



ERAS és perioperatív táplálás

OFTEX továbbképző tanfolyam

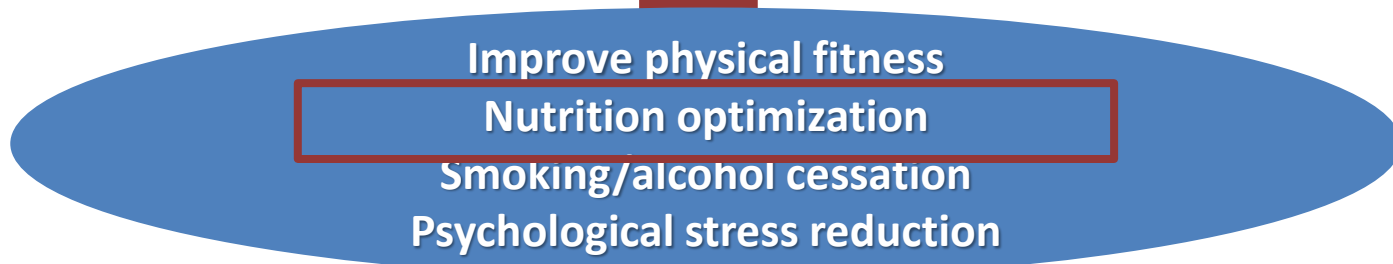
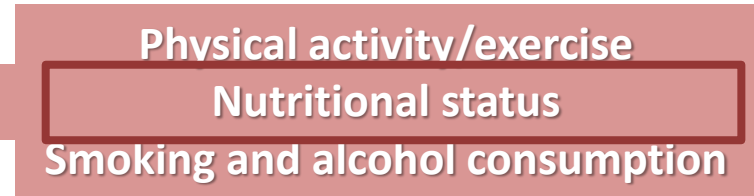
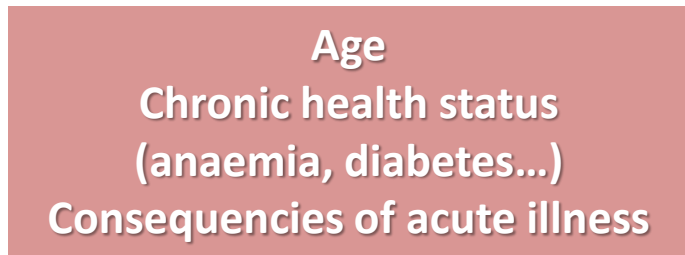
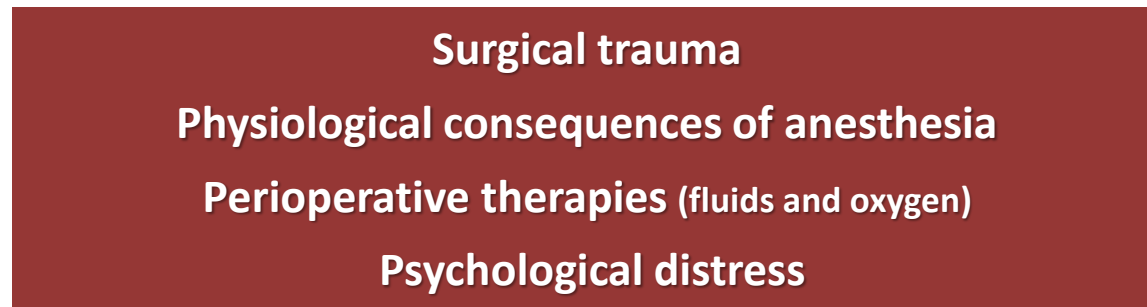
2023. Február17.

Tápláltsági állapot megítélése

- Dr. Tanczos Krisztián -

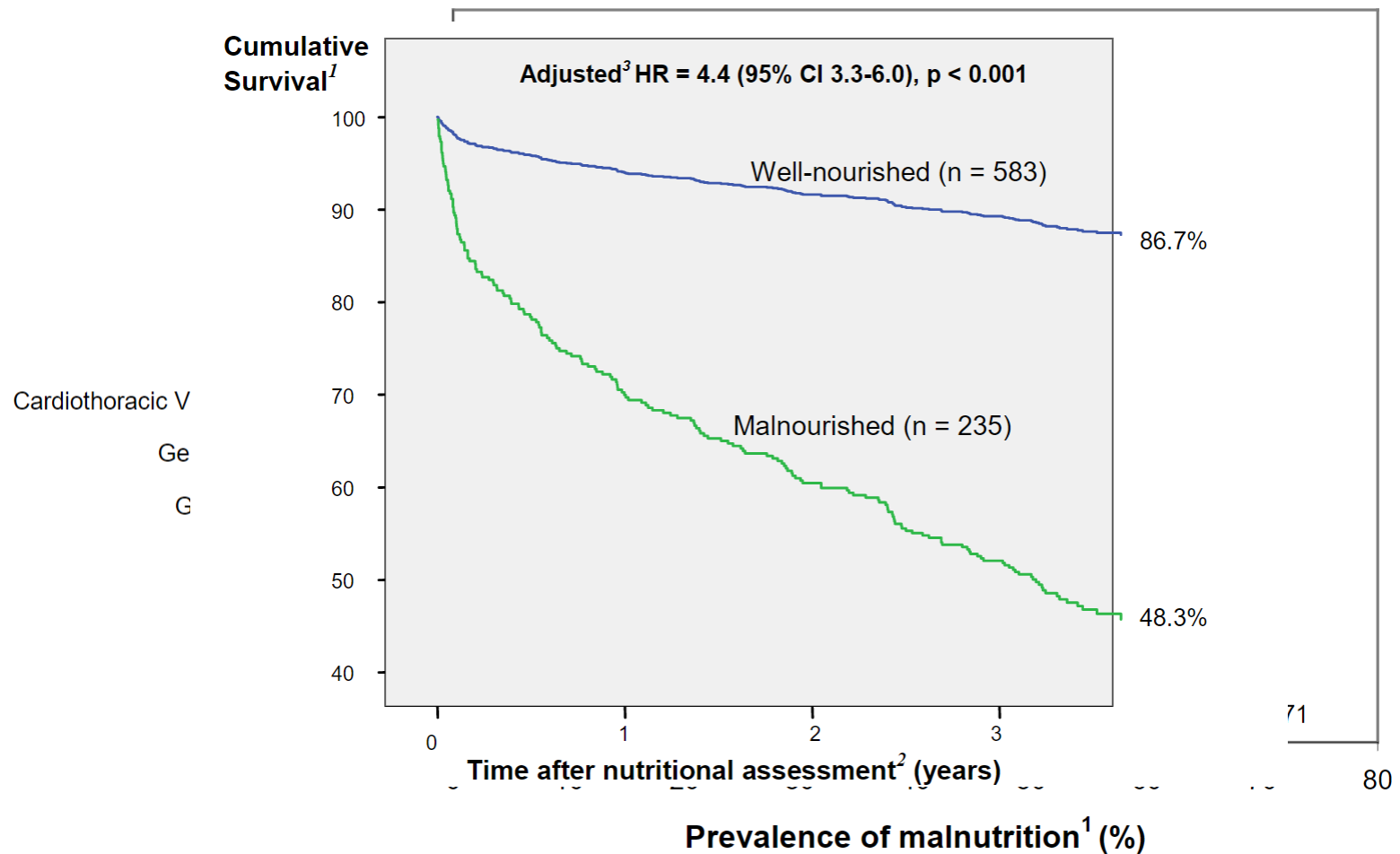


Perioperatív időszak



Malnutrition and its impact on cost of hospitalization, length of stay, readmission and 3-year mortality

Su Lin Lim ^a ✉ • Kian Chung Benjamin Ong ^h ✉ • Yiong Huak Chan ⁱ ✉ • Wai Chiong Loke ^j ✉ •
Maree Ferguson ^k ✉ • Lynne Daniels ^l ✉ • [Show footnotes](#)



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Cumulative
Survival^l

100

Adjusted³ HR = 4.4 (95% CI 3.3-6.0), p < 0.001

Conclusions: Malnutrition was evident in up to one third of the inpatients and led to poor hospitalization outcomes and survival as well as increased costs of care, even after matching for DRG. Strategies to prevent and treat malnutrition in the hospital and post-discharge are needed

G

50

40

48.3%

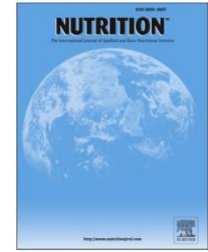
71

80

Time after nutritional assessment² (years)

Prevalence of malnutrition¹ (%)

Effects of malnutrition on complication rates, length of hospital stay, and revenue in elective surgical patients in the G-DRG-system



Michael N. Thomas M.D. ^{a,*}, Johannes Kufeldt M.P.H. ^b, Ulrich Kissler M.D. ^c,
Hans-Martin Hornung M.D. ^a, Jessica Hoffmann B.Sc. ^a, Monika Andraschko M.B.A. ^b,
Jens Werner M.D. Prof. ^a, Peter Rittler M.D. ^a

Cox model: Risk factors for hospital length of stay

	Hazard ratio	95% CI	P-value
<u>Patients at risk for malnutrition</u>	0.668	0.569–0.784	<0.0001
Malignant tumor	0.713	0.610–0.833	<0.0001
Complication	0.285	0.228–0.357	<0.0001
Age ²	1.000	1.000–1.000	<0.0001

Multiple logistic regression: Risk factors for complications

	OR	95% CI	P-value
<u>Patients at risk for malnutrition</u>	1.437	1.169–1.766	0.0006
LOS (d)	1.143	1.104–1.184	<0.0001
Thoracic surgery	3.320	1.568–7.028	0.0017
Major abdominal surgery	1.643	0.821–3.286	0.1605
Minor abdominal surgery (includes appendectomy)	0.456	0.191–1.090	0.0775
Trauma	0.443	0.148–1.326	0.1455

Applied nutritional investigation

Effects of malnutrition on complication rates, length of hospital stay, and revenue in elective surgical patients in the G-DRG-system



Michael N. Thomas M.D. ^{a,*}, Johannes Kufeldt M.P.H. ^b, Ulrich Kissler M.D. ^c,
Hans-Martin Hornung M.D. ^a, Jessica Hoffmann B.Sc. ^a, Monika Andraschko M.B.A. ^b,
Jens Werner M.D. Prof. ^a, Peter Rittler M.D. ^a

Cox model: Risk factors for hospital length of stay


„To reduce the negative clinical outcomes of malnutrition, it is essential that at-risk patients are identified immediately at admission and treated with additional nutritive support.”

