Impact of Nutritional Intervention on the overall Outcome of patients undergoing Surgery

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Consultant Colorectal Surgeon
Pantai Hospital Kuala Lumpur,
Malaysia

PANTAI HOSPITAL
Kuala Lumpur

What Do Healthcare Providers Know About Nutrition Support? A Survey of the Knowledge, Attitudes, and Practice of Pharmacists and Doctors Toward Nutrition Support in Malaysia

Sarah A. Karim, MPharm[1]; Baharudin Ibrahim, PhD, MPharm[2]; Balamurugan Tangiisuran, PhD, MPharm[2]; and J. Graham Davies, PhD, FRPharmS[3]

Journal of Parenteral and Enteral Nutrition
Volume XX Number X
Month 201X 1–8

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SAGE

- Cross sectional survey
- November 2011-December 2011
- Hospital Pulau Pinang
- 76 pharmacists and 324 doctors

ATTITUDES

KNOWLEDGE

PRACTICE

Findings

ATTITUDES

Attitudes

- Majority ambivalent
- 74.1% of doctors agree that NST is important

KNOWLEDGE

Knowledge

- 70.4% had an average score
- 58.7% knew normal BMI values
- Only 15.7% knew the answer of poor indicator for nutrition status

PRACTICE

Practice

- 31% screen their patients
- 47.4% document nutrition care plans

More then half claim that they did not have a nutrition care proctocol in their department.

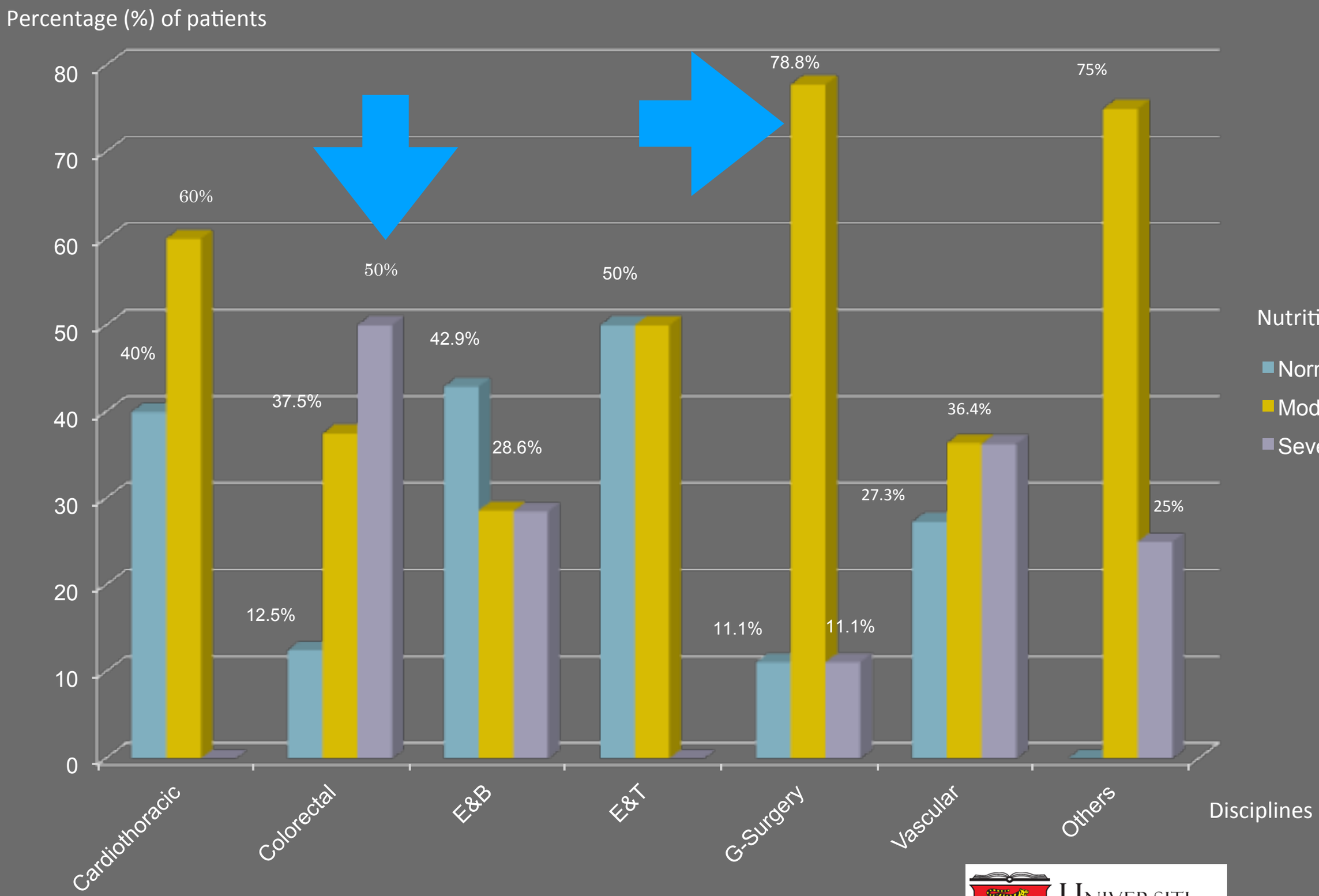
Prevalence of malnutrition in the hospital

Reference	N	Tool	Prevalence
Constans 1992	324	A, Bio	30 (M) - 40 (F) %
Mowé 1994	311	A, Bio, FI	10 %
Gazotti 2000	175	MNA	21 %
Thomas 2002	837	A,Bio,MNA	18-53-29 %
Pablo 2003	60	SGA,NRI,A,Bio	63-90-58 %
Paillaud 2004	97	A	32 %
Stratton 2006	60	MUST	58 %

20-50%

A : anthropometry, Bio : biology, FI : food intake, MNA : mini nutritional assessment, SGA : subjective nutritional assessment, NRI : nutritional risk index, MUST : malnutrition universal screening tool, M : males, F : females

Nutritional Status and Respective Disciplines



NUTRITIONAL STATUS EVALUATION FOR PREOPERATIVE ELECTIVE SURGICAL PATIENTS IN PPUKM

– GAN KZ, WAN MAISARAH WD, EY ONG, BIRINDER K.

UNIVERSITI KEBANGSAAN MALAYSIA
National University of Malaysia

PREVALENCE OF MALNUTRITION IN SURGICAL POPULATION AND ITS IMPACT OVER EARLY POST-OPERATIVE OUTCOMES AT A TERTIARY CARE HOSPITAL IN MALAYSIA

OMAID HAYAT KHAN[1*], AMER HAYAT KHAN[1], ANDEE DZULKERNAIN ZAKARIA[2], MUHAMAD NIZAM HASHIM[2] AND SYED AZHAR SYED SULAIMAN[1]

INTERNATIONAL CONFERENCE ON PHARMACY EDUCATION AND PRACTICE

Improving Patient Care through Integration of Education and Practice

29–31 January 2016

Prospective observational study
HUSM over the period of 4 months

Malnutrition Universal Screening Tool (MUST) and Nutritional Risk Index (NRI);

Outcome :surgical site infection (SSI), total length of hospital stay (LOS) and mortality

PREVALENCE OF MALNUTRITION IN SURGICAL POPULATION AND ITS IMPACT OVER EARLY POST-OPERATIVE OUTCOMES AT A TERTIARY CARE HOSPITAL IN MALAYSIA

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INTERNATIONAL CONFERENCE ON PHARMACY EDUCATION AND PRACTICE

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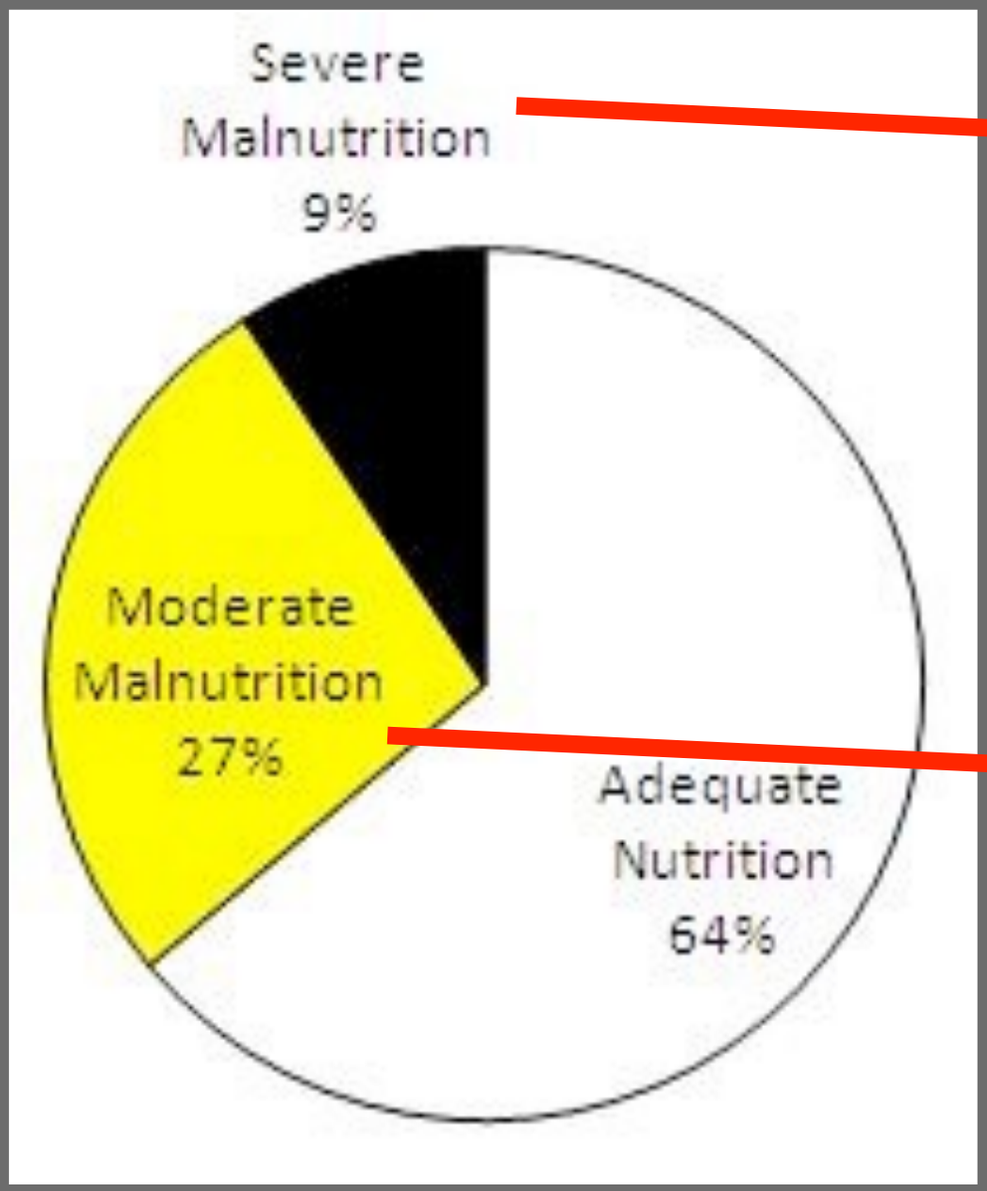
RESULTS

