Prise en charge nutritionnelle du patient agressé ou “critically ill”

HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme | ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Congrès de diététique thérapeutique et de support nutritionnel 2024

Jean-Charles Preiser, interniste, Hôpital Erasme

Gabrielle Bronne, diététicienne, Hôpital Erasme

Ceci n'est pas un exposé « USI »

The three phases..

Institution	Localisation du patient					
Hôpital A	USI			USI		Salle
Hôpital B	USI	Middle care	Salle	Salle		Revali/Domicile

Critical Care Is a Concept, Not a Location*

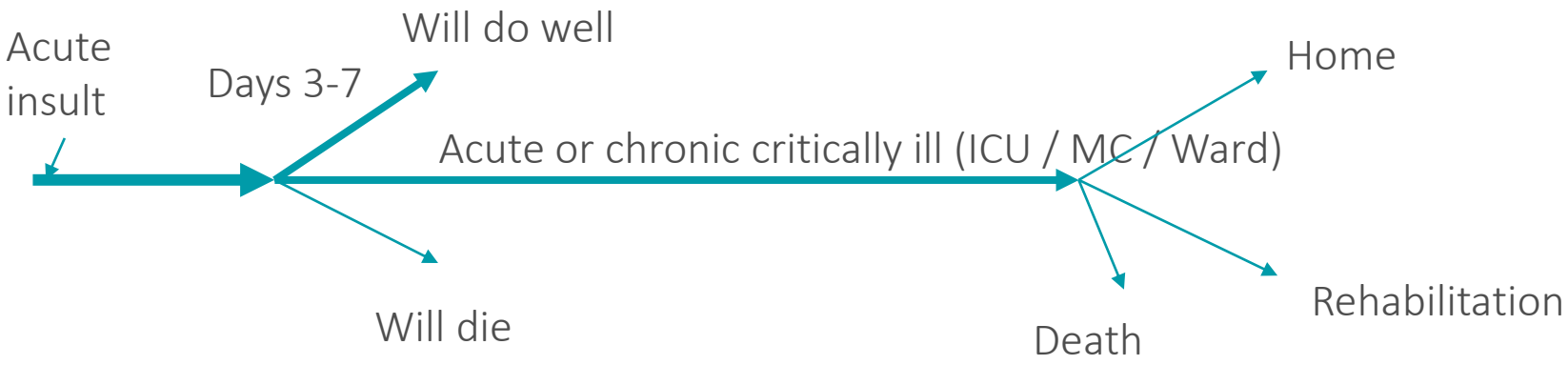
Vikramjit Mukherjee, MD[1]
Ryan C. Maves, MD[2]

KEYWORDS: COVID-19; high-flow nasal oxygen; hypoxemia; resource utilization; respiratory failure

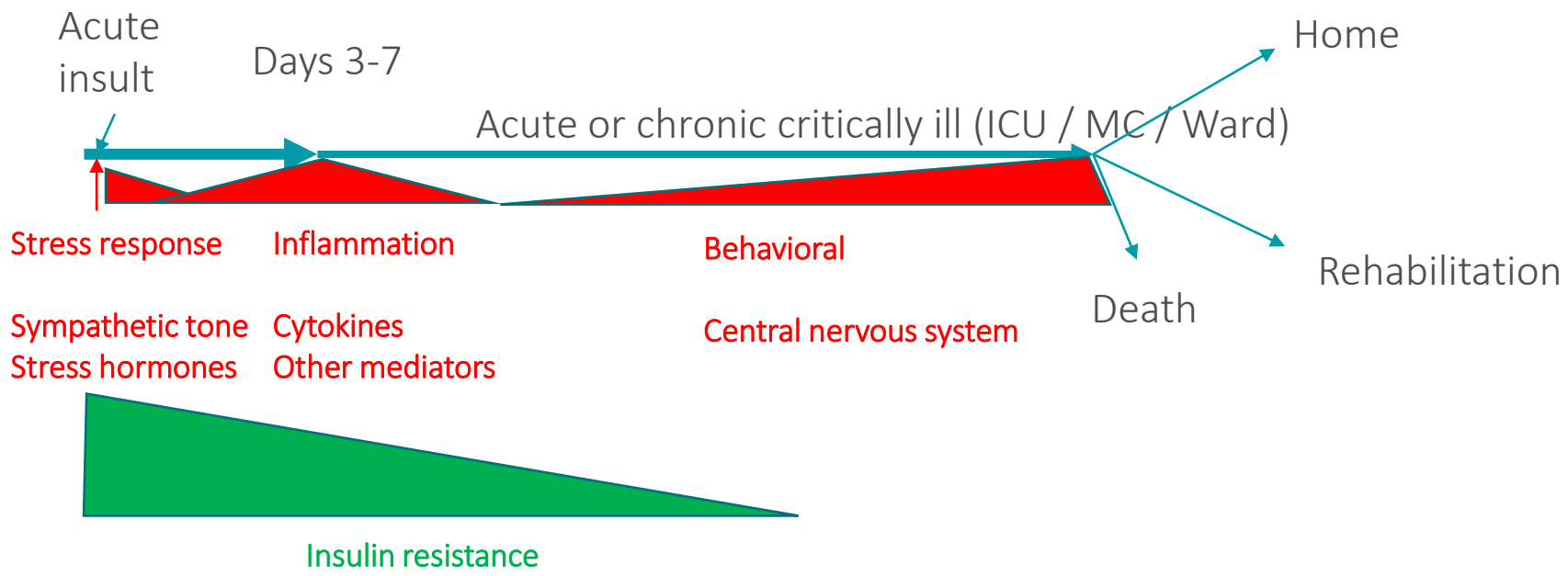
www.ccmjournal.org

January 2024 • Volume 52 • Number 1

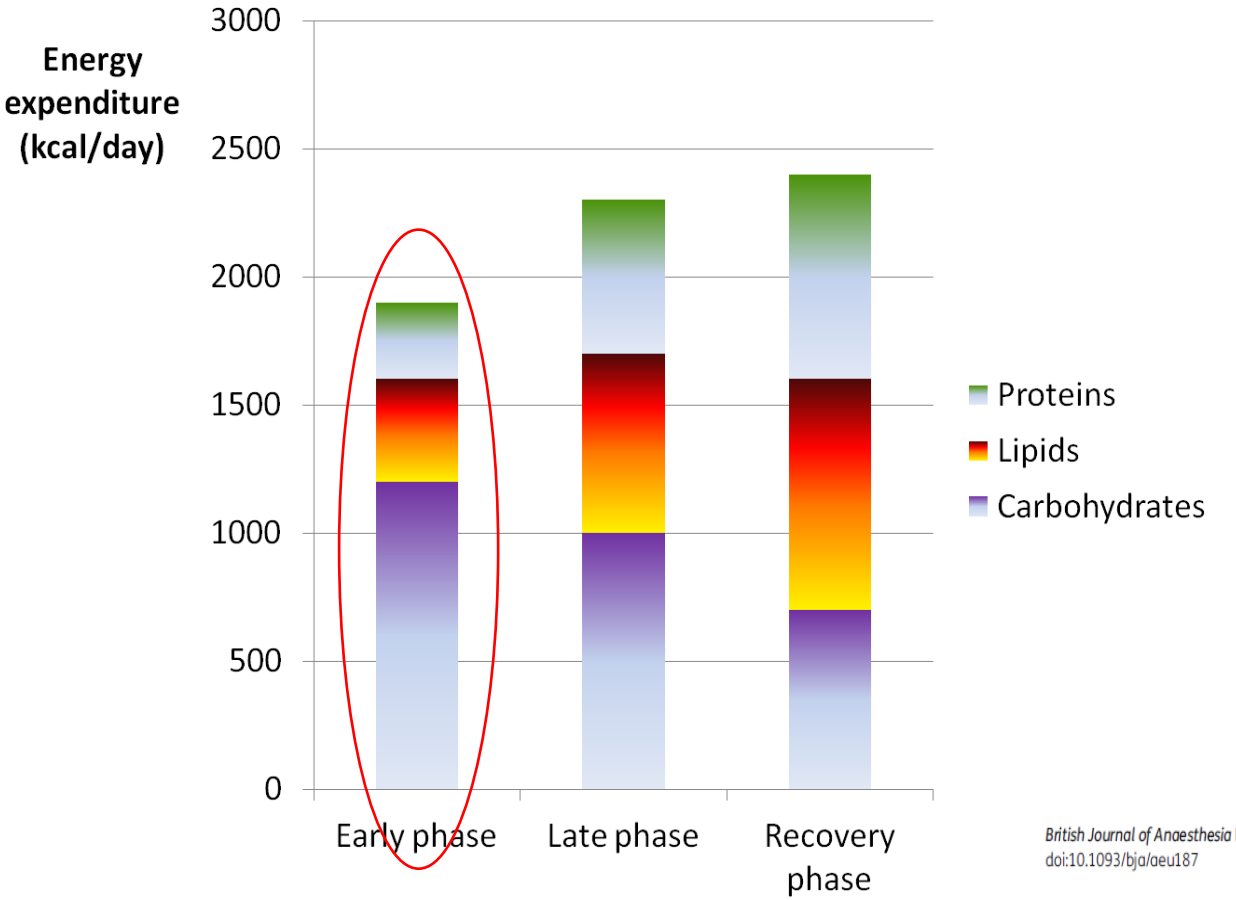
Time course of acute illness (real-life)



Time course of acute illness (insulin resistance)



The 3 post-injury phases



British Journal of Anaesthesia Page 1 of 10
doi:10.1093/bja/aeu187

BJA

Metabolic response to the stress of critical illness

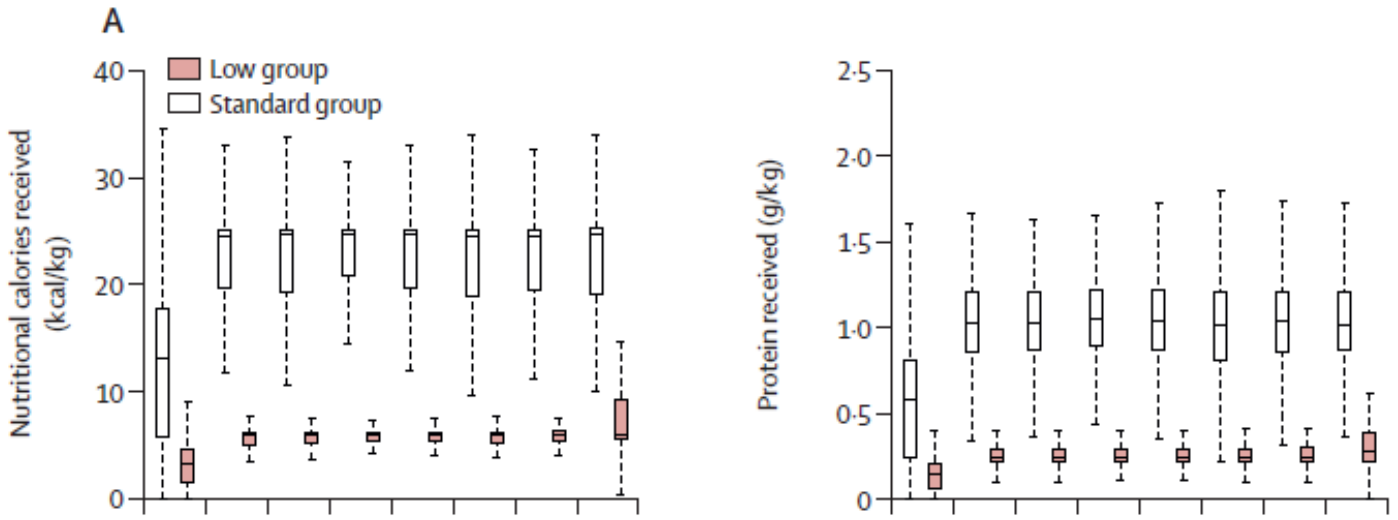
Preiser, Ichai, Orban, Groeneveld

Phase aïgue / précoce
Quelques heures à 3-7 jours..

