



PÉCSI TUDOMÁNYEGYETEM

Klinikai Központ

Aneszteziológiai és Intenzív Terápiás Intézet



Perioperatív táplálás, visszatáplálási szindróma

Csontos Csaba

PTE KK AITI



Miért szükséges tápláltsági állapot felmérése?



- A malnutritio kezelése javítja a beteg prognózisát és ráadásul még költségghatékony is.
 - *Clin. Nutr.* **2016**, 35, 370–380.
 - *Am. J. Manag. Care* **2013**, 19, 121–128.
 - *Nutr. Hosp.* **2013**, 28, 592–599.
 - *Clin. Nutr.* **2016**, 35, 18–26.
 - *Gut* **2000**, 46, 813–818.
 - *Clin. Nutr.* **2017**, 36, 1–18.

Perioperatív táplálás



- Több korábbi vizsgálat alapján megfelelő táplálással csökkenthető a perioperatív komplikációk száma súlyos malnutritióban szenvedő betegek esetén, de a borderline betegek vagy enyhe malnutricióban szenvedő betegek esetében szignifikáns előny nem mutatható ki.
 - N Engl. J. Med 1991; 325: 525-32
 - Curr Opin Clin Nutr Metab Care 1998; 1: 51-8
 - Clin Nutr 1997; 16: 193-218



Applied nutritional investigation

Impact of preoperative nutritional support on clinical outcome in abdominal surgical patients at nutritional risk

Bin Jie Ph.D.^{a,b}, Zhu-Ming Jiang M.D.^{a,*}, Marie T. Nolan Ph.D.^c, Shai-Nan Zhu M.P.H.^d, Kang Yu M.S.^e, Jens Kondrup M.D.^f

1085 beteg

NRS>3 512 beteg

NRS> 5 120 beteg –
Őket vizsgálták
preoperatív táplálás
vonatkozásában

Impaired nutritional status

Score		Score	
Absent: 0	Normal nutritional status	Absent: 0	Normal nutritional requirements
Mild: 1	Wt loss >5 % in 3 mths or food intake below 50 – 75% of normal requirement in preceding week.	Mild: 1	Hip fracture, Chronic patients, in particular with acute complications cirrhosis, COPD*. Chronic haemodialysis, diabetes, oncology
Moderate: 2	Wt loss >5 % in 2 mths or BMI 18.5 – 20.5 + impaired general condition or food intake 25 – 60 % of normal requirement in preceding week.	Moderate: 2	Major abdominal surgery, Stroke, Severe pneumonia, hepatologic malignancy
Severe: 3	Wt loss >5 % in 1 mths (>15 % in 3 mths) or BMI <18.5 + impaired general condition or food intake 0 – 25 % of normal requirement in preceding week.	Severe: 3	Head injury, Bone marrow transplantation, Intensive care patients (APACHE >10)

Severity of disease

(↓ increase in requirements)

Score (nutritional status) + score (disease severity) = Total score:

Adjustment for age: if ≥ 70 years: add 1 to total score above

➔ Age-adjusted total score



Table 3

Complications in preoperative nutrition and control groups in patients with Nutritional Risk Screening Tool score of at least 5

	Preoperative nutrition group (n = 43)	Control group (n = 77)
Infectious		
Pneumonia	2	7
Wound infection	3	9
Intra-abdominal infection	1	15
Sepsis or bacteremia	1	1
Urinary tract infection	1	2
Gastrointestinal infection	0	1
Catheter-related infection	2	1
Non-infectious		
Postoperative bleeding	1	3
Anastomosis leakage	2	11
Wound dehiscence or impaired healing	0	3
Gastrointestinal obstruction or perforation	3	4
Pleural effusion or pneumothorax	0	3
Deep venous thrombosis	1	1
Cardiac, renal, or respiratory dysfunction	1	6
Multiple-organ failure	0	2 (died)

NRS < 5 esetén nem volt szignifikánsan pozitív hatása a preoperatív táplálásnak.



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LOS: 13,7 +/- 7,9 vs 17,9 +/- 11,3 (p=0,018)

Table 4

Number of complications occurring in each patient in preoperative nutrition and control groups in patients with Nutritional Risk Screening Tool score of at least 5

	Preoperative nutrition group (n = 43)	Control group (n = 77)
No complications	32 (74.4%)	38 (49.3%)
Patients with 1 complication	6 (14.0%)	18 (23.4%)
Patients with 2 complications	3 (7.0%)	12 (15.6%)
Patients with ≥3 complications	2 (4.6%)	9 (11.7%)

