.29 \text{ to } -0.34; P = .0007$)
1 EXTRA ENTERAL APPROACH PER MONTH

Yearly Impact

Saved days in ICU: 12
Cost per day: €1400

€16,800

Change in costs of nutrition: €1200

Assuming €100 more expensive per patient (EN vs PN)

Yearly cost saving: €18,000

Conservative assessment
- excludes managing infectious complications
Cost savings with enteral versus parenteral nutrition

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Country</th>
<th>Patient group</th>
<th>Reduction in cost</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>McClave</td>
<td>1997</td>
<td>USA</td>
<td>Pancreatitis</td>
<td>76.9%</td>
<td>0.001</td>
</tr>
<tr>
<td>Sand</td>
<td>1997</td>
<td>Finland</td>
<td>GI surgery (cancer)</td>
<td>76.5%</td>
<td>N/R</td>
</tr>
<tr>
<td>Bower</td>
<td>1986</td>
<td>USA</td>
<td>GI surgery</td>
<td>73.6%</td>
<td>0.001</td>
</tr>
<tr>
<td>Braga</td>
<td>2001</td>
<td>Italy</td>
<td>GI surgery (cancer)</td>
<td>72.5%</td>
<td>N/R</td>
</tr>
<tr>
<td>Adams</td>
<td>1986</td>
<td>USA</td>
<td>Laparotomy (trauma)</td>
<td>63.9%</td>
<td>N/R</td>
</tr>
<tr>
<td>Trice</td>
<td>1997</td>
<td>USA</td>
<td>Surgery (trauma)</td>
<td>62.9%</td>
<td>N/R</td>
</tr>
<tr>
<td>Hamaoui</td>
<td>1990</td>
<td>USA</td>
<td>Abdominal surgery</td>
<td>56.9%</td>
<td>0.001</td>
</tr>
<tr>
<td>Bauer</td>
<td>2000</td>
<td>France</td>
<td>ICU (not surgery)</td>
<td>48.0%</td>
<td>0.0001</td>
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<tr>
<td>Barzotti</td>
<td>1994</td>
<td>USA</td>
<td>Head injury</td>
<td>46.4%</td>
<td>N/R</td>
</tr>
<tr>
<td>Abou-Assi</td>
<td>2002</td>
<td>USA</td>
<td>Pancreatitis</td>
<td>23.4%</td>
<td>0.0004</td>
</tr>
<tr>
<td>Zhu</td>
<td>2003</td>
<td>China</td>
<td>GI surgery (cancer)</td>
<td>11.8%</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

N/R = not reported
Simple savings calculator *(ICU LOS only)*

<table>
<thead>
<tr>
<th>Enteral best practise</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patients switched per month</strong></td>
</tr>
<tr>
<td><strong>Saved days in ICU per year</strong></td>
</tr>
<tr>
<td><strong>Cost per day in ICU</strong></td>
</tr>
<tr>
<td><strong>Yearly cost saving</strong></td>
</tr>
<tr>
<td><strong>Cost difference EN vs PN</strong></td>
</tr>
<tr>
<td><strong>Total nutrition cost</strong></td>
</tr>
<tr>
<td><strong>Net cost savings</strong></td>
</tr>
</tbody>
</table>

Example using daily ICU costs as 300, and difference between PN and EN of 50
EN vs PN the benefits

Why is this important
ICUs are costly
Critical care
Specialised staff
Expensive daily costs

Why is this important to your patients
Guideline based care
Better recovery chances
Reduction in infections

Why is this important to your ICU
Saves Costs
Saves Time
Best Practise
Other considerations with economic implications

Reaching nutritional targets

Energy/protein goals
SPN
Closer to target
Fewer infections

What stays in

Improving GI tolerance
Reducing the frequency of Diarrhoea
- A focus on Fibre....
The importance of reaching the nutritional target

What about that struggle to meet energy goals?

