OPTIMAL NUTRITION SUPPORT: A COST-EFFECTIVE AND CLINICALLY BENEFICIAL INTERVENTION – IN THE CONTEXT OF PMBS

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The 18th Annual BHF Southern African Conference
Cape Town
16 -19 July 2017
Private sector embracing universal healthcare

Maastricht University
Health Services Research
Focusing on Value-based Care and Ageing

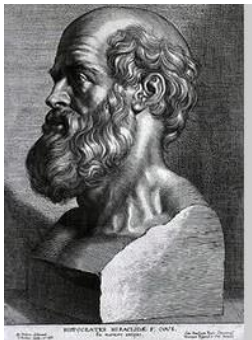
NUTRICIA
Advanced Medical Nutrition

NUTRITION

Healthy: death after approx. 70 days

Ill: death after approx. *28 days*

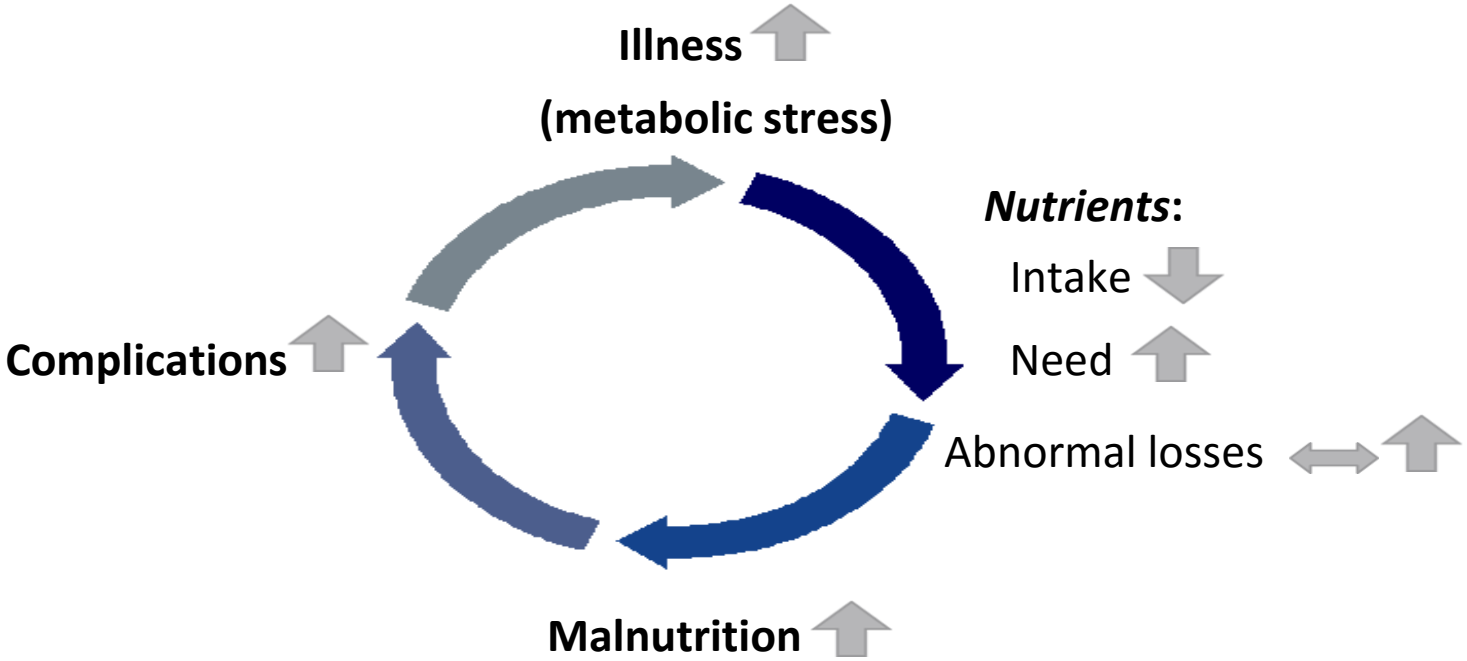
Loss of muscle mass ≥ 40% = death



"Let food be thy medicine and medicine be thy food" – Hippocrates

PALEOSPIRIT.COM

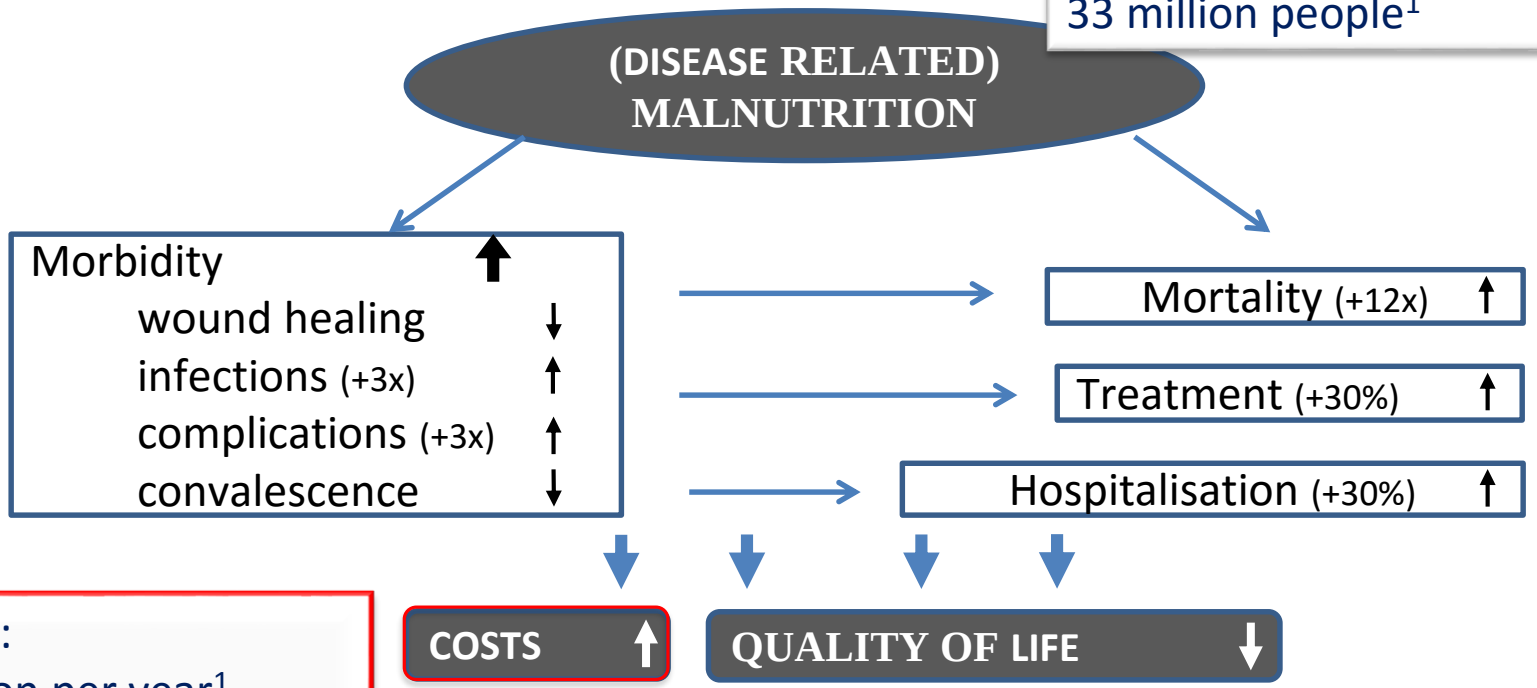
Vicious circle → downward spiral



Freijer K. Nutrition Economics: DRM & Economic value of medical nutrition-PhD Thesis 2014, Maastricht University NL

Cost of illness – malnutrition (DRM)

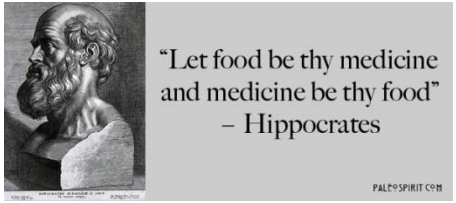
In Europe:
33 million people[1]