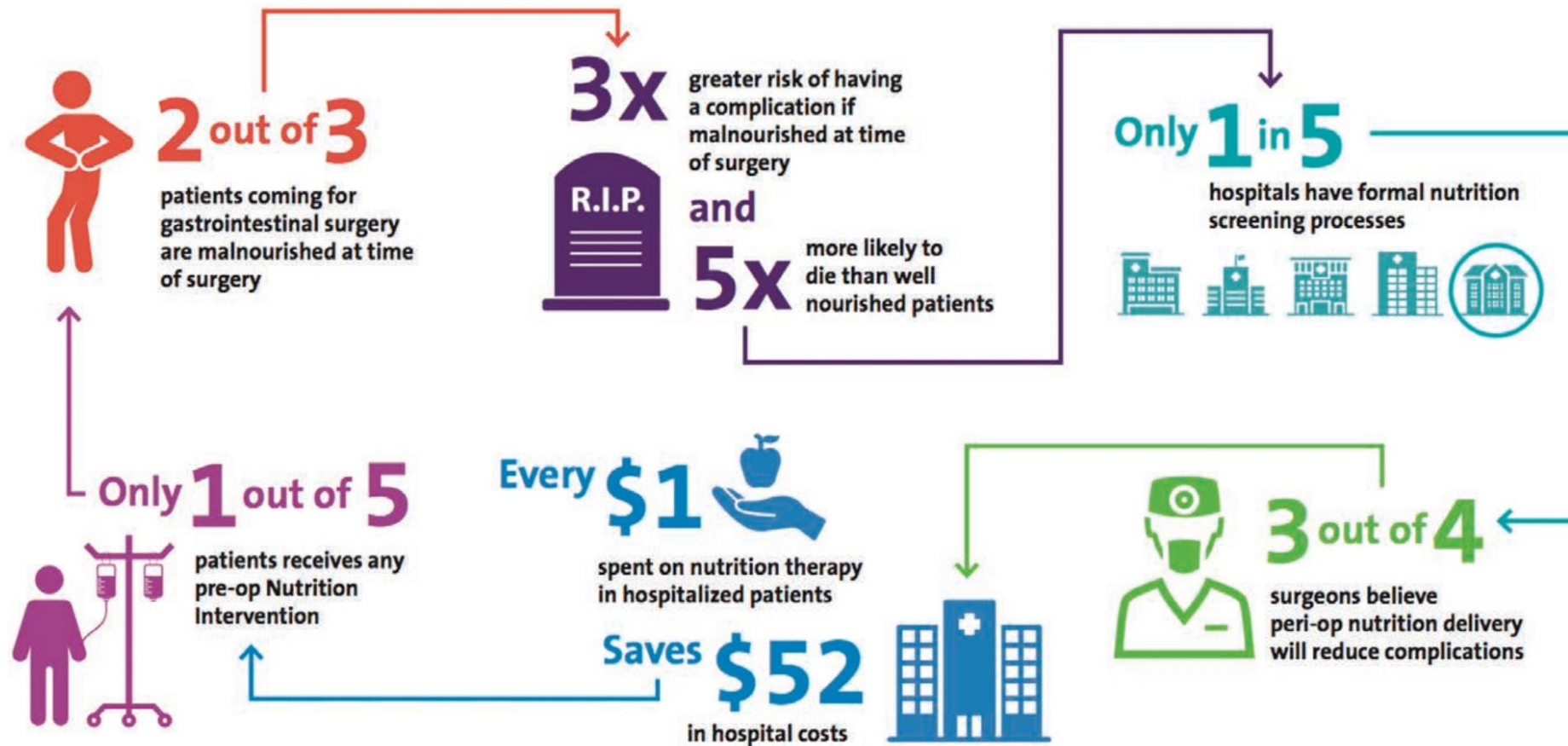
Values are presented as number of patients (percentage). The percentage of patients who had no complications was significantly smaller in the control group than in the preoperative nutrition group (49.3% versus 74.4%, chi-square = 7.13, $P = 0.008$). In addition, the percentage of patients who had two or more complications was significantly larger in the control group than in the preoperative nutrition group (27.3% versus 11.6%, chi-square = 3.98, $P = 0.046$). The chi-square test was used

Irányelvek



- J. Arends, V. Baracos, H. Bertz, F. Bozzetti, P.C. Calder, N.E.P. Deutz, *et al.* **ESPEN expert group recommendations for action against cancer-related malnutrition** Clin Nutr, 36 (5) (2017 Oct), pp. 1187-1196
- J. Arends, P. Bachmann, V. Baracos, N. Barthelemy, H. Bertz, F. Bozzetti, *et al.* **ESPEN guidelines on nutrition in cancer patients** Clin Nutr, 36 (1) (2017 Feb), pp. 11-48
- A. Weimann, M. Braga, F. Carli, T. Higashiguchi, M. Hübner, S. Klek, *et al.* **ESPEN guideline: clinical nutrition in surgery** Clin Nutr, 36 (3) (2017 Jun), pp. 623-650

Miért kell erről beszélni még



American Society for Enhanced Recovery and Perioperative Quality Initiative Joint Consensus Statement on Nutrition Screening and Therapy Within a Surgical Enhanced Recovery Pathway