- Anorexie
- Dépense énergétique limitée
- Utilisation préférentielle du glucose comme substrat énergétique

Low versus standard calorie and protein feeding in ventilated adults with shock: a randomised, controlled, multicentre, open-label, parallel-group trial (NUTRIREA-3)

Lancet Respir Med 2023



Low versus standard calorie and protein feeding in ventilated adults with shock: a randomised, controlled, multicentre, open-label, parallel-group trial (NUTRIREA-3)

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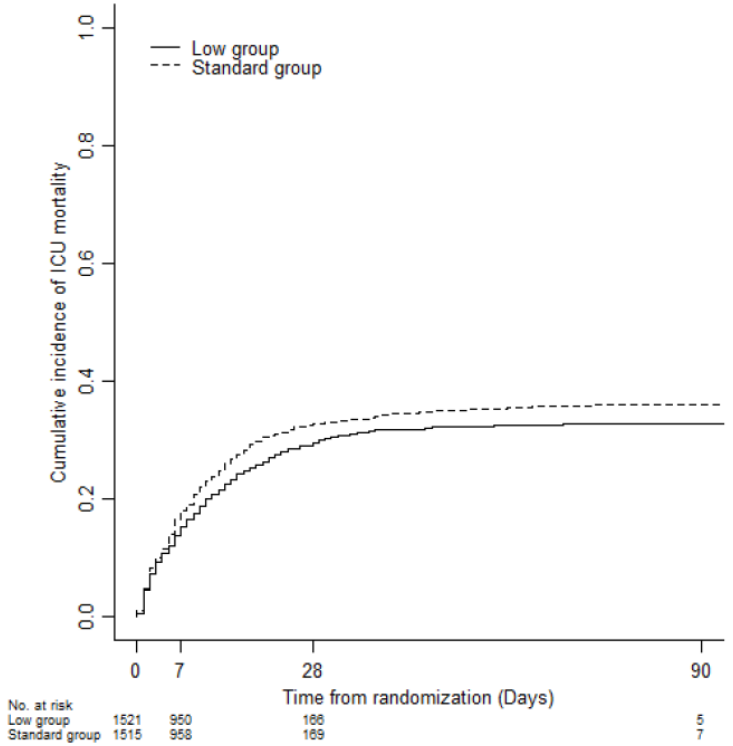


The probability of death in the ICU did not differ significantly between the two groups: the hazard ratio for the low calorie-protein group versus the standard calorie-protein group was 0·89 (95% confidence interval, 0·78 to 1·0; p=0·051). Time was counted in days starting at randomisation.

WHY COULD HIGH CALORIC INTAKE BE DETRIMENTAL DURING THE ACUTE / EARLY PHASE?

WE NEED TO OPEN THE ENGINE!!

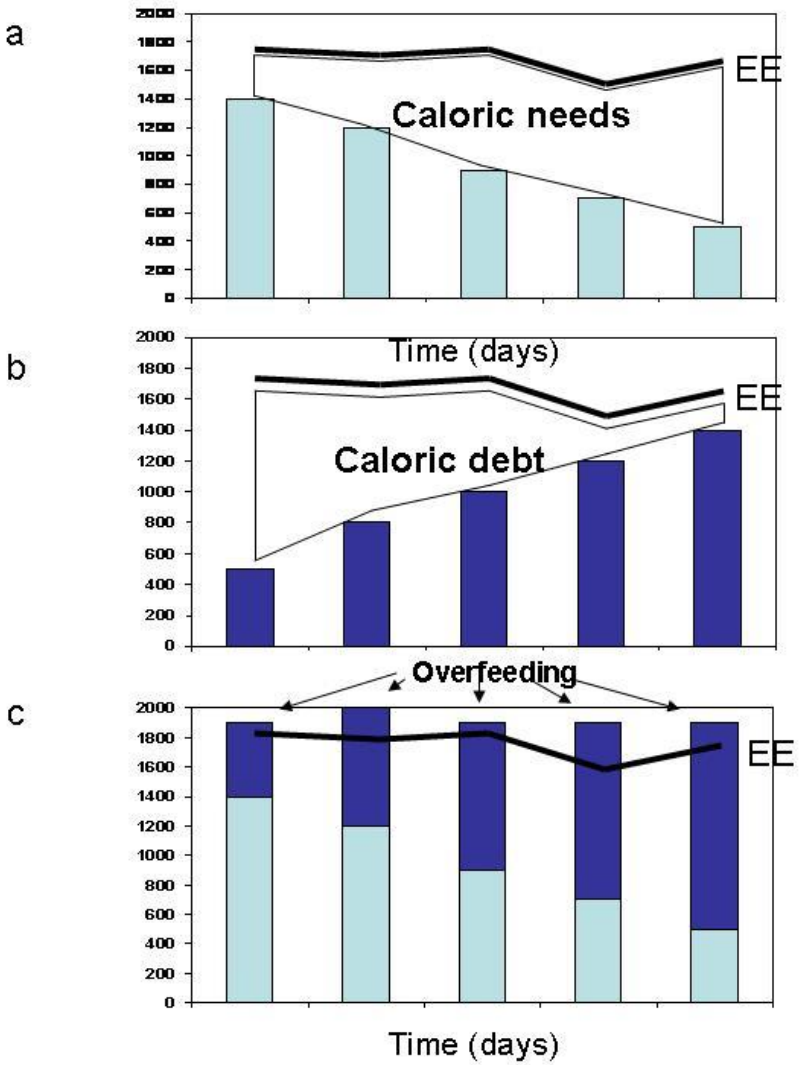
Overfeeding
Autophagy
Refeeding

Critically ill patients are able to match their REE

Tappy L et al Crit Care Med 1998; 26: 860

3 day starvation

Resting metabolic rate	1824 kcal/ day
Glycemia	7.3 mmol/L
Endogenous glucose production	360 g/ day (1360 kcal/d)
Net protein balance	-117 g/ day



Energy estimation and measurement in critically ill patients.
Fraipont V, Preiser JC. JPEN J Parenter Enteral Nutr. 2013 Nov-Dec;37(6):705-13

Refeeding : tout un spectre!

Refeeding hypophosphatemia

Refeeding syndrome

Le plus Fréquent en SI

Restricted versus continued standard caloric intake during the management of refeeding syndrome in critically ill adults: a randomised, parallel-group, multicentre, single-blind controlled trial

*Gordon S Doig, Fiona Simpson, Philippa T Heighes, Rinaldo Bellomo, Douglas Chesher, Ian D Caterson, Michael C Reade, Peter W J Harrigan, for the Refeeding Syndrome Trial Investigators Group**

- Standard care

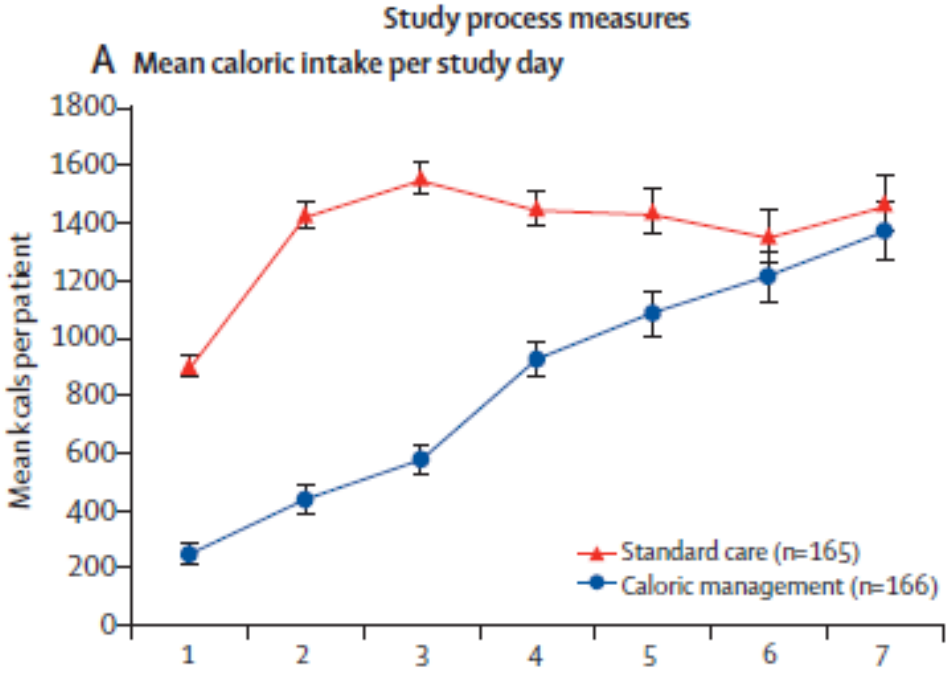
- Intervention

-Reduce support to 20 kcal/h
-Replace phosphate (protocol)
-Thiamine (at least 100 mg IV/d)
-Other B-group vitamins
-Monitoring of K, Mg
-Gradual return to normal intake protocol (40 – 60 kcal/h, 80 – 100%) unless P drop < 0.71 mmol/l

Restricted versus continued standard caloric intake during the management of refeeding syndrome in critically ill adults: a randomised, parallel-group, multicentre, single-blind controlled trial

*Gordon S Doig, Fiona Simpson, Philippa T Heighes, Rinaldo Bellomo, Douglas Chesher, Ian D Caterson, Michael C Reade, Peter W J Harrigan, for the Refeeding Syndrome Trial Investigators Group**

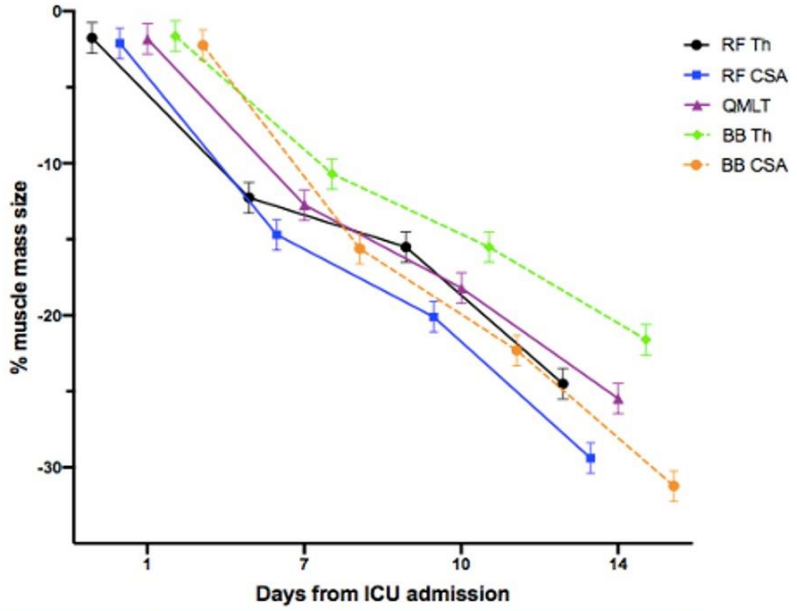
Lancet Respir Med 2015;
3: 943-52



Combien de protéines ?