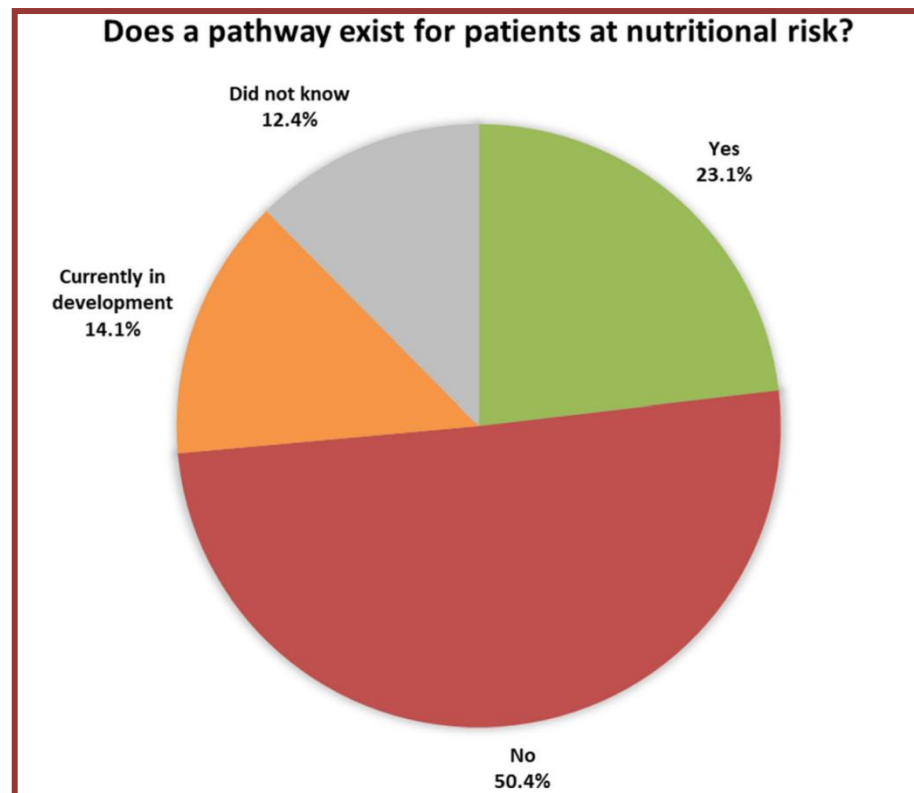
„To identify patients who would benefit from additional, preoperative nutritive treatment, a comprehensive nutritional screening program should be established.”

Trauma	0.443	0.148–1.326	0.1455
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Screening, assessment and management of perioperative malnutrition: a survey of UK practice




L. S. Matthews^{1,2*} , S. A. Wootton^{2,3}, S. J. Davies⁴ and D. Z. H. Levett^{1,2}



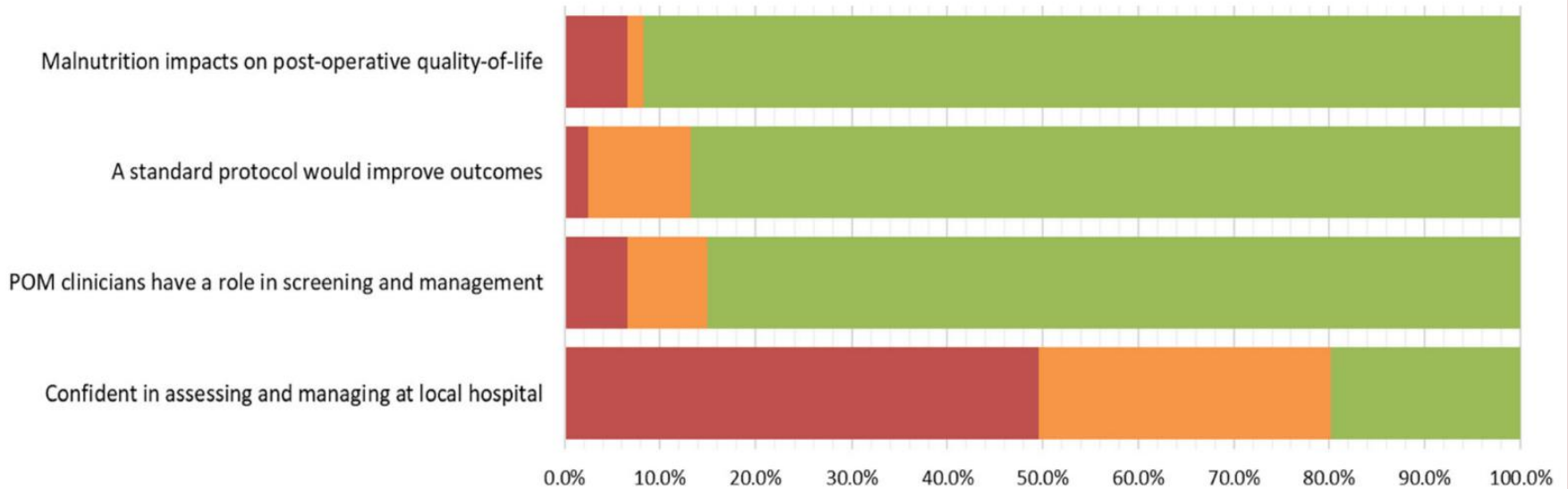
Screening, assessment and management of perioperative malnutrition: a survey of UK practice



L. S. Matthews^{1,2*} , S. A. Wootton^{2,3}, S. J. Davies⁴ and D. Z. H. Levett^{1,2}

Does a pathway exist for patients at nutritional risk?


Disagree or strongly disagree Neutral Agree or strongly agree



No
50.4%

REVIEW

CE From clinical guidelines to practice: The nutrition elements for enhancing recovery after colorectal surgery

Leslee Hasil RD¹ | Tanis R. Fenton PhD, RD^{1,2}  | Olle Ljungqvist MD, PhD^{3,#} | Chelsia Gillis PhD, RD^{4,#}

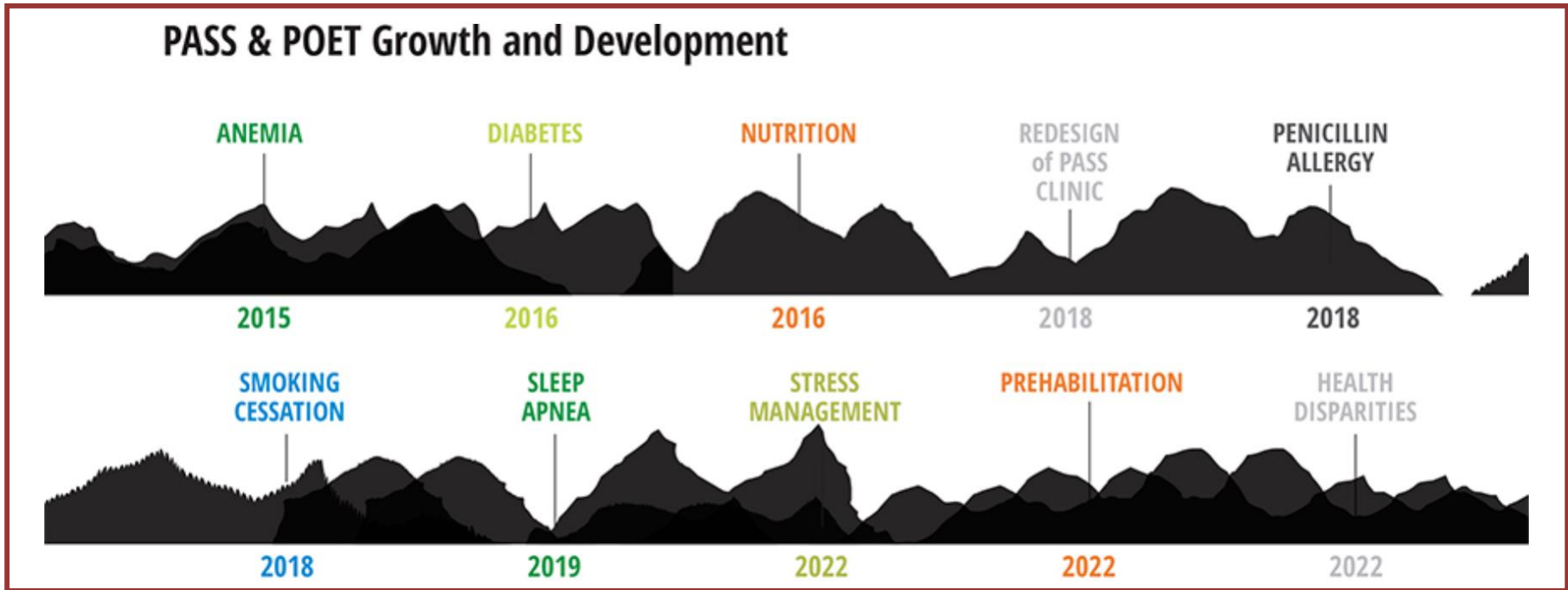
Preoperative	Who?	Where?	How?
Nutrition risk screening	<ul style="list-style-type: none"> • Office assistant • Nurse • Dietitian • Surgeon 	<ul style="list-style-type: none"> • Surgeon's office • Preoperative assessment clinic • Prehabilitation clinic • Over the phone 	<ul style="list-style-type: none"> • MST²⁷ • MUST²⁸ • NRS-2002²⁹ • MNA-SF³⁰ • SNAQ³¹ • CNST³² • PGSGA-SF³³
Education	<ul style="list-style-type: none"> • Dietitian • Nurse • Surgeon 	<ul style="list-style-type: none"> • Surgeon's office • Preoperative assessment clinic • Prehabilitation clinic • Over the phone 	<ul style="list-style-type: none"> • Education handouts • Web pages • Videos • Class-based education • One-on-one education