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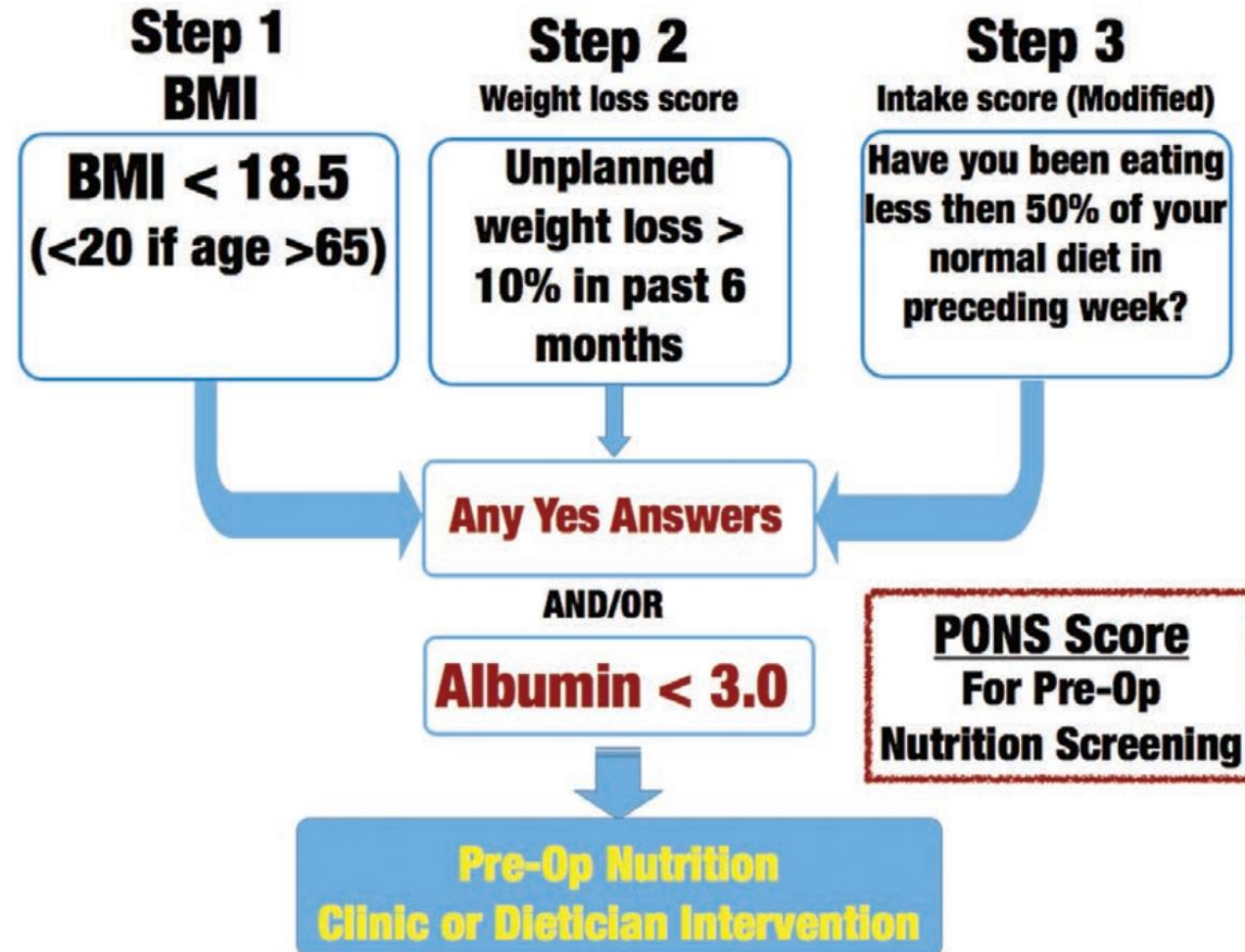
Table 2. Consensus Statements and Recommendations

Before Surgery

1. We recommend screening of nutritional status before major surgery using a simple screening tool (via electronic medical record where possible) (see suggested/example tools in manuscript).
2. We propose the PONS questions for clinic-based perioperative nutrition screening
 - Does the patient have a low BMI $<18.5 \text{ kg/m}^2$ (<20 in >65 y of age)?
 - Has the patient experienced a weight loss $>10\%$ in past 6 mo?
 - Has the patient had a reduced oral intake by $>50\%$ in the past week? (and/or)
 - Does the patient have a preoperative serum albumin $<3.0 \text{ g/dL}$?
3. We recommend that if any screening questions in PONS score are positive for nutritional risk, that intervention and/or referral for formal nutrition assessment take place (see recommendation 6).
4. We suggest evaluation of lean body mass via CT scan, when available, to assist with nutritional risk prediction before surgery.
5. We recommend reaching an overall protein intake goal is more important than achieving a total calorie intake in the preoperative period with a recommended protein goal $>1.2 \text{ g/kg/d}$.
6. We recommend that patients who are screened as being at nutritional risk before major surgery receive preoperative ONSs for a period of at least 7 d. This may be achieved with either of the following:
 - IMN formulas (containing arginine and fish oil)
 - High-protein ONS (2–3× a day, minimum of 18 g protein/dose)
7. We recommend that for patients who are screened as being at nutritional risk before major surgery, where oral nutrition supplementation via ONS is not possible, that a dietician be consulted and an enteral feeding tube be placed and home EN initiated for a period of at least 7 d.
8. If neither oral nutrition supplementation via ONS nor EN is possible, or when protein/kcal requirement ($>50\%$ of recommended intake) cannot be adequately met by ONS/EN, we recommend preoperative PN to improve outcomes
9. Preoperative IMN should be considered for all patients undergoing elective major abdominal surgery.
10. We recommend preoperative fasting from midnight be abandoned.
11. In patients undergoing surgery who are considered to have minimal specific risk of aspiration, we encourage unrestricted access to solids for up to 8 h before anesthesia and clear fluids for oral intake up to 2 h before the induction of anesthesia.
12. We recommend a preoperative carbohydrate drink containing at least 45 g of carbohydrate to improve insulin sensitivity (except in type I diabetics due to their insulin deficiency state). We suggest that complex carbohydrate (eg, maltodextrin) be used when available.