The rate and assessment of muscle wasting during critical illness: a systematic review and meta-analysis

Fazzini *et al. Critical Care* *(2023) 27:2*



% RF th	-1.75	-12.25	-15.5	-24.5
% RF CSA	-2.10	-14.7	-20.1	-29.4
% QMLT	-1.82	-12.74	-18.2	-25.48
% BB Th	-1.64	-10.7	-15.5	-21.6
% BB CSA	-2.23	-15.61	-22.30	-31.22

Perte de 2% de masse musculaire par jour !!

Metabolic aspects of muscle wasting during critical illness

van Gassel RJJ

Curr Opin Clin Nutr Metab Care 2020 Mar;23(2):96-101

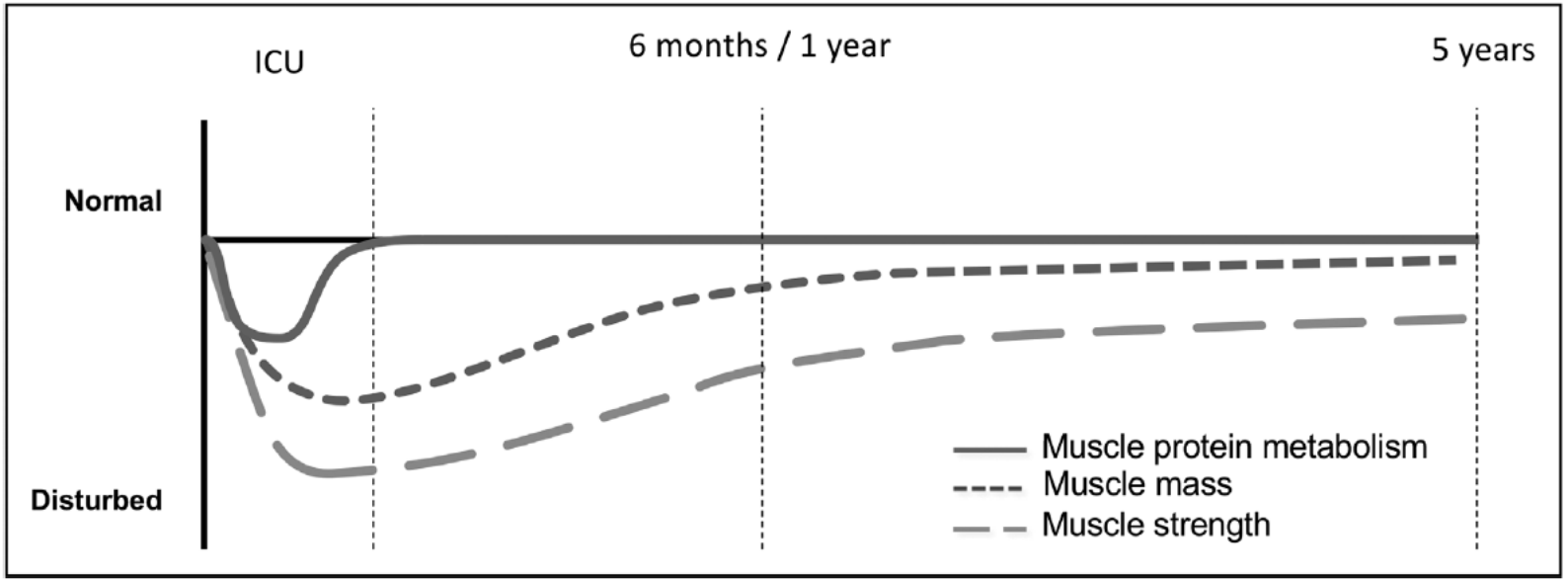
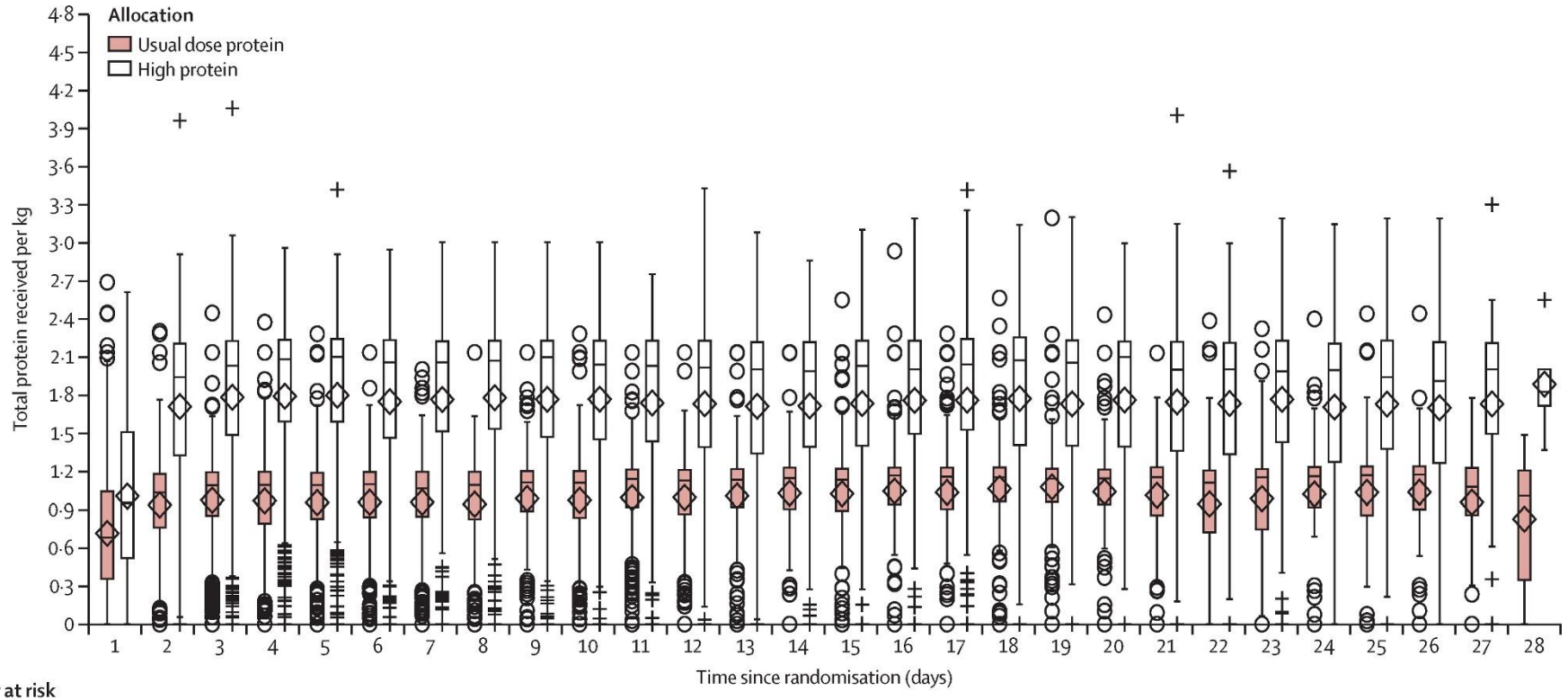


FIGURE 1. Protein metabolism in critical illness and impact on muscle mass and function. Changes over time in muscle protein metabolism, mass and function, distinguishes a short catabolic phase during ICU stay with subsequent persistent impact on muscle mass and function. Put together, this timeline further emphasizes the long-lasting impact of the relative short period of disturbed protein metabolism.

The effect of higher protein dosing in critically ill patients with high nutritional risk (EFFORT Protein): an international, multicentre, pragmatic, registry-based randomised trial

Daren K Heyland, Jayshil Patel, Charlene Compher, Todd W Rice, Danielle E Bear, Zheng-Yii Lee, Victoria C González, Kevin O'Reilly, Racquel Regala, Courtney Wedemire, Miguel Ibarra-Estrada, Christian Stoppe, Luis Ortiz-Reyes, Xuran Jiang, Andrew G Day, on behalf of the EFFORT Protein Trial team

www.thelancet.com **Published online January 25, 2023**



Number at risk																												
Usual dose protein	651	635	590	552	505	463	421	377	347	314	285	261	242	223	207	196	185	175	163	158	148	136	122	112	95	72	33	8
High protein	642	627	603	565	519	475	428	393	363	328	303	273	255	239	219	197	185	168	155	147	136	123	112	105	88	65	37	7

The effect of higher protein dosing in critically ill patients with high nutritional risk (EFFORT Protein): an international, multicentre, pragmatic, registry-based randomised trial

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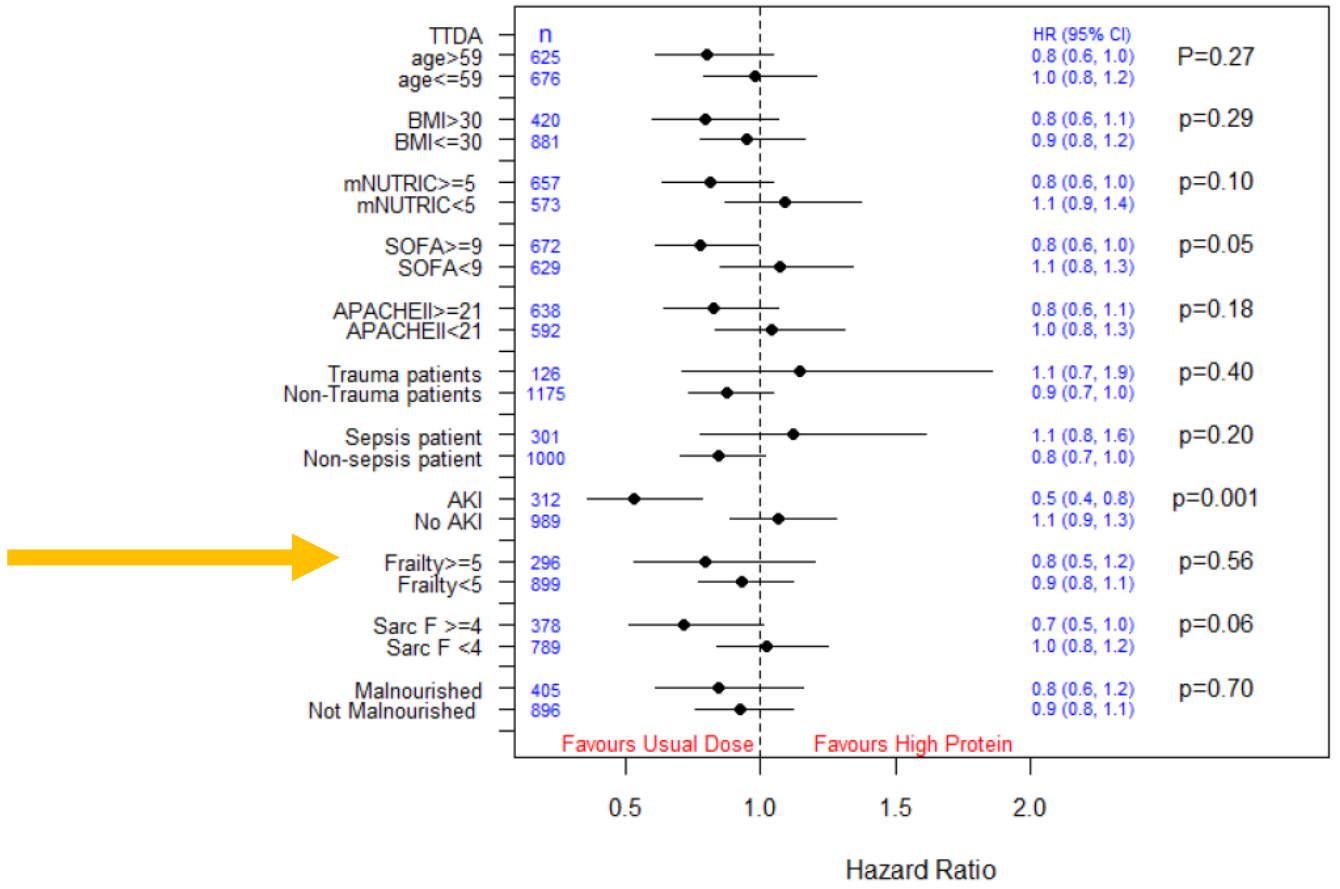
www.thelancet.com **Published online January 25, 2023**

Figure S2 – Subgroup Analysis Based on Effect on Time-to-Discharge-Alive from Hospital



Gunst et al. Critical Care (2023) 27:43
https://doi.org/10.1186/s13054-023-04317-9

Critical Care

REVIEW Open Access

Toward nutrition improving outcome of critically ill patients: How to interpret recent feeding RCTs?