220 patients enrolled
64 (29.1%) patients were malnourished.

Malnourished patients exhibited significantly increased

LOS ($p<0.001$)
SSI rate ($p<0.01$)
mortality ($p<0.001$).

Malnutrition in surgical patients



- 42% of severely malnourished patients → major complications

- 9% of moderately malnourished patients → major complications

Detsky et al. JPEN 1987

Detsky et al. JAMA 1994

Why is a surgical patient malnourished?

Inadequate intake – altered tastes, dysphagia

Reduced absorption – Short Bowel Syndrome, Inflammatory bowel disease

Heightened output – Entero-cutaneous Fistula

Increased metabolic demand – cancer, sepsis, diabetes, burns, SURGERY

SURGERY

↓

INFLAMMATION
Metabolic response
Endocrine response

↓

↑CELL MULTIPLICATION results in ↑NUTRIENT NEEDS

GOOD NUTRITION STATUS
Resolution of inflammation
Good wound healing

↓

Recovery

POOR NUTRITION STATUS
Immunosuppresion
Poor wound healing
Malnutrition

↓

Morbidity and Mortality

INFLAMMATION
Metabolic response
Endocrine response

POOR NUTRITION STATUS

Immunosuppresion
Poor wound healing
Malnutrition

Wound healing and immunity requires .....

- Increased requirements
  - Energy and protein
  - Electrolytes, vitamins, trace elements
  - Oxygen and water
- Addition of:
  - conditional essential amino acids (glutamine)
  - Trace elements (selenium in burns)
  - Antioxidants
- Continuous supply of the requirements

NUTRITIONAL MANAGEMENT IN THE PERI-OPERATIVE PERIOD

ESPEN Guidelines on Enteral Nutrition: Surgery including Organ Transplantation ☆

Clinical Nutrition (2006) **25**, 224–244

ESPEN Guidelines on Parenteral Nutrition: Surgery

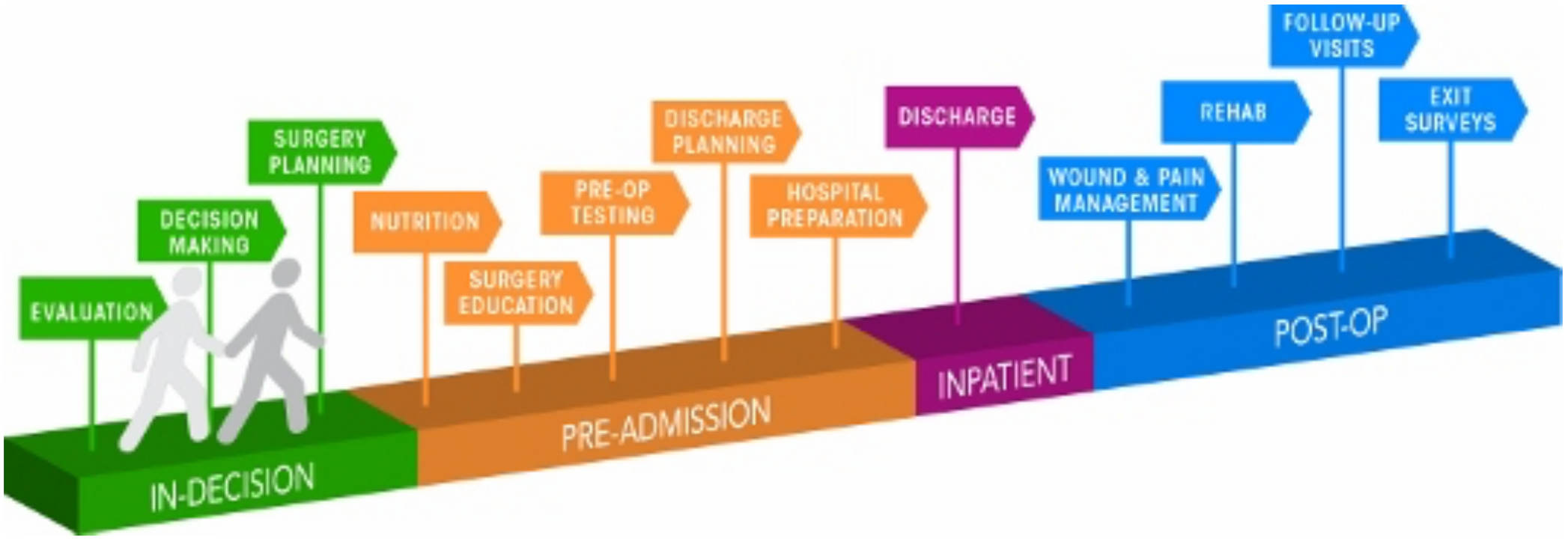
M. Braga [a], O. Ljungqvist [b], P. Soeters [c], K. Fearon [d], A. Weimann [e], F. Bozzetti [f]

Clinical Nutrition 28 (2009) 378–386

Clinical Nutrition 36 (2017) 623–650

ESPEN guideline: Clinical nutrition in surgery

Arved Weimann [a, *], Marco Braga [b], Franco Carli [c], Takashi Higashiguchi [d], Martin Hübner [e], Stanislaw Klek [f], Alessandro Laviano [g], Olle Ljungqvist [h], Dileep N. Lobo [i], Robert Martindale [j], Dan L. Waitzberg [k], Stephan C. Bischoff [l], Pierre Singer [m]


FOLLOW-UP VISITS
REHAB
EXIT SURVEYS
DISCHARGE
DISCHARGE PLANNING
WOUND & PAIN MANAGEMENT
SURGERY PLANNING
PRE-OP TESTING
HOSPITAL PREPARATION
DECISION MAKING
NUTRITION
SURGERY EDUCATION
EVALUATION
POST-OP
INPATIENT
PRE-ADMISSION
IN-DECISION