Preoperatív screening

- Több pontrendszer is létezik
- Perioperative Nutrition Screen



Fehérjebevitel fontosabb mint az energia

- Fehérje kell
 - Az akut fázis fehérjék szintéziséhez
 - Immunológiai funkciókhoz
 - Sebgyógyuláshoz
- Fehérjeigény stressz állapotban
 - **1,2 – 2 g/kg/nap**
- Ha a beteg tud táplálkozni
 - **25-35 g fehérje bevitele** szükséges minden táplálkozásnál az izom fehérje felépítéséhez



Preoperatív táplálás

- Azon betegeknél, akik a rizikó csoportba tartoznak legalább 1 hetes előkészítés szükséges.
 - Orális táplálék kiegészítők – ha képes táplálkozni 2-3x naponta
 - Gyomorszonda – ha az enterális felszívódás biztosítható
 - Parent. táplálás – ha másképp nem lehet



Preoperatív táplálás

- A rizikó csoportba nem tartozó betegek mindegyike sem képes elegendő protein bevitelére, ezért az orális kiegészítők adása minden esetben megfontolandó.



Preoperatív éhezés

- Kedvezőtlen hatások
 - Növeli a stresszreakciót
 - Súlyosbítja az inzulinrezisztenciát
 - Befolyásolja a GI motilitást
 - Szubjektíve is kellemetlen.
- Tiszta folyadék – 2 órával a műtét előtt
- Tiszta CH (50 g) 2-3 órával a műtét előtt – csökkent LOS



ESPEN practical guideline: Clinical nutrition in surgery[☆]

Clinical Nutrition 40 (2021) 4745–4761



3.1. *Is preoperative fasting necessary?*

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 h before anesthesia. Solids shall be allowed until 6 h before anesthesia.

Grade of recommendation **A** – strong consensus (97% agreement)

3.2. *Is preoperative metabolic preparation of the elective patient using carbohydrate treatment useful?*

Recommendation

In order to reduce perioperative discomfort including anxiety oral preoperative carbohydrate treatment (instead of overnight fasting, the night before and 2 h before surgery) should be administered (B). To impact postoperative insulin resistance and LOS, preoperative carbohydrates can be considered in patients undergoing major surgery (0).

Grade of recommendation **B/0** – strong consensus (100% agreement)

Perioperatív immunonutrició?



- Arginin, halolaj, antioxidánsok kombinációja. Az egyes elemeknek külön-külön nem lehetett a hatását bizonyítani
 - Arginin
 - T lymphocyták aktiválása
 - T helper sejtek funkciójának megőrzése
 - Phagocytosis
 - NO és Prolin szintézis

Perioperatív immunonutrició



- Halolaj
 - Ox stressz csökkentés
 - Antiinflammatorikus hatás
 - Csökkenti az arachnidon sav termelődést
 - Fokozza a resolvin termelést
- A korábbi vizsgálatokkal szemben az újabb metaanalízisek nem igazolták a preoperatív immunutrició kedvező hatását.

Perioperatív immunnutrició - pro

Medicine®

CLINICAL TRIAL/EXPERIMENTAL STUDY

OPEN

Perioperative Standard Oral Nutrition Supplements Versus Immunonutrition in Patients Undergoing Colorectal Resection in an Enhanced Recovery (ERAS) Protocol

A Multicenter Randomized Clinical Trial (SONVI Study)

Pedro Moya, MD, PhD, Leticia Soriano-Irigaray, PharmD, Jose Manuel Ramirez, MD, PhD,
Alessandro Garcea, MD, Olga Blasco, MD, Francisco Javier Blanco, MD, PhD,
Carlo Brugioti, MD, Elena Miranda, MD, and Antonio Arroyo, MD, PhD

Surg Endosc (2016) 30:4946–4953
DOI 10.1007/s00464-016-4836-7



Perioperative immunonutrition in normo-nourished patients undergoing laparoscopic colorectal resection

