

4^{ème} Journée COmmune de Réanimation
Hôtel The Russelior Hammamet
Samedi 31 Mai 2025

NUTRITION ENTERALE EN REANIMATION

Etat des lieux et recommandations

Dr REBAI Aïcha
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D A R
H M P

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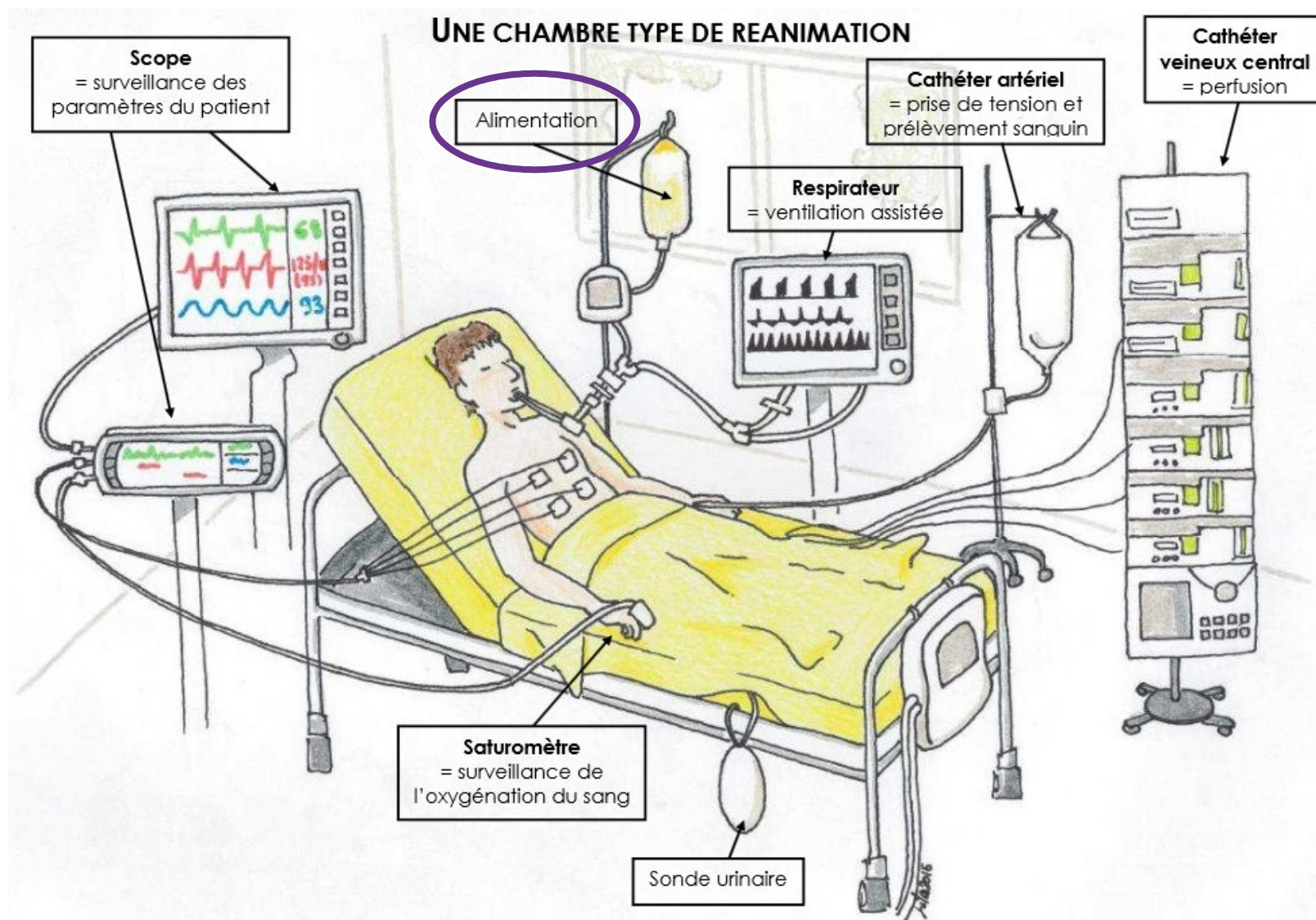


D A R
H M P

CONFLITS D'INTERE



Pourquoi doit-on en parler



Quelques chiffres

Admission : **30 – 60%** Dénutris ou à risque

Lew CCH, et al. Crit Care Med. 2017

Moisey LL, et al. JPEN J Parenter Enteral Nutr. 2020

Feeding-Gap : **50 – 70%** besoins calorico-protéïques à la 1^{ère} semaine

Cahill NE, et al. Crit Care Med. 2017

JPEN J Parenter Enteral Nutr. 2017

Initiation : **25 – 40%** de nutrition entérale (NE) initiée à H48

Heyland SR, et al. International Nutrition Survey

Interruption : **20 – 25%** de son temps d'administration (NE)

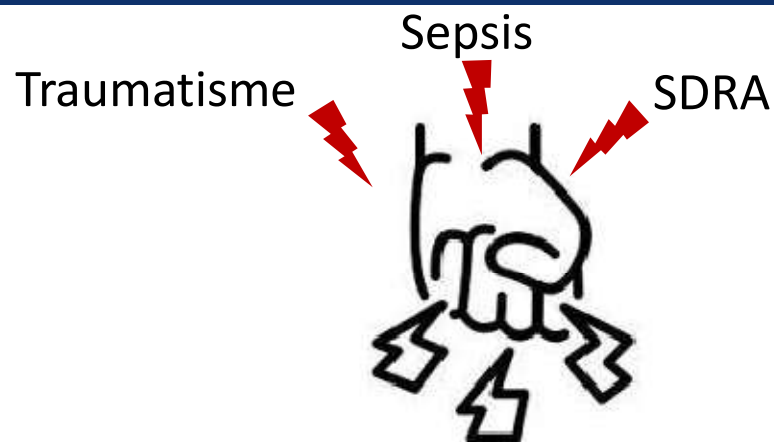
McClave SA, et al. JPEN J Parenter Enteral Nutr. 2009 (étude observationnelle)

Over-feeding : **15-25%**

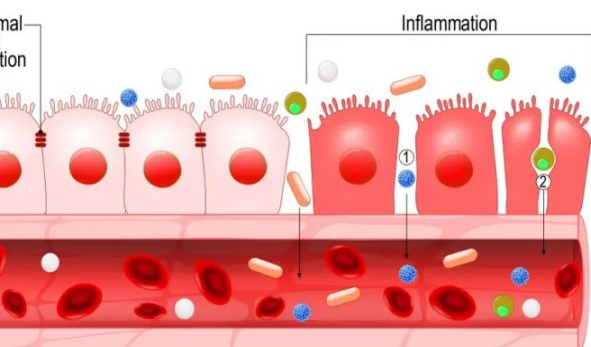
Zusman O, et al. Crit Care. 2016

Singer P, et al. Clin Nutr. 2019 (guidelines ESPEN)

