ESPEN Guideline on clinical nutrition in the intensive care unit: A summary for clinical practice[1]

Clinical questions with recommendations (critical care patients)

1. *Target group* — GPP
- All patients staying in the ICU, mainly for more than 48 h.

2. *Assessing malnutrition*
- General clinical assessment should be performed to assess malnutrition in the ICU, until a specific tool has been validated. — GPP
  This 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.

3. *Screening for the risk of malnutrition during hospital stay:*
- Every critically ill patient staying for more than 48 h in the ICU should be considered at risk for malnutrition.

4. *Initiation and route for nutrition in critically ill patients*
- Oral diet shall be preferred over EN or PN in patients who are able to eat (amount above 70% of the needs is considered as adequate). — GPP
- If oral intake is not possible, early EN (within 48 h) should be performed/initiated rather than delaying EN. — B
- If oral intake is not possible, early EN (within 48 h) shall be performed/initiated rather than early PN — A

  } Low rate and progressive increase within 48 h
- In case of contraindications to oral and EN, PN should be implemented within 3 to 7 days. — B
- Early and progressive PN can be provided instead of no nutrition in case of contraindications for EN in severely malnourished patients. — 0
- To avoid overfeeding, early full EN and PN shall not be used in critically ill patients but shall be prescribed within 3 to 7 days. — A

5. *Intermittent EN vs continuously administered EN:*
- Continuous rather than bolus EN should be used. — B

6. *Postpyloric EN vs gastric EN on outcomes (reduce mortality, reduce infections):*
- Gastric access should be used as the standard approach to initiate EN. — GPP
- In patients with gastric feeding intolerance not solved with prokinetic agents, postpyloric feeding should be used. — B
- In patients deemed to be at high risk for aspiration, postpyloric, mainly jejunal feeding can be performed. — GPP

7. *Administration of prokinetics on outcome (reduce mortality, reduce infections)*
- In critically ill patients with gastric feeding intolerance, intravenous erythromycin should be used as a first line prokinetic therapy. — B
- Alternatively, intravenous metoclopramide or a combination of metoclopramide and erythromycin can be used as a prokinetic therapy. — 0

8. *Defining the energy expenditure (EE):*
- In critically ill mechanically ventilated patients, EE should be determined by using indirect calorimetry. — B
- If calorimetry is not available, using VO2 (oxygen consumption) from pulmonary arterial catheter or VCO2 (carbon dioxide production) derived from the ventilator will give a better evaluation on EE than predictive equations.

9. *Isocaloric vs hypocaloric nutrition when caloric needs are measured using indirect calorimetry or estimated using predictive equations:*
- If indirect calorimetry is used, isocaloric nutrition rather than hypocaloric nutrition can be progressively implemented after the early phase of acute illness. — 0
- Hypocaloric nutrition (not exceeding 70% of EE) should be administered in the early phase of acute illness. — B
- After day 3, caloric delivery can be increased up to 80-100% of measured EE. — 0
- If predictive equations are used to estimate the energy need, hypocaloric nutrition (below 70% estimated needs) should be preferred over isocaloric nutrition for the first week of ICU stay. — B

10. *When to apply/implement supplemental PN:*
- 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. — GPP
- PN should not be started until all strategies to maximize EN tolerance have been attempted. — GPP

11. *High protein intake vs low protein intake on outcome (reduce mortality, reduce infections):*
- During critical illness, 1.3 g/kg protein equivalents per day can be delivered progressively. — 0
- Physical activity may improve the beneficial effects of nutritional therapy.

12. *Optimal combinations of carbohydrates and fat during EN and PN:*
- The amount of glucose (PN) or carbohydrates (EN) should not exceed 5 mg/kg/min. — GPP
- The administration of intravenous lipid emulsions should be generally a part of PN. — GPP
- Intravenous lipid (including non-nutritional lipid sources) should not exceed 1.5 g lipids/kg/day and should be adapted to individual tolerance. — GPP

13. *Additional enteral/ parenteral glutamine (GLN) in the ICU:*
- In patients with burns > 20% body surface area, additional enteral doses of GLN (0.3-0.5 g/kg/d) should be administered for 10 -15 days as soon as EN is commenced. — B
- In critically ill trauma, additional EN doses of GLN (0.2-0.3 g/ kg/d) can be administered for the first five days with EN. In case of complicated wound healing it can be administered for a longer period of ten to 15 days. — 0
- In ICU patients except burn and trauma patients, additional enteral GLN should not be administered. — B
- In unstable and complex ICU patients, particularly in those suffering from liver and renal failure, parenteral GLN -dipeptide shall not be administered. — A

14. *Enteral vs parenteral EPA/DHA:*
- High doses of omega-3-enriched EN formula should not be given by bolus administration. — B
- EN enriched with omega-3 FA within nutritional doses can be administered. — 0
- High doses omega-3 enriched enteral formulas should not be given on a routine basis. — B
- Parenteral lipid emulsions enriched with EPA/DHA (Fish oil dose 0.1-0.2 g/kg/d) can be provided in patients receiving PN. — 0

15. *Parenteral micronutrients and antioxidants:*
- To enable substrate metabolism, micronutrients (i.e. trace elements and vitamins) should be provided daily with PN. — B
- Antioxidants as high dose monotherapy should not be administered without proven deficiency. — B

16. *Additional vitamin D:*
- In critically ill patients with measured low plasma levels (25-hydroxy-vitamin D < 12.5 ng/ml, or 50 nmol/l) vitamin D3 can be supplemented. — GPP
- In critically ill patients with measured low plasma levels (25-hydroxy-vitamin D < 12.5 ng/ml, or 50 nmol/l) a high dose of vitamin D3 (500,000 UI) as a single dose can be administered within a week after admission. — 0

17. *Nutritional therapy in special conditions:*
- EN should be delayed: — B
  - If 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;
  - In case 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;

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- In patients suffering from active upper GI 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; and
- If gastric aspirate volume is above 500 ml/6 h.