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Rafael Calpena^{1,2}

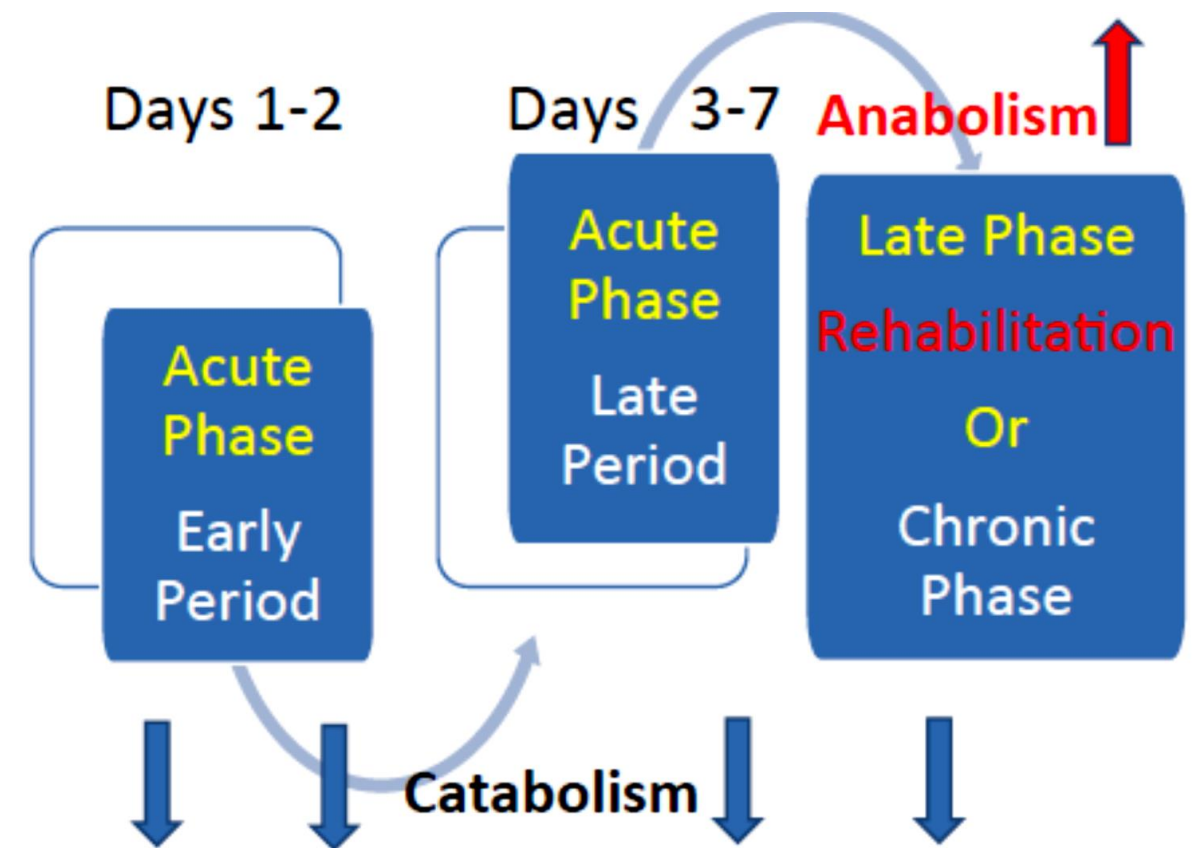
TABLE 5. Complications

Outcome Variable	Without Perioperative Immunonutrition N = 122	With Perioperative Immunonutrition N = 122	RR (95% CI)	P Value
Percentage with any complications ^a	35.20%	23.00%	0.547 (0.312–0.960)	0.035
Percentage with any surgical complications ^a	21.30%	17.20%	0.768 (0.405–1.455)	0.417
Anastomotic leak	8.20%	4.90%	0.579 (0.204–1.647)	0.301
Ileus	13.10%	8.20%	0.592 (0.257–1.361)	0.213
Others	0.80%	3.30%	4.102 (0.452–37.238)	0.175
Percentage with any infectious complications ^a	23.80%	10.70%	0.382 (0.188–0.778)	0.007
Surgical site infection	17.2%	5.70%	0.293 (0.119–0.717)	0.005
Superficial and Deep incisional	16.4%	5.70%	0.310 (0.126–0.764)	0.008
Organ/Space	2.40%	0.80%	0.328 (0.034–3.196)	0.313
Pneumonia	3.30%	1.60%	0.492 (0.088–2.736)	0.408
Urinary tract infection	0.80%	0.80%	1.000 (0.062–16.171)	1
Venous catheter infection	7.40%	3.30%	0.426 (0.127–1.421)	0.154
Mortality	0%	0%		
Reoperation rate	9%	6.60%	0.708 (0.275–1.826)	0.474

TABLE 4. Complications

Outcome variable	Without perioperative immunonutrition (N = 61, %)	With perioperative immunonutrition (N = 61, %)	RR (95% CI)	p value
Percentage with any complications ^a	21.30	18.00	1.231 (0.503–3.014)	0.649
Percentage with any surgical complications ^a	11.50	13.10	0.859 (0.291–2.536)	0.783
Anastomotic leak	3.30	4.90	0.655 (0.106–4.067)	0.648
Ileus	6.20	8.20	0.786 (0.201–3.079)	0.729
Others	1.60	1.60	1.000 (0.061–16.360)	1.000
Percentage with any infectious complications ^a	14.80	6.60	2.466 (0.716–8.491)	0.142
Wound infection	11.50	0.00	0.470 (0.387–0.570)	0.006
Pneumonia	3.30	3.30	1.000 (0.136–7.337)	1.000
Venous catheter infection	1.60	3.30	0.492 (0.043–5.569)	0.559
Mortality	0	0		
Reoperation rate	3.30	4.90	0.655 (0.106–4.067)	0.648