The surgical nutrition process

PRE - OPERATIVE

SCREENING

ASSESSMENT

High risk patients given nutrition care plans

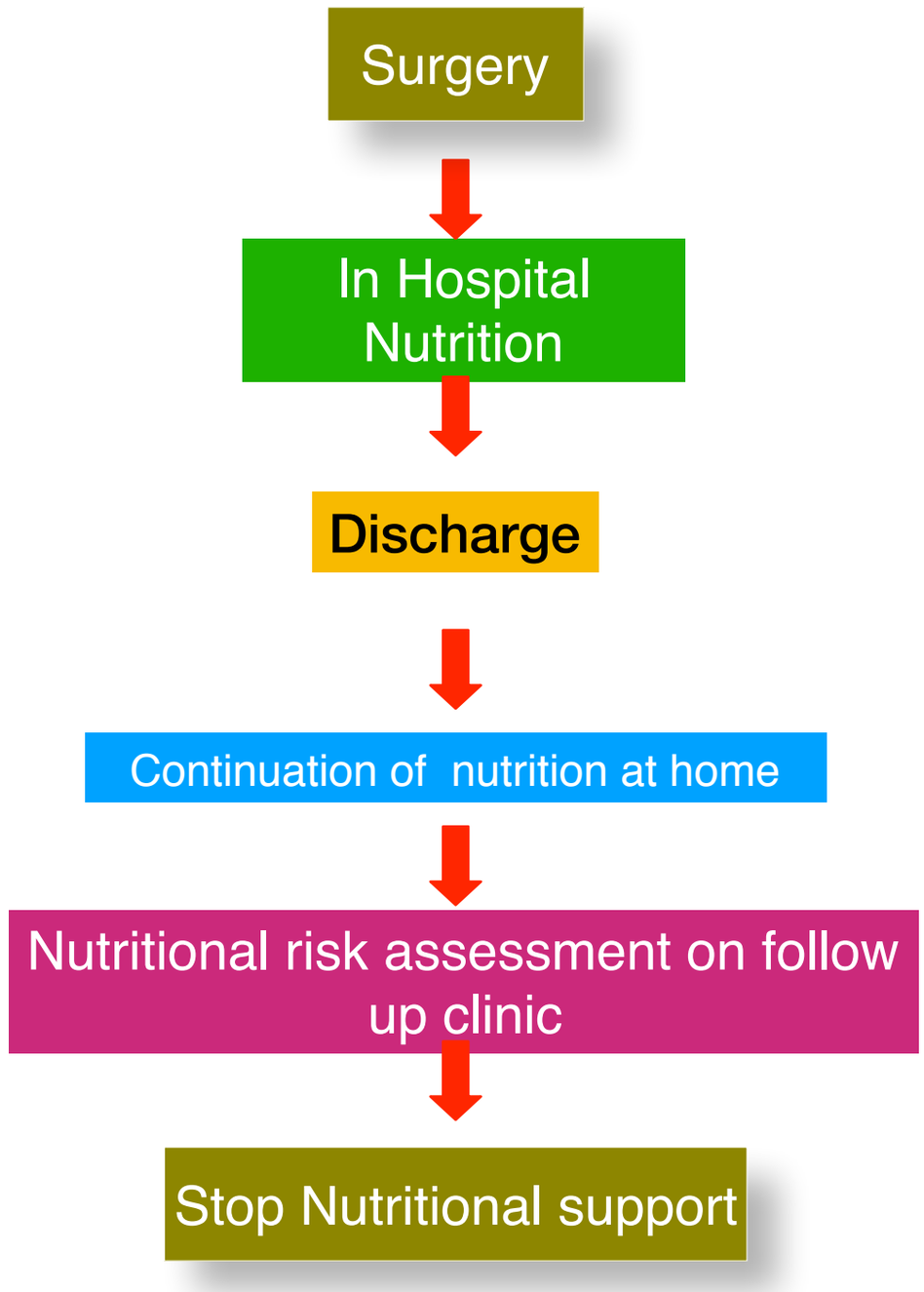
Monitoring of the nutrition process

Nutrition care plan modification

Surgery

The surgical nutrition process

POST - OPERATIVE



High risk patients given nutrition care plans

WHO IS HIGH RISK ????

Nutritional risk screening
NRS 2002 score

UNIVERSITI KEBANGSAAN MALAYSIA
The National University of Malaysia

HOSPITAL CANSELOR TUANKU MUHRIZ
UNIVERSITI KEBANGSAAN MALAYSIA MEDICAL CENTRE
NUTRITIONAL SUPPORT TEAM

NUTRITION RISK SCREENING

Patient Data			
Name		**Height (meters)**	
		Weight (kg)	
Ward/Bed Number		**BMI**	
Team			
Diagnosis			

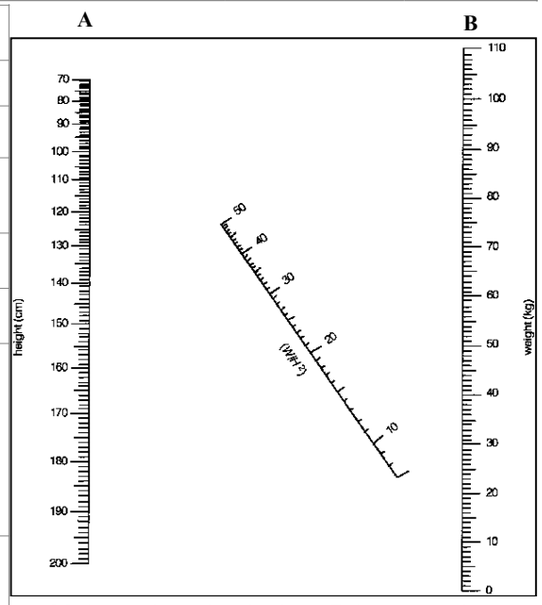
PLEASE ANSWER ALL THE FOLLOWING QUESTIONS		
Questions	**Yes**	**No**
• Is BMI < 18.5 or > 30?		
• Has the patient lost weight within the last three (3) months?		
• Did the patient have a reduced dietary intake in the last week?		
• Is the patient severely ill (e.g. in intensive therapy)?		

Only one "YES" answer is enough to categorize as "Nutritionally at Risk"

☐ **No nutritional risk**

☐ **NUTRITIONALLY AT RISK;**
Notify Clinical Nutrition Services

(Reference: Kondrup J, Allison SP, Elia M, Plauth M. ESPEN Guidelines for Nutrition Screening 2002. Clin Nutr 2003; 22(4): 415-21)



Mark on column A and column B then use a ruler to join the two marks to get the BMI.

NSTUKMMC8/2015

Nutritional risk screening NRS 2002 score

Patient Data			
Name		**Height (meters)**	
		Weight (kg)	
Ward/Bed Number		**BMI**	
Team			
Diagnosis			

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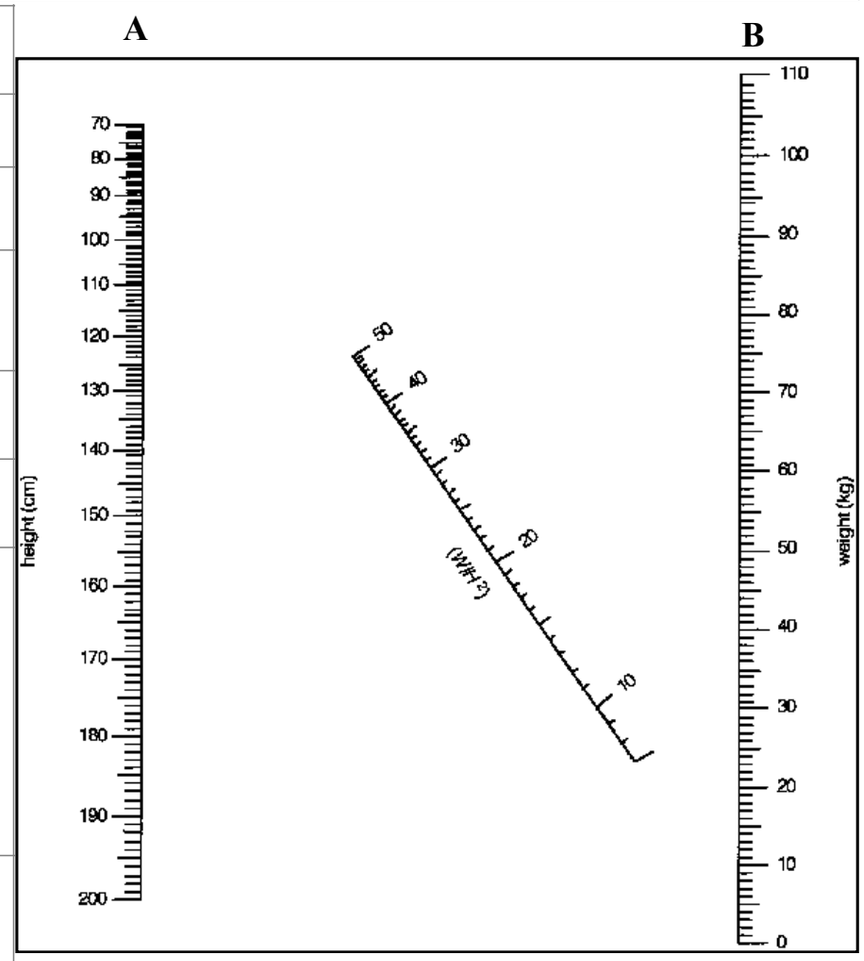


Mark on column A and column B then use a ruler to join the two marks to get the BMI.

ESPEN (2006)

- The risk of severe malnutrition is present when at least one of the following criteria is present:

1. weight loss > 10–15% within 6 months; BMI < 18 kg/m2;
2. Subjective global assessment, Grade C
3. Serum albumin < 30 g/L (with no evidence of hepatic or renal dysfunction).

ESPEN (2016)

option 1:

BMI <18.5 kg/m^2

<u>option 2:</u>
combined:

weight loss >10% or >5% over 3 months +

reduced BMI or a low fat free mass index (FFMI).

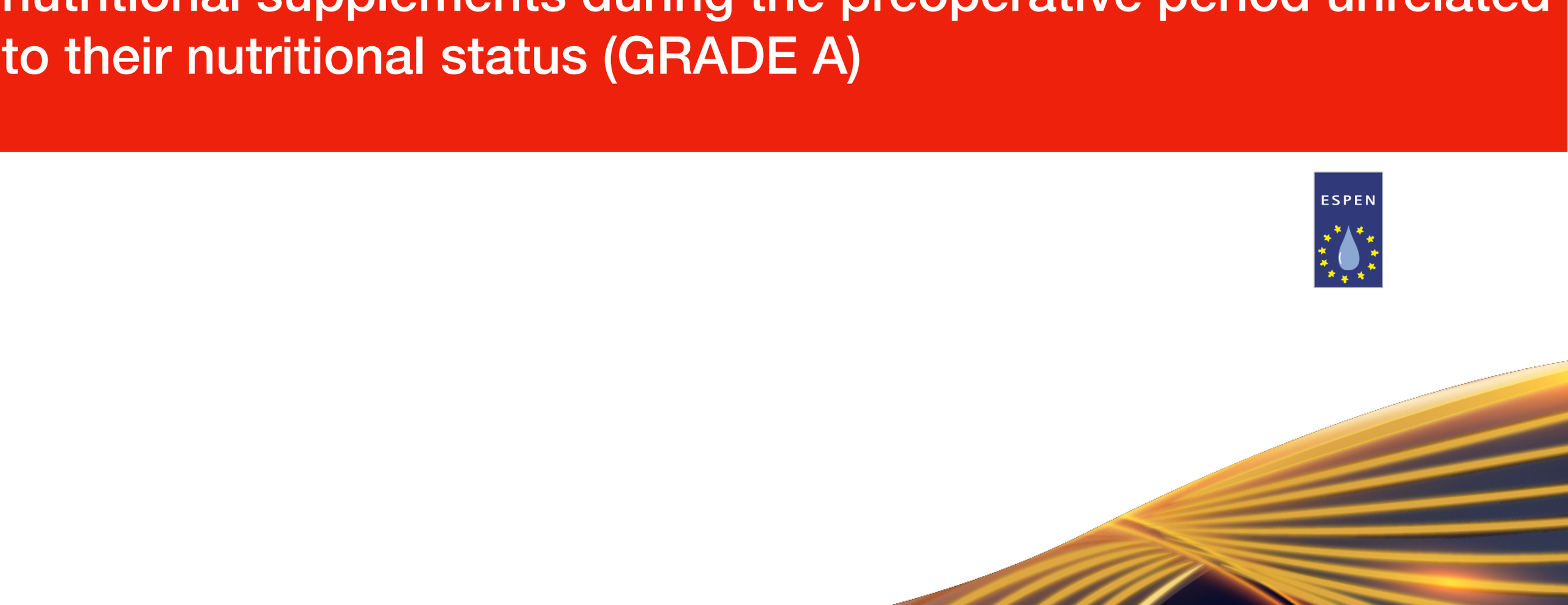
Reduced BMI is <20 or <22 kg/m^2 in patients younger and older than 70 years, respectively. Low FFMI is <15 and <17 kg/m^2 in females and males, respectively.