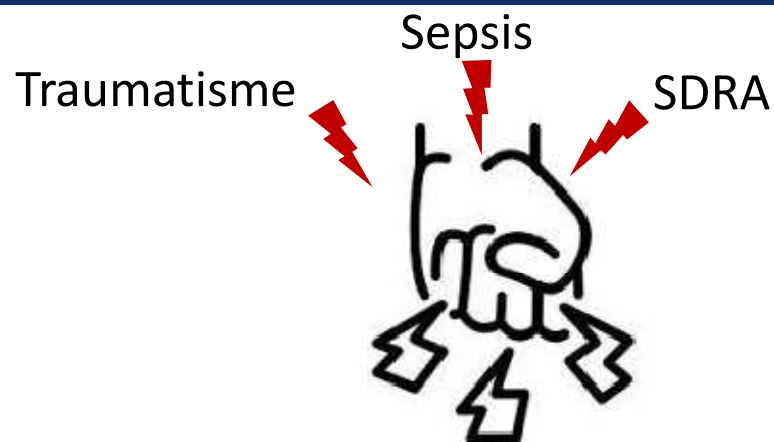
Ce que l'on sait



ALTERATION BARRIERE

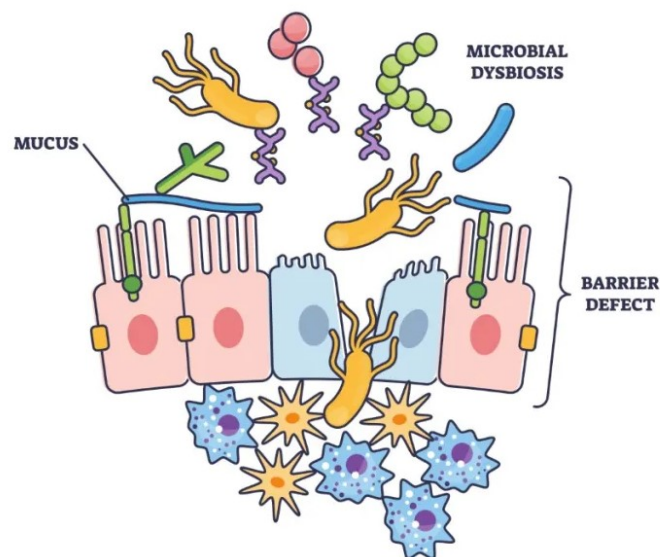


Ce que l'on sait

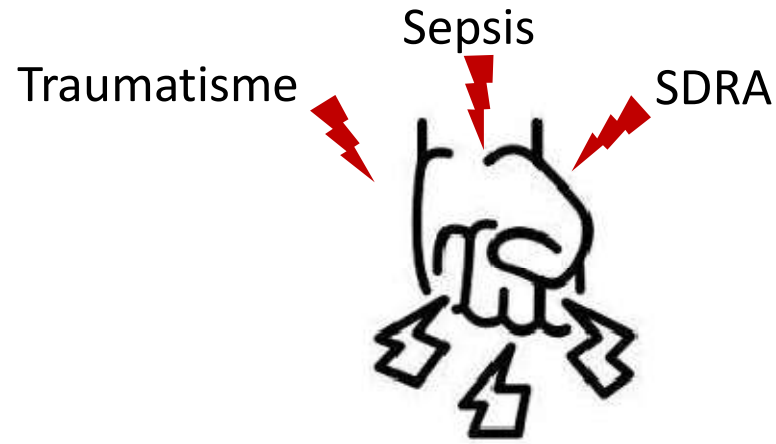


ALTERATION
BARRIERE

DYSBIOSE INTESTINALE

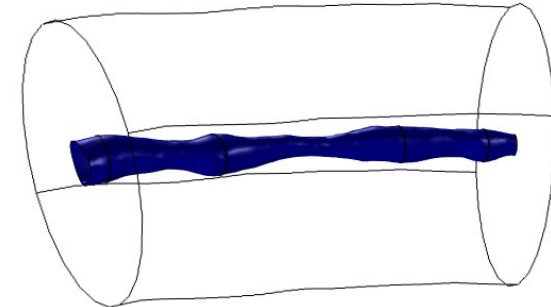


Ce que l'on sait

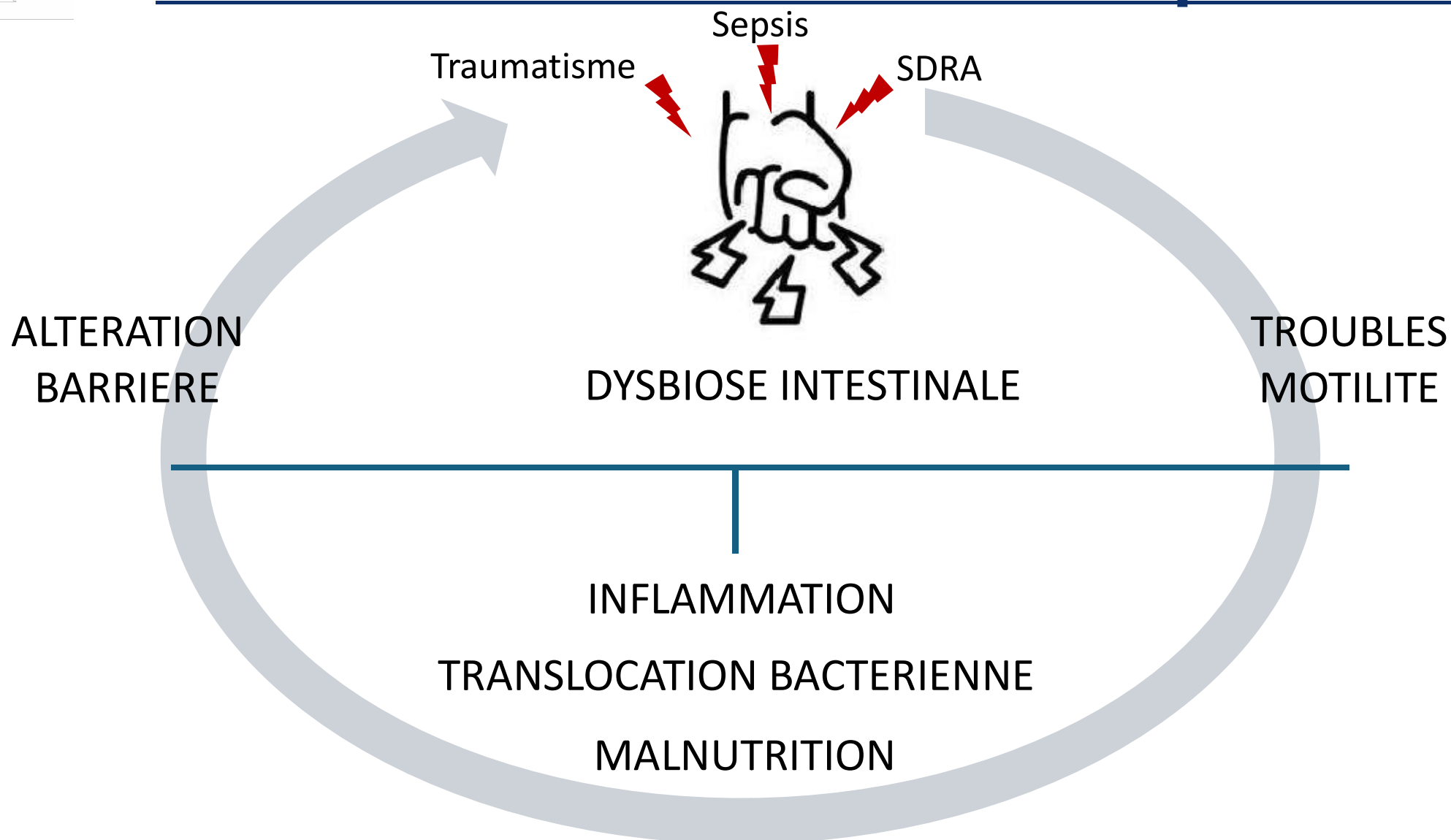


ALTERATION
BARRIERE

TROUBLES
MOTILITE



Ce que l'on sait



ORIGINAL ARTICLE

Negative impact of hypocaloric feeding and energy balance on clinical outcome in ICU patients

Clinical Nutrition (2005) 24, 502–509

Stéphane Villet^a, René L. Chiolerio^b, Marc D. Bollmann^b,
Jean-Pierre Revelly^b, Marie-Christine Cayeux RN^b,
Jacques Delarue^c, Mette M. Berger^{b,*}

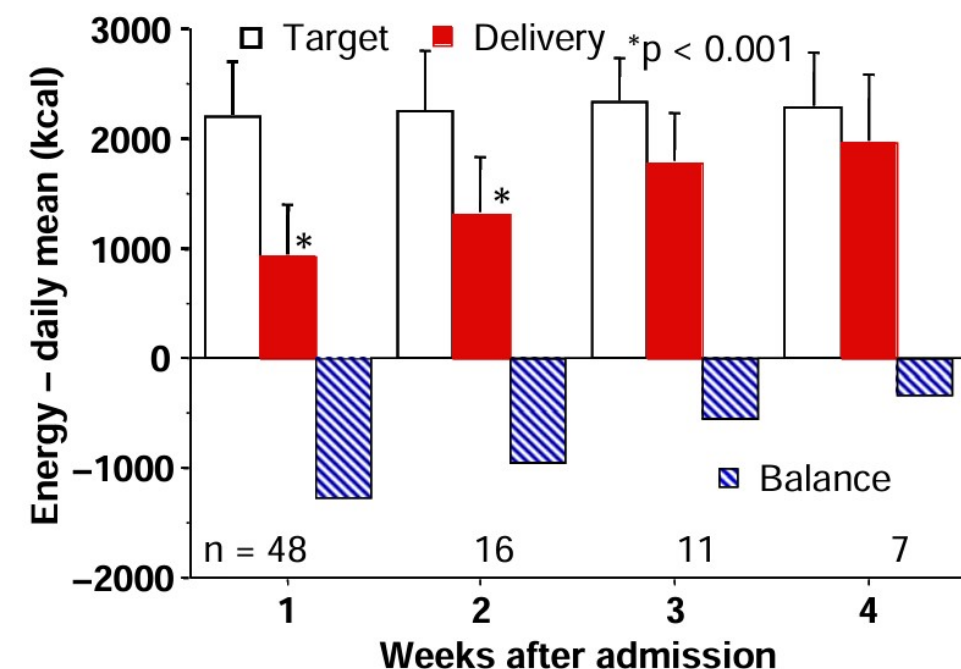
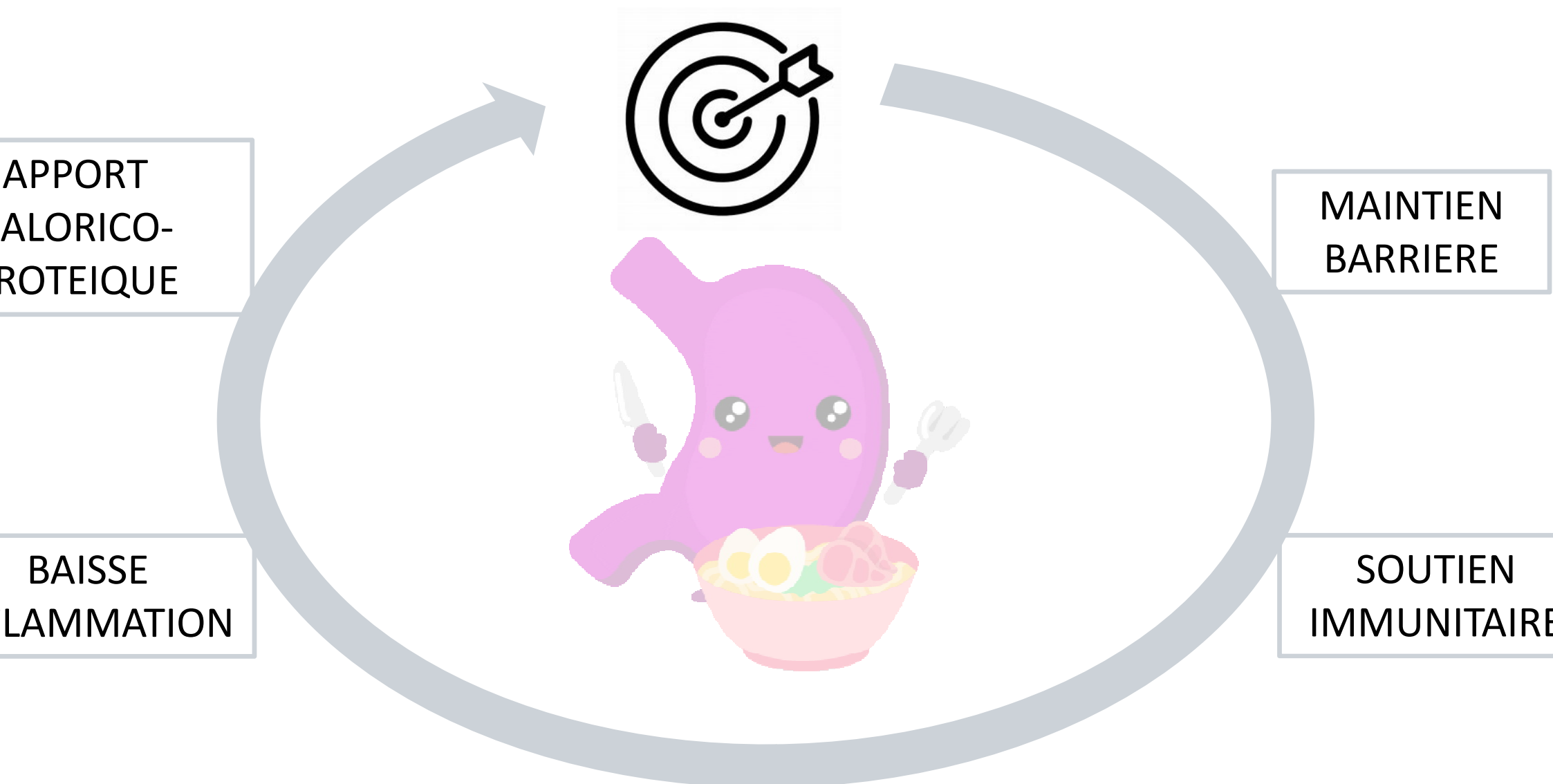


Table 4 Relationship between complications and cumulated energy deficit by regression analysis.