Jan Gunst[1*], Michael P. Casaer[1], Jean-Charles Preiser[2], Jean Reignier[3] and Greet Van den Berghe[1]

Maximum
70% REE (20-25 kcal/kg/d)
Protein loss

Acute critical illness

Timing?

Health and recovery

Minimum
100% REE (25-35 kcal/kg/d)
1,3 g proteins

ANABOLIC RESISTANCE

FEEDING RESPONSIVENESS

Muscle catabolism
Liberation of amino acids → Gluconeogenesis

Macronutrients

↑ Glucose → ↑ Hyperglycemia
↑ Lipids → ↑ Hypertriglyceridemia, liver dysfunction
↑ Amino acids → ↑ Hyperuremia

Suppression of autophagy and ketogenesis

~~Muscle catabolism~~
~~Liberation of amino acids~~ → ~~Gluconeogenesis~~

Macronutrients

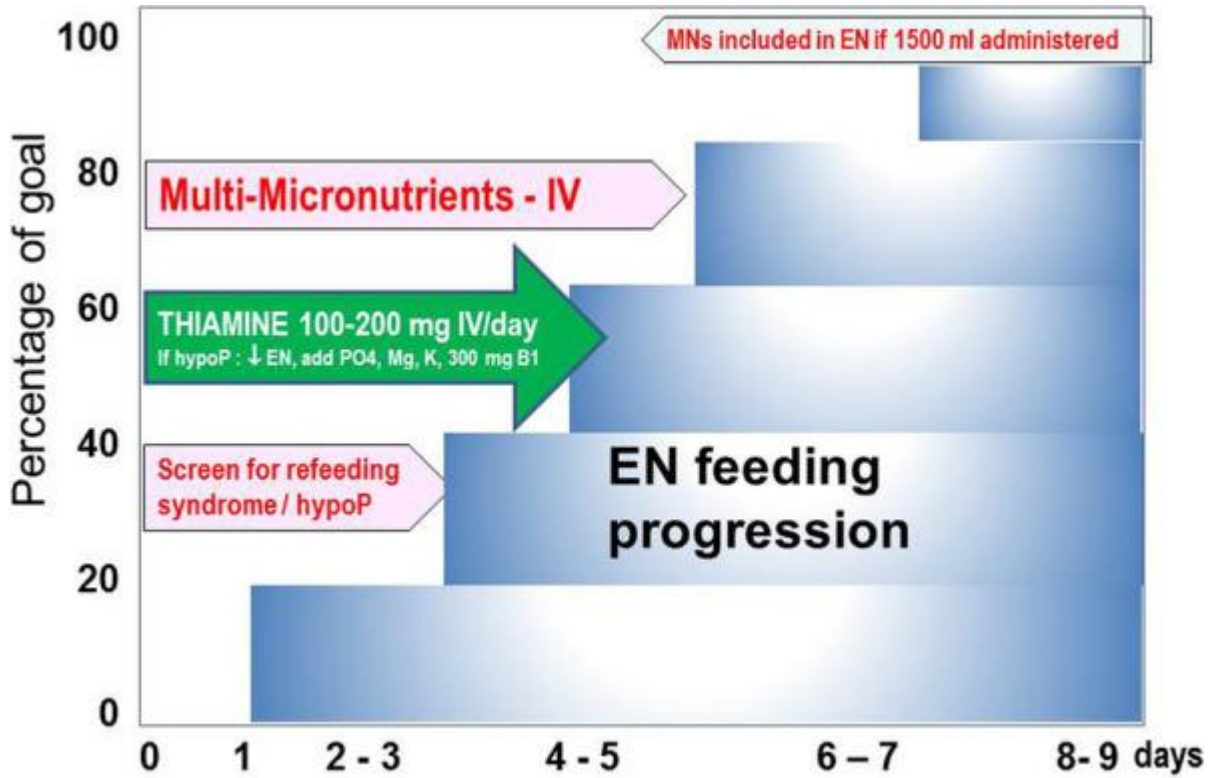
Glucose and lipids: energy substrate, excess stored in glycogen and adipose tissue
Amino acids: muscle anabolism

Suppression of autophagy and ketogenesis (intermittent in normal diet)

REVIEW Open Access

A guide to enteral nutrition in intensive care units: 10 expert tips for the daily practice

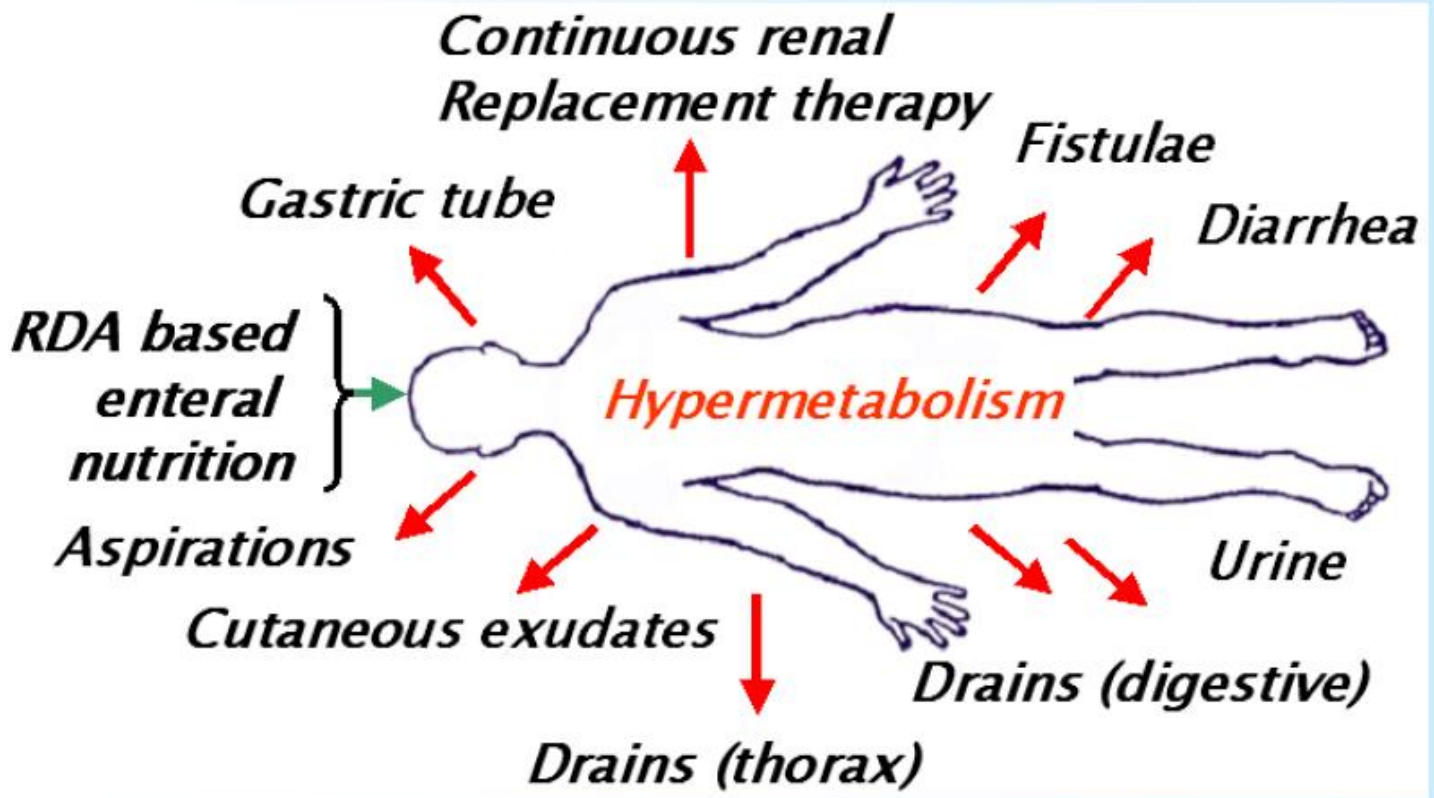
Jean-Charles Preiser[1*], Yaseen M. Arabi[2], Mette M. Berger[3], Michael Casaer[4], Stephen McClave[5], Juan C. Montejo-González[6], Sandra Peake[7,8], Annika Reintam Blaser[9,10], Greet Van den Berghe[4], Arthur van Zanten[11], Jan Wernerman[12] and Paul Wischmeyer[13]



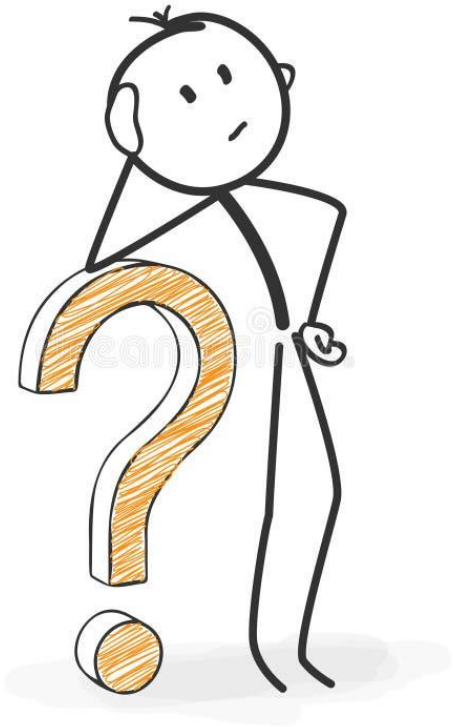
Why macronutrients?

