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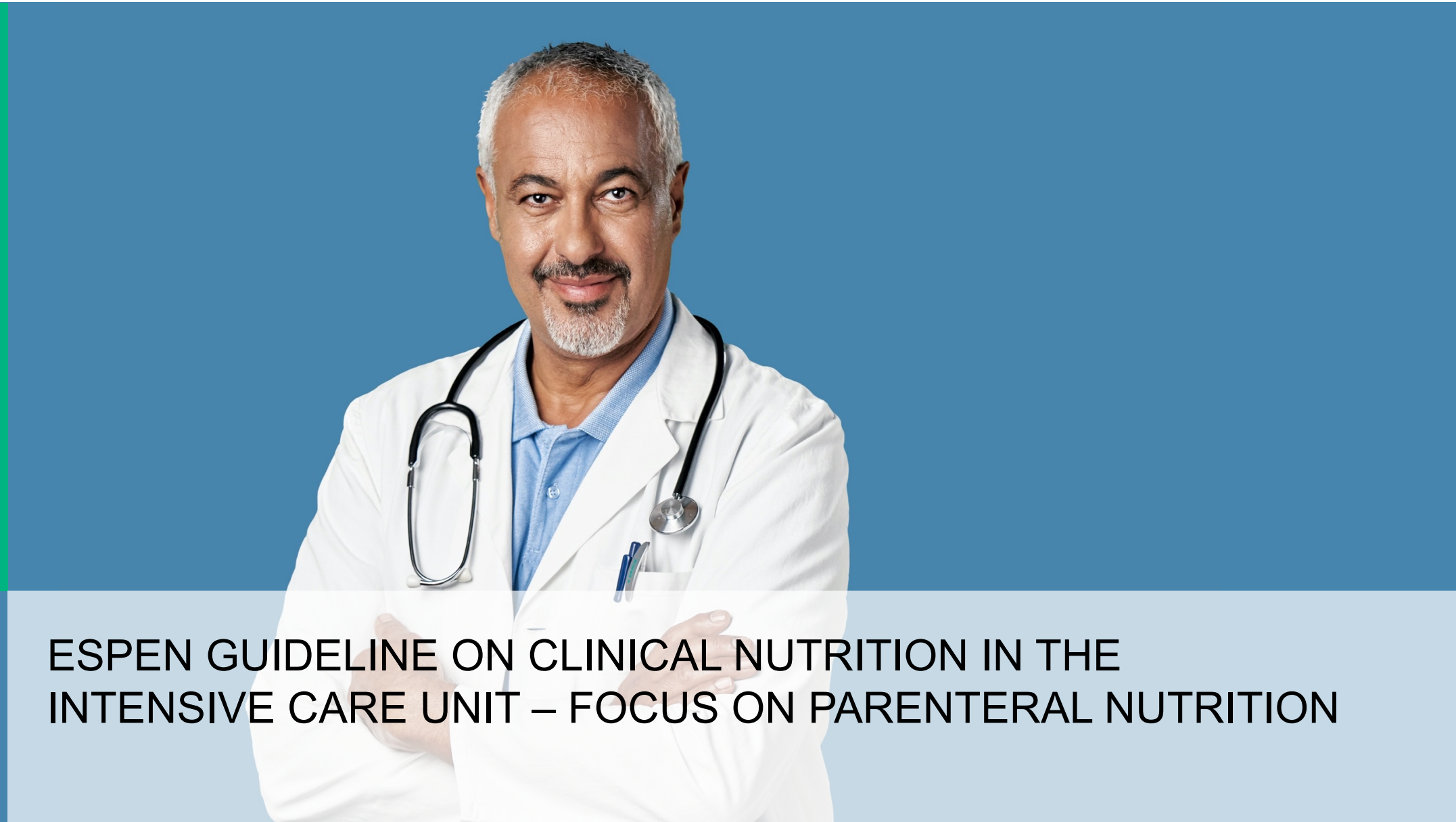
SHARING EXPERTISE



ESPEN GUIDELINE ON CLINICAL NUTRITION IN THE INTENSIVE CARE UNIT – FOCUS ON PARENTERAL NUTRITION

CLINICAL QUESTION 1:

Who should benefit from medical nutrition?

Who should be considered for medical nutrition therapy?

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 1

Medical nutrition therapy shall be considered for all patients staying in the ICU, mainly for more than 48 h.