Variables	F	P
Length of stay	25.18	0.00
Complications	15.15	0.00
Infections	9.14	0.00
Days on antibiotics	17.48	0.00
Start of nutrition	17.17	0.00
Days of mechanical ventilation	17.12	0.00

Ce que l'on sait



CLINICAL GUIDELINES



Guidelines for the provision of nutrition support therapy for the adult critically ill patient: The American Society for Parenteral and Enteral Nutrition

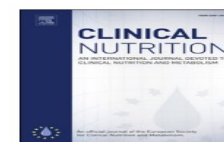
Charlene Compher PhD, RD¹ | Angela L. Bingham PharmD^{2,3} | Michele McCall MD⁴ | Jayshil Patel MD⁵ | Todd W. Rice MD, MSc⁶ | Carol Braunschweig PhD⁷ | Liam McKeever PhD, RDN⁷

Clinical Nutrition 42 (2023) 1671–1689

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: <http://www.elsevier.com/locate/clnu>



Guideline

AN practical and partially revised guideline: Clinical nutrition in intensive care unit

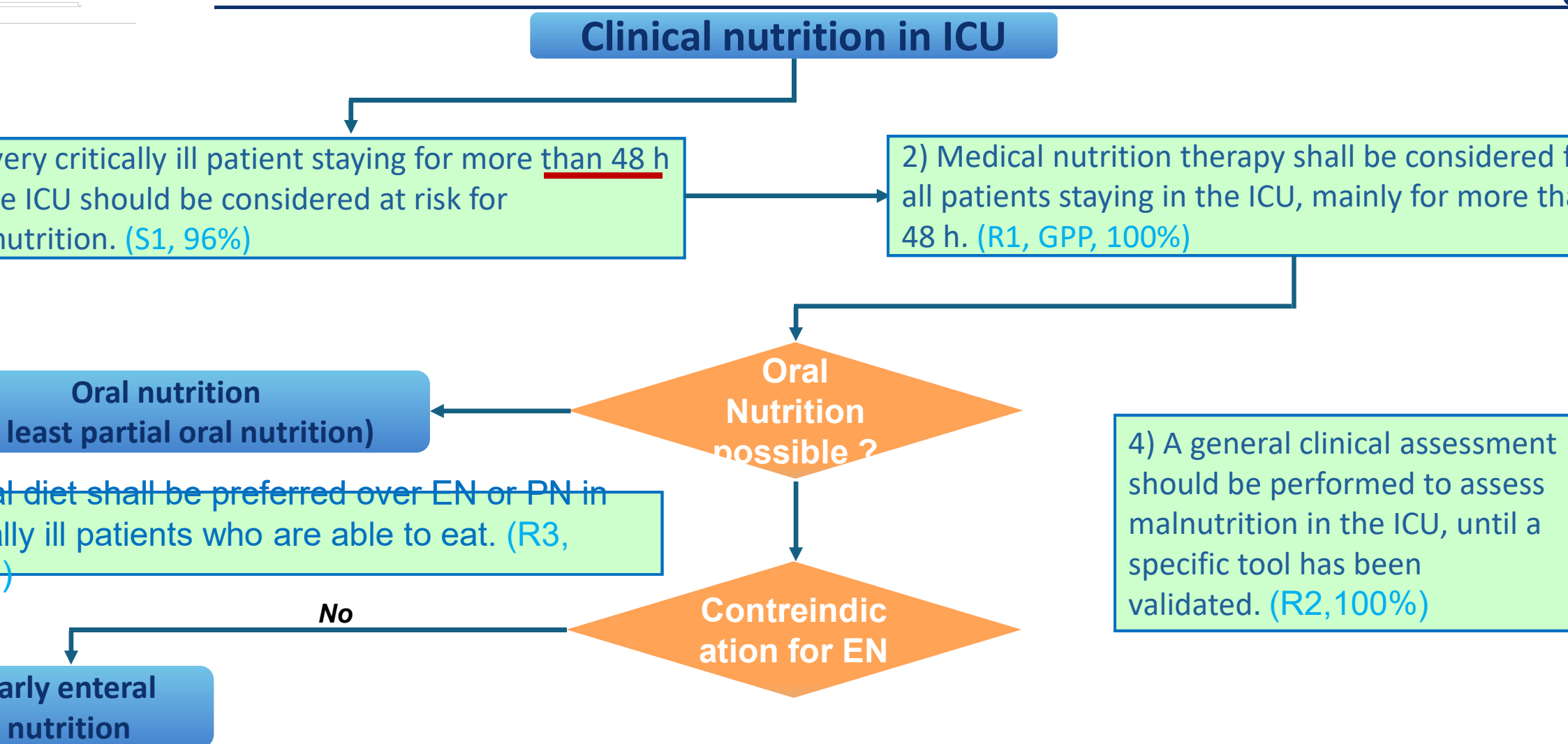
Singer ^{a,*}, Annika Reintam Blaser ^{b,c}, Mette M. Berger ^d, Philip C. Calder ^e,
El Casaer ^f, Michael Hiesmayr ^g, Konstantin Mayer ^h,
Carlos Montejo-Gonzalez ⁱ, Claude Pichard ^j, Jean-Charles Preiser ^k,
Michal Szczeklik ^l, Arthur R.H. van Zanten ^m, Stephan C. Bischoff ⁿ



1

Quel
Timing

1 Quel timing



1 Quel timing



choc non contrôlé

hyperoxémie, Hypercapnie ou Acidose non contrôlée

hémorragie gastro-intestinale supérieure

ischémie intestinale

occlusion intestinale à haut débit

syndrome du compartiment abdominal

volume d'aspiration gastrique > 500 mL/6h

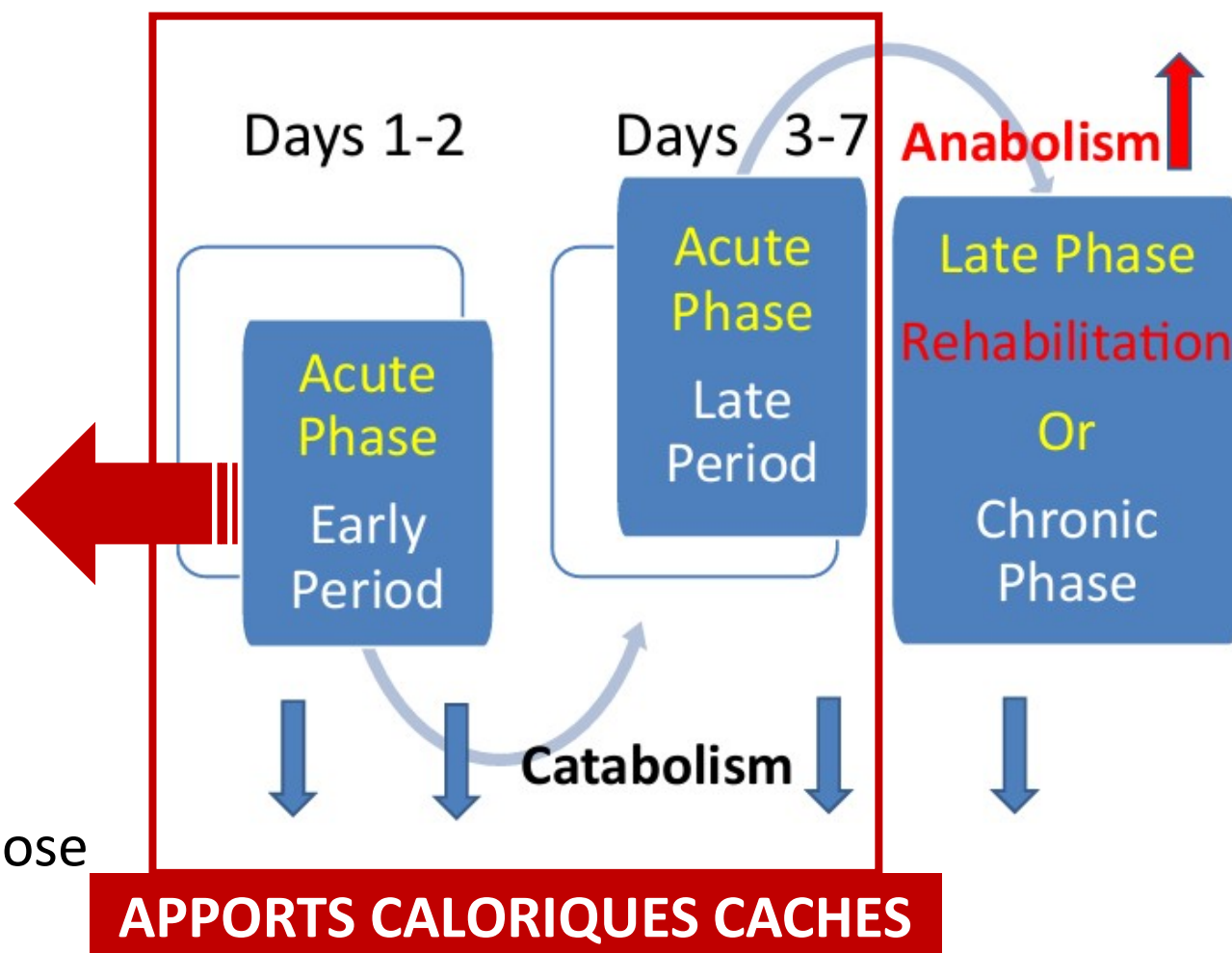
- Hypothermie thérapeutique
- Hypertension intra abdominale sans syndrome du compartiment abdominale
- Insuffisance hépatique aiguë