Negative balances – the causes in critically ill

Berger, NCP 21:438, 2006



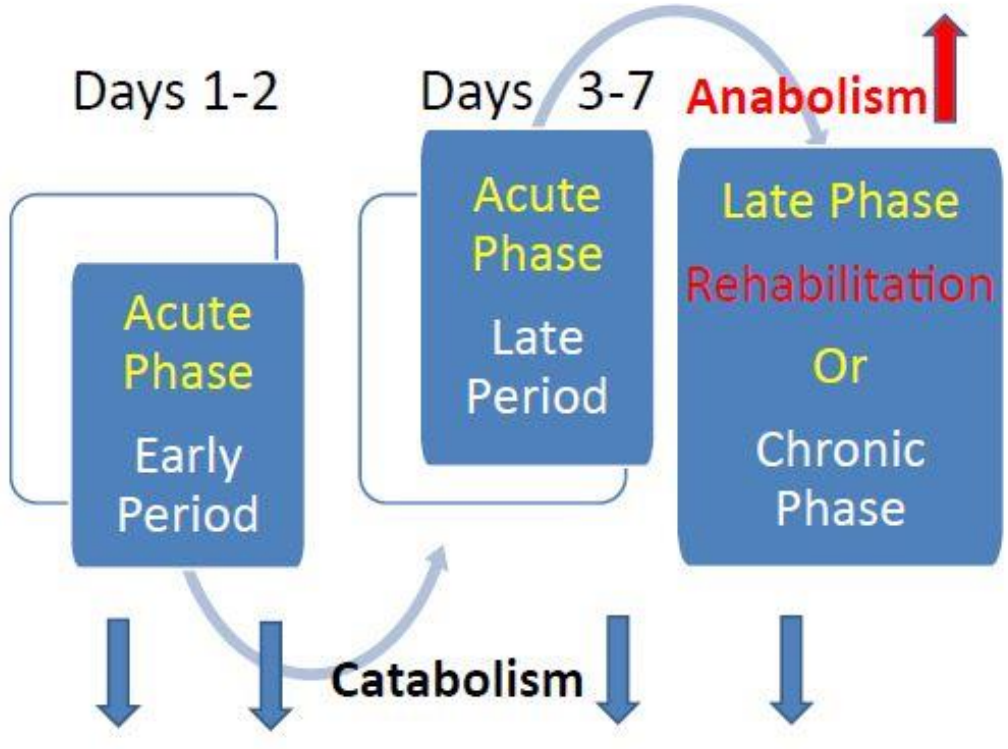
Le diététicien aux SI



Besoins nutritionnels

Aux SI

ESPEN The European Society for Clinical Nutrition and Metabolism



Guidelines 2019, ESPEN, Clinical nutrition in the intensive carte unit

ESPEN	
Phase Aigue	• **Max 70 %** de la dépense énergétique mesurée **via calorimétrie indirecte * jusque J3, ensuite 80 -100 %** • **Max 70 % si formule utilisée** (20-25 kcal/kg/j) jusque J7
Phase Tardive	• **100 %** de la dépense énergétique mesurée • **100 % : 20-25 kcal/kg/j**
Besoin en protéines	• 1,3 g /kg/j **progressivement**

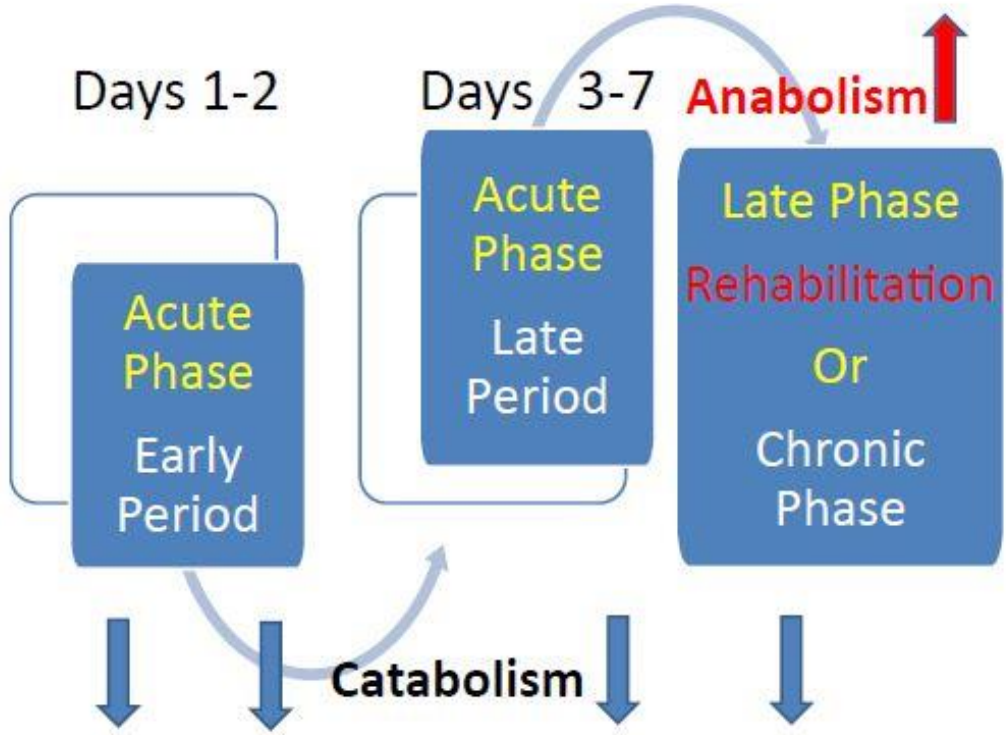
Calorimétrie indirecte

→Mesure la quantité d'énergie produite par combustion des nutriments
→ Equation de Weir: DER (kcal/j) = 1.44 x (3,94 x V02 (ml/min) + 1.1 x VC02(ml/min)
→ Durée de mesure : Environ 15 minutes

Besoins nutritionnels

Aux SI

ESPEN
The European Society for Clinical Nutrition and Metabolism



Guidelines 2019, ESPEN, Clinical nutrition in the intensive carte unit

ESPEN	
Phase Aig…	…ue mesurée …ensuite
B… prot…	

Importance de la réévaluation !

Patient « chronique »?
Escarre?
Nouveau choc?
CVVHD?

Quel poids?

- Poids sec = admission, pesée à l'étage, estimé si œdèmes/ ascite, poids le + bas
- Réel si BMI/IMC < 30 (Espen 2019)
- Ajusté si BMI ≥ 30 = Poids idéal + 25 % (Poids réel - Poids idéal) (Espen 2019)
- Poids "ideal"? ou de forme" si BMI <18.5 après la phase aigue
- Importance donc de vérifier que la taille soit présente dans le dossier du patient
- Patient, famille, mesure de l'avant bras / talon-genoux

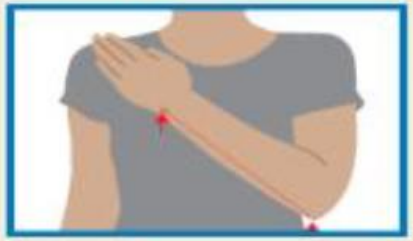
Indicateurs alternatifs : instructions et tableaux

BAPEN

Si une mesure directe est impossible, utiliser la longueur de l'avant-bras (cubitus) pour estimer la taille à partir des tableaux ci-dessous.

[Se reporter à la brochure explicative du 'MUST' pour un complément d'informations sur les autres indicateurs alternatifs (hauteur talon-genou et demi-envergure des bras) qui peuvent également être utilisés pour estimer la taille].

Estimation de la taille à partir de la longueur du cubitus



Mesurer la distance entre la pointe du coude (olécrâne) et le milieu de l'os saillant du poignet (apophyse styloïde radiale) (autant que possible du côté gauche).

Taille (m)	Hommes (<65 ans)	1.94	1.93	1.91	1.89	1.87	1.85	1.84	1.82	1.80	1.78	1.76	1.75	1.73	1.71
	Hommes (≥65 ans)	1.87	1.86	1.84	1.82	1.81	1.79	1.78	1.76	1.75	1.73	1.71	1.70	1.68	1.67
	Longueur du cubitus (cm)	32.0	31.5	31.0	30.5	30.0	29.5	29.0	28.5	28.0	27.5	27.0	26.5	26.0	25.5
Taille (m)	Femmes (<65 ans)	1.84	1.83	1.81	1.80	1.79	1.77	1.76	1.75	1.73	1.72	1.70	1.69	1.68	1.66
	Femmes (≥65 ans)	1.84	1.83	1.81	1.79	1.78	1.76	1.75	1.73	1.71	1.70	1.68	1.66	1.65	1.63
Taille (m)	Hommes (<65 ans)	1.69	1.67	1.66	1.64	1.62	1.60	1.58	1.57	1.55	1.53	1.51	1.49	1.48	1.46
	Hommes (≥65 ans)	1.65	1.63	1.62	1.60	1.59	1.57	1.56	1.54	1.52	1.51	1.49	1.48	1.46	1.45
	Longueur du cubitus (cm)	25.0	24.5	24.0	23.5	23.0	22.5	22.0	21.5	21.0	20.5	20.0	19.5	19.0	18.5
Taille (m)	Femmes (<65 ans)	1.65	1.63	1.62	1.61	1.59	1.58	1.56	1.55	1.54	1.52	1.51	1.50	1.48	1.47
	Femmes (≥65 ans)	1.61	1.60	1.58	1.56	1.55	1.53	1.52	1.50	1.48	1.47	1.45	1.44	1.42	1.40

BIP diététicienne Gabrielle Bronne : 56867

Per os – première semaine suivant l'admission

Original Communication

Nutrition During Critical Care: An Audit on Actual Energy and Protein Intakes

Loïc Rougier, MD[1]; Jean-Charles Preiser, PhD[2]; Marjorie Fadeur, RD[3]; Anne-Marie Verbrugge, RD[3]; Nicolas Paquot, PhD[3,4]; Didier Ledoux, PhD[3,5]; Benoit Misset, MD[5]; and Anne-Françoise Rousseau, PhD[3,5]

Journal of Parenteral and Enteral Nutrition
Volume 0 Number 0
xxxx 2020 1–10
© 2020 American Society for Parenteral and Enteral Nutrition
DOI: 10.1002/jpen.1962
wileyonlinelibrary.com
WILEY

- Mixed ICU (LOS ≥ 3 j) N = 289 patients

Apports oraux étaient plus faibles comparés aux autres supports nutritionnels et déficit plus important pour les protéines

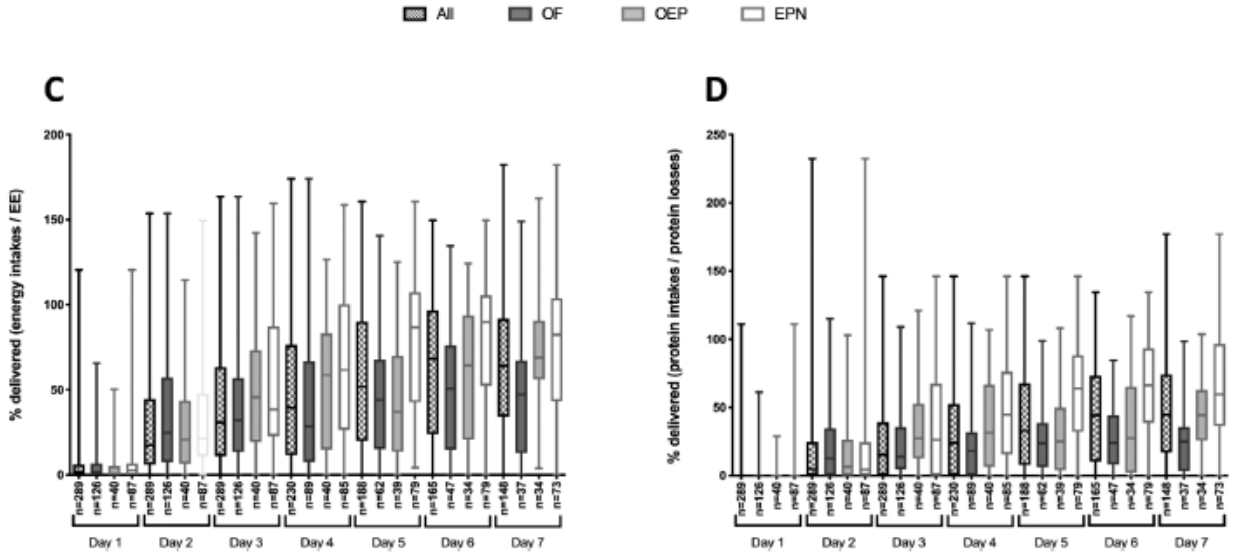


Figure 2. Daily energy (A) or protein (B) intakes and daily percentage of delivered energy (C) or protein (D) during the first 7 days, in the whole cohort and in the 3 groups. EPN, enteral/parenteral nutrition; OEP, oral + enteral/parenteral; OF, orally fed.