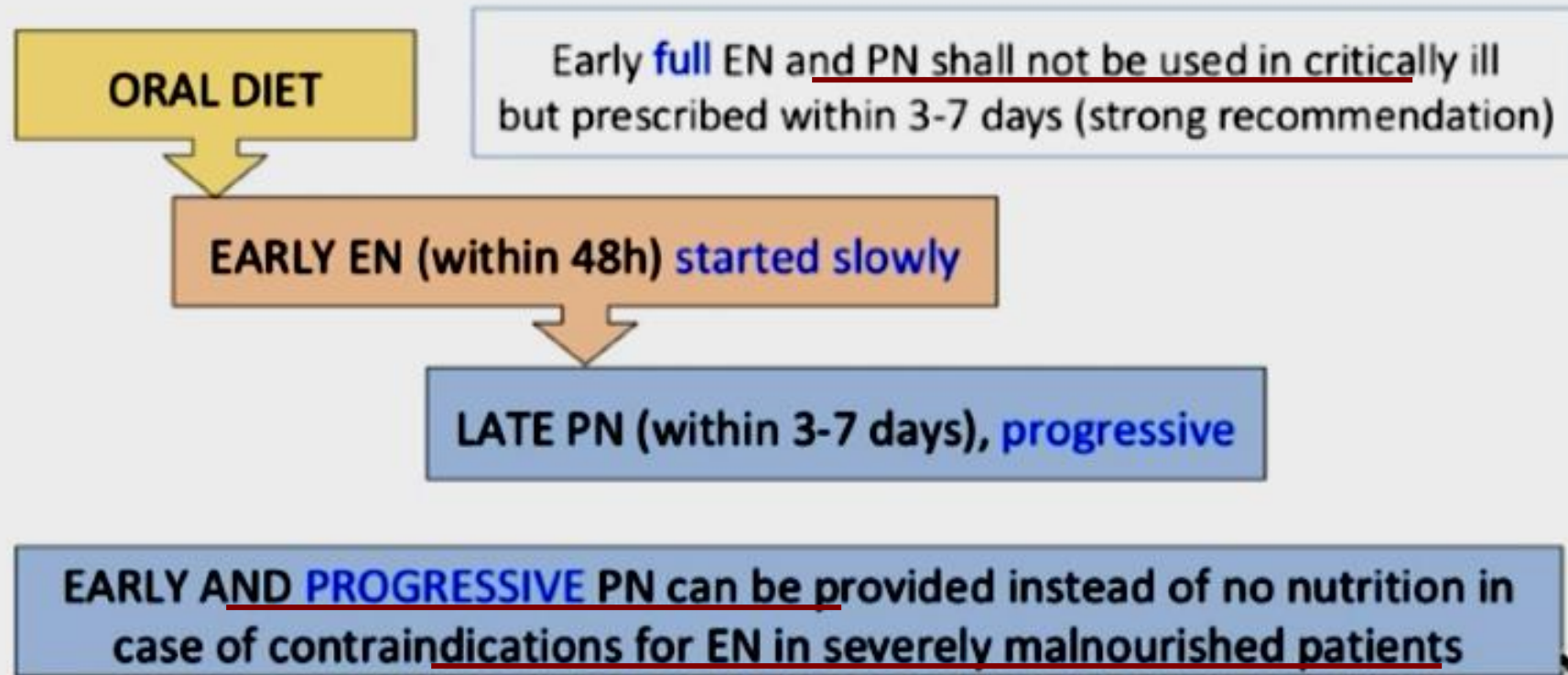


33rd ANNUAL
CONGRESS
6-9 DECEMBER



What's new in
2020

ESPEN Guidelines route and dosage



Makronutriens dózis a betegség fázisa szerint

Akut fázis (24-96 óra reszuscitáció)

- Hiányállapotok rendezése
- Protein 1g/kg, nem fehérje Kcal: 15 Kcal/kg
- IC: REE 70%

Krónikus fázis (elbocsátásig)

- Protein 1,5-2 g/kg, nem fehérje kalória: 25-30 Kcal/kg
- IC: REE 100%

Rehabilitáció (az ITO után)

- Protein 1,2-2 g/kg, nem fehérje kalória: 4000-5000 Kcal/nap
- A kritikus betegek hospitális kezelési ideje 2x olyan hosszú
- Hypermetabolizmus 1-2 évig folytonos lehet!
- IC: REE 100%

Wischmeyer PE. Crit Care Clin. 2018 Jan;34(1):107-125



Visszatáplálási szindróma

Hogy is néz ki egy refeeding szindrómás eset



- 28 éves nő 23 kg BMI < 10 kg/m²
- Labor
 - K 3,6 mmol/l,
 - **Foszfát 1,1 mmol/l**
- PN táplálás indul
- 20 óra múlva mellkas fájdalom
- Labor
 - K 2,5 mmol/l
 - **Foszfát 0,5 mmol/l**
- Órák múlva hypotensió, arrhitmia, metabolikus acidózis
- Légzési elégtelenség, légúti fertőzés
- Exitus 3 héttel a táplálás megkezdése után

Patomechanizmus



- Az éhezés során a vitamin, energia, intracelluláris ion raktárak kimerülnek
- A bevitt glukóz hatására nő az inzulin termelés
 - Hiány miatt zuhan a szérum szint
 - K, foszfát, Mg

Foszfát szerepe

- Az ATP része – energia tárolás
- Hiányának következményei
 - Légzőizomgyengeség
 - Csökkent izom kontraktilitás
 - Arrhytmiák fellépte.
 - 2,3 difoszfoglicerát szint csökken
 - Nő a Hgb oxigén affinitása



Kálium

- Csökkenése potenciálisan halálos arrhythmia'khoz vezet
- Gyengeség
- Légzésdepresszió
- Paralízis



MG



- A K felvételében játszik szerepet a NA-K ATPáz enzim befolyásolásán keresztül
- Csökkenésének oka jelenleg nem ismert.