PRE-OPERATIVE FASTING

PRE-OPERATIVE

RECOMMENDATION 16

When patients do not meet their energy needs from normal food it is recommended to encourage these patients to take oral nutritional supplements during the preoperative period unrelated to their nutritional status (GRADE A)



PRE-OPERATIVE

Journal of Cachexia, Sarcopenia and Muscle (2017)
Published online in Wiley Online Library (wileyonlinelibrary.com) **DOI:** 10.1002/jcsm.12170

Pre-operative oral nutritional supplementation with dietary advice versus dietary advice alone in weight-losing patients with colorectal cancer: single-blind randomized controlled trial

Sorrel T. Burden[1,2,6]*, Debra J. Gibson[1,6], Simon Lal[2,4,6], James Hill[3,4,6], Mark Pilling[1], Mattias Soop[2,4,6], Aswatha Ramesh[5,6] & Chris Todd[1,6]

Table 6 Dietary intake at each time point for energy and protein intakes, including additional nutrition from oral nutritional supplements at pre-operative time point

	Energy (KJ) Median (IQR)			Protein (g) Median (IQR)		
Time point *n* = participants	Control	ONS	*P*-value	Control	ONS	*P*-value
Baseline *n* = 93	6085(4743–7493)	6407 (4233–8193)	0.760	68 (48–83)	57 (41–76)	0.271
Pre-operative *n* = 70	6350 (4714–6350)	8120 (6490–9831)	0.001	63 (49–78)	79 (67–97)	0.018
Post-operative *n* = 89	4499 (3218–6416)	5302 (3973–7173)	0.282	46 (31–70)	60 (43–70)	0.181

IQR, interquartile range; ONS, oral nutritional supplement.
Mann–Whitney U-tests.

PRE-OPERATIVE

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Table 3 Intention to treat analysis for number of participants with chest, surgical site, or urinary tract infections

	Control		Intervention		
	n = 45(%)	95% CI	*n* = 55(%)	95% CI	*P*-value
Surgical site infection	17 (38)	25.1 to 52.4	11 (20)	11.6 to 32.4	[a]0.044
Chest infection	3 (7)	2.3 to 17.9	5 (9)	3.9 to 19.6	[b]0.359
Urinary tract infection	6 (13)	6.3 to 26.2	4 (7)	2.9 to 17.3	[a]0.315

CI, confidence interval.
[a]χ^2.
[b]Fisher's exact test.

RECOMMENDATION 1 :

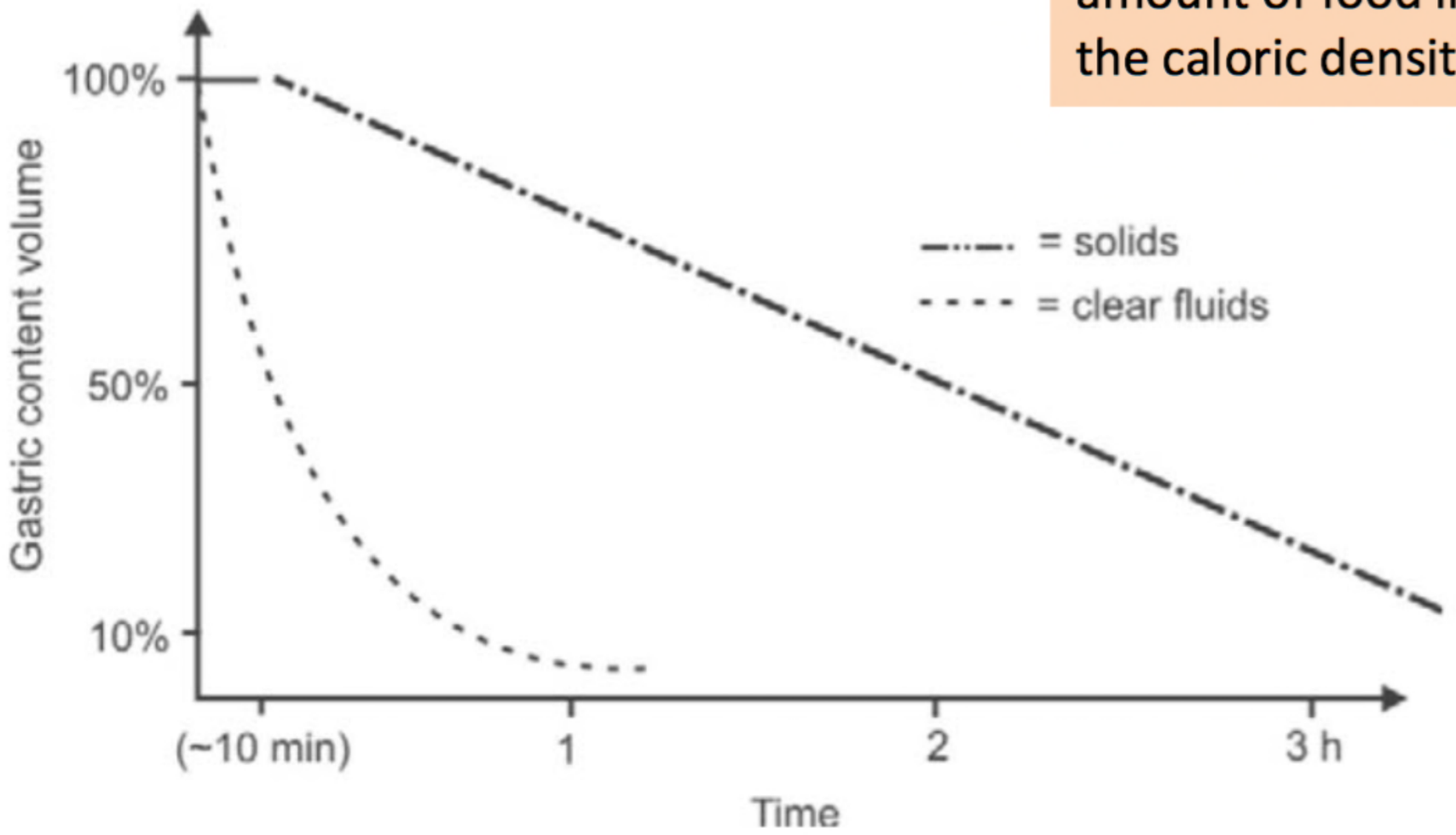
- Preoperative fasting from midnight is unnecessary in most patients.
- Patients undergoing surgery, who are considered to have no specific risk of aspiration, shall drink clear fluids until 2 hours before anaesthesia.
- Solids shall be allowed until 6 hours before anaesthesia

Grade of recommendation A

Preoperative fasting time

Gastric emptying of **water and other inert, non-caloric fluids** follows an extremely fast exponential curve with a mean half-time of 10 min

Gastric emptying of **solid food** starts approximately 1 h after a meal. Within 2 h, approximately 50% of the solid food ingested is passed to the duodenum. The gastric emptying of solids is independent of the amount of food ingested but dependent on the caloric density of the meal.



When do you start nutritional support preoperatively?

ESPEN 2009

Patients who do not meet energy needs from normal food need to take nutritional supplements pre-op (better before admission)

- Enteral always preferable
- Consider +PN if < 60% of caloric requirement is not met enterally
- In normal patients when it is anticipated that post surgery patient won't eat for >7 days.

ESPEN 2017

- Patients who do not meet energy needs from normal food need to take nutritional supplements pre-op (better before admission)
- Enteral always preferable
- Consider +PN if < 50% of caloric requirement is not met enterally
- In normal patients when it is anticipated that post surgery patient won't eat for >5 days.

Contraindications

Three conditions are incompatible with enteral nutrition:

- **severe shock state**
- **nonfunctional gut (i.e. anatomic disruption, obstruction, ischemia)**
- **severe peritonitis**

How much calories to give ?
ESPEN Guidelines 2009: Surgery

- Calorie Requirement(s):
  - The commonly used formula of 25 kcal/kg ideal body weight
  - Under conditions of severe stress requirements may approach 30 kcal/kg ideal body weight
  - (Grade B)