1 Quel timing

Apport calorique endogène :
1200 kcal/J : Non modulable, non mesurable

Perte de muscle :
1,5 à 3 kg de muscle/sem

- Insulino-résistance
- Protéolyse musculaire
- Production endogène de glucose



ure Med (2009) 35:2018–2027
7/s00134-009-1664-4

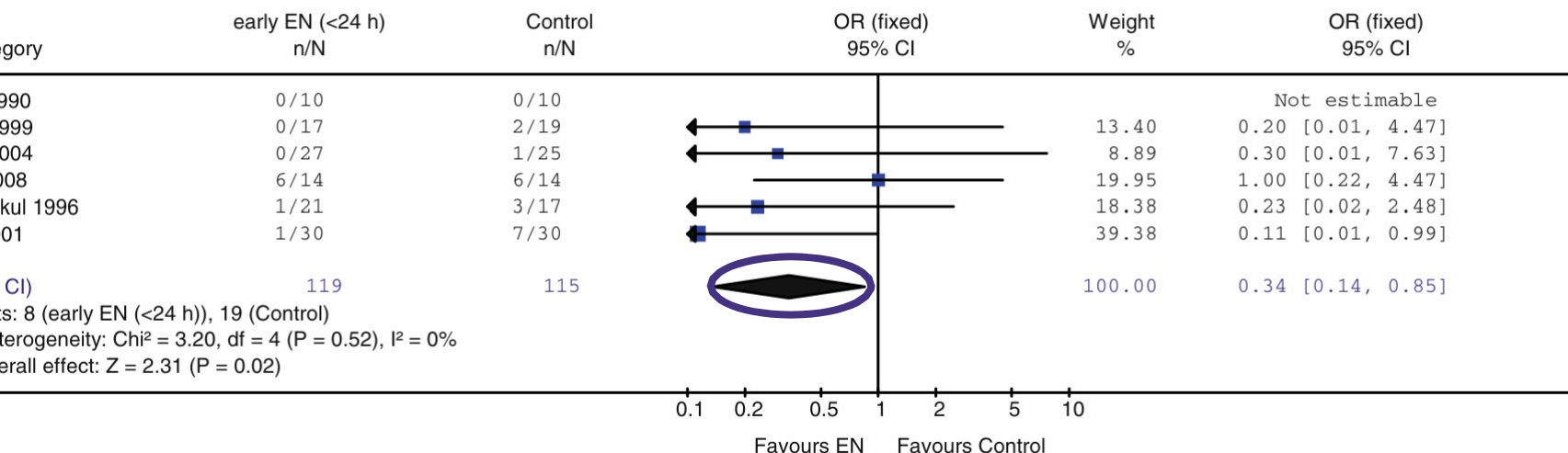
SYSTEMATIC REVIEW

. Doig
T. Heighes
apson
A. Sweetman
R. Davies

Early enteral nutrition, provided within 24 h of injury or intensive care unit admission, significantly reduces mortality in critically ill patients: a meta-analysis of randomised controlled trials

Early EN (<24h) vs Control (Primary Analysis)

n: 01 early EN vs Control
01 Mortality, Intention to treat analysis



Early enteral with
adequate calories
< 24h

Vs

EN>24h

Primary analysis: mortality. EN enteral nutrition, OR odds ratio

er et al. *Critical Care* (2021) 25:424
/doi.org/10.1186/s13054-021-03847-4

Critical Care

REVIEW

Open Access

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



-Charles Preiser^{1*}, Yaseen M. Arabi², Mette M. Berger³, Michael Casaer⁴, Stephen McClave⁵,
n C. Montejo-González⁶, Sandra Peake^{7,8}, Annika Reintam Blaser^{9,10}, Greet Van den Berghe⁴,
ur van Zanten¹¹, Jan Wernerman¹² and Paul Wischmeyer¹³

tion

Suggested answer

ASPEN/SCCM guidelines [6]

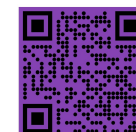
ESPEN guidelines [7]

h to start?

Start within 24–48 h of ICU admission

Recommendation: start early EN within
24–48 h (quality of evidence: very low)

Start early EN (within 48 h) rather than
ing EN (grade of recommendation: E
consensus)
Start early EN (within 48 h) rather than
(grade of recommendation: a strong