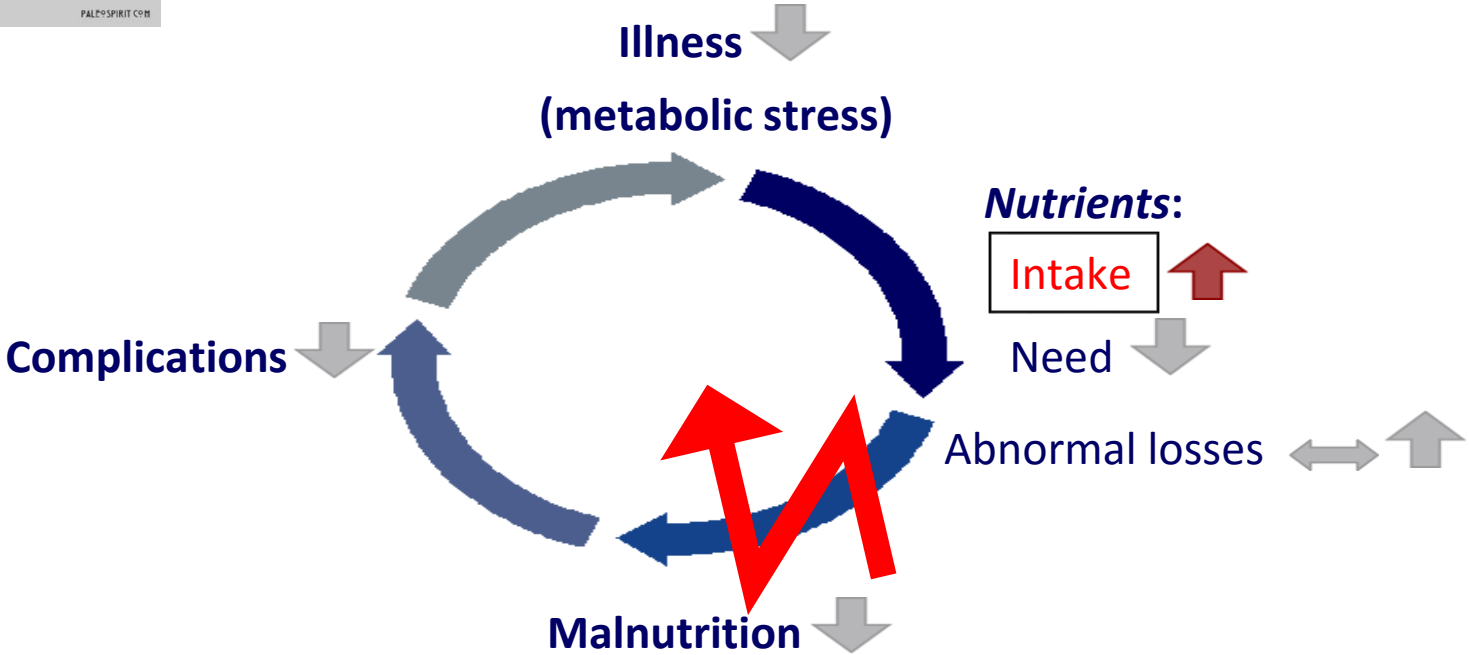


In Europe:
€170 billion per year[1]

Norman K et al. *Clin Nutr 2008* 27: 5:1510-1016; MNI report 2016; 1. Ljungqvist O, de Man F. *Nutr Hosp* 2009; 24:368-70

Break vicious circle - intervention (medical) nutrition





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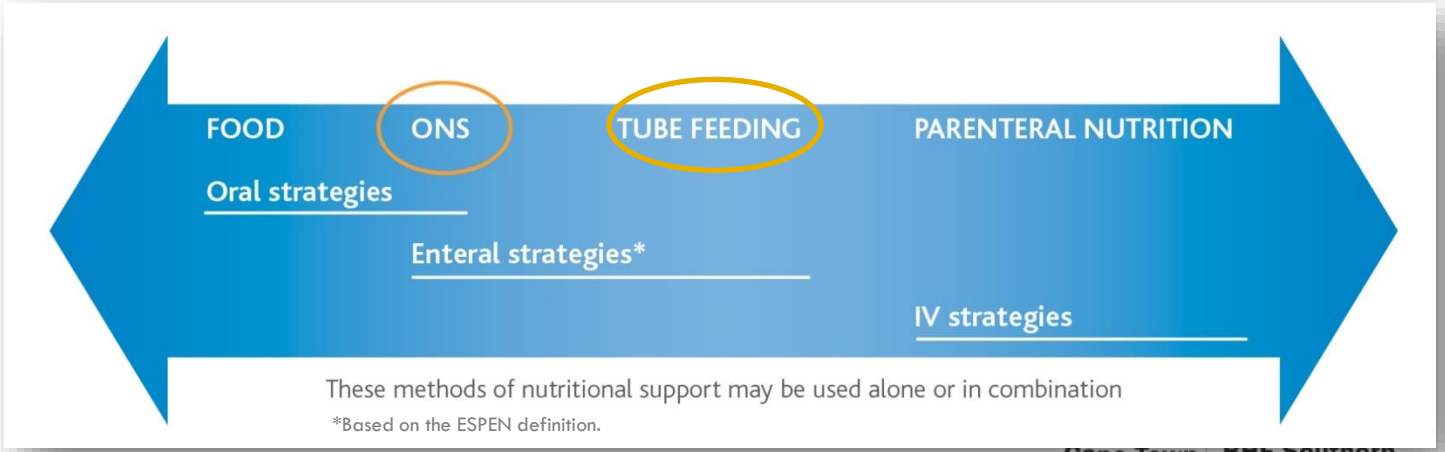
Management of DRM[1]