PERIOPERATIVE MEDICINE: Forging the Path to Surgery and Recovery

October 18, 2022 | By Jennifer Bringle and Jeanna Blitz



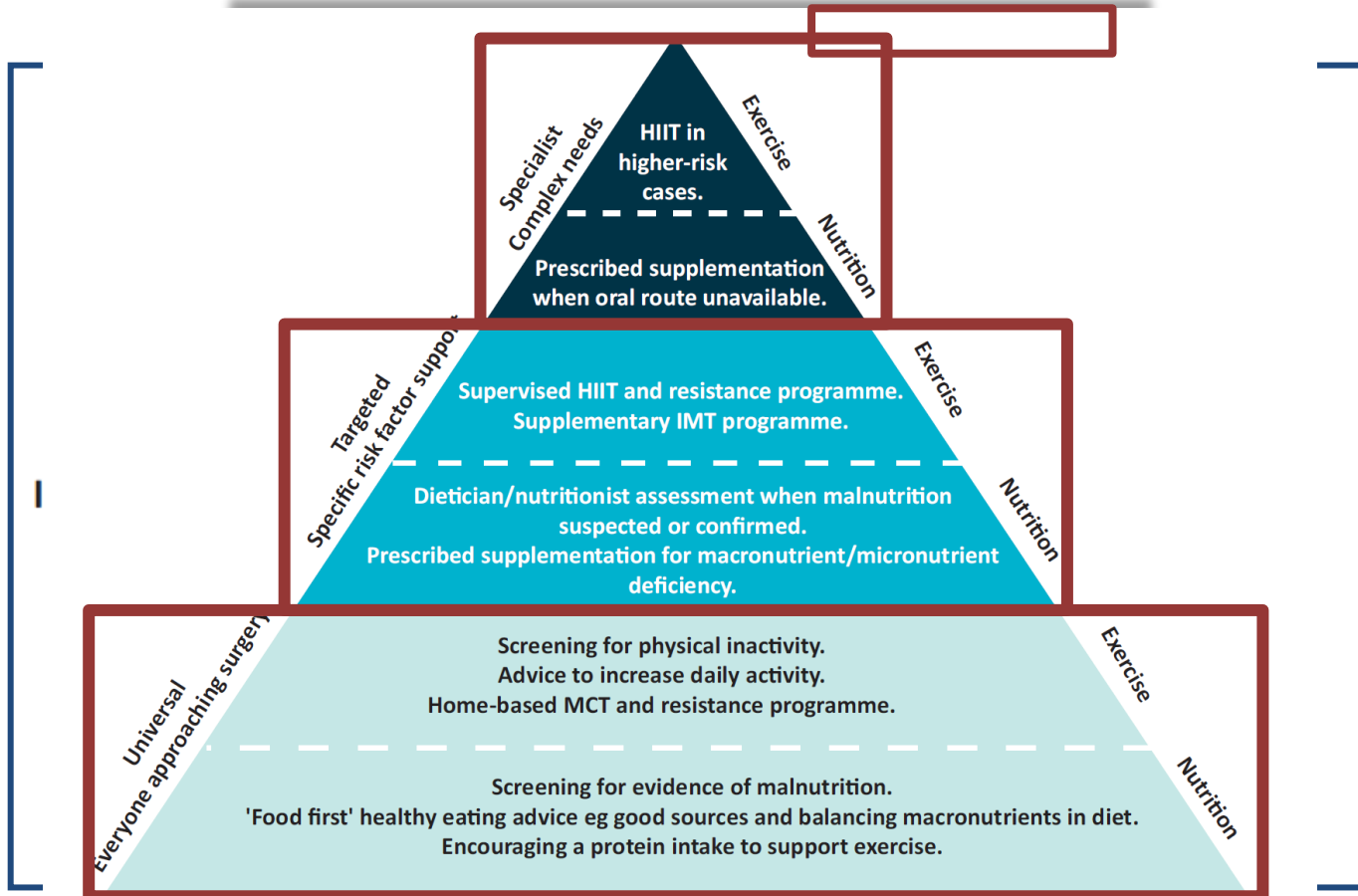
“You haven’t climbed the mountain until you’ve come back down”





Prehabilitation

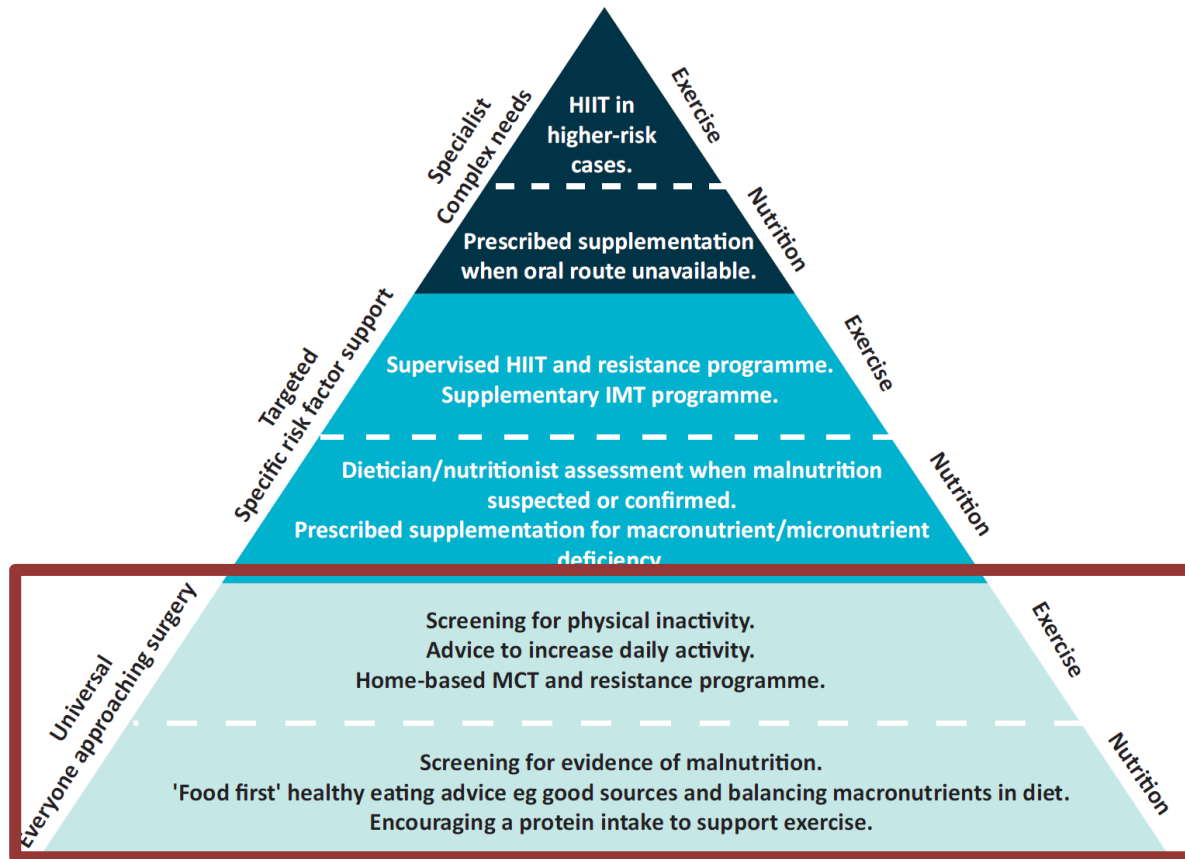
Authors: James Durrand,^A Sally J Singh^B and Gerry Danjoux^C





Prehabilitation

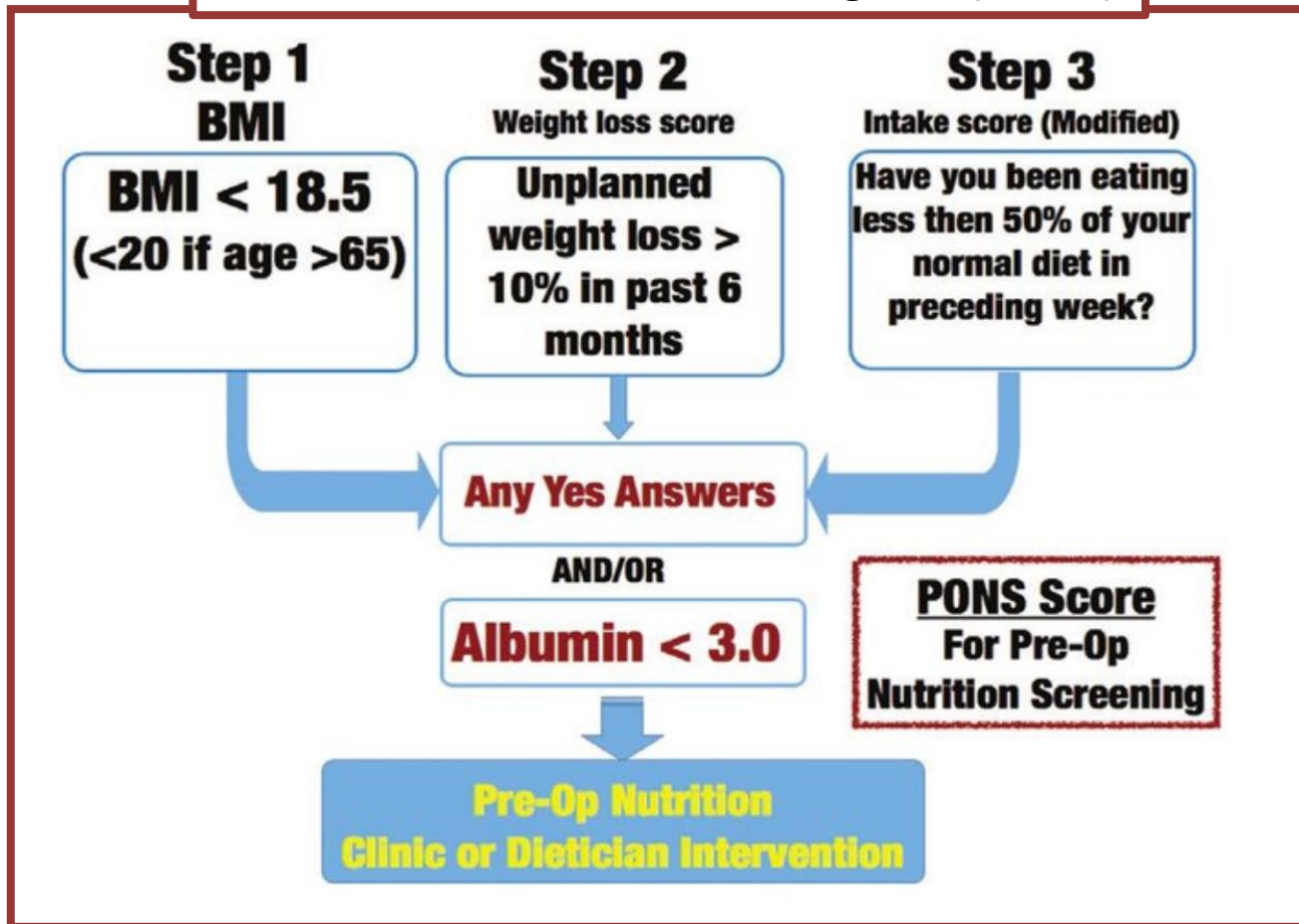
Authors: James Durrand,^A Sally J Singh^B and Gerry Danjoux^C