Swiss study  N = 305  
Inclusion : Failing to meet 60% of calorie target with EN
Strategy : supplemental parenteral nutrition
days 4-8

Result : add 2320 cals over 4 days
(SPN = 1500 CKZ per day)

Impact: 5% absolute reduction in nosocomial infections

+1000kCals = -10% relative risk of nosocomial infection

Nosocomial infection + 7,7 days ICU, + 11.9 days in hosp
Other considerations with economic implications

**What stays in**
- Improving GI tolerance
- Reducing the frequency of Diarrhoea
  - A focus on Fibre....

**Reaching nutritional targets**
- Energy/protein goals
  - SPN
  - Closer to target
  - Fewer infections
Reaching feeding targets - the impact of tolerance

Reason for Cessation of Feeding

- GI Disturbance
- Airway
- Procedure
- Other

Episodes (n)

De Beaux 2001
The burden of diarrhoea

How frequent?
• 14% diarrhoea incidence in ICU patients
• Diarrhea risk factors – Relative risks
  • Antibiotics – RR = 3.64 (1.26 to 10.51)
  • Antifungals - = 2.79 (1.16 to 6.70)
  • EN covering >60% target energy = 1.75 (1.02 to 3.01)),

Costs of managing Diarrhoea
• Nurse time = 17mins 33 secs
• Cost of Nurse time = ~€25 (26.6 CHF)
Describing Diarrhoea ....

**Frequency**
- Intensive nursing
  - Time
  - Lab analysis
  - Laundry
  - Cleaning

**Consistency**
- Spread risk of infection
  - Clostridium Difficile infections
  - Antibiotics
  - Sterilisation

**Nutritional Risk**
- Reduced nutritional intake
  - Reaching protein & energy goals
  - Longer hospital stay
  - Recovery
Systematic review and meta-analysis: the clinical and physiological effects of fibre-containing enteral formulae

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E-mail: m.elia@aston.ac.uk

SUMMARY

Background
Enteral nutrition can be associated with gastrointestinal side effects and fibre supplementation has been proposed as a means to normalize bowel function.

Aim
To evaluate systematically the effects of fibre supplementation of enteral feeds in healthy volunteers and patients both in the hospital and community settings.

Methods
Electronic and manual bibliographic searches were conducted. Controlled studies in adults or children, comparing fibre-supplemented vs. fibre-free formulae given as the sole source of nutrition for at least 3 days, were included.

Results
Fibre supplementation was generally well tolerated. In the hospital setting, the incidence of diarrhoea was reduced as a result of fibre administration (OR 0.68, 95% CI: 0.48–0.96; 13 randomized-controlled trials). Meta-regression showed a more pronounced effect when the baseline incidence of diarrhoea was high. In both patients and

Conclusions
The review indicates that the fibre-supplemented enteral formulae have important physiological effects and clinical benefits. There is a need to use a consistent approach to undertake more studies on this issue in the community setting.

Aliment Pharmacol Ther 27, 120–145
New research isolating the impact of a multifibre mix

120 Turkish ICU patients who required mechanical ventilation and enteral nutrition with a nasogastric tube were studied

The control group received the fibre-free nutrition solution (Nutrison). The study group, received the fibre enriched nutrition solution (Nutrison Multifibre)

Improved management of critical care patients can save costs

• EN when used appropriately reduces infection risk and ICU length of stay

• Reaching nutritional targets supports recovery

• Multifibre EN can reduce the burden of Diarrhoea

The right nutritional strategy can save costs
What are the other key ways in which integrating medical nutrition brings health economic benefits to the hospital....

1. Enhanced Recovery After Surgery (ERAS)

2. Screening on admission and managing disease related malnutrition with Oral Nutritional Supplements
ERAS compliance: Length of stay & Readmissions

Colorectal cancer

Compliance with ERAS protocol elements
Single center study consecutive patients

Gustafsson et al, Arch Surg 2011
The benefit of FSMPs – supporting effective and efficient health outcomes

A recent (2016) comprehensive systematic review with meta analysis of all cost effectiveness research on oral nutritional supplements in the hospital setting.

- 1 in 3
- 2 days
- 12%

<table>
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<tr>
<th>35% reduction in deaths &amp; complications (p&lt;0.05)</th>
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<tbody>
<tr>
<td>Shorter hospital Length of Stay (13% reduction)</td>
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<tr>
<td>Net hospital cost reduction (£750 ~ €1000 saving)*</td>
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*A meta-analysis of 5 studies in abdominal surgical patients showed a mean cost saving of £746 (or 13.5% of total care costs) with ONS versus standard care. Based on 2003 prices – translates to £1,014 2015 prices (Following adjustment for inflation, using specific healthcare inflation rates)

The Health Economists’ Conclusion

We are forced to make choices on which healthcare should be publicly funded. We search for value.

Applying guideline based care delivers significant health economic benefits to critical care.

Better for the health of the patient
Better outcomes from the hard work of HCPs
Better for the hospital / health budget

Integrated Nutritional Care
A value we can’t afford to ignore
Thank You