- ***Early identification*** is key to effective management of malnutrition
- ***Screening*** using validated tools should be routine practice
- A range of strategies can be used to manage malnutrition, e.g. ***dietary advice and/or medical nutrition***



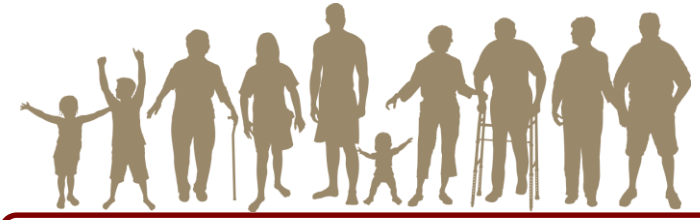
1. Lochs H et al. 2006; Cederholm T et al. 2015;

Medical Nutrition

Food | Vit & Min | Medical Nutrition | Pharmaceuticals

Medical Nutrition
- 1. Enteral
- 2. Parenteral

- ***Nutrients***
- In general c***ombination of nutrients*** tested in clinical trials (safety, tolerance, efficacy)
- **National** registration/notification
- For ***patients*** use; part of total medical treatment (medical supervision)
- ***Frequently*** reimbursed



To meet specific nutritional needs

Disease related malnutrition
- Cancer
- COPD
- ICU
- Surgery

Genetic metabolic disorders or allergies
- Cow's milk allergy
- Alzheimers's disease

Swollow problems
- Stroke
- Epilepsy

Medical nutrition products are regulated in Europe by Commission Directive 1999/21/EC on dietary foods for special medical purposes. [2,3]

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Nutritional benefits[2]

✓Improvement intake required nutrients (protein, energy, vit & min)

Functional benefits[2]

✓Weight gain
✓Increase activity
✓mobility
✓functional independency & QoL

Economical benefits

Clinical benefits[2]

✓Reduction
- complications (e.g. infections; 33%)
- falls (60%)
- (re)admission hospital (29%)
- risk decubitus (25%)
- mortality (33%)

✓Faster recovery (reduction LOS (2 days), improved wound healing)

1. Lochs H et al. 2006; Cederholm T et al. 2015; 2. Stratton RJ et al 2003; MNI report ONS 2012 –http://www.medicalnutritionindustry.com; NHS guideline 2006/2014; Neelemaat et al 2012; Cawood et al. syst review 2012; Stratton RJ et al. syst review 2013; Stratton et al 2003/2005; Elia et al . Syst review 2016;

Medical nutrition – economics

Home enteral nutrition reduces complications, length of stay, and health care costs: results from a multicenter study[1–3]

Stanislaw Klek, Adam Hermanowicz, Grzegorz Dziwiszek, Konrad Matysiak, Kinga Szczepanek, Piotr Szybinski, and Aleksander Galas

- N = 456
- 4 Polish medical centers
- Self blendered tube feed vs medical nutrition

TABLE 1
Primary (underlying) diagnosis

Type of disease	Patients
	n (%)
Neurovascular	137 (30.0)
Cerebral palsy	74 (16.2)
Abdominal cancer	19 (12.2)
Inherited disease	51 (11.2)
Digestive tract diseases	26 (5.7)
Head and neck cancer	23 (5.0)
Head/spinal injury	22 (4.8)
Dementia	18 (3.9)
SLA[1]	17 (3.7)
Sclerosis multiplex	17 (3.7)
Neurodegenerative	13 (2.9)
Alzheimer disease	11 (2.4)
Parkinson disease	7 (1.5)
Cystic fibrosis	6 (1.3)
Huntington disease	4 (0.9)
Crohn disease	4 (0.9)
Muscular dystrophy	3 (0.7)
Miscellaneous	2 (0.4)
Psychological	1 (0.2)
Epilepsy	1 (0.2)
Overall	456 (100)

[1] SLA, amyotrophic lateral sclerosis.