Prehabilitation and Nutritional Support to Improve Perioperative Outcomes

Malcolm A. West^{1,2,3,4} · Paul E. Wischmeyer^{5,6} · Michael P. W. Grocott^{2,3,4,7}

Malnutrition Universal Screening Tool (MUST)

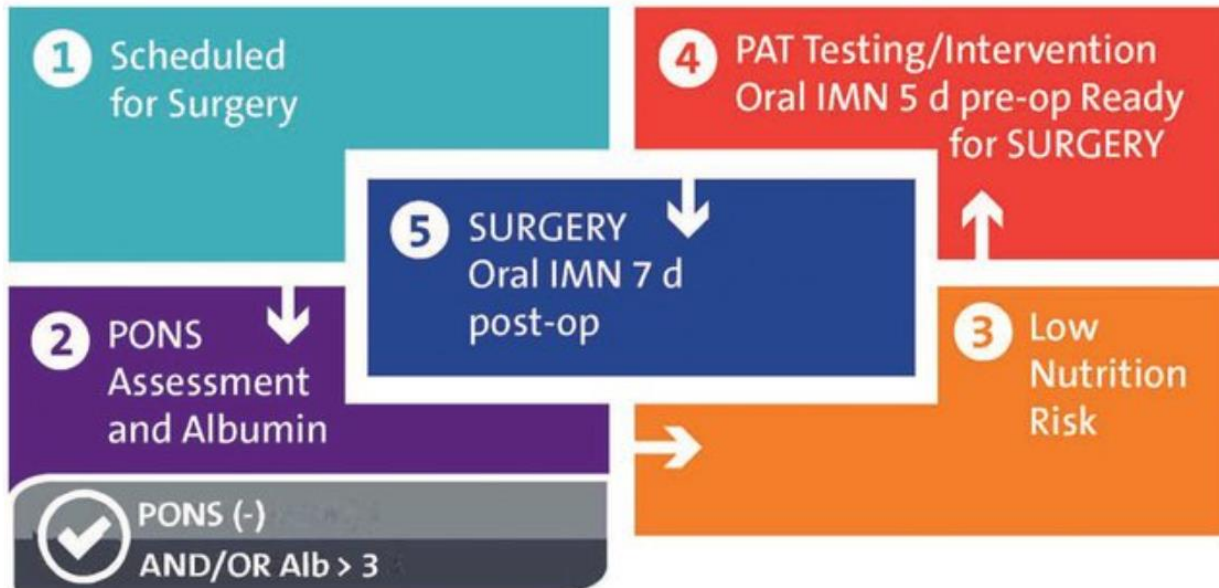


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A PRE-OPERATIVE NUTRITION CARE PATHWAY

Low Nutrition Risk



Prehabilitation and Nutritional Support to Improve Perioperative Outcomes

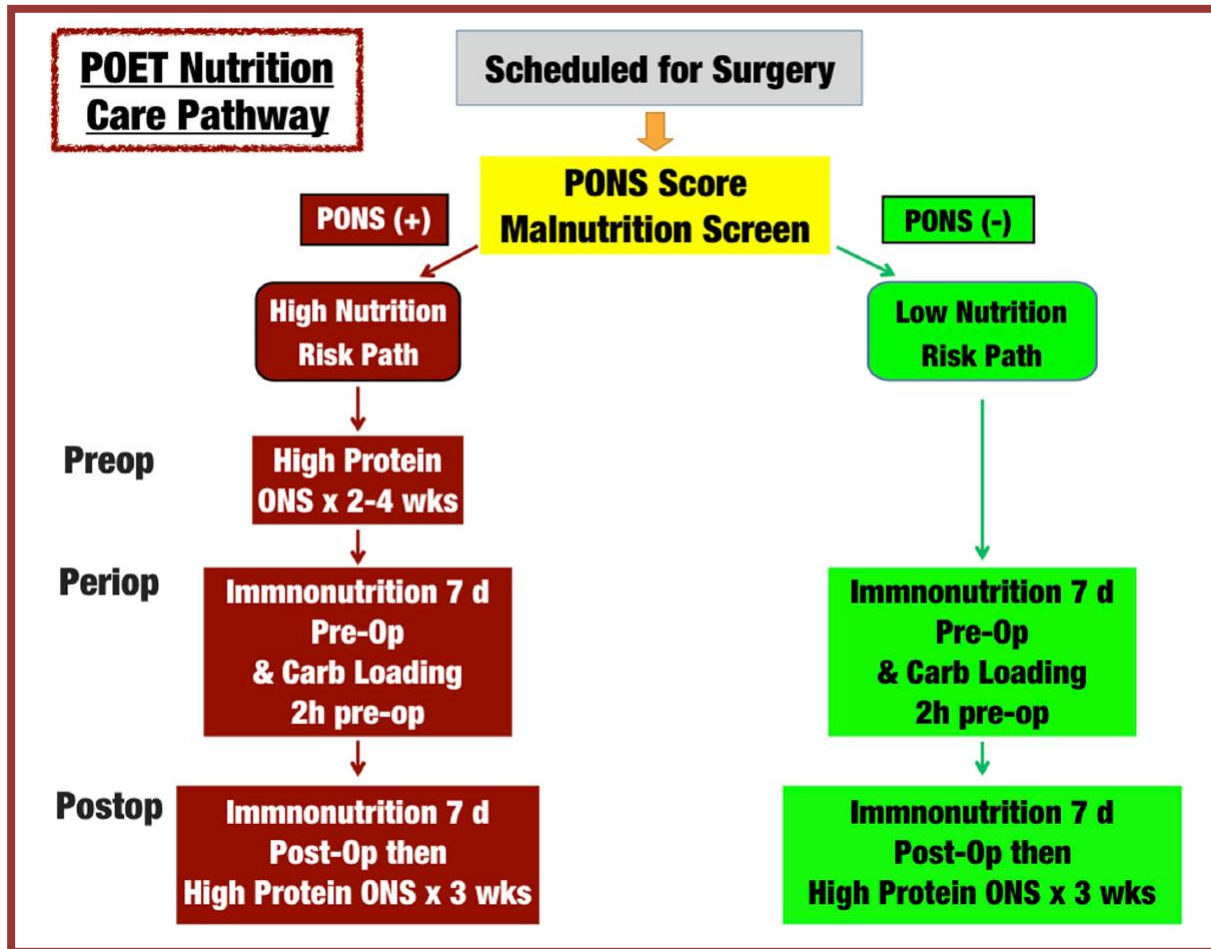
Malcolm A. West^{1,2,3,4} · Paul E. Wischmeyer^{5,6} · Michael P. W. Grocott^{2,3,4,7}

B PRE-OPERATIVE NUTRITION CARE PATHWAY High Nutrition Risk



Prehabilitation and Nutritional Support to Improve Perioperative Outcomes

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Azonos fenotípus – különböző etiológia!

MALNUTRÍCIÓ

Éhezés

energia bevitel és igény közti aránytalanság
(izom és zsírvesztés)

CACHEXIA

Inflamáció

(izom)proteolízis és zsírvesztés
(malignitás, IBD, Szervelégtelenség)



SARCOPÉNIA

Immobilizáció

izomtömeg és erő veszteség

STRESSZ

neurohormonális (izom)proteolízis
(corticosteroidok, catecholaminok, szimpatikus aktiváció)

Evaluation of Nutrition Status Using the Subjective Global Assessment: Malnutrition, Cachexia, and Sarcopenia

**Donald R. Duerksen, MD, FRCPC¹ ; Manon Laporte, RD, MSc, CNSC²;
and Khursheed Jeejeebhoy, PhD, MBBS, FRCPC³**

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Parenteral and Enteral Nutrition
DOI: 10.1002/nep.10613
wileyonlinelibrary.com

WILEY

Subjective Global Assessment:

validated in 59 consecutive surgical patients (1982)

length of stay and development of complications

reproducible when performed independently by 2 different practitioners

validated in different disease states

(chronic renal failure, cancer, geriatrics, critically ill patients, and hospitalized general medical patients).