- Low dose EN should be administered, in patients: **B**
  - receiving therapeutic hypothermia and increasing the dose after rewarming;
  - 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; and
  - with acute liver failure when acute, immediately life-threatening metabolic derangements are controlled with or without liver support strategies, independent on grade of encephalopathy.

- Early EN should be performed, in patients: **B**
  - receiving ECMO
  - with traumatic brain injury
  - with stroke (ischemic or hemorrhagic)
  - with spinal cord injury
  - with severe acute pancreatitis
  - after GI surgery
  - after abdominal aortic surgery
  - with abdominal trauma when the continuity of the GI tract is confirmed/restored
  - receiving neuromuscular blocking agents
  - managed in prone position
  - with open abdomen
  - Regardless of the presence of bowel sounds unless bowel ischemia or obstruction is suspected in patients with diarrhea

18. Special conditions not included in the ESICM recommendations:

- Non intubated patients:
  - In non-intubated patients not reaching the energy target with an oral diet, oral nutritional supplements should be considered first and then EN. **GPP**
  - In non-intubated patients with dysphagia, texture-adapted food can be considered. If swallowing is proven unsafe, EN should be administered **GPP**
  - In non-intubated patients with dysphagia and a very high aspiration risk, postpyloric EN or, if not possible, temporary PN during swallowing training with removed nasoenteral tube can be performed **GPP**
- Frail patients

19. Adult critically ill patients with sepsis: EN vs no nutrition on outcome (reduce mortality, reduce infections

20. Adult critically ill patients with sepsis: EN vs PN on outcome (reduce mortality, reduce infections)?

- Early and progressive EN should be used in septic patients after hemodynamic stabilization.
- If contraindicated, EN should be replaced by progressive PN. **GPP**

21. Critically ill patients with surgical complications after abdominal or esophageal surgery:

- In patients after abdominal or esophageal surgery, early EN can be preferred over delayed EN **0**
- In critically ill patients with surgical complications after abdominal or esophageal surgery and unable to eat orally, EN (rather than PN) should be preferred unless discontinuity or obstruction of GI tract, or abdominal compartment syndrome is present. **GPP**
- In the case of an unrepaired anastomotic leak, internal or external fistula, a feeding access distal to the defect should be aimed for to administer EN. **GPP**
- In the case of an unrepaired anastomotic leak, internal or external fistula, or if distal feeding access is not achieved, EN should be withheld and PN may be commenced. **GPP**
- In case of high output stoma or fistula, the appropriateness of chyme reinfusion or enteroclysis should be evaluated and performed if adequate.

22. Trauma patients:

- Preferentially receive early EN instead of early PN. **B**

23. Obese patients:

- An iso-caloric high protein diet can be administered, preferentially guided by indirect calorimetry measurements and urinary nitrogen losses. **0**
- Energy intake should be guided by indirect calorimetry. **GPP**
- Protein delivery should be guided by urinary nitrogen losses or lean body mass determination (using CT or other tools). **GPP**
- If indirect calorimetry is not available, energy intake can be based on “adjusted body weight”. **GPP**
- If urinary nitrogen losses or lean body mass determination are not available, protein intake can be 1.3 g/kg “adjusted body weight”/d. **GPP**

24. Monitoring nutrition therapy during the ICU stay:

25. Laboratory parameters:

a. Glucose:
   i. Blood glucose should be measured initially (after ICU admission or after artificial nutrition initiation) and at least every 4 h, for the first two days in general. **GPP**
   ii. Insulin shall be administered, when glucose levels exceed 10 mmol/L. **A**

b. Elektrolytes:
   i. Electrolytes (potassium, magnesium, phosphate) should be measured at least once daily for the first week. **GPP**
   ii. In patients with refeeding hypophosphatemia (< 0.65 mmol/l or a drop of > 0.16 mmol/l), electrolytes should be measured 2-3 times a day and supplemented if needed. **GPP**
   iii. In patients with refeeding hypophosphatemia energy supply should be restricted for 48 h and then gradually increased. **B**

[1]Singer P, Reintam Blaser A, Berger MM, et al. ESPEN guideline on clinical nutrition in the intensive care unit. Clin Nutr. 2019;38:48-79.
*Document not officially endorsed by ESPEN
Recommendations summarised. See guideline for full wording and definitions of grades of evidence. Note wording in guidelines as follows: Grade A = ‘shall’, Grade B = ‘should’, Grade 0 = ‘can’ or ‘may’, GPP = based on expert opinion, wording chosen deliberately.