Am J Clin Nutr 2014;100:609–15

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Out of hospital treatment with medical nutrition results in reductions of:

- Infectious complications ***37% vs 15%*** (p<0.001)
- Hospital admissions with ***26%*** (p<0.001)
- LOS ***40 days vs 12 days*** (p<0.001)

Reduction of hospitalization **costs:**
$ 4426 *(68%)* **per patient per year**
$ 6500 vs $ 2074 (p<0.001)

Am J Clin Nutr 2014;100:609–15

Cost-benefit optimal nutrition in ICU

Journal
Current Medical Research and Opinion
Volume 27, 2011 - Issue 2

Brief Review

A clinical and economic evaluation of enteral nutrition

Michael J. Cangelosi, Hannah R. Auerbach & Joshua T. Cohen

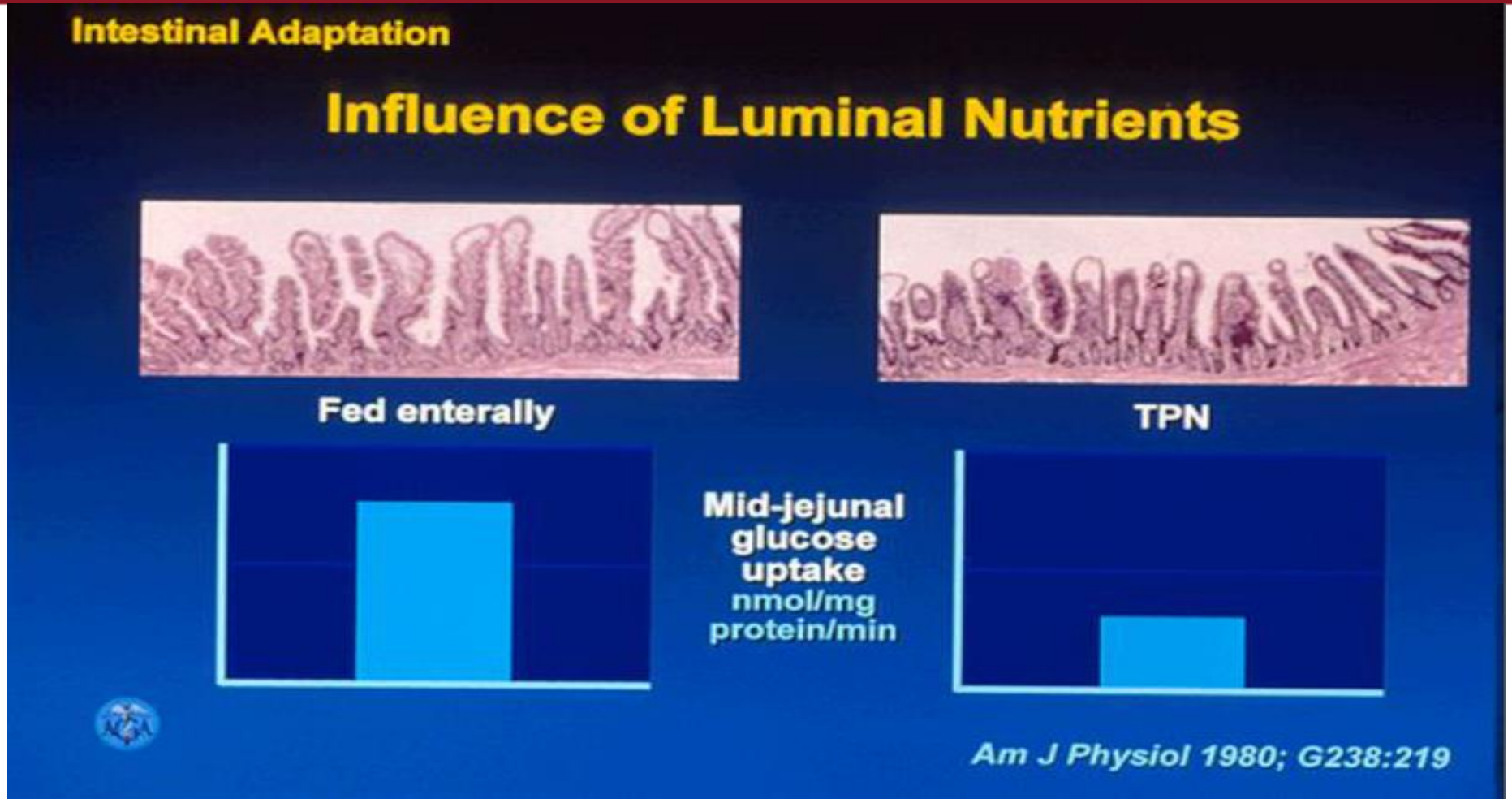
Pages 413-422 | Accepted 03 Dec 2010, Published online: 30 Dec 2010

Syst Review & meta analysis[1]:
48 articles (mostly EN vs PN)

AIM:
Comprehensively characterise the clinical and economic implications that may result from the ***greater use of EN to treat critically ill patients***

1 Cangelosi MJ et al. Med Res Opin 2011; 27:413–22

Enteral vs Parenteral nutrition



Cost-benefit changing from Parenteral to Enteral

Significant reduction infections

Table 3. Impact of enteral nutrition on clinical outcomes.