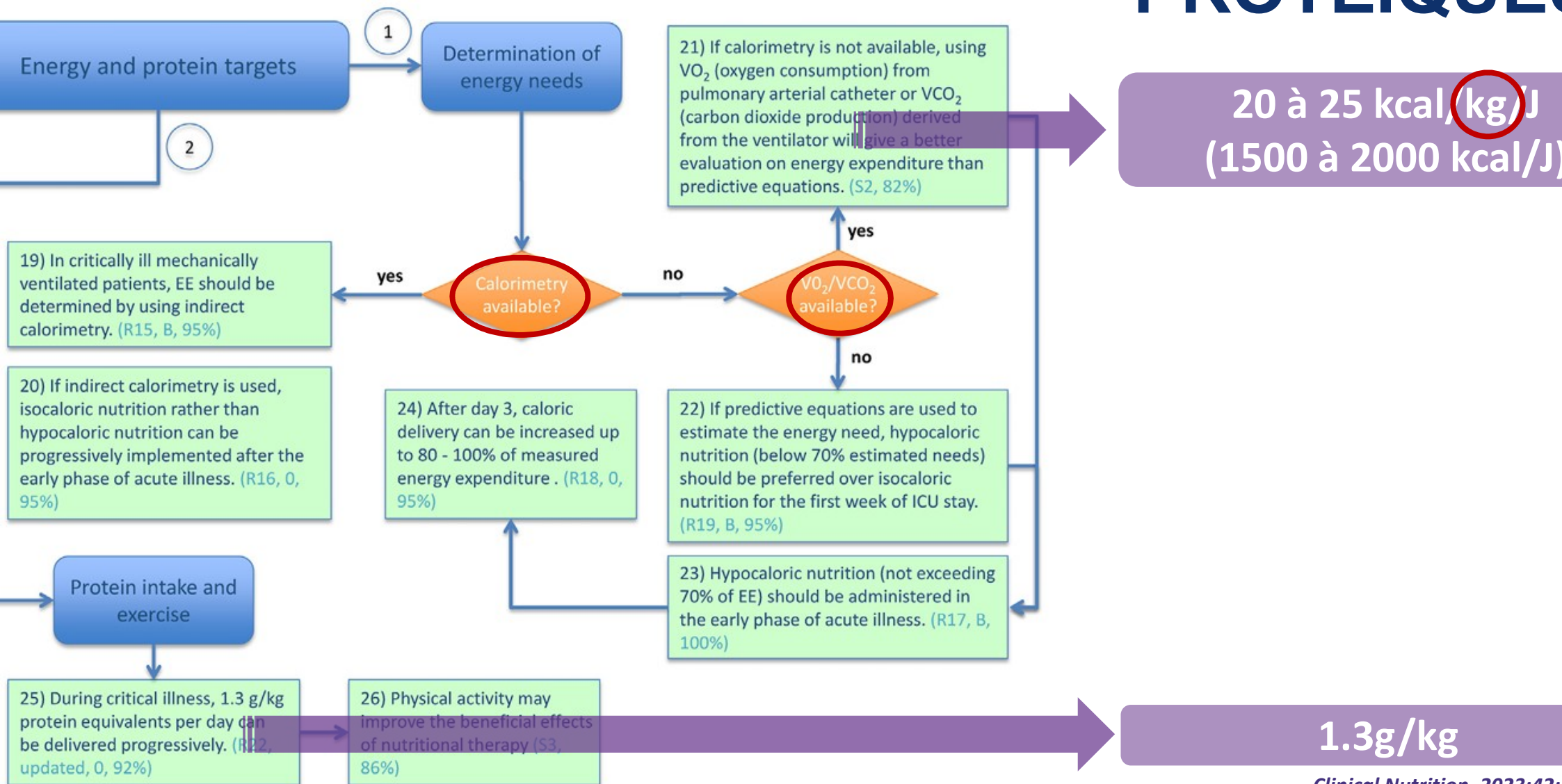
1

Quel
Timing

2

Quel
Objectif

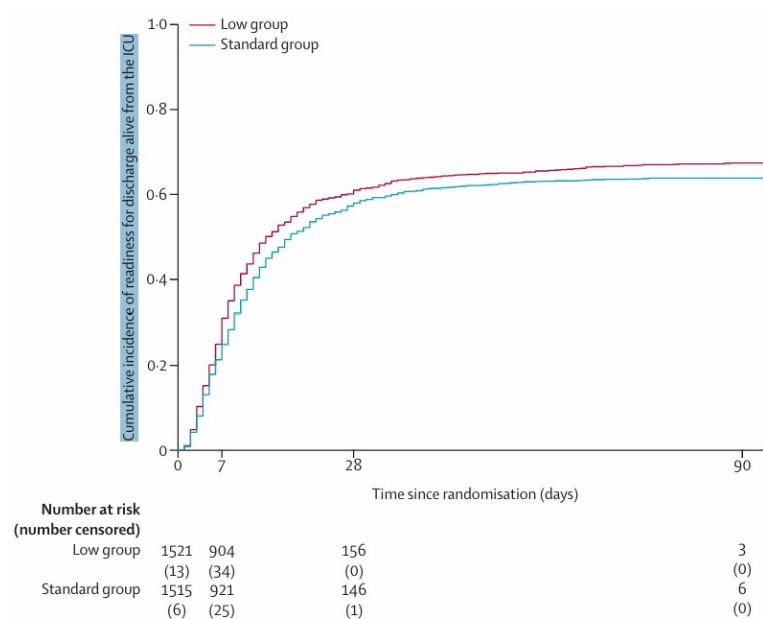
QUELS OBJECTIFS CALORIQUES PROTEIQUES



QUELS OBJECTIFS CALORICO PROTEIQUES

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

Investigators: Gaetan Plantefeve, Jean-Paul Mira, Laurent Argaud, Pierre Asfar, Nadia Aissaoui, Julio Badie, Nicolae-Vlad Botoc, Laurent Brisard, Vincent Bui, Delphine Chatellier, Louis Chauvelot, Alain Combes, Christophe Cracco, Michael Darmon, Vincent Das, Matthieu Debarre, Jérôme Devaquet, Louis-Marie Dumont, Olivier Gontier, Samuel Groyer, Laurent Guérin, Bertrand Guidet, Yannick Hourmant, Fabien Lambiotte, Christophe Leroy, Philippe Letocart, Benjamin Madeux, Julien Maizel, Olivier Martinet, Frédéric Martino, Maxime, Emmanuelle Mercier, Mai-Anh Nay, Saad Nseir, Johanna Oziel, Walter Picard, Gael Piton, Jean-Pierre Quenot, Florian Reizine, Vincent Rault, Jack Richecoeur, Jean-Philippe Rigaud, Francis Schneider, Daniel Silva, Michel Sirodot, Bertrand Souweine, Fabienne Tamion, Vincent Tazi, Didier Thévenin, Guillaume Thiery, Nathalie Thieulot-Rolin, Jean-Francois Timsit, Francois Tinturier, Patrice Tiroit, Peter van der Linden, Isabelle Vinatier, Christophe Vinsonneau, Sebastian Voicu, Jean-Baptiste Lascarrou, Amélie Le Gouge, for the NUTRIREA-3 Trial Investigators and the Clinical Research in Intensive Care and Sepsis (CRICS-TRIGGERSEP) Group

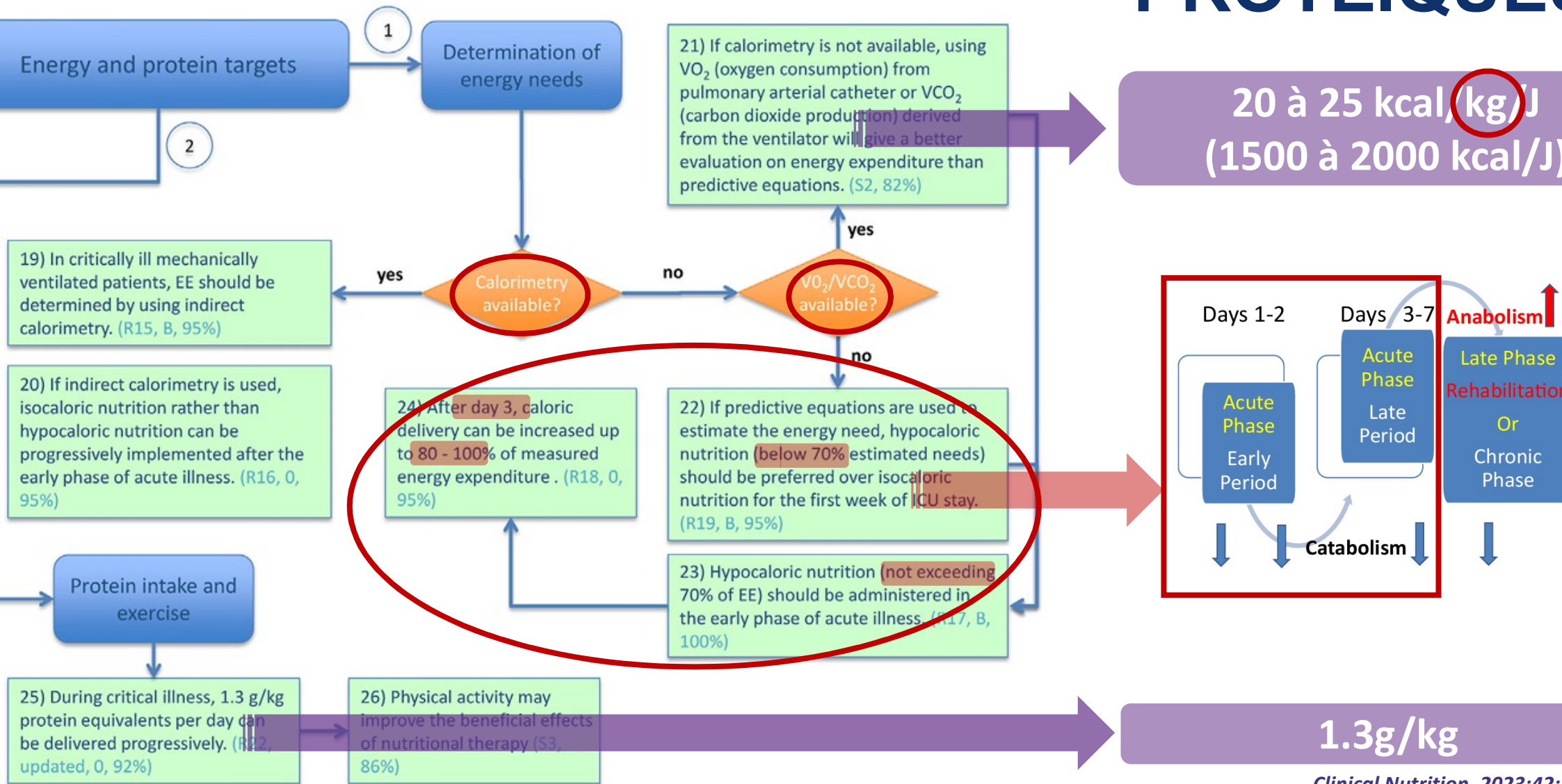


10 767 patients assessed for eligibility

3044 randomly assigned

	Low group (n=1521)	Standard group (n=1515)	Hazard ratio (95% CI)
Daily intakes			
Calories, kcal/kg per 24 h*	7.4 (5.8–9.5)	22.0 (17.5–24.9)	..
Protein, g/kg per day	0.2 (0.2–0.3)	0.9 (0.7–1.0)	..
Fluids, L	11.1 (6.1–16.4)	17.2 (9.7–23.4)	..
Secondary outcomes			
Day 28 mortality	504 (33.2%; n=1519)	533 (35.2%)	–2.0 (–5.4 to 1.4) ..
ICU mortality, cumulative incidence	29.6%	32.7%	.. 0.89 (0.78 to 1.0)
Hospital mortality, cumulative incidence	32.2%	34.5%	.. 0.93 (0.83 to 1.0)
ICU length of stay, days†	9.0 (5.0 to 15.0)	10.0 (6.0 to 17.0)	
Acute-care hospital length of stay, days†	21.0 (12.0 to 38.0)	22.0 (14.0 to 39.0)	
Time to weaning from vasopressor support, days	3.0 (2.0 to 4.0)	3.0 (2.0 to 4.0)	.. 1.07 (0.99 to 1.15)
Time to invasive mechanical ventilation weaning, days	5.0 (2.0 to 11.0)	6.0 (3.0 to 12.5)	.. 1.12 (1.03 to 1.22)
Received dialysis, cumulative incidence	30.1%	31.9%	.. 0.93 (0.82 to 1.0)
Infections, cumulative incidence			
ICU infection‡	15.3%	17.5%	.. 0.85 (0.71 to 1.0)
Ventilator-associated pneumonia	11.2%	10.9%	.. 0.98 (0.79 to 1.2)
Bacteraemia	4.0%	5.5%	.. 0.73 (0.53 to 1.0)
Central venous catheter infection	1.5%	1.9%	.. 0.81 (0.48 to 1.3)
Urinary tract infection	0.7%	0.8%	.. 1.20 (0.54 to 2.7)
Soft-tissue infection	7 patients	5 patients	
Other infection	1.7%	2.4%	.. 0.78 (0.48 to 1.2)
Gastrointestinal events, cumulative incidence			
Vomiting	20.2%	25.5%	.. 0.77 (0.67 to 0.88)
Diarrhoea	28.9%	33.3%	.. 0.83 (0.73 to 0.94)
Constipation	27.8%	28.7%	.. 0.97 (0.86 to 1.0)
Bowel ischaemia	0.9%	1.8%	.. 0.50 (0.26 to 0.91)
Acute colonic pseudo-obstruction	8 patients	2 patients	
Liver dysfunction, cumulative incidence§	61.7%	65.8%	.. 0.92 (0.86 to 0.98)