GRADE OF RECOMMENDATION

GPP – strong consensus (100 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

CLINICAL QUESTION 2:

How to assess malnutrition?

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 2

A general clinical assessment should be performed to assess malnutrition in the ICU, until a specific tool has been validated.

Remark*:* General clinical assessment could include anamnesis, report of unintentional weight loss or decrease in physical performance before ICU admission, physical examination, general assessment of body composition, and muscle mass and strength, if possible.

GRADE OF RECOMMENDATION

GPP – strong consensus (100 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

STATEMENT 1

» Every critically ill patient staying for more than 48 h in the ICU should be considered at risk for malnutrition.

Strong consensus (96 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

CLINICAL QUESTION 4:

When should nutrition therapy be initiated and which route should be used?

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 6

In case of contraindications to oral and EN, PN should be implemented **within three to seven days.**

GRADE OF RECOMMENDATION

B – consensus (89 % agreement)*

RECOMMENDATION 7

Early and progressive PN can be provided instead of no nutrition in case of contraindications for EN in severely malnourished patients.

GRADE OF RECOMMENDATION

0 – strong consensus (95 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

COMMENT ON RECOMMENDATION 6 AND 7 (ESPEN GUIDELINE PAGE 55):

… The Canadian Critical Care Practice Guideline guidelines[72] recommend similarly stating "when considering nutrition support for critically ill patients, we recommend the use of EN over PN in patients with an intact gastrointestinal tract." However, based on expert consensus, when a patient is determined to be at high nutrition risk (e.g., NRS 2002 > 5) or severely malnourished, and EN is not feasible, the initiation of low-dose PN should be carefully considered and balanced against the risks of overfeeding and refeeding, which may outweigh the expected benefits.

We endorse contraindications as defined in ESICM guidelines[15] and suggest withholding EN in critically ill patients with uncontrolled shock, uncontrolled hypoxemia and acidosis, uncontrolled upper GI bleeding, gastric aspirate >500 ml/6 h, bowel ischemia, bowel obstruction, abdominal compartment syndrome, and high-output fistula without distal feeding access.

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

COMMENT ON RECOMMENDATION 6 AND 7 (ESPEN GUIDELINE PAGE 56):

Taken together, timing, route and caloric/protein target should no longer be considered as three different issues, but should rather be integrated into a more comprehensive approach considering all these aspects. After defining the timing and the route, the energy/ protein goal should be achieved progressively and not before the first 48 h to avoid over-nutrition.

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

Key points should be aiming for

1	Oral nutrition as early as possible while considering the risks of complications (e.g. aspiration)
2	Early EN at a low rate and progressive increase within 48 h if oral nutrition is not possible while considering the risk of complications; this progressive increase should be ruled by local protocols
3	Determination of the optimal starting point and dose of (supplemental) PN based on the risk of complications from oral or EN, state of acute illness and presence of previous under/malnutrition

The issue of intentional underfeeding is a matter of intense debate and is currently being investigated in prospective trials comparing low and high amounts of calories and/or proteins.

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 15

In critically ill mechanically ventilated patients, EE should be determined by using indirect calorimetry

GRADE OF RECOMMENDATION

B – strong consensus (95 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

STATEMENT 2

» If calorimetry is not available, using VO_2 (oxygen consumption) from pulmonary arterial catheter or VCO_2 (carbon dioxide production) derived from the ventilator will give a better evaluation on EE than predictive equations.

Consensus (82 % agreement)

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 16

If indirect calorimetry is used, isocaloric nutrition rather than hypocaloric nutrition can be progressively implemented after the early phase of acute illness.

GRADE OF RECOMMENDATION

0 – strong consensus (95 % agreement)*

RECOMMENDATION 17

Hypocaloric nutrition (not exceeding 70 % of EE) should be administered in the early phase of acute illness.

GRADE OF RECOMMENDATION

B – strong consensus (100 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

RECOMMENDATION 18

After day 3, caloric delivery can be increased up to 80 – 100 % of measured EE.

GRADE OF RECOMMENDATION

0 – strong consensus (95 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

CLINICAL QUESTION 10:

When should we apply/implement supplemental PN?

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 20

In patients who do not tolerate full dose EN during the first week in the ICU, the safety and benefits of initiating PN should be weighed on a case-by-case basis.

GRADE OF RECOMMENDATION

GPP – strong consensus (96 % agreement)*

RECOMMENDATION 21

PN should not be started until all strategies to maximize EN tolerance have been attempted.