Subjective Global Assessment Form

MEDICAL HISTORY

Patient name: _____ Date: ____/____/____

NUTRIENT INTAKE

- No change, adequate
- Inadequate; duration of inadequate intake _____
 Suboptimal solid diet Full fluids or only oral nutrition supplements Minimal intake, clear fluids or starvation
- Nutrient Intake in past 2 weeks*
 Adequate Improved but not adequate No improvement or inadequate

WEIGHT

Usual weight _____ Current weight _____

- Non fluid weight change past 6 months Weight loss (kg) _____
 <5% loss or weight stability 5-10% loss without stabilization or increase >10% loss and ongoing
If above not known, has there been a subjective loss of weight during the past six months?
 None or mild Moderate Severe
- Weight change past 2 weeks* Amount (if known) _____
 Increased No change Decreased

SYMPTOMS (Experiencing symptoms affecting oral intake)

- Pain on eating Anorexia Vomiting Nausea Dysphagia
 Diarrhea Dental problems Feels full quickly Constipation
- None Intermittent/mild/few Constant/severe/multiple
- Symptoms in the past 2 weeks*
 Resolution of symptoms Improving No change or worsened

FUNCTIONAL CAPACITY (Fatigue and progressive loss of function)

- No dysfunction
- Reduced capacity; duration of change _____
 Difficulty with ambulation/normal activities Bed/chair-ridden
- Functional Capacity in the past 2 weeks*
 Improved No change Decrease

METABOLIC REQUIREMENT

High metabolic requirement No Yes

PHYSICAL EXAMINATION

- Loss of body fat No Mild/Moderate Severe
Loss of muscle mass No Mild/Moderate Severe
Presence of edema/ascites No Mild/Moderate Severe

SGA RATING

- A Well-nourished Normal B Mildly/moderately malnourished Some progressive nutritional loss C Severely malnourished Evidence of wasting and progressive symptoms

CONTRIBUTING FACTOR

- CACHEXIA (fat and muscle wasting due to disease and inflammation)
 SARCOPENIA (reduced muscle mass and strength)

Subjective Global Assessment Guidance For Body Composition

SUBCUTANEOUS FAT

Physical examination	Normal	Mild/Moderate	Severe
Under the eyes	Slightly bulging area	Somewhat hollow look, Slightly dark circles	Hollowed look, depression, dark circles
Triceps	Large space between fingers	Some depth to fat tissue, but not ample. Loose fitting skin.	Very little space between fingers or fingers touch, loose fitting skin
Ribs, lower back, sides of trunk	Chest is full; ribs do not show. Slight to no protrusion of the iliac crest	Ribs obvious, but indentations are not marked. Iliac Crest somewhat prominent	Indentation between ribs very obvious. Iliac crest very prominent

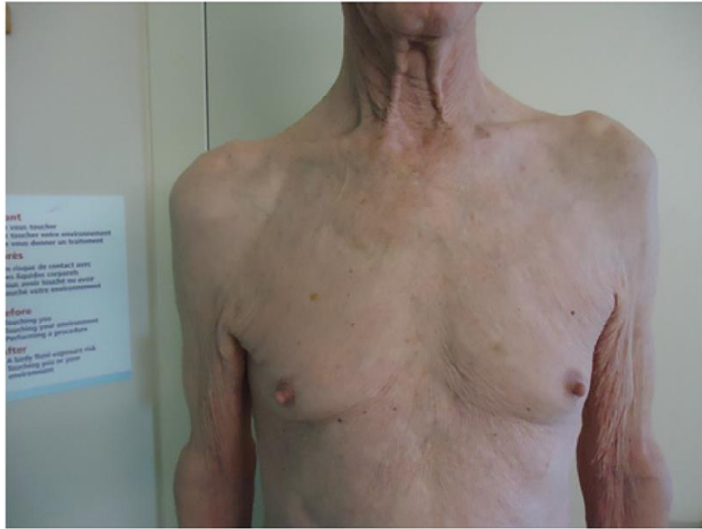
MUSCLE WASTING

Physical examination	Normal	Mild/Moderate	Severe
Temple	Well-defined muscle	Slight depression	Hollowing, depression
Clavicle	Not visible in males; may be visible but not prominent in females	Some protrusion; may not be all the way along	Protruding/prominent bone
Shoulder	Rounded	No square look; acromion process may protrude slightly	Square look; bones prominent
Scapula/ribs	Bones not prominent; no significant depressions	Mild depressions or bone may show slightly; not all areas	Bones prominent; significant depressions
Quadriceps	Well defined	Depression/atrophy medially	Prominent knee, Severe depression medially
Interosseous muscle between thumb and forefinger (back of hand)**	Muscle protrudes; could be flat in females	Slightly depressed	Flat or depressed area

FLUID RETENTION

Physical examination	Normal	Mild/Moderate	Severe
Edema	None	Pitting edema of extremities / pitting to knees, possible sacral edema if bedridden	Pitting beyond knees, sacral edema if bedridden, may also have generalized edema
Ascites	Absent	Present (may only be present on imaging)	

A



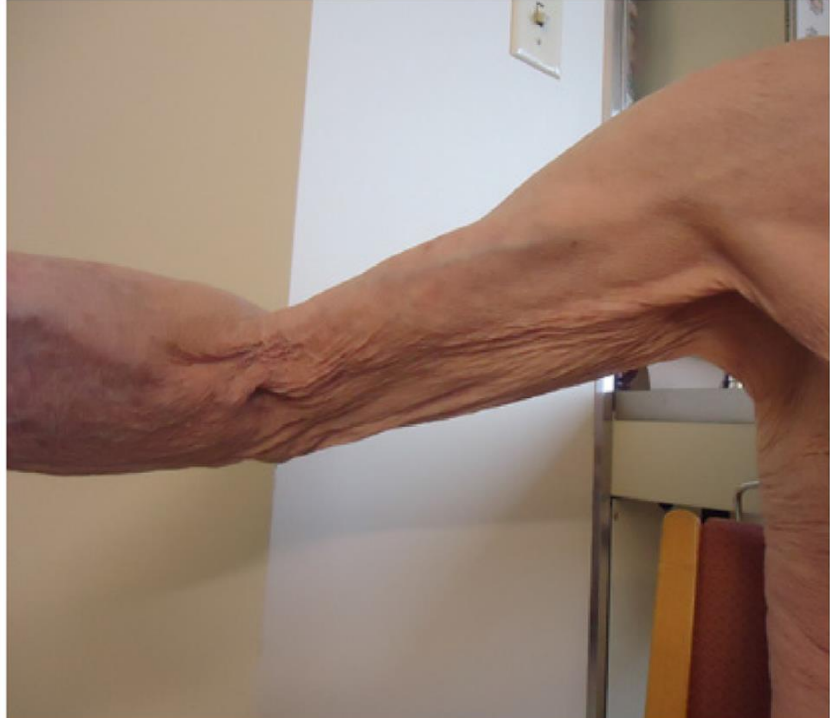
B



C



D



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 SARCOPENIA(reduced muscle mass and strength)

A - Well-nourished: no decrease in food/nutrient intake; < 5% weight loss; no/minimal symptoms affecting food intake; no deficit in function; no deficit in fat or muscle mass OR *an individual with some criteria for SGA B or C but with recent adequate food intake; non-fluid weight gain; **significant recent improvement** in symptoms allowing adequate **oral intake**; significant recent improvement **in function**; and chronic deficit in fat and muscle mass but with recent clinical improvement in function

LEVEL A: Standard Nutrition Care:

- Sit patient in chair or position upright in bed
- Ensure vision and dentition needs are addressed
- Address nausea, pain, constipation
- Ensure food is available at all times
- Monitor & Report:
 - Food intake 2x/week
 - Duration of NPO/clear fluid intake
 - Hydration status
 - Weekly weights
- Ensure bedside table is cleared for tray set-up, open packages, provide assistance to eat
- Monitor for signs of dysphagia
- Encourage family to bring preferred foods from home

B - Mildly/moderately malnourished definite **decrease in food/nutrient intake**; **5% - 10% weight loss** without stabilization or gain; **mild/some symptoms** affecting food intake; **moderate functional deficit** or recent deterioration; **mild/moderate loss of fat and/or muscle mass** OR *an individual meeting some criteria for SGA C but with improvement (but not adequate) of oral intake, **recent stabilization of weight**, decrease in symptoms affecting oral intake, and **stabilization of functional status**.

LEVEL B: Advanced Nutrition Care:

Continue **Standard Nutrition Care** practices **AND**

- Assess & address other barriers to food intake
- Monitor food intake at least 1 meal/day
- Promote intake with one or more of:
 - Nutrient dense diet (high in energy, protein, micronutrients)
 - Liberalized diet
 - Preferred foods
 - High energy/protein shakes/drinks
 - Snacks available between meals

C - Severely malnourished severe deficit in food/nutrient intake; > 10% weight loss which is ongoing; significant symptoms affecting food/nutrient intake; severe functional deficit OR *recent significant deterioration; obvious signs of fat and/or muscle loss.

LEVEL C: Specialized Nutrition Care:

Where appropriate, **Standard & Advanced Nutrition Care** strategies should be continued. Patient will undergo a Comprehensive Nutrition Assessment completed by the dietitian. This involves:

- More detailed assessment of nutrition status using physical examination, anthropometry, dietary, clinical, and biochemical markers
- Further identification of barriers to food intake (e.g. swallowing ability)
- Identification of eating behaviours that will support food intake
- Individualized treatment and monitoring