Outcome Categories	Median Results[a]	
	Relative Risk	Absolute Reduction in Risk
EN vs. PN		
Death	0.70 (0.45, 1.09)[b]	2.8% (−0.2%, 5.9%)
Major infections	0.58 (0.44, 0.77)	4.3% (1.4%, 7.1%)
Minor infections	0.75 (0.52, 1.10)	1.1% (−0.4%, 2.5%)
Major non-infectious	0.73 (0.59, 0.91)	4.1% (0.7%, 7.6%)
Minor non-infectious	0.97 (0.61, 1.56)	0.5% (−6.1%, 7.1%)

42%

27%

Total Cost Saving from Adverse Events reduction: *$1496*

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Cost-benefit changing from Parenteral to Enteral

Reduction LOS

Table 5. Impact of EN compared to PN on resource use.

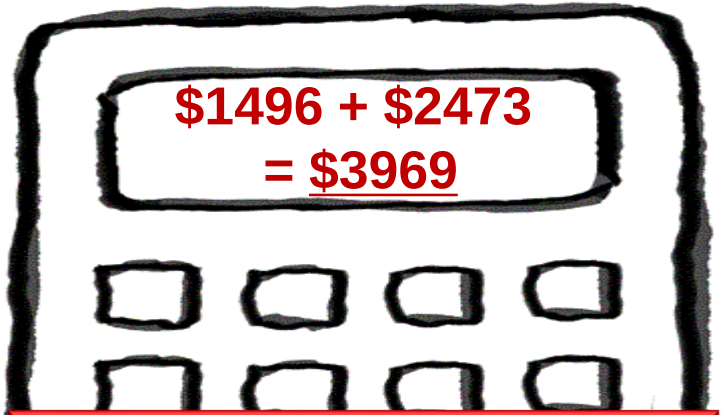
Outcome	Reduced Resource Consumption (Patient Days)[a] 95% Confidence Interval in Parentheses	
	Per Patient	Nationally[b]
Length of nutritional treatment	1.18 (0.02 to 2.33)[c]	27,300 (500 to 53,800)
Length of stay in ICU	1.61 (0.72 to 2.49)	37,200 (16,600 to 57,500)
Length of stay in hospital excluding ICU	1.25 (−0.58 to 2.93)	40,400 (−13,400 to 67,500)
Total hospital length of stay	1.66 (0.95 to 2.37)	38,300 (22,000 to 54,700)

[a]Negative values represent 'negative savings' – i.e., an *increase* in length of stay.
[b]The estimated population reductions in resource consumption are based on an assumed annual population of 231,000 PN patients and the assumption that 10% of these patients can be switched to EN (23,100 patients).
[c]Random effects model was used for length of nutritional treatment (row 1) due to significant ($P < 0.10$) heterogeneity among studies. Fixed effect models were used for all other outcomes in this table because in all three cases, $I^2 < 25\%$ and $P > 0.10$.

Cost saving from hospital stay @ $1490 per day = *$2473*

1 Cangelosi MJ et al. Med Res Opin 2011; 27:413–22

Potential economic benefits of EN vs PN



Improve ICU efficiency

Save hospital costs

Quicker patient recovery

Per suitable patient switched to EN

Cost saving

(Reduced AEs) + (Reduced LOS)

Cangelosi MJ et al. Med Res Opin 2011; 27:413–22

Type of medical nutrition can make difference

Cost savings attributable to enteral tube feeding compared with parenteral nutrition (RCT evidence)

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

N/R=not reported

Stroud M et al; The National Institute for Clinical Excellence. Nutrition support for adults oral nutrition support, enteral tube feeding and parenteral nutrition. Methods, evidence & guidance. NICE, 2006; 1-176.