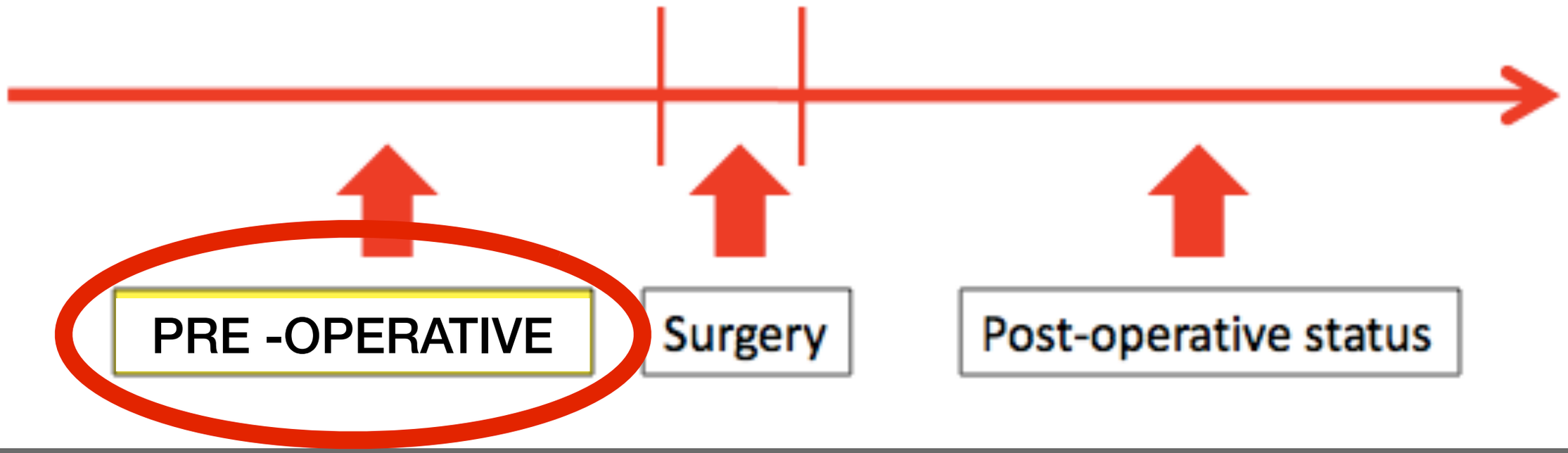
Energy needs

kcal/kg/day	
Maintenance	25
Minor infection, underN	30
Major surgery, sepsis	35
Burns	40