Thiamin

- Számos cukor anyagcserefolyamat kofaktora
- Hiányának következménye:
 - Neurológiai zavarok
 - Konfúzió
 - Okulomotor zavarok
 - Hypotermia
 - Kóma
 - Laktát acidózis – laktát piruvát átalakulás gátlása miatt
 - Csökkent ATP aktivitás a szívizomzatban.
 - Adenozin felszabadulás
 - Vazodilatáció
 - Csökkent szívkontraktilitás
 - Alacsony diasztolés nyomás



Table 2. Signs and Symptoms of Severe Refeeding Syndrome.^a

Hypophosphatemia	Hypokalemia	Hypomagnesemia	Thiamin Deficiency	Sodium Retention
Neurological	Neurological	Neurological	Encephalopathy	Fluid overload
Paresthasias	Paralysis	Weakness	Lactic acidosis	Pulmonary edema
Weakness	Weakness	Tremor	Nystagmus	Cardiac
Delirium	Cardiac	Muscle twitching	Neuropathy	decompensation
Disorientation	Arrhythmias	Changed mental status	Dementia	
Encephalopathy	Contraction changes	Tetany	Wernicke's syndrome	
Areflexic paralysis	Respiratory failure	Convulsions	Korsakoff psychosis	
Seizures	Gastrointestinal	Seizures	Wet and dry beriberi	
Coma	Nausea	Coma		
Tetany	Vomiting	Cardiac		
Cardiac	Constipation	Arrhythmias		
Hypotension	Other	Gastrointestinal		
Shock	Rhabdomyolysis	Anorexia		
Decreased stroke volume	Muscle necrosis	Nausea		
Decreased mean arterial Pressure		Vomiting		
Increased wedge pressure		Constipation		
Pulmonary				
Diaphragmatic weakness				
Respiratory failure				
Dyspnea				
Hematologic				
Hemolysis				
Thrombocytopenia				
Leukocyte dysfunction				

Adapted with permission from Reference 96. Kraft MD, Btaiche IF, Sacks GS. Review of the refeeding syndrome. *Nutr Clin Pract.* 2005;20(6):625-633.



Hogyan láthatjuk előre bekövetkeztét



- Short Nutritional Assessment Questionnaire (SNAQ)
- National Institute for Health and Care Excellence (NICE)
 - Szenzitivitásuk alig érte el az 50 % -ot.
- Global Leadership Initiative on Malnutrition (GLIM)
 - Még nem tesztelték megfelelő számú betegen



Table 3. ASPEN Consensus Criteria for Identifying Adult Patients at Risk for Refeeding Syndrome.^{49,71,110}

	Moderate Risk: 2 Risk Criteria Needed	Significant Risk: 1 Risk Criteria Needed
BMI	16–18.5 kg/m ²	<16 kg/m ²
Weight loss	5% in 1 month	7.5% in 3 months or >10% in 6 months
Caloric intake	None or negligible oral intake for 5–6 days OR <75% of estimated energy requirement for >7 days during an acute illness or injury OR <75% of estimated energy requirement for >1 month	None or negligible oral intake for >7 days OR <50% of estimated energy requirement for >5 days during an acute illness or injury OR <50% of estimated energy requirement for >1 month
Abnormal prefeeding potassium, phosphorus, or magnesium serum concentrations ^a	Minimally low levels or normal current levels and recent low levels necessitating minimal or single-dose supplementation	Moderately/significantly low levels or minimally low or normal levels and recent low levels necessitating significant or multiple-dose supplementation
Loss of subcutaneous fat	Evidence of moderate loss	Evidence of severe loss
Loss of muscle mass	Evidence of mild or moderate loss	Evidence of severe loss
Higher-risk comorbidities (see Table 4)	Moderate disease	Severe disease

Veszélyeztetett betegek

- Anorexia
- Pszichotikus betegek
- Alkohol és drog használók
- Nyelőcsőbetegek
- Malabsorptio
- Katonák
- Atléták
- Végstádiumú vesebetegek
- Tumoros betegek
- ITO-n kezelt betegek



Refeeding szindróma elkerülése



- Nincs egységes javaslat
 - Lassan építsük fel a táplálást
 - 1 hét alatt érjük el a kívánt tápanyagbevitelt.
 - Elektrolit pótlás
 - 10-15 mmol foszfát/1000 kal

ASPEN Consensus Recommendations for Refeeding Syndrome

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Table 1. Published Recommendations for Initiation and Advancement of Nourishment for Patients at Risk for RS.