QUELS OBJECTIFS CALORIQUES PROTEIQUES



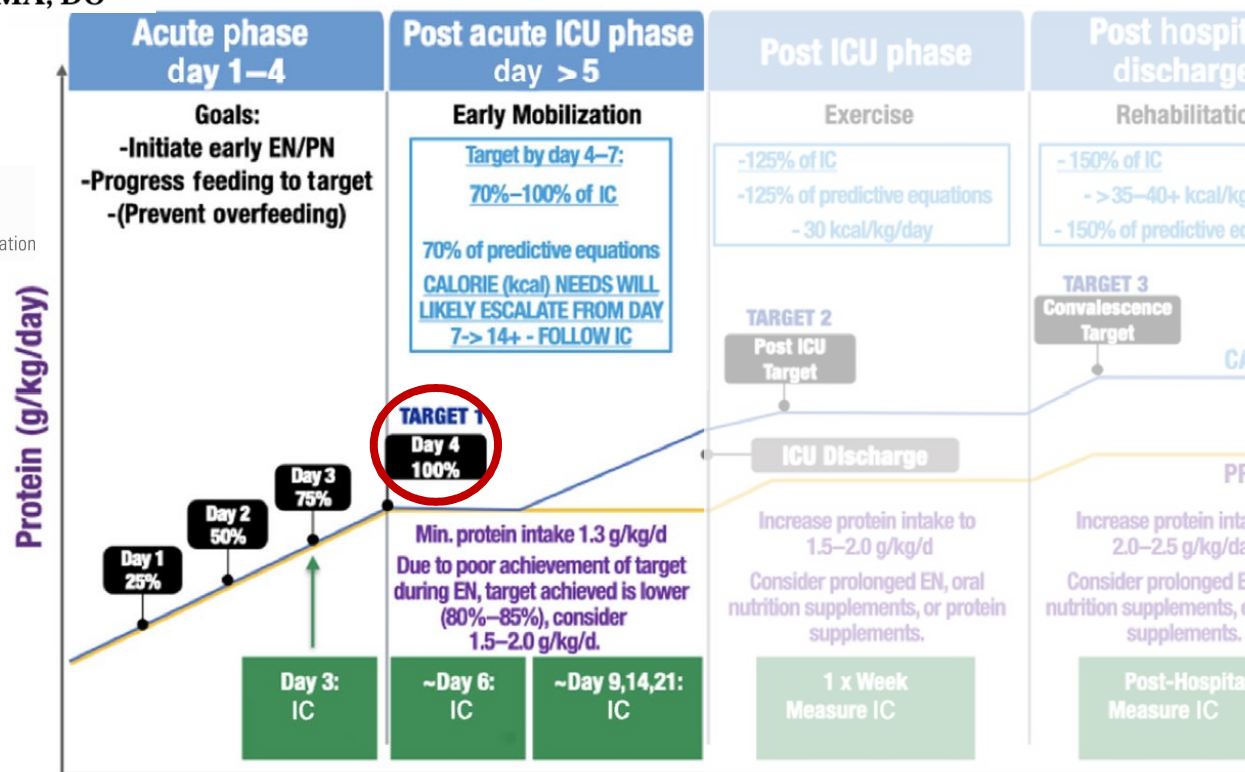
QUELS OBJECTIFS CALORIQUES PROTEIQUES



Nutr. Clin. Pract. 2021;36:275–281

Point-Counterpoint: Indirect Calorimetry Is Essential for Optimal Nutrition Therapy in the Intensive Care Unit

Vischmeyer MD, EDIC¹ | Jeroen Molinger MSc² | Krista Haines MA, DO³



QUELS OBJECTIFS CALORIQUES ET PROTÉIQUES ?

et al. Critical Care (2021) 25:424
doi.org/10.1186/s13054-021-03847-4

Critical Care

EVALUATION ET PERSONNALISATION

VIEW

Open Access

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



Charles Preiser^{1*}, Yaseen M. Arabi², Mette M. Berger³, Michael Casaer⁴, Stephen McClave⁵,
C. Montejo-González⁶, Sandra Peake^{7,8}, Annika Reintam Blaser^{9,10}, Greet Van den Berghe⁴,
van Zanten¹¹, Jan Wernerman¹² and Paul Wischmeyer¹³

J1 < 70%

12-15 kcal/kg/J
1 g/kg/J



J4 : 100%

25 kcal/kg
1.3 g/kg/J

Question

Suggested answer

ASPEN/SCCM guidelines [6]

ESPEN guidelines [7]

How much energy?

Accept below energy expenditure during the early phase and increase energy to match energy expenditure later (4–7 days)

Recommendation: No significant difference in clinical outcomes was found between patients with higher vs lower levels of energy intake. We suggest feeding between 12 and 25 kcal/kg (the range of mean energy intakes examined) in the first 7–10 day of ICU stay.

Administer hypocaloric EN (not exceeding 100% of EE) in the early phase of acute illness. Recommendation: B strong consensus. Increase caloric delivery can be increased after day 3 (grade of recommendation: 0 strong consensus).

How much proteins?

Low dose (e.g., 0.8 g/kg/day) during the early phase—to be increased to > 1.2 g/kg/day later

Suggestion: Administer sufficient (high-dose) protein in the range of 1.2–2.0 g/kg actual body weight per day and may likely be even higher in burn or multitrauma patients (quality of evidence: very low)

During critical illness, 1.3 g/kg protein elements per day can be delivered progressively (grade of recommendation: 0: strong consensus)

QUELS OBJECTIFS CALORICO PROTEIQUES



FORMULE :

Iso ou Hypercalorique
Hyperprotéique
Avec ou sans fibres

1

Quel
Timing

2

Quel
Objectif

3

Quel
site



should be delayed :

- Shock is uncontrolled and hemodynamic and tissue perfusion goals are not reached, whereas low dose EN can be started as soon as shock is controlled with fluids and vasopressors/inotropes, while remaining vigilant for signs of bowel ischemia
- Onset of uncontrolled life-threatening hypoxemia, hypercapnia or acidosis, whereas EN can be started in patients with stable hypoxemia, and compensated or permissive hypercapnia and acidosis
- In patients suffering from active upper gastrointestinal bleeding, whereas EN can be started when the bleeding has stopped and no signs of re-bleeding are observed
- In patients with overt bowel ischemia
- In patients with high-output intestinal fistula if reliable feeding access distal to the fistula is not achievable
- In patients with abdominal compartment syndrome if gastric aspirate volume is above 500 mL/6 h.

12) Low dose EN should be administered in patients:

- Receiving therapeutic hypothermia and increasing the dose after rewarming
- In patients with intra-abdominal hypertension without abdominal compartment syndrome, whereas temporary reduction or discontinuation of EN should be considered when intra-abdominal pressure values further increase under EN
- In patients with acute liver failure when acute, immediately life-threatening metabolic derangements are controlled with or without liver support strategies
- In dependent on grade of encephalopathy

EN Route of administration

15) Gastric access should be used as standard approach to initiate EN. (R100%)

QUEL SITE ?...Comment y arrive

	Sonde Salem	SNG	SNJ	Gastrostomie	Jejunosto
Type de sonde	Naso-gastrique Double courant	Naso-gastrique Simple lumière	Naso-jejunal Post-Pylorique	Gastrique	Post-pylori
Fonction	Aspiration gastrique Décompression NE possible	Nutrition entérale exclusive	Nutrition entérale exclusive Contourne l'estomac	Nutrition entérale exclusive	Nutrition ent exclusiv Contourne l'estoma
Durée d'utilisation	Courte < 5j	Moyenne (4-6 sem)	Moyenne (4-6 sem)	Longue durée > 4 – 6 sem	Longue du > 4 – 6 se
Facilité de pose	Facile	Facile	Modérée à difficile	Modérée (procédure invasive, nécessite une expertise)	Difficile (procédu chirurgica invasive
Confort	Faible Rigide / Gros calibre	Bon > Souple / Petit	Faible à bon (Irritation)	Bon	Bon

RECOMMANDATIONS FORMALISÉES D'EXPERTS

Alimentation artificielle en réanimation

Guidelines for nutrition support in critically ill patient

Frant^{a,*}, D. Hurel^b, N.J. Cano^{c,d,e}, C. Ichai^f, J.-C. Preiser^g, F. Tamion^h

Encadré 6.2 – Il faut probablement privilégier la sonde d'alimentation naso- ou oro-gastrique en première intention en raison de sa simplicité d'utilisation et du moindre coût ([Accord fort](#)).

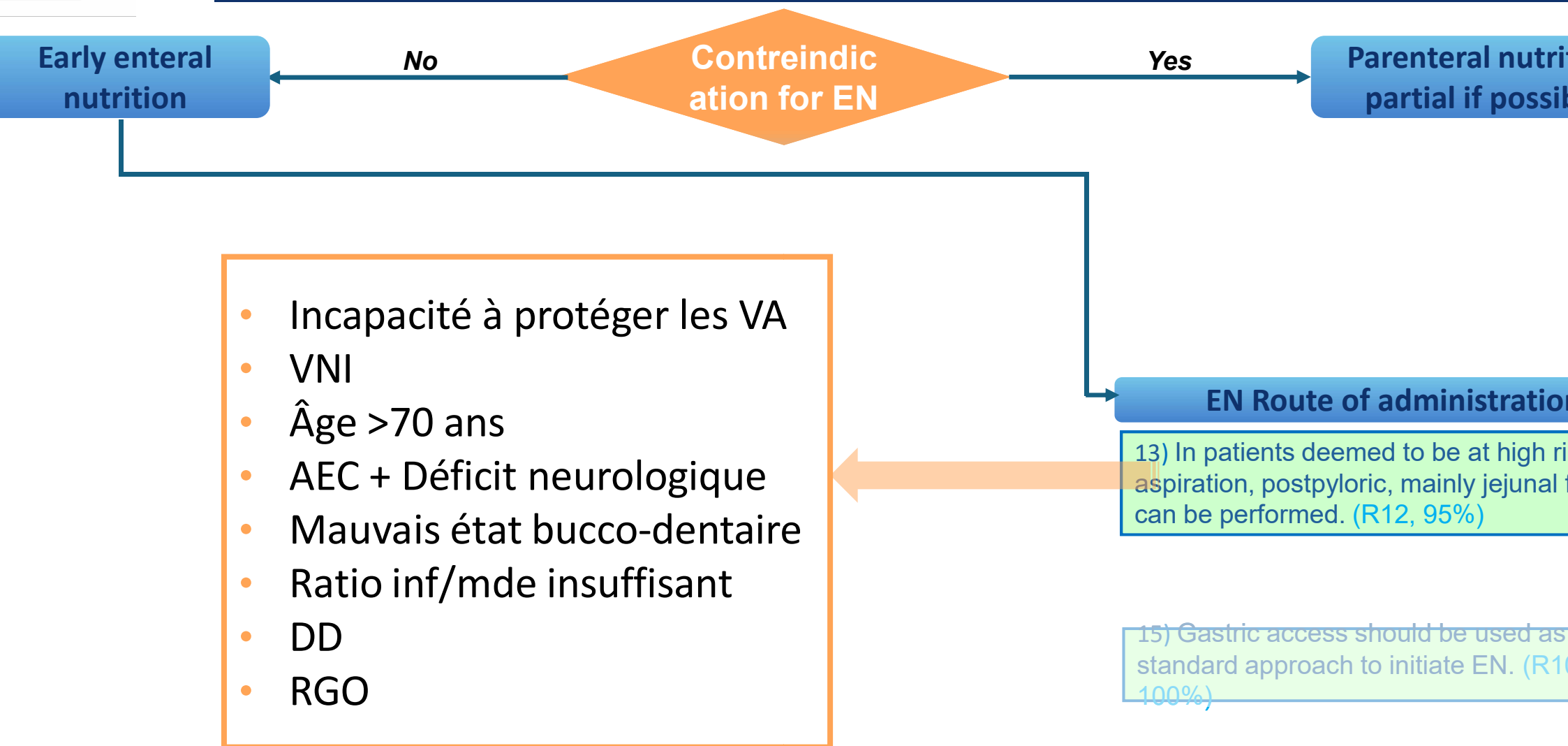
Encadré 6.5 – Il faut installer le patient en position semi-assise ($> 30^\circ$) pendant le NE ([Accord fort](#)).