adapted from TLLL slides from ESPEN

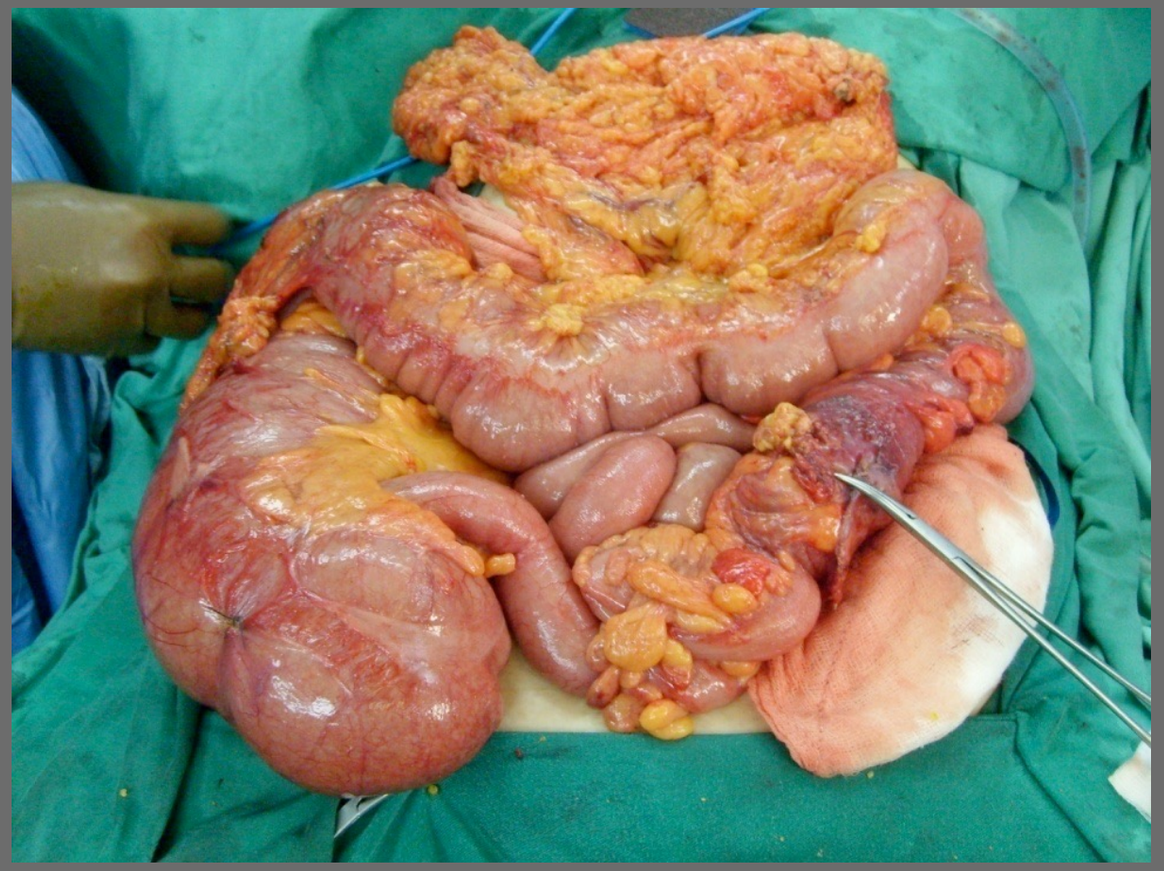
INDIRECT CALORIMETRY

The patient's journey in the surgical road

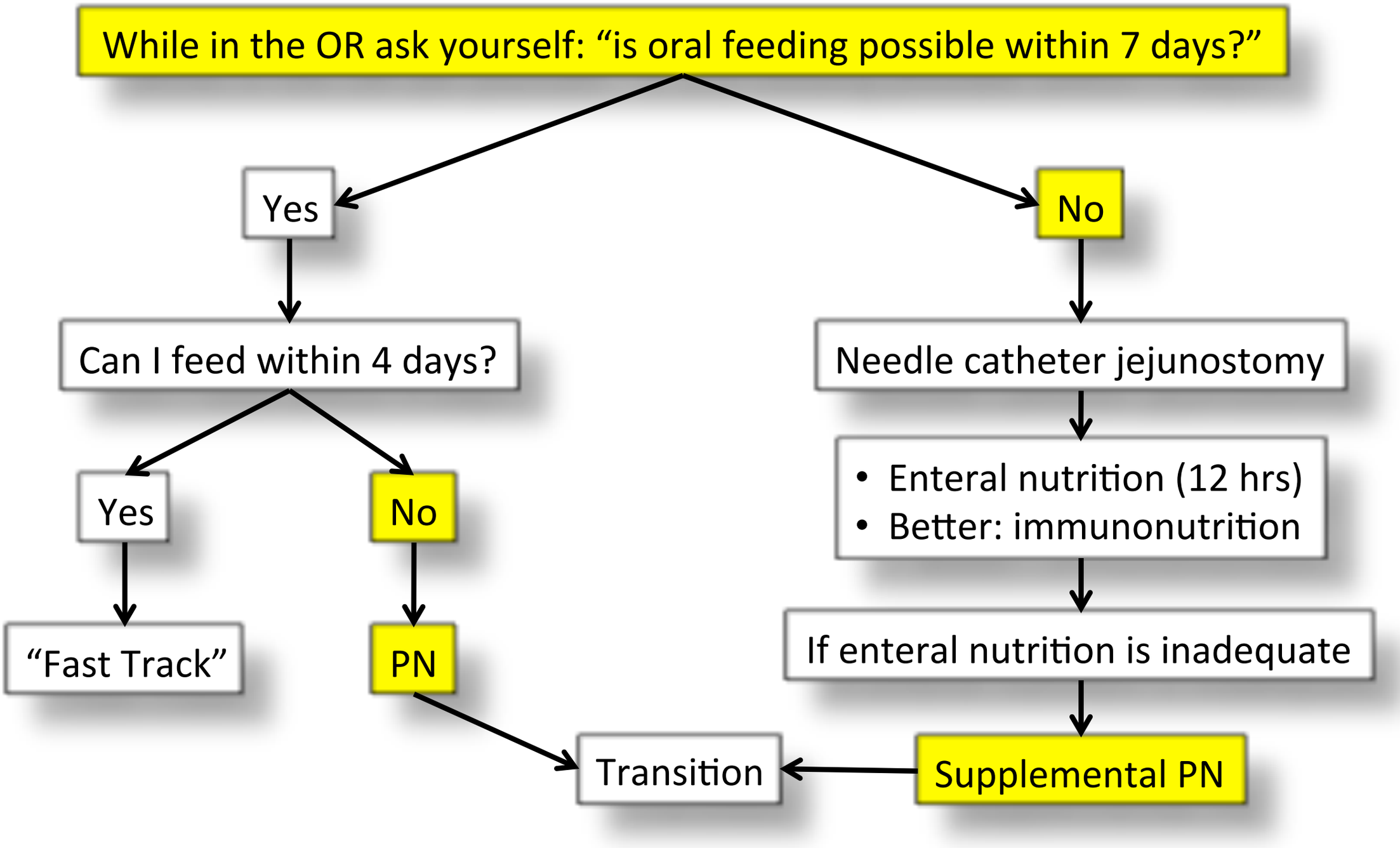


INTRAOPERATIVE

- Gentle tissue handling
  - Reduce ileus
  - Reduce infection

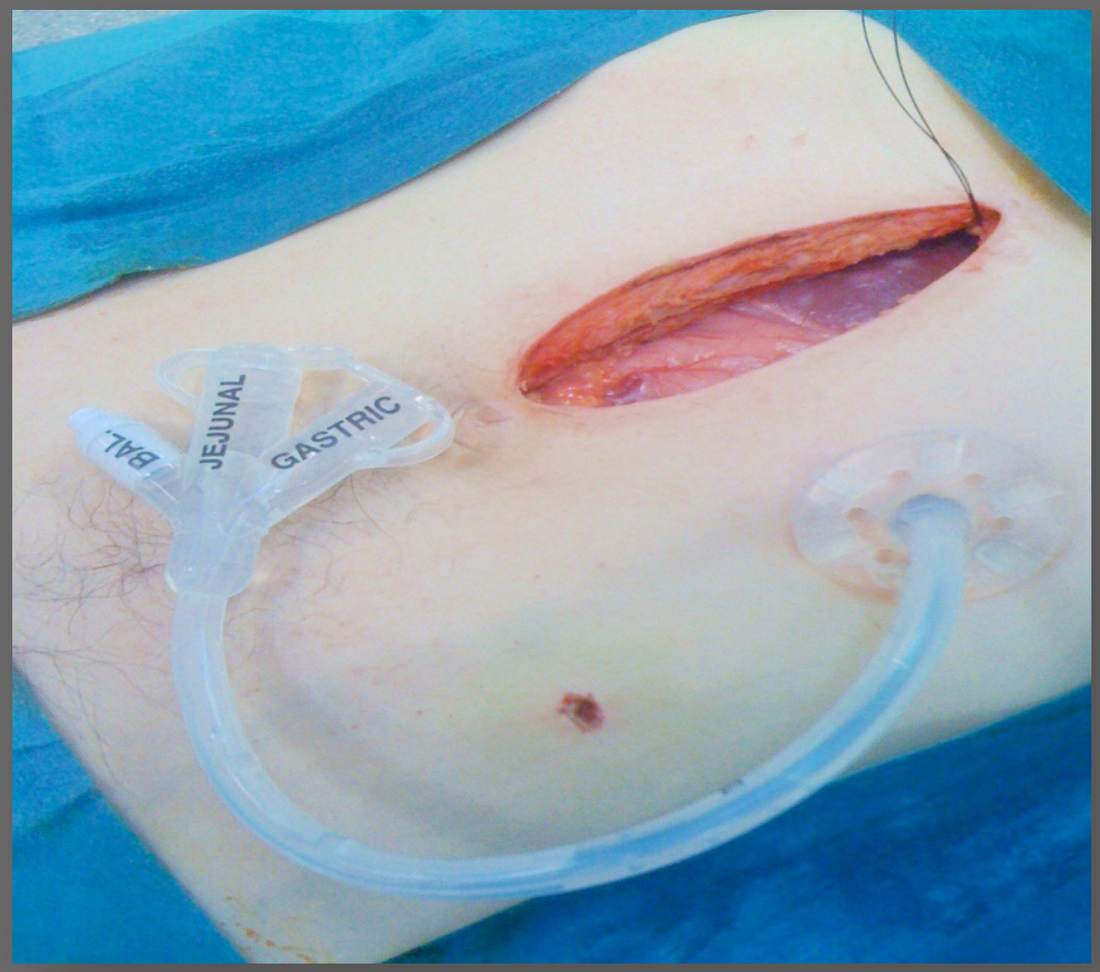


Surgical nutrition pathways: Intra & Post-operative Period

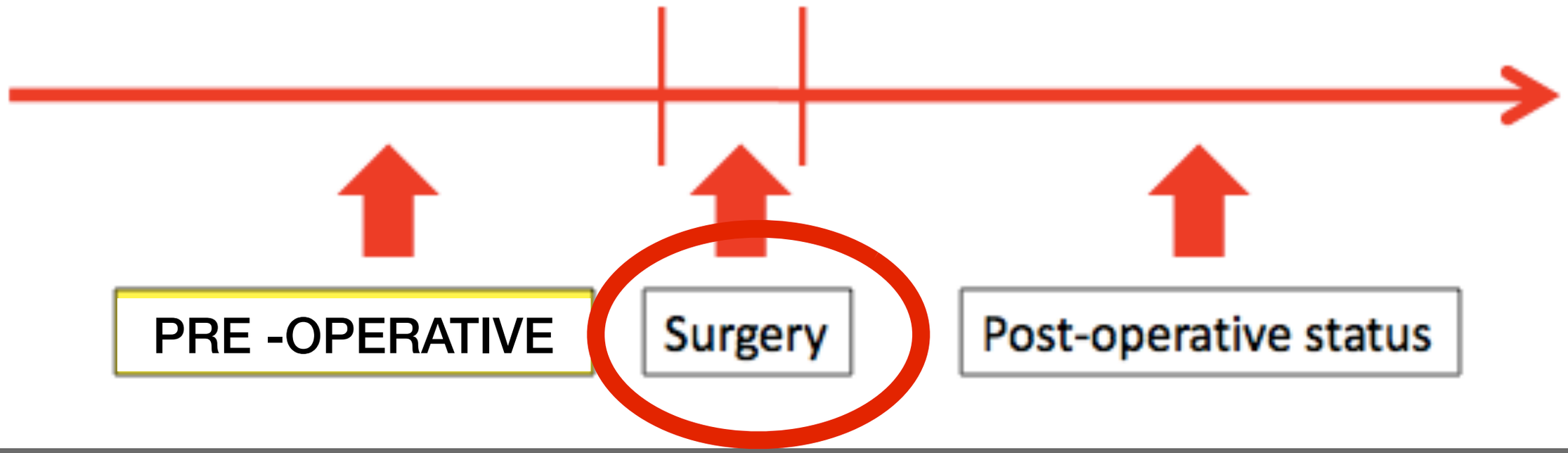


ESPEN Guidelines on Enteral Nutrition (2006) and Parenteral Nutrition (2009)

OPEN GASTROSTOMY / JEJUNOSTOMY



The patient's journey in the surgical road



Is post-operative interruption of nutrition necessary ?

NO

Recommendation 3:

In general, oral nutritional intake shall be continued after surgery without interruption

Grade of recommendation A

WHEN TO RESTART FEEDING?

Recommendation 5:

Oral intake, including clear liquids, shall be initiated within hours after surgery in most patients.

Grade of recommendation A

RATIONALE FOR EARLY ENTERAL FEEDING

- provide nutrients
- maintain GI integrity

WHEN TO RESTART FEEDING?

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.

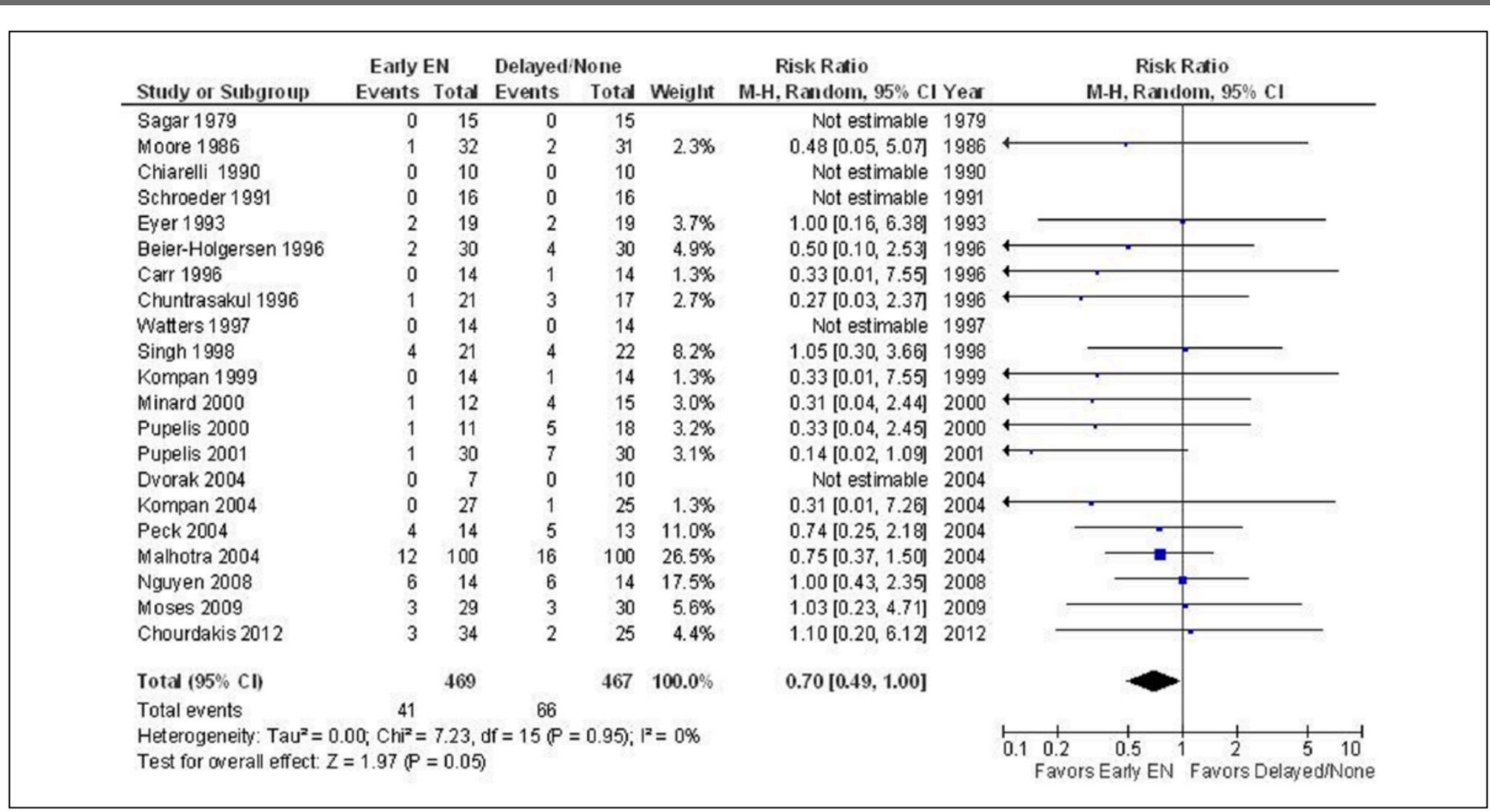


Figure 1. Early enteral nutrition (EN) vs delayed EN, mortality.