Subjective Global Assessment Form

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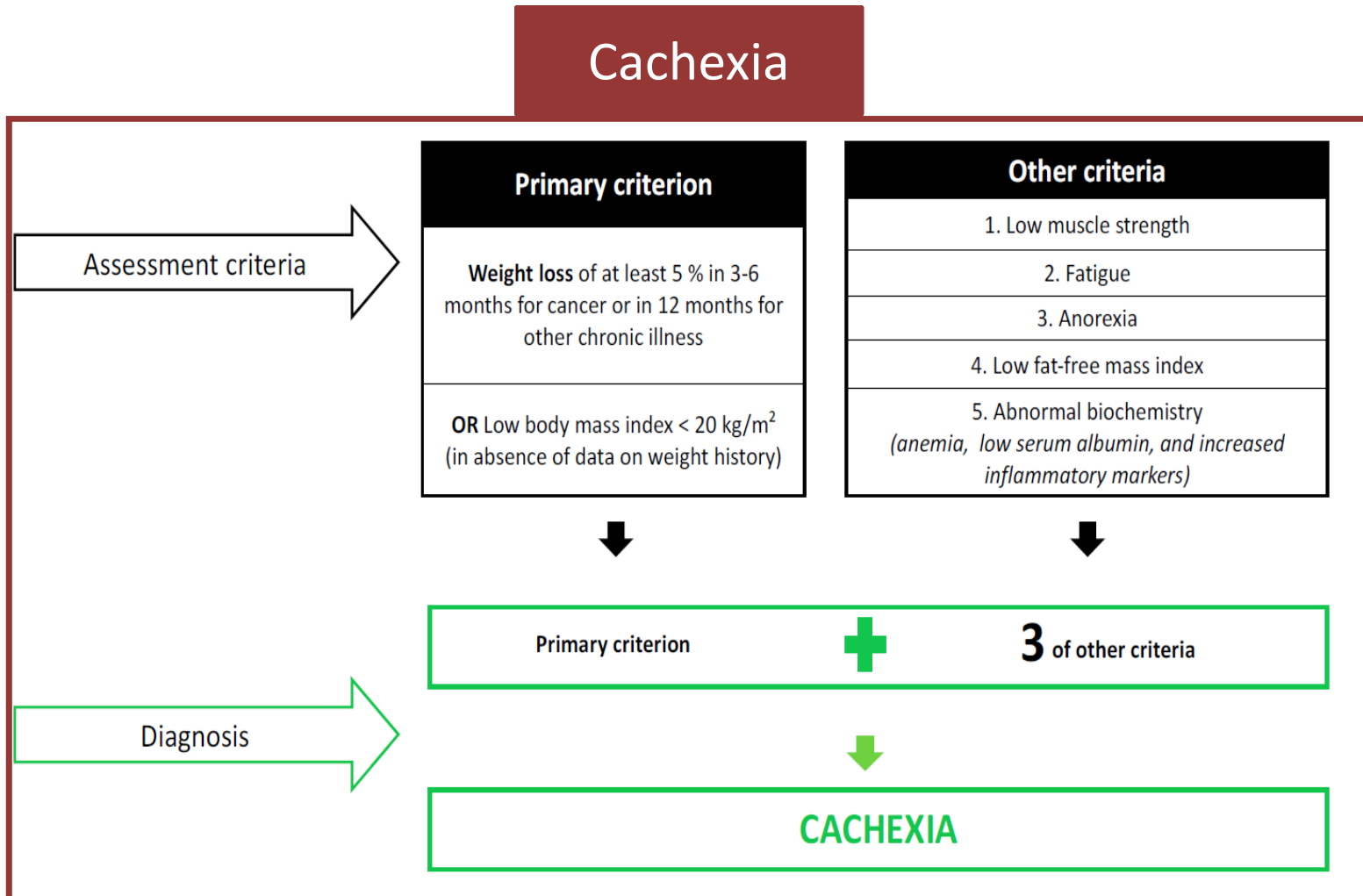


Review

Sarcopenia, Malnutrition, and Cachexia: Adapting Definitions and Terminology of Nutritional Disorders in Older People with Cancer

Delky Meza-Valderrama ^{1,2,3,4}, Ester Marco ^{1,5,6,7}, Vanesa Dávalos-Yerovi ^{1,2,5}, Maria Dolors Muns ⁸, Marta Tejero-Sánchez ^{1,5}, Esther Duarte ^{1,5,6} and Dolores Sánchez-Rodríguez ^{1,2,9,10,11,*}

Cachexia





POQI Nutrition Six

- 1. Pre-op/Post-op Nutrition Screening Essential**
- 2. Protein more important than calories**
- 3. Stop feeding late pre-op, restart early post-op**
- 4. Consider Oral Nutrition Supplements for All**
- 5. Oral before enteral before parenteral**
- 6. Nutrition management is a team game**

Mit tehetünk az intenzív osztályon?



Izomgyengeség diagnosztikája

Ilse V. et al. Intensive Care Med (2020) 46:637–653

Éber, kooperáló beteg

Technique	Measures	Advantages	Disadvantages	References
Volitional functional testing		Functional measurement	Patients need to be awake and cooperative and comprehend how to perform the measurements Does not differentiate CIPNM from deconditioning	
MRC sum score—6 categories 0: no contraction 1: contraction without movement 2: movement, gravity eliminated 3: movement against gravity 4: movement against resistance 5: normal muscle force	Bilateral scoring of: Shoulder abduction Elbow flexion Wrist extension Hip flexion Knee extension Foot dorsiflexion Significant weakness: < 48/60 Severe weakness < 36/60	Gold standard Non-invasive, bedside testing Reliable and valid (at least for score 0–3) High inter-rater reliability (provided strict guidelines on adequacy and standardized test procedures and positions are followed) Overall estimation of motor function	May be affected by positioning of the patient and availability of limbs for assessment (e.g., limitations by pain, dressings, immobilizing devices) Ordinal scale, lower sensitivity to more subtle changes in muscle function, difficulty in differentiation between score 4 and 5 Weak correlation with physical functioning	[2, 3, 21, 22]
MRC sum score—4 categories 0: paralysis 1: > 50% loss of strength 2: < 50% loss of strength 3: normal strength	Same muscles as above weakness: < 24/36 to be validated	Non-invasive, bedside testing Excellent inter-rater reliability Excellent accuracy in diagnosing weakness Requires less discrimination between grades than 6-grade score	Concerns on potential subjectivity Further validation needed	[23]
Hand-held dynamometry	Handgrip strength weakness: < 11 kg for men, < 7 kg for women Quadriceps force	Gold standard, quantitative measure Non-invasive, quick and easy bedside testing High inter-rater reliability High sensitivity and specificity	Significant floor effect Uncertain whether representative of global muscle strength	[3, 21, 23, 24]
Scored Physical Function in Intensive Care Test (PFIT-s) Functional abilities scored 0–3	Shoulder flexion strength Knee extension strength Sit-to-stand assistance Step cadence	Feasible and safe Inexpensive Evaluates patients' functional abilities Validated, predictive of key outcomes	Floor effect at admission Ceiling effect at discharge	[25]
Functional Status Score for the ICU Functional abilities scored 0–7 0: not able to perform 7: complete independence	Rolling Transfer from spine to sit Sitting at the edge of bed Transfer from sit to stand Walking	Feasible and safe Evaluates patients' functional abilities	Has not undergone additional psychometric testing for validation and scale analysis	[26]
Chelsea Critical Care Physical Assessment Tool		Feasible and safe Evaluates patients' functional abilities	Has not undergone additional psychometric testing for validation and scale analysis	[27]

Izomgyengeség diagnosztikája

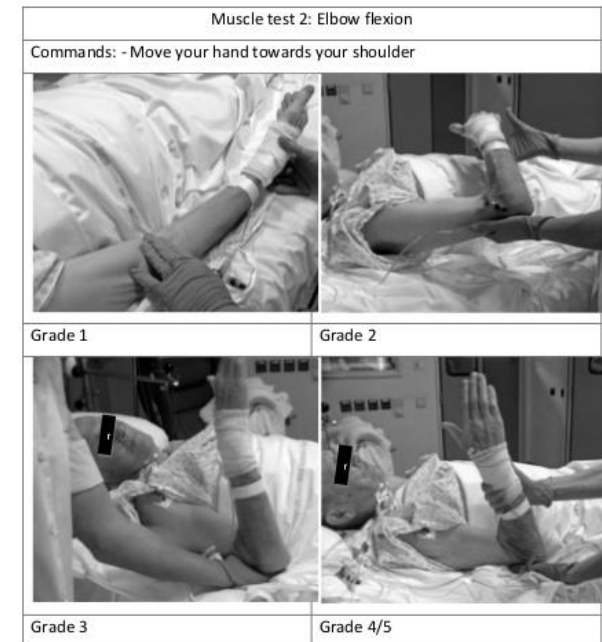
Ilse V. et al. Intensive Care Med (2020) 46:637–653

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MRC sum score—6 categories	Bilateral scoring of:	May be affected by positioning of the patient and availability of limbs for assessment (e.g., limitations by pain, dressings, immobilizing devices)
0: no contraction	Shoulder abduction	Ordinal scale, lower sensitivity to more subtle changes in muscle function, difficulty in differentiation between score 4 and 5
1: contraction without movement	Elbow flexion	
2: movement, gravity eliminated	Wrist extension	Weak correlation with physical functioning
3: movement against gravity	Hip flexion	
4: movement against resistance	Knee extension	
5: normal muscle force	Foot dorsiflexion	
	Significant weakness: < 48/60	
	Severe weakness < 36/60	



Functional Status Score for the ICU	Rolling	Feasible and safe
Functional abilities scored 0–7	Transfer from spine to sit	Evaluates patients' functional abilities
0: not able to perform	Sitting at the edge of bed	
7: complete independence	Transfer from sit to stand	
Chelsea Critical Care Physical Assessment Tool	Walking	Feasible and safe
		Evaluates patients' functional abilities

Izomgyengesség diagnosztikája

Ilse V. et al. Intensive Care Med (2020) 46:637–653




Éber, kooperáló beteg

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Volitional functional testing		Functional measurement	Patients need to be awake and cooperative and comprehend how to perform the measurements Does not differentiate CIPNM from deconditioning	
MRC sum score—6 categories 0: no contraction 1: contraction without movement 2: movement, gravity eliminated 3: movement against gravity 4: movement against resistance 5: normal muscle force	Bilateral scoring of: Shoulder abduction Elbow flexion Wrist extension Hip flexion Knee extension Foot dorsiflexion Significant weakness: < 48/60 Severe weakness < 36/60	Gold standard Non-invasive, bedside testing Reliable and valid (at least for score 0–3) High inter-rater reliability (provided strict guidelines on adequacy and standardized test procedures and positions are followed) Overall estimation of motor function	May be affected by positioning of the patient and availability of limbs for assessment (e.g., limitations by pain, dressings, immobilizing devices) Ordinal scale, lower sensitivity to more subtle changes in muscle function, difficulty in differentiation between score 4 and 5 Weak correlation with physical functioning	[2, 3, 21, 22]
MRC sum score—4 categories 0: paralysis 1: > 50% loss of strength 2: < 50% loss of strength 3: normal strength	Same muscles as above weakness: < 24/36 to be validated	Non-invasive, bedside testing Excellent inter-rater reliability Excellent accuracy in diagnosing weakness Requires less discrimination between grades than 6-grade score	Concerns on potential subjectivity Further validation needed	[23]
Hand-held dynamometry	Handgrip strength weakness: < 11 kg for men, < 7 kg for women Quadriceps force	Gold standard, quantitative measure Non-invasive, quick and easy bedside testing High inter-rater reliability High sensitivity and specificity	Significant floor effect Uncertain whether representative of global muscle strength	[3, 21, 23, 24]
Scored Physical Function in Intensive Care Test (PFIT-s) Functional abilities scored 0–3	Shoulder flexion strength Knee extension strength Sit-to-stand assistance Step cadence	Feasible and safe Inexpensive Evaluates patients' functional abilities Validated, predictive of key outcomes	Floor effect at admission Ceiling effect at discharge	[25]
Functional Status Score for the ICU Functional abilities scored 0–7 0: not able to perform 7: complete independence	Rolling Transfer from spine to sit Sitting at the edge of bed Transfer from sit to stand Walking	Feasible and safe Evaluates patients' functional abilities	Has not undergone additional psychometric testing for validation and scale analysis	[26]
Chelsea Critical Care Physical Assessment Tool		Feasible and safe Evaluates patients' functional abilities	Has not undergone additional psychometric testing for validation and scale analysis	[27]