Encadré 6.7 – Il faut probablement poser une gastrostomie lorsque la durée anticipée d'une NE dépasse 4 semaines ([Accord faible](#)).

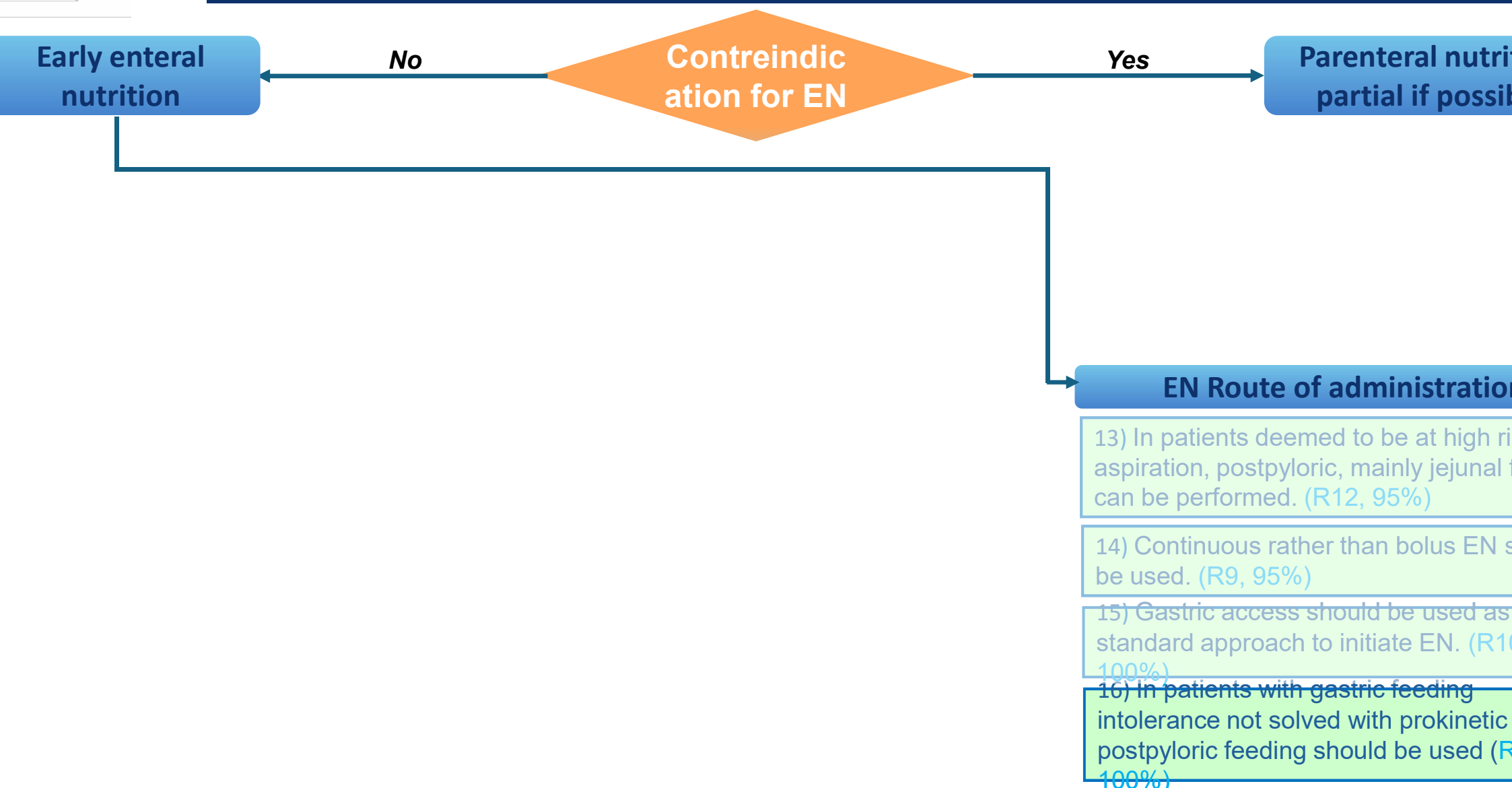


SFAR

Société Française d'Anesthésie et de Réanimation



3. QUEL SITE



1

Quel
Timing

2

Quel
Objectif

3

Quel
site

4

Quelle
surveillance

Q4ELLE SURVEILLAN

l should not be started until all
nable strategies to improve EN
nce have been attempted. (R 21,
ed, 100%)

- Surveillance des complications associées à la N
 - Distension abdominale
 - Remplissage gastrique excessif
 - Vomissements, régurgitations alimentaires
 - Distension intestinale jusqu'à Ogilvie
 - Ischémie intestinale
 - Diarrhée
- Surveillance du **volume gastrique résiduel**
- Mesure de la pression intra-abdominale

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



Charles Preiser^{1*}, Yaseen M. Arabi², Mette M. Berger³, Michael Casaer⁴, Stephen McClave⁵,
C. Montejo-González⁶, Sandra Peake^{7,8}, Annika Reintam Blaser^{9,10}, Greet Van den Berghe⁴,
van Zanten¹¹, Jan Wernerman¹² and Paul Wischmeyer¹³

Question	Suggested answer	ASPEN/SCCM guidelines [6]	ESPEN guidelines [7]
How to assess gastrointestinal tolerance?	At the start of low-dose EN: high gastric residual volume (optional—threshold 500 ml/6 h), vomiting, pain, distension, elevated/increasing intra-abdominal pressure, absent bowel sounds—dynamic ileus	Suggestion: Do not use GRVs as part of routine care to monitor ICU patients receiving EN Suggestion: for those ICUs where GRVs are still utilized, avoid holding EN for GRVs < 500 mL in the absence of other signs of intolerance (quality of evidence: low)	The measurement of GRV for the assessment of gastrointestinal dysfunction is common and may help to identify intolerance to EN during initiation and progression of EN. However, monitoring established EN with continued measurements of GRV may not be necessary. We suggest that enteral feeding should be delayed when GRV is > 500 mL/6 h in this situation, and if examination of the abdomen does not suggest an acute abdominal complication, application of prokinetics should be considered.

ORIGINAL ARTICLE

Ultrasonographic-measurement of Gastric Residual Volume in Critically Ill Patients for Prediction of Gastric Tube Feed Intolerance

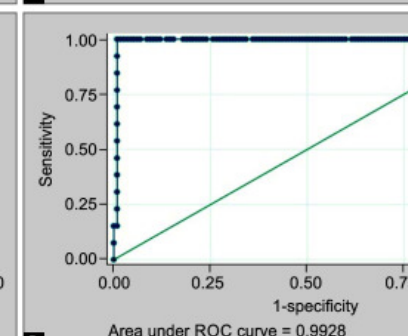
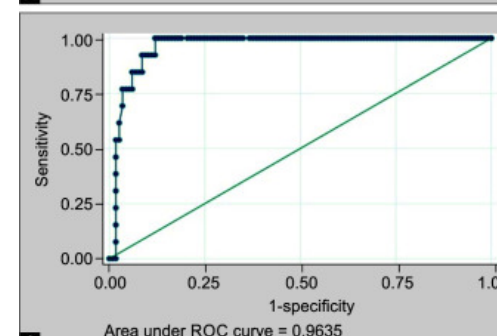
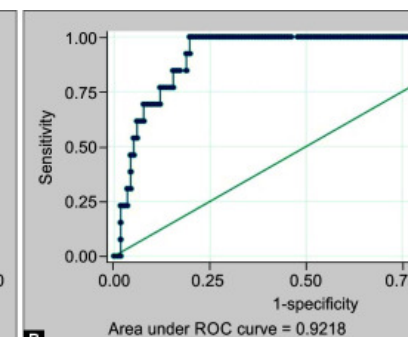
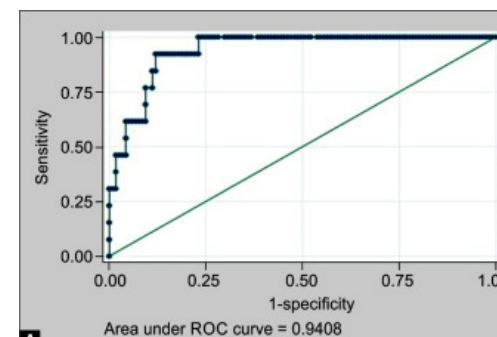
Indian J Critical Care Med. 2022; 26(9):

Ankalagi¹, Preet Mohinder Singh², Vimi Rewari³, Rashmi Ramachandran⁴, Richa Aggarwal⁵, Kapil Dev Soni⁶,
Das⁷, Kumble Seetharama Madhusudhan⁸, Deep Narayan Srivastava⁹, Manpreet Kaur¹⁰, Anjan Trikha¹¹