PN, only if EN is not possible/insufficient

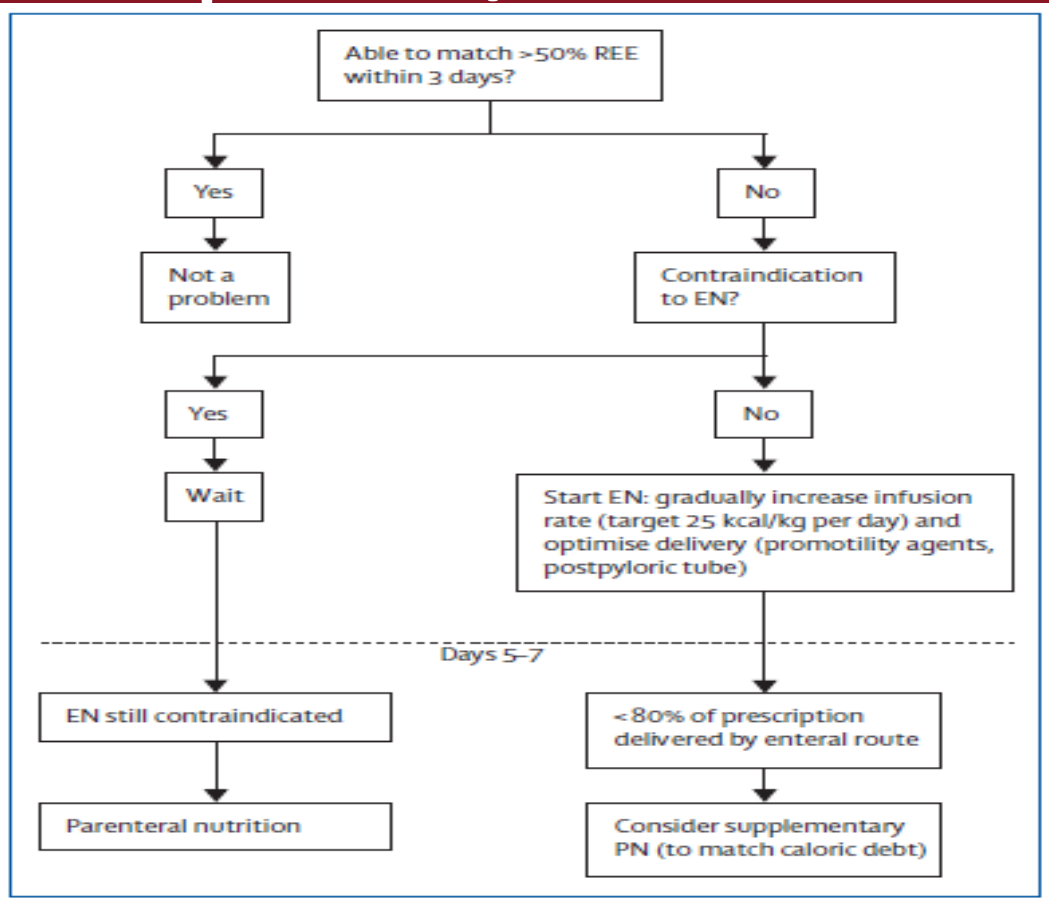


Figure: **Proposed framework for starting parenteral nutrition in acutely ill patients**

REE=resting energy expenditure. EN=enteral nutrition. PN=parenteral nutrition.

Vincent & Preiser, Lancet 2013; 381: 354-355

Economic evaluation – meta analysis

Elia *et al.* Clinical Nutrition (2016) 35, 370–380

Meta-analyses

A systematic review of the cost and cost effectiveness of using standard oral nutritional supplements in the hospital setting

This review suggests that use of standard ONS in the hospital setting generally produce cost savings and are cost effective in patient groups with variable age, nutritional status and underlying conditions.

Studies		N[a]
Surgical: abdominal	Beattie et al. [34] (Scotland)	101
	Keele et al. [32] (England)	86
	Rana et al. [31] (England)	40
	MacFie et al. [33] (England)	52
	Smedley et al. [26] (England)	89
Surgical: orthopaedic	Delmi et al. [35] (Switzerland)	59
	Lawson et al. [27] (England)	181
Non-surgical	Potter et al. [36] (Scotland)	381
	Gazzotti et al. [37] (Belgium)	80
	Gariballa et al. [38] (England)	40
Mixed:	Vlaming et al. [39] (England)	281

Economic evaluation – meta analysis

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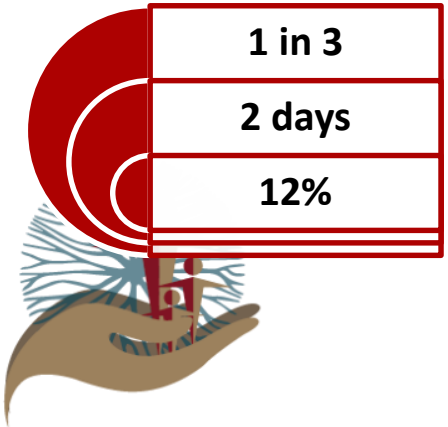

Meta analysis - **reduction of**:

Mortality (RR 0.650 p<0.05) **& complications** by 35% (p<0.001)

LOS by ~ 2 days → 13% (p<0.05)

Mean net cost saving: 12% (£746) per patient

Economic evaluation – meta analysis

Ageing Research Reviews 12 (2013) 884-897

Review

A systematic review and meta-analysis of the impact of oral nutritional supplements on hospital readmissions

Rebecca J. Stratton [a,*], X. Hébuterne [b], M. Elia [a]

This systematic review shows that ONS significantly reduce hospital (re)admissions, particularly in older patient groups, with economic implications for health care.