Izomgyengeség diagnosztikája

Ilse V. et al. Intensive Care Med (2020) 46:637–653

Éber, kooperáló beteg

Technique	Measures	Advantages	Disadvantages	References
Volitional functional testing		Functional measurement	Patients need to be awake and cooperative and comprehend how to perform the measurements	
Technique	Measures	Advantages	Disadvantages	
Hand-held dynamometry	Handgrip strength weakness: < 11 kg for men, < 7 kg for women Quadriceps force	Gold standard, quantitative measure Non-invasive, quick and easy bedside testing High inter-rater reliability High sensitivity and specificity	Significant floor effect Uncertain whether representative of global muscle strength	
MRC sum score—4 categories 0: paralysis 1: > Handgrip Dynamometry 2: < 3: n	Same muscles as above weakness: < 24/36 to be d	Non-invasive, bedside testing Excellent inter-rater reliability Excellent accuracy in diagnosing weakness	Concerns on potential subjectivity Further validation needed	[23]
 <p>Handgrip strength for men, quadriceps force</p> <p>flexion extension and assistance</p> <p>from sitting the edge from sitting</p>			<p>Assessment Tool</p> <p>Evaluates patients' functional abilities</p> <p>psychometric testing for validation and scale analysis</p>	

Izomgyengeség diagnosztikája

Ilse V. et al. Intensive Care Med (2020) 46:637–653

Szedált, nem kooperáló beteg

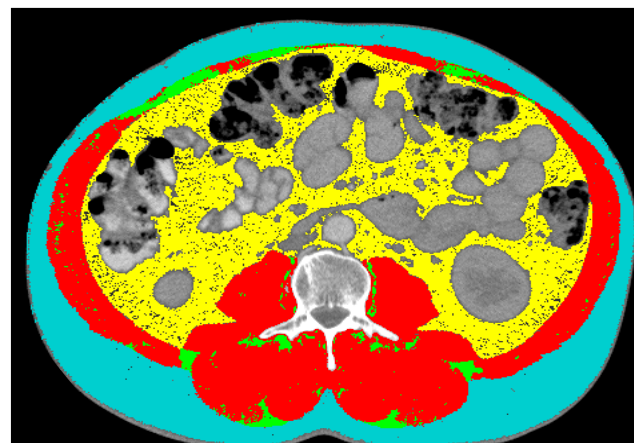
Technique	Measures	Advantages	Disadvantages
Electrophysiology			
Full nerve conduction studies (NCS) and needle electromyography (EMG)	CMAP amplitude and duration SNAP amplitude Nerve conduction velocity Fibrillation potentials Positive sharp waves Motor unit potentials	Can delineate CIPNM from deconditioning	Mildly invasive (EMG) Requires specialized training Partially requires patient cooperation (EMG) Anticoagulation therapy is a relative contra-indication



Izomvesztés diagnosztikája

Ilse V. et al. *Intensive Care Med* (2020) 46:637–653

Technique	Measures	Advantages	Disadvantages
Computed tomography (CT)	Infiltration of muscle by adipose tissue Fat-free skeletal muscle	Highly accurate, highly reliable Valid in patients with severe fluid retention Allows evaluation of the deepest muscles	High cost, time-consuming Highly specialized staff and software needed Transport of patient outside ICU needed High level of radiation exposure (may be limited if only a single muscle group is assessed) Inappropriate for repeated monitoring
Magnetic resonance imaging (MRI)	Infiltration of muscle by adipose tissue Fat-free skeletal muscle	Highly accurate, highly reliable Valid in patients with severe fluid retention	High cost, time-consuming Highly specialized staff and software needed Transport of patient outside ICU needed Inappropriate for repeated monitoring



Izomvesztés diagnosztikája

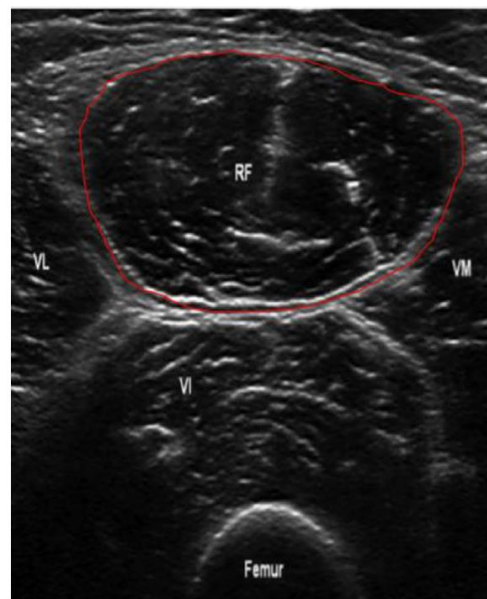
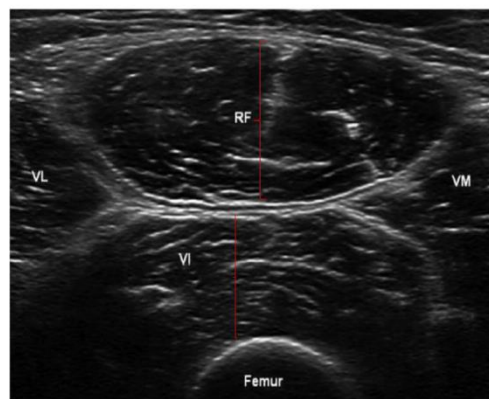
Ilse V. et al. Intensive Care Med (2020) 46:637–653

Technique

Ultrasonography



Measures



Advantages

Disadvantages



Izomvesztés diagnosztikája

Ilse V. et al. *Intensive Care Med* (2020) 46:637–653

Technique

Measures

Advantages

Disadvantages

Ultrasonography

Formenti et al. *Ann. Intensive Care* (2019) 9:57
<https://doi.org/10.1186/s13613-019-0531-x>

 Annals of Intensive Care

REVIEW

Open Access

Clinical review: peripheral muscular ultrasound in the ICU



Paolo Formenti^{1,3*}, Michele Umbrello^{1,3}, Silvia Coppola^{1,3}, Sara Froio^{1,3} and Davide Chiumello^{1,2,3}

A - Well-nourished: no decrease in food/nutrient intake; < 5% weight loss; no/minimal symptoms affecting food intake; no deficit in function; no deficit in fat or muscle mass OR *an individual with some criteria for SGA B or C but with recent adequate food intake; non-fluid weight gain; **significant recent improvement** in symptoms allowing adequate **oral intake**; significant recent improvement **in function**; and chronic deficit in fat and muscle mass but with recent clinical improvement in function

B - Mildly/moderately malnourished definite decrease in food/nutrient intake; 5% - 10% weight loss without stabilization or gain; **mild/some symptoms** affecting food intake; **moderate functional deficit** or recent deterioration; **mild/moderate loss of fat and/or muscle mass** OR *an individual meeting some criteria for SGA C but with improvement (but not adequate) of oral intake, **recent stabilization of weight**, decrease in symptoms affecting oral intake, and **stabilization of functional status**.

C - Severely malnourished severe deficit in food/nutrient intake; > 10% weight loss which is ongoing; **significant symptoms** affecting food/nutrient intake; **severe functional deficit** OR *recent **significant deterioration**; obvious signs of fat and/or muscle loss.

Ki profitál a táplálásból?



Article

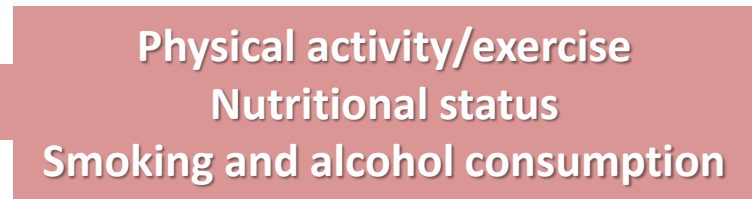
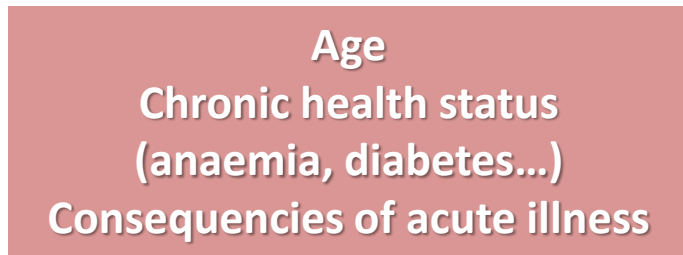
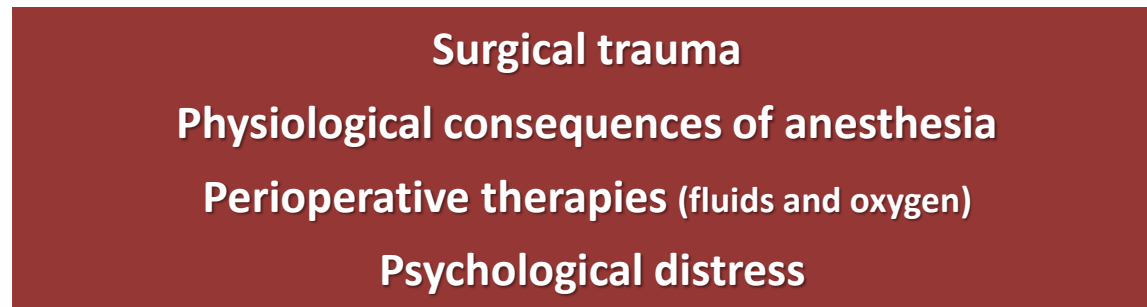
Assessment of Nutritional Status and Nutrition Impact Symptoms in Patients Undergoing Resection for Upper Gastrointestinal Cancer: Results from the Multi-Centre NOURISH Point Prevalence Study