Gut 2000;**46**:813–818

A randomised controlled trial evaluating the use of enteral nutritional supplements postoperatively in malnourished surgical patients

A H Beattie, A T Prach, J P Baxter, C R Pennington

POST-OPERATIVE

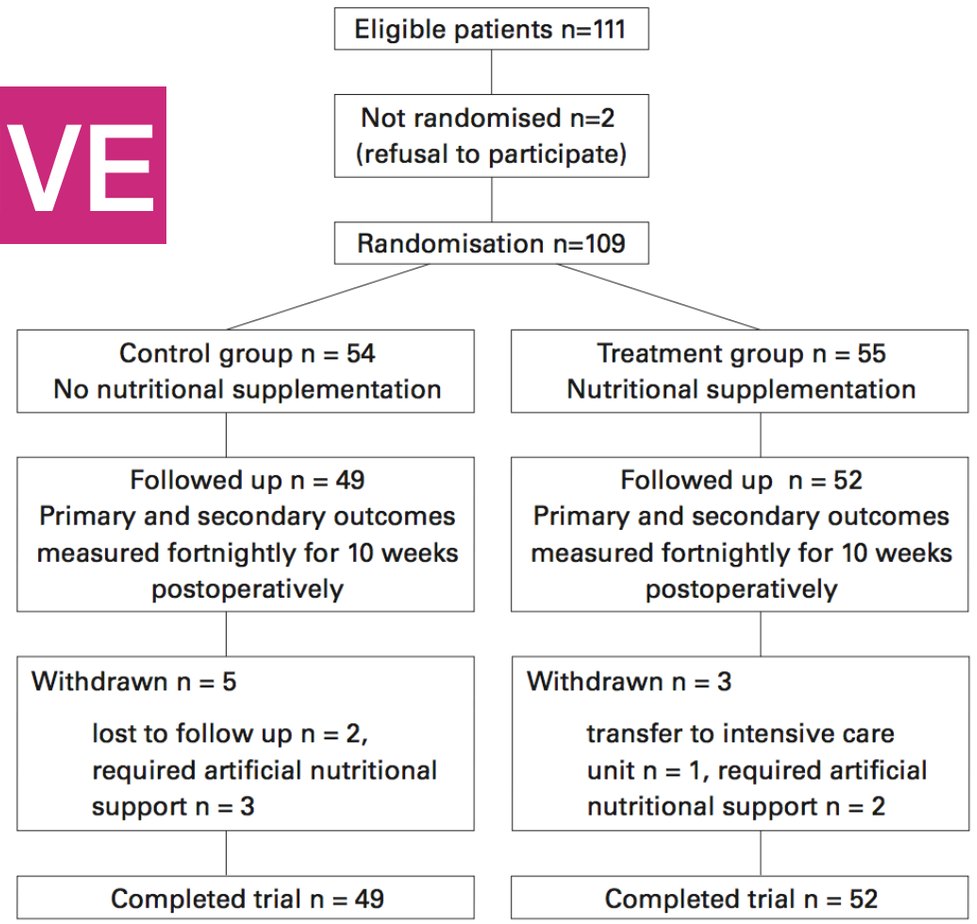


Figure 1 *Flow chart describing the progress of patients through the clinical trial.*

Gut 2000;**46**:813–818

POST-OPERATIVE

A randomised controlled trial evaluating the use of enteral nutritional supplements postoperatively in malnourished surgical patients

A H Beattie, A T Prach, J P Baxter, C R Pennington

Table 4 Changes in nutritional variables at each assessment point from time of admission

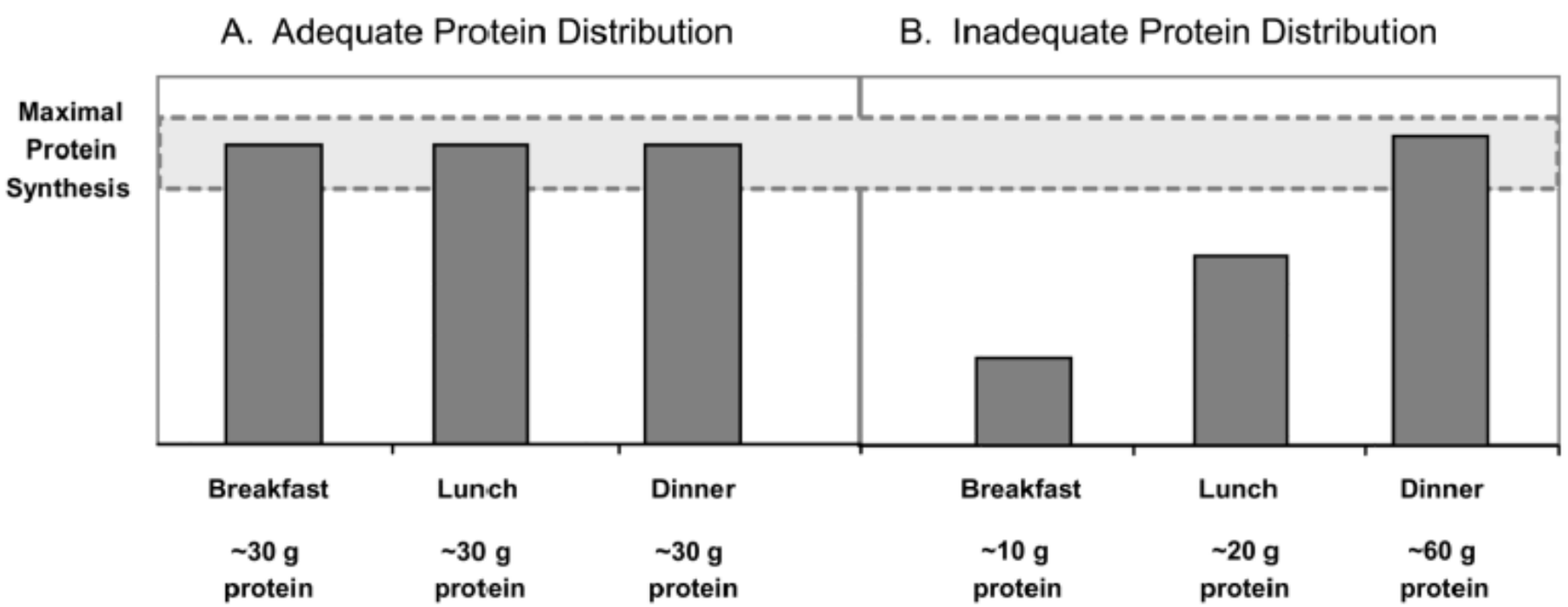
Reduced weight loss

Better strength

	Inclusion	*2 weeks*	*4 weeks*	*6 weeks*	*8 weeks*	*10 weeks*	**Linear trend* *F*	*p*	***Difference*	*F*	*p*
Weight loss (kg)											
Control	2.28 (1.28)	4.21 (2.44)	5.13 (3.23)	5.68 (3.90)	5.96 (4.21)	5.86 (4.33)	33.6	<0.001	(1)	71.53	<0.001
Treatment	2.31 (1.36)	3.40 (2.94)	3.40 (3.26)	2.48 (3.58)	1.89 (4.27)	1.53 (4.23)	5.48	0.02	(2)	4.34	0.001
Decrease in TSF (mm)											
Control	0.10 (0.32)	0.32 (0.90)	0.51 (1.19)	0.72 (1.32)	0.80 (0.42)	0.82 (1.41)	3.09	0.01	(1)	22.01	<0.001
Treatment	0.19 (0.68)	0.11 (0.94)	0.26 (0.77)	0.07 (0.82)	0.02 (0.90)	0.16 (1.73)	0.42	NS	(2)	1.44	NS
Decrease in MAMC (cm)											
Control	0.56 (1.30)	1.01 (1.80)	[illegible]	[illegible]	1.37 (1.90)	1.28 (1.73)	4.88	<0.03	(1)	17.16	<0.001
Treatment	0.55 (0.75)	0.86 (0.94)	0.81 (0.82)	0.71 (0.83)	0.61 (0.92)	0.42 (1.01)	2.10	NS	(2)	1.64	NS
Decrease in grip strength (kg/m^2)											
Control	1.56 (1.82)	2.51 (3.13)	2.45 (2.99)	2.16 (2.41)	2.10 (2.35)	1.93 (2.21)	0.01	NS	(1)	13.58	<0.001
Treatment	1.73 (1.87)	1.82 (1.92)	1.95 (2.80)	1.17 (1.64)	1.04 (2.00)	0.82 (2.10)	9.94	<0.005	(2)	2.12	NS

Values are mean (SD).
*One way ANOVA for differences between time points. **Two way ANOVA: (1) difference between control and treatment groups; (2) difference between time points.

PROTEIN DISTRIBUTION ALSO MATTERS



Paddon-Jones & Rasumussen. Curr Opin Clin Nutr Metab Care. 2009;12(1):86–90.

Pharmacologic Options for the Treatment of Sarcopenia

Morley J, Calcif Tissue Int 2016;98:319–333

Table 4 Approaches currently available or being developed to treat sarcopenia

Modality	Effect	Side effects
Resistance exercise	Increase muscle mass, strength, and power	Potential for falls; muscle injuries
Protein (essential amino acids)	Increase muscle mass; synergy with	Minimal increased creatinine levels
Testosterone	Increase muscle mass, strength, power, and function	Fluid retention; increased hematocrit; short term worsening of sleep apnea; effects on prostate cancer; possible increase in cardiovascular events
Selective androgen receptor modulators (SARMS)	Increase muscle mass; small increase in power	Increased cardiac failure
Growth hormone	In ase	Arthralgia; muscle pain; edema; carpal tunnel syndrome; hyperglycemia
Ghrelin agonists	In ite	Fatigue; atrial fibrillation; dyspnea
Myostatin antibodies	Increased lean body mass and handgrip	Urticaria; aseptic meningitis; diarrhea; confusion; fatigue
Activin 11R antagonists	Increase thigh muscle volume, muscle mass, and 6-min walk distance	Acne; involuntary muscle contractions
Angiotensin converting enzyme inhibitor (perindopril)	Increased distance walked; decreased hip fracture	Hypotension; hyperkalemia; muscle cramps; numbness
Espindolol (B_1/B_2 adrenergic receptor antagonist)	Maintains muscle mass; increased hand grip strength	?
Fast skeletal muscle troponin activators (Tirasemtiv)	Improves muscle function	?