Patient population:

- Mainly elderly (≥ 65+)
- Ischaemic heart disease, COPD, chest infections, CVA, falls, elective surgery, gastrointestinal diseases (IBD, liver disease, biliary disease, pancreatic disease, gastritis)

Economic evaluation – meta analysis

Ageing Research Reviews 12 (2013) 884-897

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Meta analysis - **reduction of**:

(Re)admission - 29% (OR 0.59, 95% CI 0.43–0.80, P = 0.001)

Duration ONS[1]:

Minimum 6 weeks–3 months

1. Cawood et al Ageing Research Reviews 2012;11 : 278– 296

Economic evaluation – syst reviews

Elia *et al.* Clinical Nutrition (2016) 35, 125–137

Meta-analyses

A systematic review of the cost and cost effectiveness of using standard oral nutritional supplements in community and care home settings

This systematic review with meta-analysis suggests that use of standard ONS in the community, with and without additional use in hospital, can produce favourable financial outcomes and can be cost effective.

Patient population:

Chronic kidney disease, elective surgery for head and neck cancer, colorectal cancer, gastrointestinal, cardiovascular, mixed conditions in elderly

Economic evaluation – syst reviews

Elia *et al.* Clinical Nutrition (2016) 35, 125–137

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Meta analysis - **reduction of**:

- Complications (infections)
- Falls
- Functional limitations

1 in 6

5%-9%

Hospitalization by **16.5%** (p<0.001)

Mean cost saving: 9% (< 3 months)
5% (> 3 months)

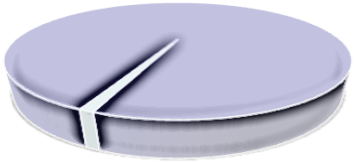
Management of DRM – economic evaluation

The use of medical nutrition with sick and malnourished elderly persons results in net benefits between € 1,433 and € 3,105 per person. For each euro that is invested in the treatment of a malnourished person society saves € 1.90 to € 4.20.

SEO report 2014. Malnutrition underestimated

Biggest Cost is Consequences of Untreated Condition, *Not Its Management*

- Costs of Medical Nutrition are a small proportion of healthcare budgets
  - 1-3% in Europe



- **Biggest cost is due to the consequences of DRM**
  - Hospital (re-)admissions and LOS
  - Complications (e.g. infections)
  - Healthcare professionals
  - Medical treatments

Medical Nutrition - a part of the cost containment

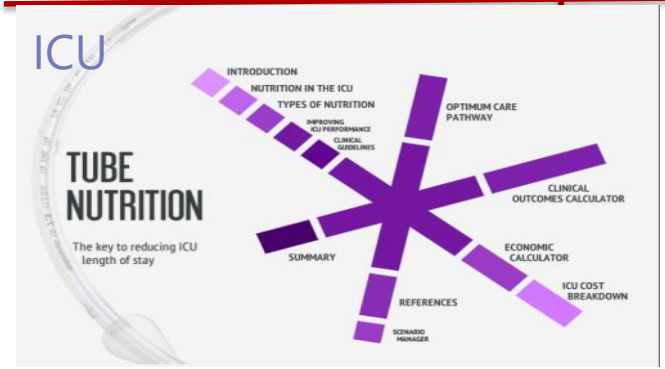
Integrating enteral medical nutrition can deliver...

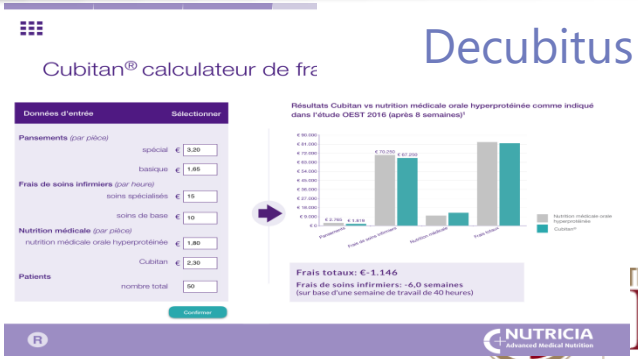
Maximum health

- ✓ Reduced mortality
- ✓ Reduced complications
- ✓ Better recovery
- ✓ Shorter ICU stay
- ✓ Shorter hospital stay
- ✓ Fewer hospital (re)admissions

… Optimal (minimize) costs of care

Value tools





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