Apports en Kcalorie/protéines moyens /jour

	Kcal/kg/j	g/kg/j
Per os seul	**9,7**	**0,35**
Per os+ NE/PN	15,1	0,57
NE et/ou PN seul	17,60	0,81

Per os post extubation

- Entre 20 % et 51 % de troul

Après l'extubation du patient et quand le patient recommence à manger → maintenir la SNG ou bien remplacer par une SNG de feeding et nutrition en nocturne

Extra Focus :

- Patient déjà dénutris avant ICU
- Patient avec cancer
- Patient âgé
- Troubles de déglutition
- …

American Dietetic Association

Research and Practice Innovations

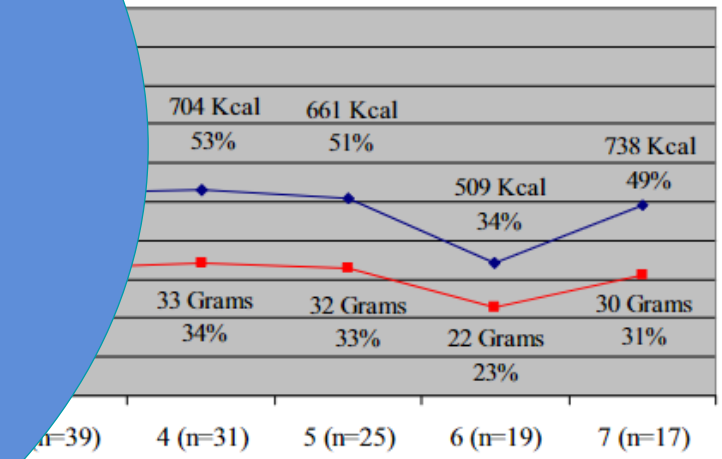
Adequacy of Oral I
1 Week after Extu

SARAH J. PETERSON, MS, RD; ANNALISA A. TSAI
PATRICIA M. SHEEAN, PhD, RD; CAROL L. BRAUN

- N= 50
- Moyenne = 5,2 J d'i
- Max 50 % des besoin

Attention! Patient n'est probabl

ke (Mean Daily Requirement 1444 kcals)
ke (Mean Daily Requirement 96 grams)



s) and grams of protein (line with squares) intake with percent of daily requirements[a] for days 1
ients were estimated using 25 kcal/kg of admission body weight for patients with a body mass index
y weight for patients with a body mass index ≥30. Protein requirements were estimated using 1.2 g
ht for patients with a body mass index <30 and 2 g protein per ideal body weight for patients with a body mass
numbers decline as a result of discharge to skilled nursing facilities and home.

Implication du diet dans la gestion de la NE/TPN

Prévention SRI */ Surnutrition en phase aigue

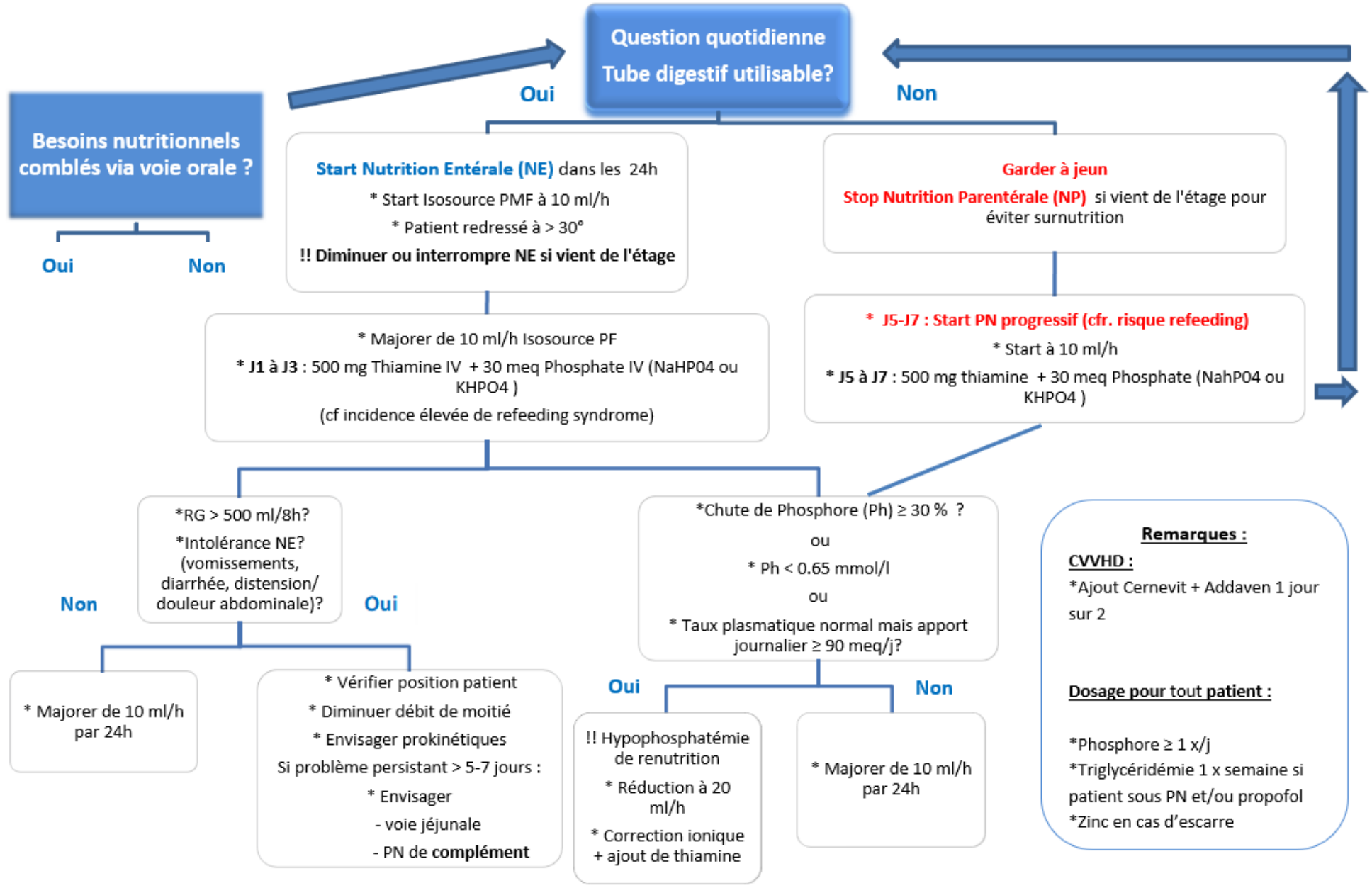
- Evaluation nutritionnelle du patient
- Définir le patient à risque de SRI
- Proposition de schéma de démarrage (progressif)
- Proposition de supplémentation notamment en Phosphore et en Thiamine
- **Quantification des kcal non nutritionnelles ***
- Suivi biologique (P, K, Mg,..)
- ...

Besoins nutritionnels cibles atteints?

- Suivi prescription vs administré
- Implication dans la voie d'administration (SNG, SNJ, PEG, TPN..)
- Proposition de supplémentation en vitamines et O.E?
- Proposition de NE/PN de complément
- ...

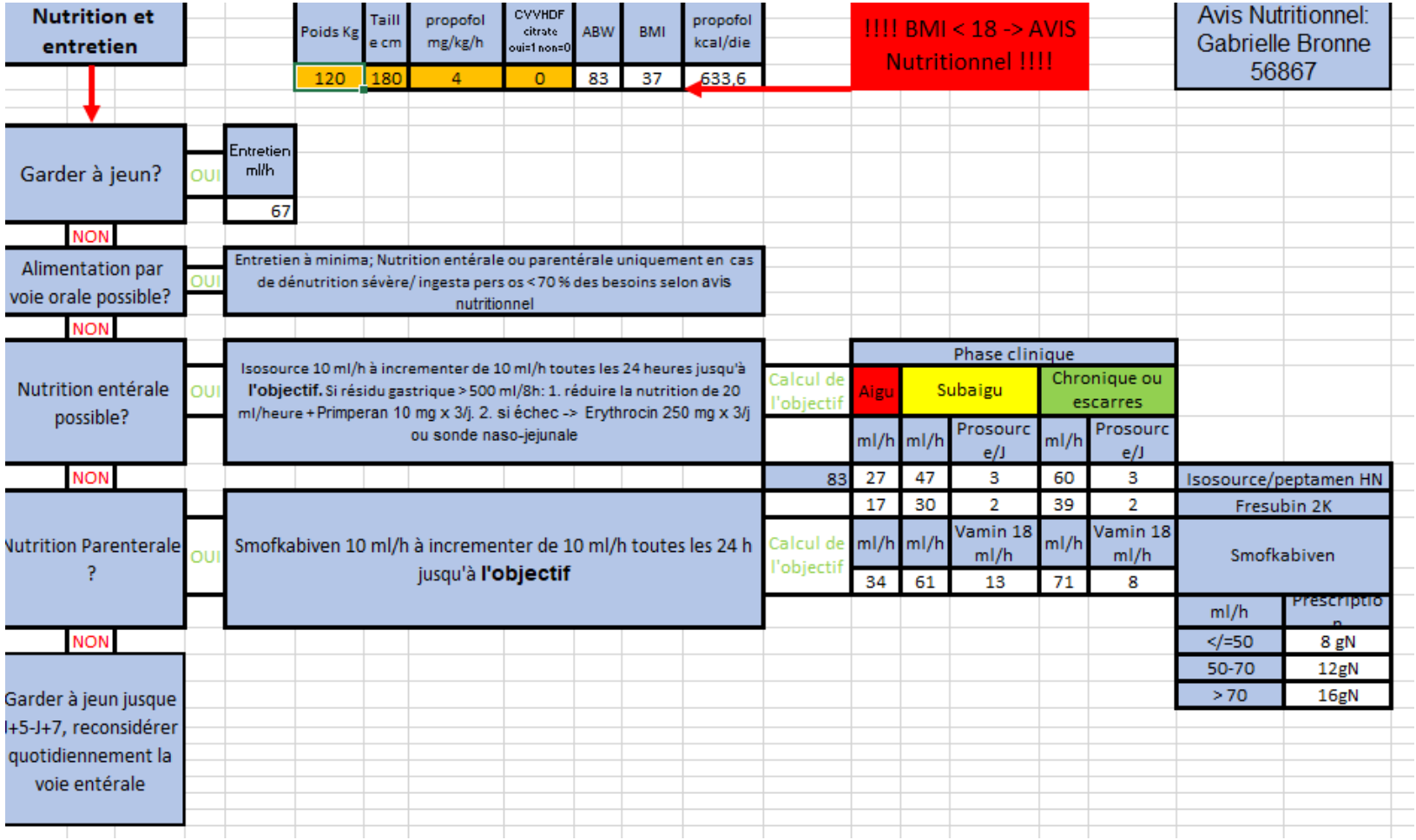
* SRI = Syndrome de Renutrition Inapproprié

*kcal non nutritionnelles:
Propofol 2% et 1% = 1,1 kcal/ml, Glucosé 5 % = 200 kcal/l
Glucose 10% = 400 kcal/l, Citrate



Pour le calcul des débits cibles se référer à la calculette « Nutrition » sur les ordinateurs

Calculette des besoins nutritionnels aux SI



En pratique

Tour du matin quotidien avec infirmier chef

- Evolution clinique du patient (phase métabolique, amélioration ou nouveau choc?)
- Tolérance NE (résidus, vomissement, diarrhée?)
- Sédation
- Présence d'escarre ? (stade + évolution)
- Dialyse
- Patient toujours intubé? Exercice passif/actif ?
- Ingesta per os

Nutrition Rehabilitation in the Intensive Care Unit

Pablo Lucas Massanet, MD[1]; Laurent Petit, MD[2]; Benjamin Louart, MD[1]; Philippe Corne, MD, PhD[3]; Celine Richard, RD[4]; and Jean Charles Preiser, MD, PhD[5]

Figure 1. Kafka's nightmare illustrates how deep the physical changes are for a patient after a critical illness and an intensive care unit stay.