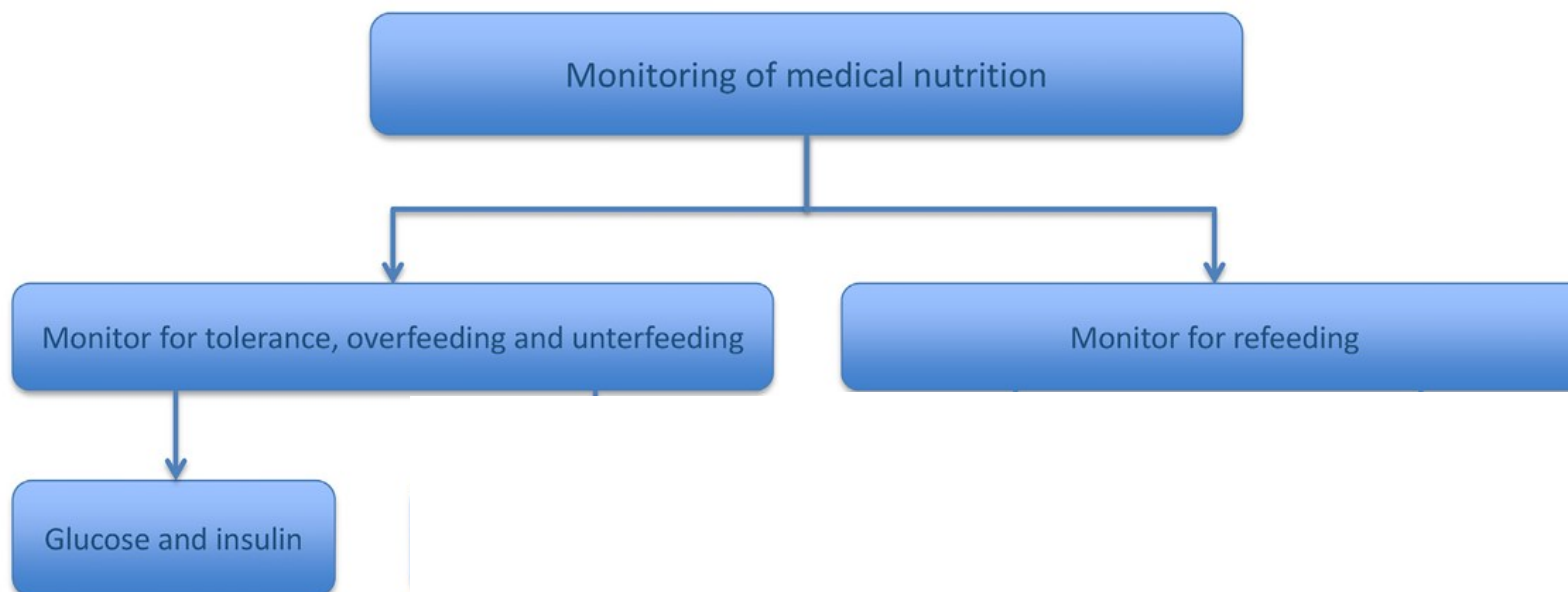
Received on: 23 June 2022; Accepted on: 25 July 2022; Published on: 31 August 2022

CONCLUSION

Ultrasonographic measurement of GRV can be used in critically ill patients for prediction of gastric tube feed intolerance in medical or surgical ICU patients receiving enteral tube feed. Ultrasonography can be used to measure GRV to predict feed intolerance with a sensitivity of 92% and specificity of 96%, (3 hours) and with a sensitivity of 100% and specificity 99%, and AUROC of 99.3% (6 hours). Hence, in critically ill patients, receiving gastric tube feed through continuous infusion, serial ultrasonographic measurement of GRV identifies feed intolerance with good sensitivity and specificity.



Q4 QUELLE SURVEILLAN

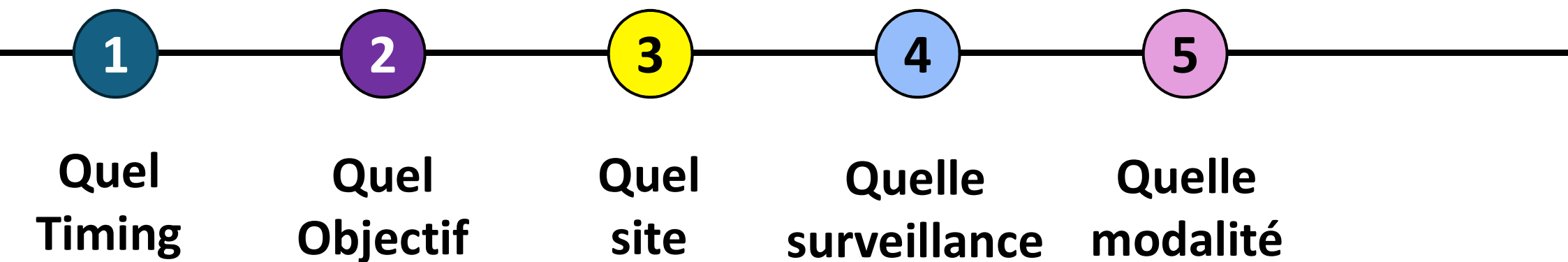


53) Blood glucose should be measured initially (after ICU admission or after artificial nutrition initiation) and at least every four hours, for the first two days in general. (R53, GPP, 93%)

c. 7.8 – 10 mmol/L

54) Insulin shall be administered, when glucose levels exceed 10 mmol/L (R54, A, 93%)

- Erythromycine : 100 – 250 mg x 3 / j
- Metoclopramide : 10 mg x 3 / j



QUELLE MODALITE D'ADMINISTRATION

Early enteral
nutrition

No

Contreindic
ation for EN

Yes

Parenteral nutri
partial if possibl

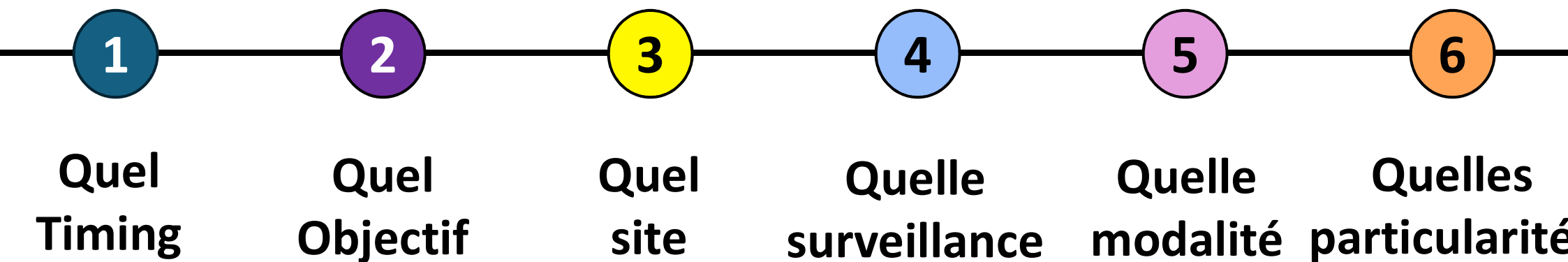
EN Route of administration

13) In patients deemed to be at high risk of aspiration, postpyloric, mainly jejunal feeding can be performed. (R12, 95%)

14) Continuous rather than bolus EN should be used. (R9, 95%)

15) Gastric access should be used as the standard approach to initiate EN. (R10, 100%)

16) In patients with gastric feeding intolerance not solved with prokinetic, postpyloric feeding should be used (R11, 100%)



Q6 ELLES PARTICULARIT

Medical nutrition in special cases

The non-
bated patient

Patient brûlé

30) In patients with burns > 20% bodysurface area, additional enteral doses of glutamine (GLN) (0.3e0.5 g/kg/d) should be administered for 10 - 15 days as soon as EN is commenced. (R26, 95%)

Encadré 9.8.1 – Les besoins énergétiques du patient gravement brûlé sont fortement augmentés, mais variables dans le temps. Cette augmentation est proportionnelle à la surface corporelle atteinte, mais plafonne à partir d'une surface corporelle brûlée (SCB) de 60 % (Accord fort).

Encadré 9.8.3 – Il faut utiliser des mesures non nutritionnelles pour atténuer l'hypermétabolisme et l'hypercatabolisme tant chez l'adulte que chez l'enfant (température ambiante, chirurgie d'excision précoce, bêtabloquants non sélectifs, oxandrolone). Contrairement à l'adulte, il faut substituer en rh-GH les enfants brûlés à plus de 60 % (Accord faible).

Encadré 9.8.2 – En l'absence de calorimétrie indirecte, il faut déterminer les besoins énergétiques avec la formule de Toronto car les formules fixes conduisent à une sous ou à une surestimation des besoins (Accord fort).

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Q⁶UELLES PARTICULARITÉS

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RECOMMANDATIONS FORMALISÉES D'EXPERTS

Alimentation artificielle en réanimation

Guidelines for nutrition support in critically ill patient

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SFAR

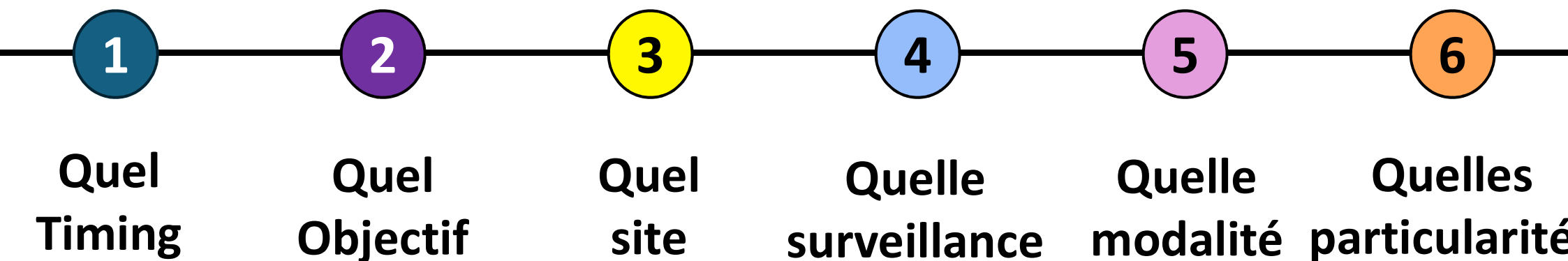
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SDRA

Encadré 9.4.1 – Il ne faut pas interrompre systématiquement la nutrition entérale lors de la mise en décubitus ventral (Accord fort).

Insuffisant rénal

Encadré 9.2.1 – Il faut probablement majorer l'apport protéique quotidien du patient sous épuration extrarénale continue pour atteindre un niveau de 1,7 à 2 g/kg par jour (Accord faible).



EXERCICE PHYSIQUE

- PRECISION NUTRITION : Phénotype du patient, métabolome, microbiome ?
- BIOMARQUEURS FIABLES : Etat nutritionnel et efficacité de la nutrition
- BIG DATA et IA : Optimisation des stratégies nutritionnelles
- OPTIMISATION DU SEVRAGE

to be continued

Alimenter c'est soigner !

- DENUTRITION : Ennemi bien installé en réanimation
- FONCTION NUTRITION = Fonction vitale
- EVALUATION obligatoire
- PERSONNALISATION : Maître-mot ➡ Quand ? Combien ? Comment ?
- MONITORAGE ➡ Gestion pro-active des complications

Que ton alimentation soit ta première Médecine