GRADE OF RECOMMENDATION

GPP – strong consensus (95 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

COMMENT ON RECOMMENDATION 20 AND 21

… when the level of energy needs provided by EN is below 60 % three days after ICU admission, ***supplementary PN should be initiated*** *to reach a maximum of 100 % of the energy needs.*

… Although early enteral feeding is recommended in most cases[15] (see specific section), the calorie and protein targets are difficult to achieve in many situations.

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

CLINICAL QUESTION 11:

In adult critically ill patients, does high protein intake compared to low protein intake improve outcome (reduce mortality, reduce infections)?

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 22

During critical illness, 1.3 g/kg protein equivalents per day can be delivered progressively.

GRADE OF RECOMMENDATION

0 – strong consensus (91 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

GRADES OF RECOMMENDATION

A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++, directly applicable to the target population; or a body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results: or extrapolated evidence from studies rated as 1++ or 1+
0	Evidence level 3 or 4; or extrapolated evidence from studies rated 2++ or 2+
GPP	Good practice points. Recommended best practice based on the clinical experience of the guideline development group

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

LEVELS OF EVIDENCE

1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1-	Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++	High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2-	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e. g. case reports, case series
4	Expert opinion

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

CLINICAL QUESTION 12:

What are the recommended combinations of carbohydrates and fat during EN and PN?

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 23

The amount of glucose (PN) or carbohydrates (EN) administered to ICU patients should not exceed 5 mg/kg/min**.

****Cave**: For 3-Chamber bags the maximum infusion rate for glucose is registered till 0.25 g/kg bw/h. This corresponds to max. 4 mg/kg/min glucose

GRADE OF RECOMMENDATION

GPP – strong consensus (100 % agreement)*

RECOMMENDATION 24

The administration of intravenous lipid emulsions should be generally a part of PN.

GRADE OF RECOMMENDATION

GPP – strong consensus (100 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

RECOMMENDATION 25

Intravenous lipid (including non-nutritional lipid sources) should not exceed 1.5 g lipids/kg/day and should be adapted to individual tolerance.

GRADE OF RECOMMENDATION

GPP – strong consensus (100 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

CLINICAL QUESTION 14:

Should we use enteral/parenteral EPA/DHA?

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 33

Parenteral lipid emulsions enriched with EPA & DHA (Fish oil dose 0.1-0.2 g/kg/d) can be provided in patients receiving PN.

GRADE OF RECOMMENDATION

0 – strong consensus (100 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

Commentary

Soyabean oil	… it is clear that the use of intravenous fat emulsions **based solely on a soybean oil** rich in 18 carbon omega-6 FA should be avoided due to their likely pro-inflammatory effects.
Olive oil	Olive oil also had an advantage over soybean oil in terms of LOS[250,251]. However, Umpierrez et al.[252] did not find any difference in terms of morbidity and mortality between olive oil and soybean oil.
Study performed with Lipoplus/Lipidem from B. Braun	Grau et al. in a multicenter prospective randomized double blind study, showed a significant decrease in infection rate using a lipid emulsion with long chain triglycerides (LCT; soybean oil), MCT and fish oil compared to an emulsion with LCT/MCT alone[259].

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

CLINICAL QUESTION 15:

Should we use parenteral micronutrients and antioxidants in critically ill patients?

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

RECOMMENDATION 34

To enable substrate metabolism, micronutrients (i.e. trace elements and vitamins) should be provided daily with PN.

GRADE OF RECOMMENDATION

B – strong consensus (100 % agreement)*

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
*for explanation, please see appendix

Appendix

GRADES OF RECOMMENDATION	
A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results
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Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

Appendix

CLASSIFICATION OF THE STRENGTH OF CONSENSUS[3]	
Strong consensus	Agreement of > 90 % of the participants
Consensus	Agreement of > 75 - 90 % of the participants
Majority agreement	Agreement of > 50 - 75 % of the participants
No consensus	Agreement of < 50 % of the participants

The recommendations were classified according to the strength of consensus within the working group in April 2018.

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

Appendix

LEVELS OF EVIDENCE	
1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
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3	Non-analytic studies, e. g. case reports, case series
4	Expert opinion

Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

References

ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79
Literature mentioned in this overview from Reference: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79

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Source: ESPEN guideline on clinical nutrition in the intensive care unit, P. Singer et al. / Clinical Nutrition 38 (2019) 48-79