Journal of Parenteral and Enteral Nutrition
Volume 39 Number 4
May 2015 391–400

Nutrition evaluation and management of critically ill patients with COVID-19 during post–intensive care rehabilitation

Alice Hoyois[1] | Asuncion Ballarin[2] | Justine Thomas[2] | Olivier Lheureux[3] | Jean-Charles Preiser[3] | Emmanuel Coppens[4] | Silvia Perez-Bogerd[5] | Olivier Taton[5] | Sylvie Farine[6] | Pauline Van Ouytsel[6] | Marianna Arvanitakis[1]

JPEN J Parenter Enteral Nutr. 2021;45:1153–1163.

(B)

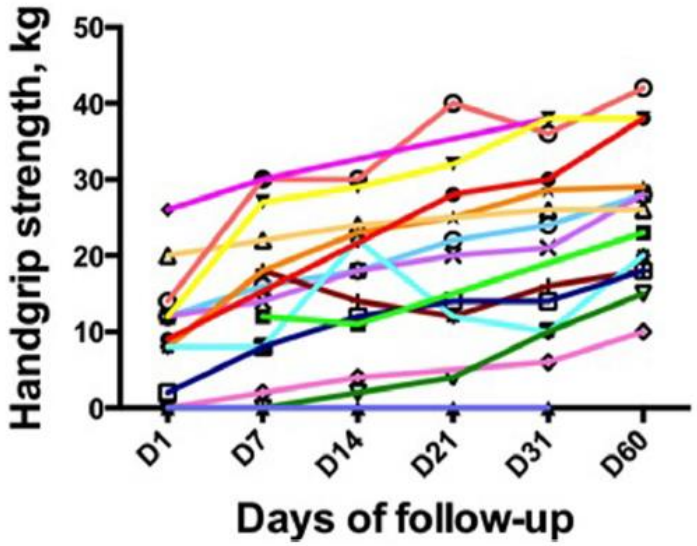
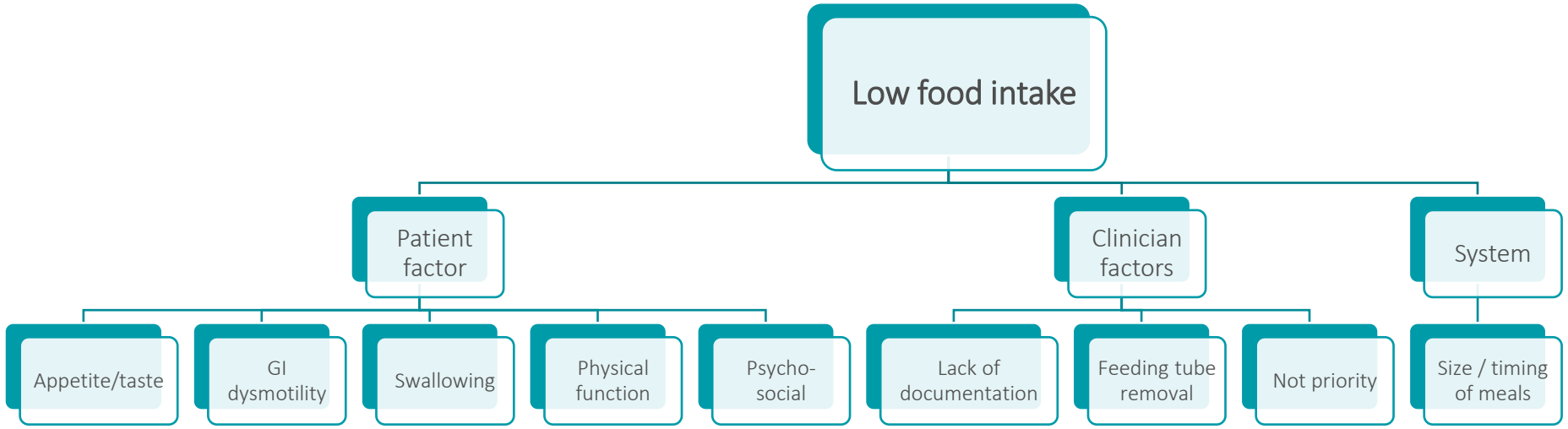


Figure 4 (A) Correlation between body mass index (BMI) and mid-arm circumference. (B) Individual dominant handgrip strength at the time of intensive care unit discharge and at day (D) 7, 14, 30, and 60 for 13 patients. Each patient is represented with a shade of gray

Nutrition intake in the post-ICU hospitalization period

Curr Opin Clin Nutr Metab Care 2020, 23:111–115

Emma J. Ridley[a,b], *Lee-anne S. Chapple*[c,d], *and Marianne J. Chapman*[c,d]



Nutrition evaluation and management of critically ill patients with COVID-19 during post–intensive care rehabilitation

Alice Hoyois[1] | Asuncion Ballarin[2] | Justine Thomas[2] | Olivier Lheureux[3] | Jean-Charles Preiser[3] | Emmanuel Coppens[4] | Silvia Perez-Bogerd[5] | Olivier Taton[5] | Sylvie Farine[6] | Pauline Van Ouytsel[6] | Marianna Arvanitakis[1]

JPEN J Parenter Enteral Nutr. 2021;45:1153–1163.

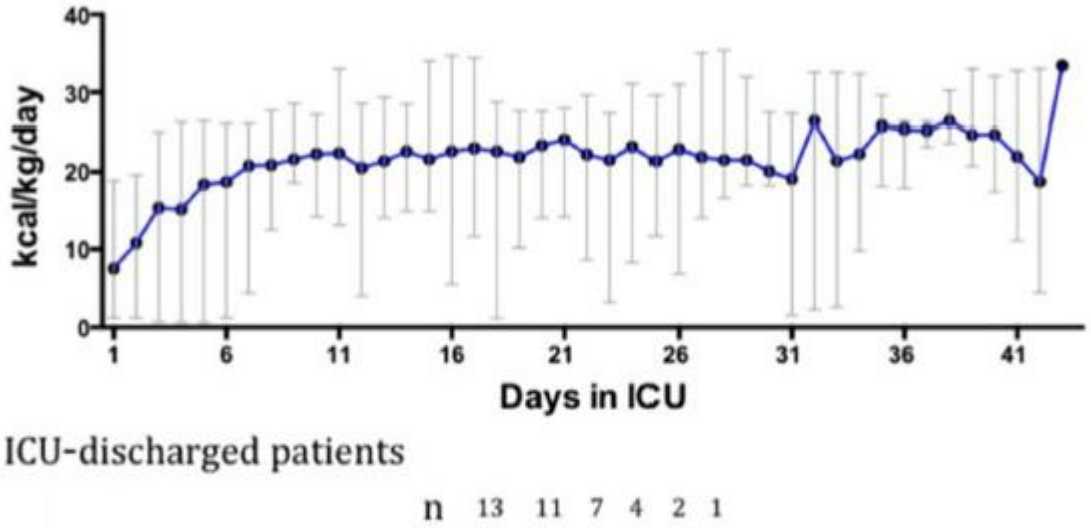


Figure 2 Nutrition intake in intensive care unit (ICU) during the phases of critical illness. Representative median of energy intake according to the kilocalories per kilos per day (kcal/kg/d) (the weight measured upon admission to the ICU) followed until discharge from ICU. Each median of kcal/kg/d is calculated each day with the number of patients remaining in ICU. Each median was the energy data of 13 patients. Two patients were transferred from another hospital and their nutrition data were missing

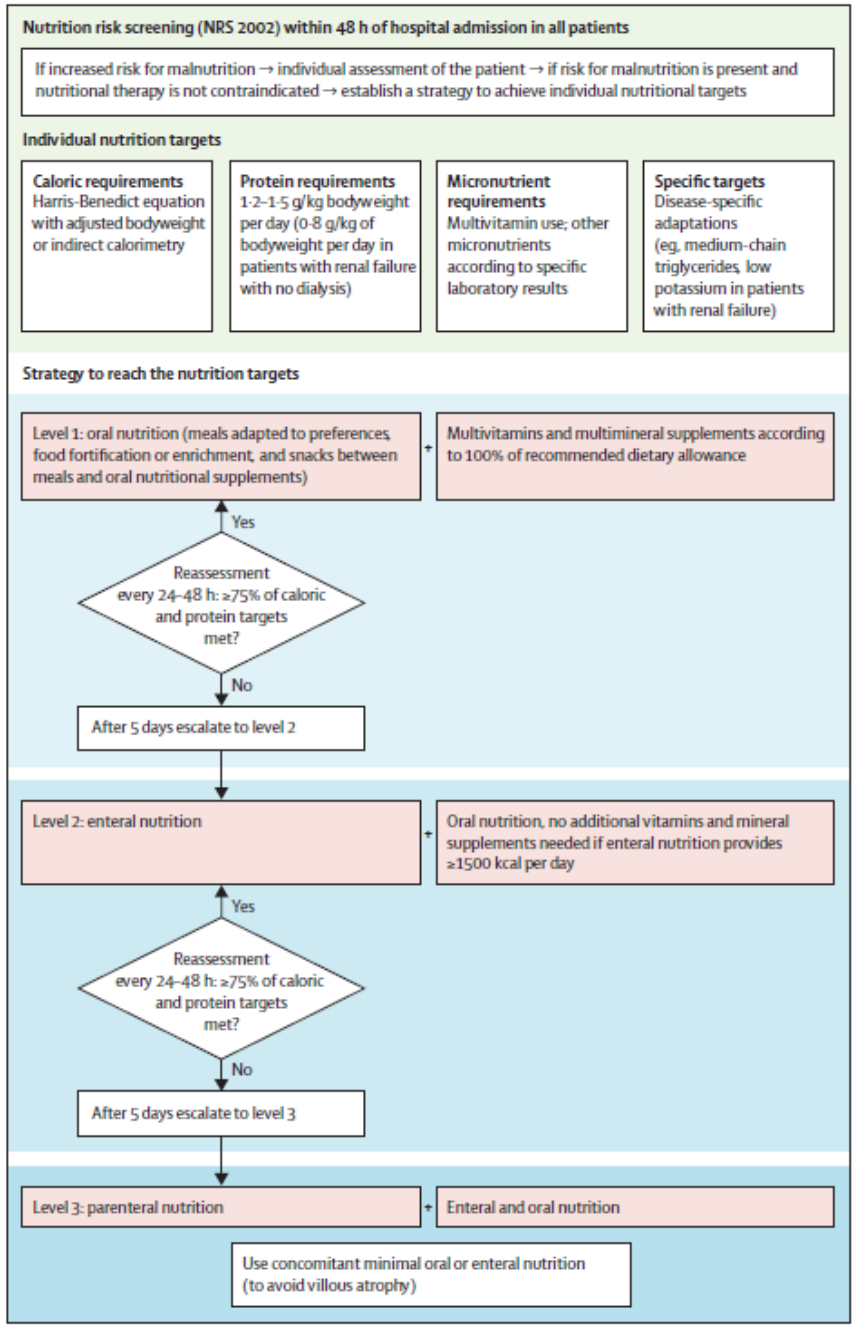


Figure 1: **Nutritional algorithm used during the trial**
Reproduced from Bounoure et al,[39] by permission of Elsevier.