	Initial Calories	Feeding Advancement	Other Recommendations
NICE ⁴⁴	<ul style="list-style-type: none"> Maximum 10 kcal/kg/d 5 kcal/kg/d in “extreme” cases (examples, BMI < 14 kg/m² or negligible intake for > 15 days) 	<ul style="list-style-type: none"> Slowly to meet or exceed full needs by 4–7 days 	<ul style="list-style-type: none"> Restore circulatory volume
IrSPEN ⁹⁸	<ul style="list-style-type: none"> Extreme risk: 5 kcal/kg/d High risk: 10 kcal/kg Moderate risk: 20 kcal/kg 	<ul style="list-style-type: none"> Slow initiation of feeding according to risk category 	<ul style="list-style-type: none"> Check electrolyte levels Electrolyte replacement to correct deficiencies Monitor fluid balance Energy and fluid must be introduced very gradually Check potassium, magnesium, phosphorus Do not discontinue feeding if electrolyte levels fall When serum potassium, magnesium, or phosphorus levels are significantly low, feeding should not be advanced further until supplementation has occurred
CNSG ⁹⁹	<ul style="list-style-type: none"> Extreme risk: consider providing only 5 kcal/kg/d High risk: commence nutrition support at a maximum of 10 kcal/kg body weight Moderate risk: introduce at a maximum of 50% of requirements for the first 2 days 	<ul style="list-style-type: none"> Extreme or high risk: slowly over 4–7 days as clinical and biochemical monitoring allows Moderate risk: increase energy intake only as clinical conditions and electrolyte results allow 	<ul style="list-style-type: none"> Consider all sources of calories and fluids in your calculations (including dextrose) Check baseline electrolytes (especially phosphorus, potassium, and magnesium) before initiating nutrition support, and replace any low levels promptly Unless hemodynamically unstable, keep sodium-containing IV fluids to ≈1 L/d initially in severely malnourished patients, such as those with anorexia nervosa, who may have a component of cardiomyopathy
Cray ⁹⁶	<ul style="list-style-type: none"> ≈10 kcal/kg/d for severe cases 15–20 kcal/kg for others 	<ul style="list-style-type: none"> Increase calories cautiously in a stepwise manner by 200–300 kcal every 2–3 days 	<ul style="list-style-type: none"> Patients at high risk for RS should receive electrolytes substitution of lower than normal/in low normal range Prophylactic supplementation of electrolytes
Friedli ¹⁰⁰	<ul style="list-style-type: none"> Ranging from 5 to 25 kcal/kg/d depending on severity of RS risk 	<ul style="list-style-type: none"> Nutrition therapy should be started with reduced caloric targets and slow increase to the full caloric amount over 5–10 days according to the individual risk category for RS Fluid overload should be prevented by restricted use of fluid and sodium restrict diet within the first 7 days 	



Table 6. ASPEN Consensus Recommendations for Avoidance and Treatment of RS in At-Risk Adults.

Aspect of Care	Recommendations
Initiation of calories	<ul style="list-style-type: none"> • Initiate with 100–150 g of dextrose or 10–20 kcal/kg for the first 24 hours; advance by 33% of goal every 1 to 2 days. This includes enteral as well as parenteral glucose. • In patients with moderate to high risk of RS with low electrolyte levels, holding the initiation or increase of calories until electrolytes are supplemented and/or normalized should be considered. • Initiation of or increasing calories should be delayed in patients with severely low phosphorus, potassium, or magnesium levels until corrected. • Calories from IV dextrose solutions and medications being infused in dextrose should be considered in the limits above and/or initiated with caution in patients at moderate to severe risk for RS. If a patient has received significant amounts of dextrose for several days, from maintenance IV fluids and/or medications in dextrose, and has been asymptomatic with stable electrolytes, calories from nutrition may be reintroduced at a higher amount than recommended above.
Fluid restriction	<ul style="list-style-type: none"> • No recommendation.
Sodium restriction	<ul style="list-style-type: none"> • No recommendation.
Protein restriction	<ul style="list-style-type: none"> • No recommendation.
Electrolytes	<ul style="list-style-type: none"> • Check serum potassium, magnesium, and phosphorus before initiation of nutrition. • Monitor every 12 hours for the first 3 days in high-risk patients. May be more frequent based on clinical picture. • Replete low electrolytes based on established standards of care. • No recommendation can be made for whether prophylactic dosing of electrolytes should be given if prefeeding levels are normal. • If electrolytes become difficult to correct or drop precipitously during the initiation of nutrition, decrease calories/grams of dextrose by 50% and advance the dextrose/calories by approximately 33% of goal every 1–2 days based on clinical presentation. Recommendations may be changed based on practitioner judgment and clinical presentation, and cessation of nutrition support may be considered when electrolyte levels are severely and/or life-threateningly low or dropping precipitously.
Thiamin and multivitamins	<ul style="list-style-type: none"> • Supplement thiamin 100 mg before feeding or before initiating dextrose-containing IV fluids in patients at risk. • Supplement thiamin 100 mg/d for 5–7 days or longer in patients with severe starvation, chronic alcoholism, or other high risk for deficiency and/or signs of thiamin deficiency. • Routine thiamin levels are unlikely to be of value. • MVI is added to PN daily, unless contraindicated, as long as PN is continued. For patients receiving oral/enteral nourishment, add complete oral/enteral multivitamin once daily for 10 days or greater based on clinical status and mode of therapy.
Monitoring and long-term care	<ul style="list-style-type: none"> • Recommend vital signs every 4 hours for the first 24 hours after initiation of calories in patients at risk. • Cardiorespiratory monitoring is recommended for unstable patients or those with severe deficiencies, based on established standards of care. • Daily weights with monitored intake and output. • Evaluate short- and long-term goals for nutrition care daily during the first several days until the patient is deemed stabilized (eg, no requirement for electrolyte supplementation for 2 days) and then based on institutional standards of care.



Agresszív vs. óvatos visszatáplálási protokollok



- Agresszív - Anorexia nervosa esetén vizsgálták
 - 1557 vs 1163 kal
 - A jelentősebb ioneltérés irányában egy trend volt megfigyelhető a magas kalória esetén
 - Csökkent viszont a kórházi tartózkodás
 - Golden NH et al. *J Adolesc Health*. 2013;53(5):573-578.
- Óvatos protokollok
 - Csökkent a 60 illetve 180 napos mortalitás
 - Doig GS et al. *Lancet Respir Med*. 2015;3(12):943-952.
 - Olthof LE et al. *Clin Nutr*. 2018;37(5):1609-1617.



PÉCSI TUDOMÁNYEGYETEM

Klinikai Központ

Aneszteziológiai és Intenzív Terápiás Intézet

Köszönöm a figyelmet