RESISTANCE EXERCISE

Protein

MANAGEMENT ALGORITHM

PRE-OP

MALNUTRITION

Mild **Moderate** **Severe**

esophageal resection / gastrectomy / pancreaticoduodenectomy

oral immunonutrition for 6-7 days

Enteral/PN nutrition for 10-14 days

SURGERY

POST-OP

SURGERY

Enteral access (NCJ)

oral feeding?

EARLY DAY 1 - 7

yes

no

use mouth?

yes

no

“Fast Track”

LATE DAY
>7

enteral nutrition +/-

immunonutrition for 6-7 days

energy requirements met enterally

yes

no

combined enteral / parenteral

Parenteral nutrition

no

after 7 days, can take enterally?

yes

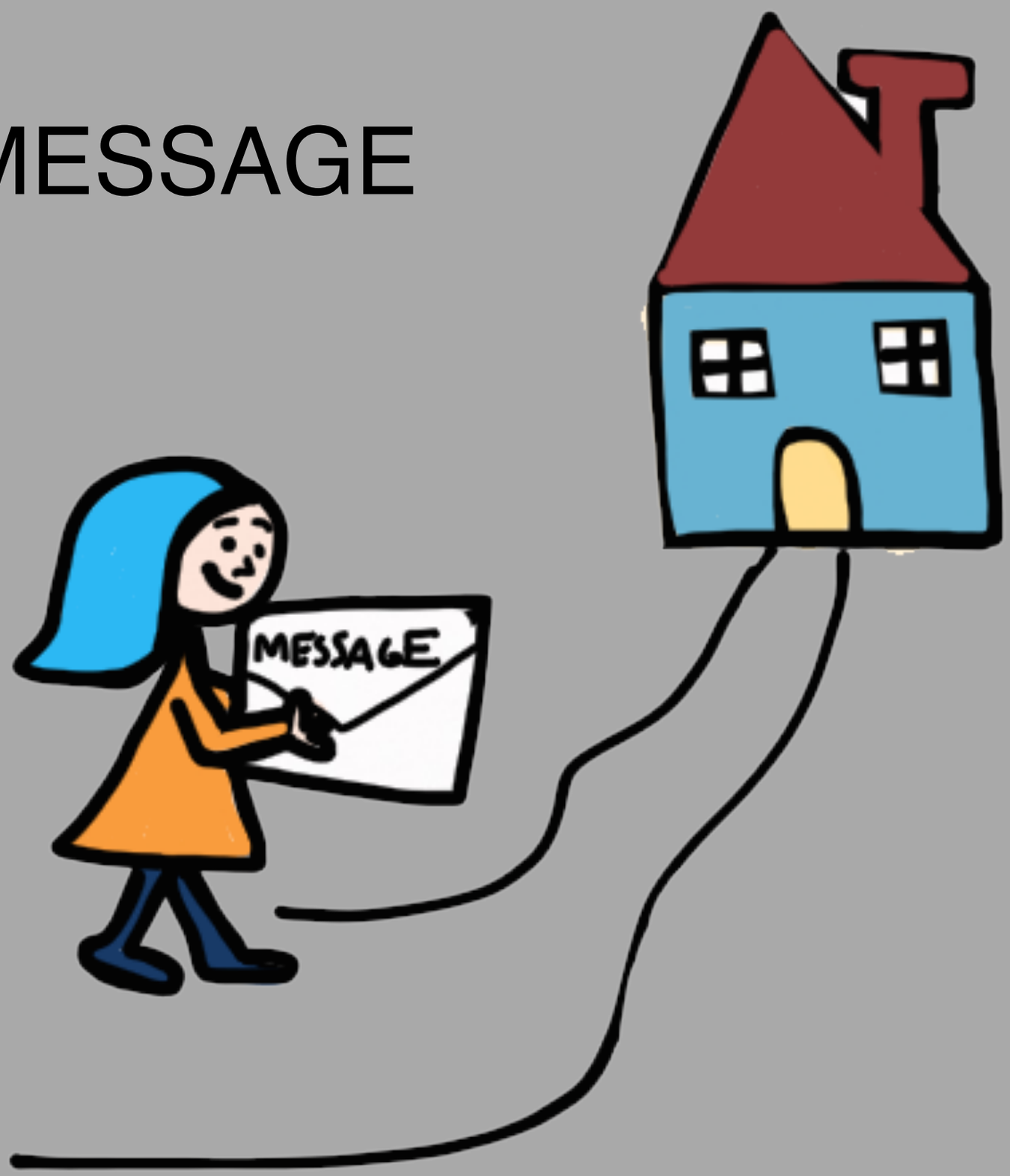
no

can reach target calories?

yes

stop PN

TAKE HOME MESSAGE



ERAS

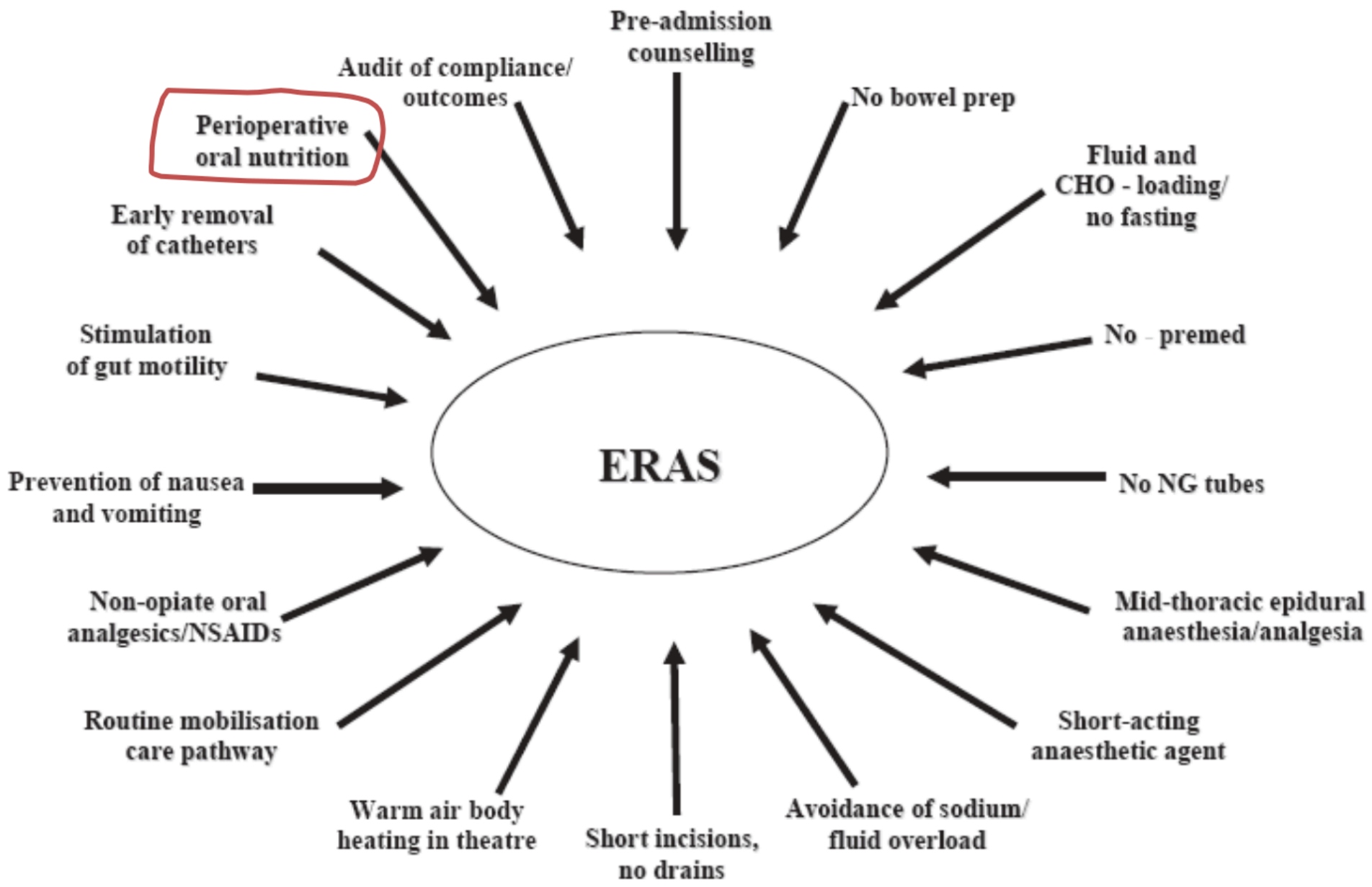


Figure 1 Main elements of the ERAS protocol.

KEY ASPECTS OF PERI-OPERATIVE NUTRITIONAL CARE

- integration of nutrition into the overall management of the patient
- avoidance of long periods of preoperative fasting
- re-establishment of oral feeding as early as possible after surgery
- start of nutritional therapy early, as soon as a nutritional risk becomes apparent
- metabolic control e.g. of blood glucose
- reduction of factors which exacerbate stress-related catabolism or impair gastrointestinal function
- minimize time on paralytic agents for ventilator management in the postoperative period
- early mobilisation to facilitate protein synthesis and muscle function.

INCIDENCE OF MALNUTRITION IS HIGH AMONG SURGICAL PATIENTS

MALNUTRITION IS ASSOCIATED WITH POORER OUTCOMES

INCLUDE NUTRITION MANAGEMENT BEFORE AND AFTER SURGERY TO IMPROVE OUTCOMES

EARLY NUTRITIONAL INTERVENTION IS ESSENTIAL IN HIGH RISK PATIENTS

AVOID THE USE OF IMMUNE MODULATING LIPIDS IN ALL CASES

"Your time on earth has been extended. Go back and thank your dietician"

THANK YOU