Individualised nutritional support in medical inpatients at nutritional risk: a randomised clinical trial

Philipp Schuetz, Rebecca Fehr, Valerie Baechli, Martina Geiser, Manuela Deiss, Filomena Gomes, Alexander Kutz, Pascal Tribolet, Thomas Bregenzer, Nina Braun, Claus Hoess, Vojtech Pavlicek, Sarah Schmid, Stefan Bilz, Sarah Sigrist, Michael Brändle, Carmen Benz, Christoph Henzen, Silvia Mattmann, Robert Thomann, Claudia Brand, Jonas Rutishauser, Drahomir Aujesky, Nicolas Rodondi, Jacques Donzé, Zeno Stanga, Beat Mueller**

Lancet 2019; 393: 2312–21

Individualised nutritional support in medical inpatients at nutritional risk: a randomised clinical trial

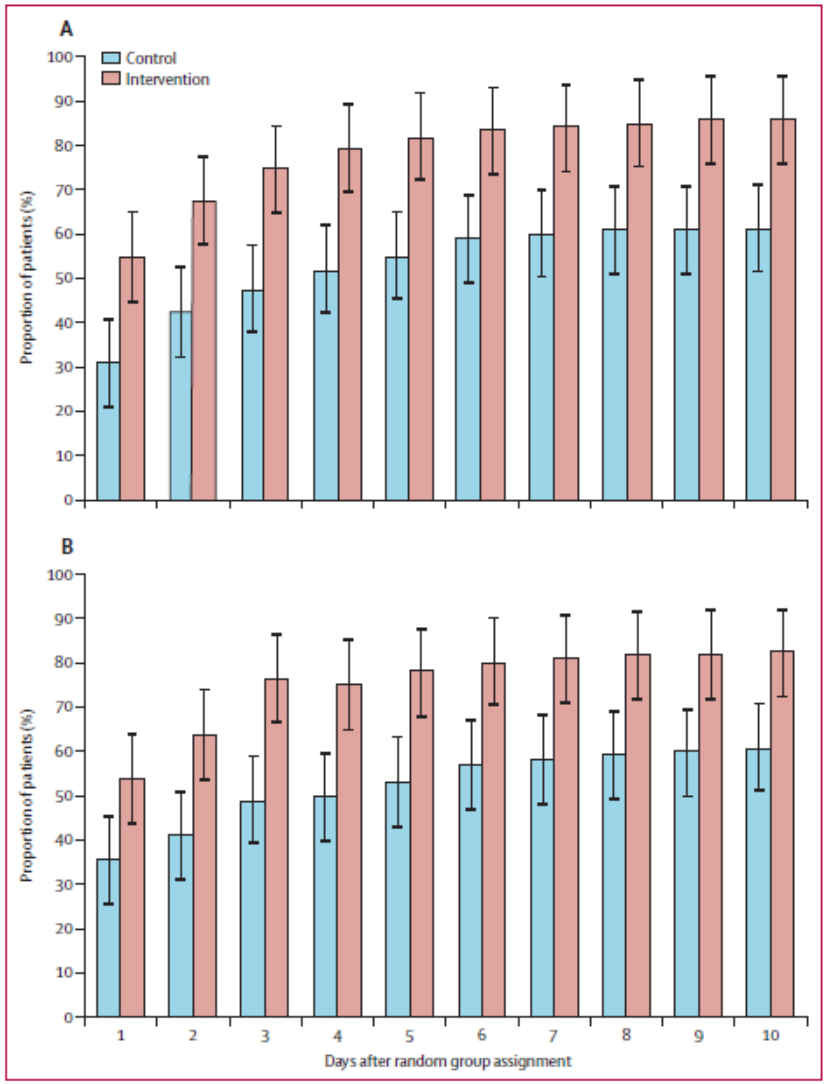


Figure 3: Proportion of patients reaching caloric (A) and protein (B) requirements during the first 10 days after random group assignment

a Gomes, Alexander Kutz, Pascal Tribolet,
ilz, Sarah Sigrist, Michael Brändle, Carmen Benz,
ser, Drahomir Aujesky, Nicolas Rodondi, Jacques Donzé,

Lancet 2019; 393: 2312–21

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Lancet 2019; 393: 2312–21

	Intervention group (n=1015)	Control group (n=1013)	Odds ratio or coefficient (95% CI)	p value
Outcomes				
Primary outcome				
Adverse outcome within 30 days	232 (23%)	272 (27%)	0·79 (0·64 to 0·97)	0·023
Single components of primary outcome				
All-cause mortality	73 (7%)	100 (10%)	0·65 (0·47 to 0·91)	0·011
Admission to the intensive care unit	23 (2%)	26 (3%)	0·85 (0·48 to 1·51)	0·58
Non-elective hospital readmission	89 (9%)	91 (9%)	0·99 (0·73 to 1·35)	0·96
Major complications				
Any major complication	74 (7%)	76 (8%)	0·95 (0·68 to 1·34)	0·79
Nosocomial infection	40 (4%)	39 (4%)	1·01 (0·63 to 1·59)	0·98
Respiratory failure	14 (1%)	13 (1%)	1·06 (0·49 to 2·28)	0·89
Major cardiovascular event	8 (1%)	7 (1%)	1·11 (0·40 to 3·11)	0·84
Acute kidney failure	32 (3%)	31 (3%)	1·01 (0·61 to 1·69)	0·96
Gastrointestinal events	9 (1%)	15 (1%)	0·57 (0·25 to 1·31)	0·19
Decline in functional status of ≥10%*	35 (4%) of 942	55 (6%) of 913	0·62 (0·40 to 0·96)	0·034
Additional secondary outcomes				
Mean length of stay (days)	9·5 (7·0)	9·6 (6·1)	−0·21 (−0·76 to 0·35)	0·46
Mean Barthel score (points)*	88 (26)	85 (30)	3·26 (0·93 to 5·60)	0·006
Mean EQ-5D VAS (points)†	59 (26)	56 (29)	3·06 (0·53 to 5·59)	<0·0001
Mean EQ-5D index (points)	0·75 (0·32)	0·73 (0·34)	0·13 (0·09 to 0·17)	0·018

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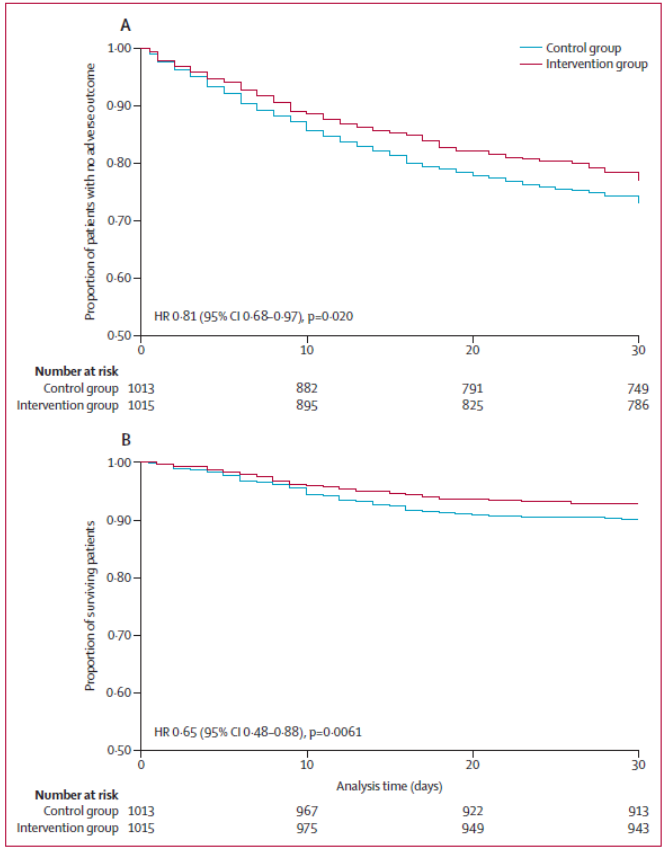


Figure 4: **Kaplan-Meier estimates of the cumulative incidence of the primary endpoint and all-cause mortality**
(A) Time to the first event of the composite primary endpoint (log-rank p value=0·035). (B) Time to death (log-rank p value=0·031).

Review

Trial Design in Critical Care Nutrition: The Past, Present and Future

Lee-anne S. Chapple [1,2,3,*], Emma J. Ridley [4,5] and Marianne J. Chapman [1,2,3]

Nutrients **2020**, *12*, 3694;

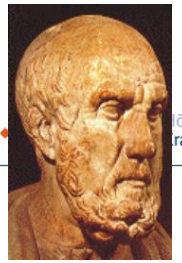
Table 1. Summary of critical care nutrition study design in the past, present, and future.

	Past	Present	Future
Study methodology	Small physiological, observational, and single-centre comparative trials; poorly defined and underdeveloped processes	Large phase III trials (usually in the 1000s); a priori defined protocols, outcomes, and interim analyses	Sophisticated statistical techniques; larger sample sizes (tens of thousands); adaptive trial designs
Population	Small, specific populations often from specialist centres	General, heterogenic populations	Homogenous; selected based on anticipated response to nutrition intervention (e.g., malnourished); includes non-invasively ventilated cohorts
Intervention	Calories; early vs. late initiation; route of delivery e.g., gastric vs. jejunal, EN vs. PN, protein- vs. glucose-based PN, medium- vs. long-chain triglycerides and branched chain amino acids; immunonutrition	General interventions for general questions; focused only on the period in ICU	Synergistic; patient-specific; based on mechanisms; extension of interventions beyond ICU discharge considering illness trajectory
Outcomes	Calorie delivery; nitrogen balance; incidence of infection; mortality (but underpowered to show an effect in the latter)	Robust clinical outcomes such as mortality	Patient recovery; functional outcomes; valid surrogate markers

Abbreviations: EN = enteral nutrition; ICU = intensive care unit; PN = parenteral nutrition.

Messages-clés

1. A la phase « aigüe », un excès de calories et de protéines est potentiellement toxique
2. En cas d'hypophosphatémie au début de la nutrition, ralentir le débit de 50% , phosphore et thiamine!
3. La voie orale / entérale est toujours préférable à la voie intraveineuse
4. Importance d'apports caloriques et protéiques suffisants en phase tardive / convalescence = réhabilitation nutritionnelles. Donc importance de réévaluer son patient !
5. Importance des micronutriments



Hippocrate (470-377 av. JC)
« Que ta nourriture soit ton médicament! »

Primum non nocere… avec une nutrition inadéquate: apports excessifs à la phase aïgue, insuffisants en phase tardive