Irene Deftereos ^{1,2,*} , Justin M. C. Yeung ^{1,3,4} , Janan Arslan ¹ , Vanessa M. Carter ², Elizabeth Isenring ^{5,6}, Nicole Kiss ^{7,8} and on behalf of The NOURISH Point Prevalence Study Group [†]

Variable	Malnutrition OR (95% CI)	<i>p</i> Value	Unintentional Weight Loss \geq 5% OR (95% CI)	<i>p</i> Value
Age \geq 65	4.1 (1.5, 11.5)	0.008		
LOW \geq 5% in 6 Months	28.7 (10.5, 78.6)	<0.001		
Length of Time of Reduced Intake				
2–4 Weeks	7.4 (1.3, 43.5)	0.026		
\geq 1 Month	7.7 (2.7, 22.0)	<0.001		
Degree of reduction in solid food intake				
\leq 75% of Usual Intake			3.3 (1.2, 9.2)	0.02
\leq 50% of Usual Intake			4.9 (1.5, 15.6)	0.008
Nutrition Impact Symptoms				
Vomiting	17.1 (1.4, 207.6)	0.025		
Poor Appetite			3.7 (1.6, 8.4)	0.002

OR = odds ratio, CI = confidence interval, and LOW = loss of weight. Bolded *p* values indicate statistical significance.

Perioperatív időszak



Nutrition Screening at Admission

If the patient answers “Yes” to the two Canadian Nutrition Screening Tool (CNST) questions listed on Page 1 **OR** if any of the following apply to the patient:

- Requires enteral/parenteral nutrition
- Has altered mental status
- Unable to complete CNST (e.g. language barrier)
- Transferred from critical care
- Has high nutrition risk conditions (e.g. trauma, burns, pressure ulcers, SIRS, etc.)

...then follow “**AT RISK**” pathway on Page 1.

If none of the above apply, then follow “**NO RISK**” pathway.

Subjective Global Assessment (SGA):

SGA is the gold standard for diagnosing malnutrition in hospital. Trained professionals assess food intake, functional status, and body composition; the assessment takes approximately 10 minutes.

LEVEL A: Standard Nutrition Care:

- Sit patient in chair or position upright in bed
- Ensure vision and dentition needs are addressed
- Address nausea, pain, constipation
- Ensure food is available at all times
- Monitor & Report:
 - Food intake 2x/week
 - Duration of NPO/clear fluid intake
 - Hydration status
 - Weekly weights
- Ensure bedside table is cleared for tray set-up, open packages, provide assistance to eat
- Monitor for signs of dysphagia
- Encourage family to bring preferred foods from home

LEVEL B: Advanced Nutrition Care:

Continue **Standard Nutrition Care** practices **AND**

- Assess & address other barriers to food intake
- Monitor food intake at least 1 meal/day
- Promote intake with one or more of:
 - Nutrient dense diet (high in energy, protein, micronutrients)
 - Liberalized diet
 - Preferred foods
 - High energy/protein shakes/drinks
 - Snacks available between meals

LEVEL C: Specialized Nutrition Care:

Where appropriate, **Standard & Advanced Nutrition Care** strategies should be continued. Patient will undergo a Comprehensive Nutrition Assessment completed by the dietitian. This involves:

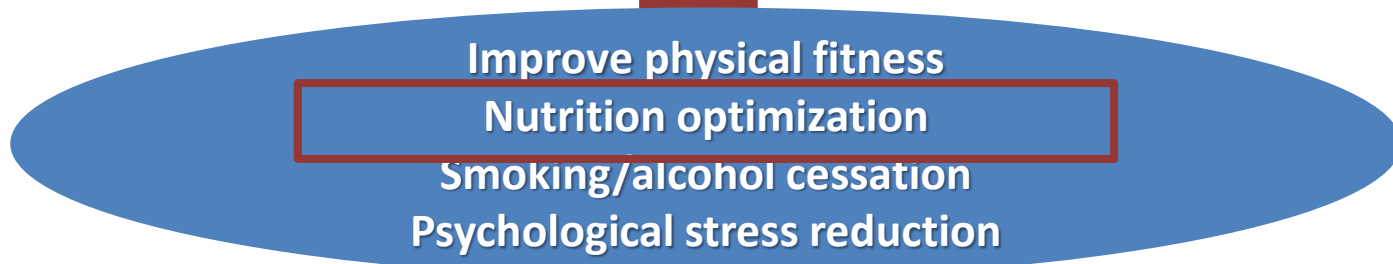
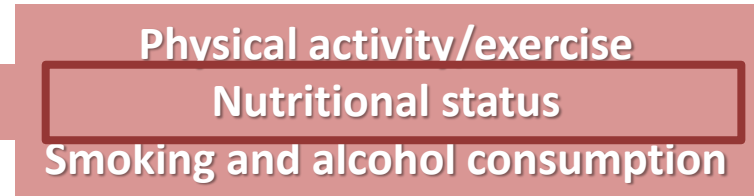
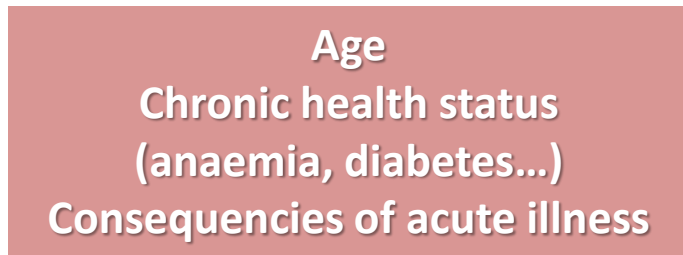
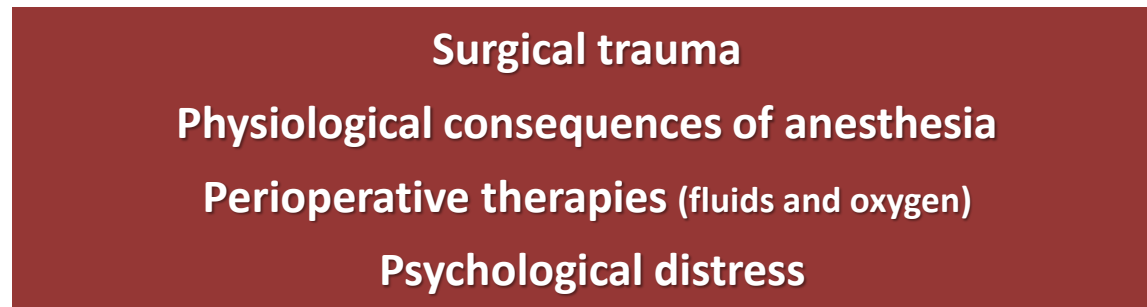
- More detailed assessment of nutrition status using physical examination, anthropometry, dietary, clinical, and biochemical markers
- Further identification of barriers to food intake (e.g. swallowing ability)
- Identification of eating behaviours that will support food intake
- Individualized treatment and monitoring

Post-Discharge Nutrition Care:

If patient is malnourished (SGA B or C) upon admission or during hospitalization, nutrition is flagged as an active issue in the discharge summary note (*completed by dietitian, physician, or nurse*)

- Education provided to patient/ family
- Transfer of care recommendations for patient’s health care providers including dietitian referral if nutrition rehabilitation is ongoing

Perioperatív időszak





Review

Sarcopenia, Malnutrition, and Cachexia: Adapting Definitions and Terminology of Nutritional Disorders in Older People with Cancer

Delky Meza-Valderrama ^{1,2,3,4}, Ester Marco ^{1,5,6,7}, Vanesa Dávalos-Yerovi ^{1,2,5}, Maria Dolors Muns ⁸, Marta Tejero-Sánchez ^{1,5}, Esther Duarte ^{1,5,6} and Dolores Sánchez-Rodríguez ^{1,2,9,10,11,*}

Malnutríciaó

Éhezés = energia bevitel és igény közti aránytalanság (izom és zsírvesztés)

Sarcopénia

Immobilizáció = izomtömeg és erő vesztés

Cachexia

Inflammáció (acut/kronikus) = diszregulált citokin aktivitás következtében kialakult(izom)proteolízis (malignitás, IBD, Szervelégtelenség)

Stressz

= neurohormonális (corticosteroidok, catecholaminok, szimpatikus aktiváció) (izom)proteolízis

Neuromuszkuláris atrófia = izombetegség, perifériás idegbetegség (diabetes, CIP, CÍM)

REPORT

Sarcopenia definition and diagnosis

Geriatric syndróna

Age and Ageing 2010; 39: 412–423

Age and Ageing 2010; 39: 412–423

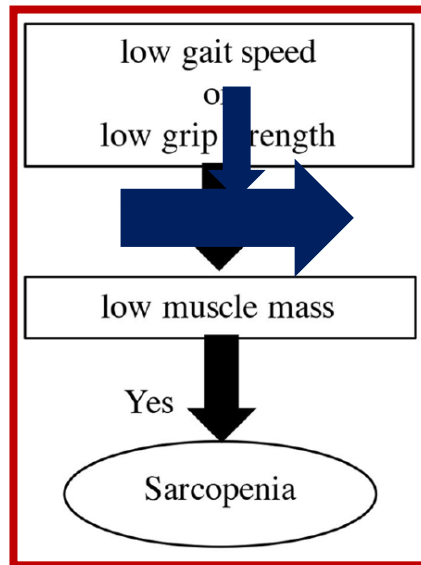
Report of the European Working Group on Sarcopenia in Older People

„Geriatric syndromes result from incompletely understood **interactions of disease and age on multiple systems**, producing a constellation of signs and symptoms.

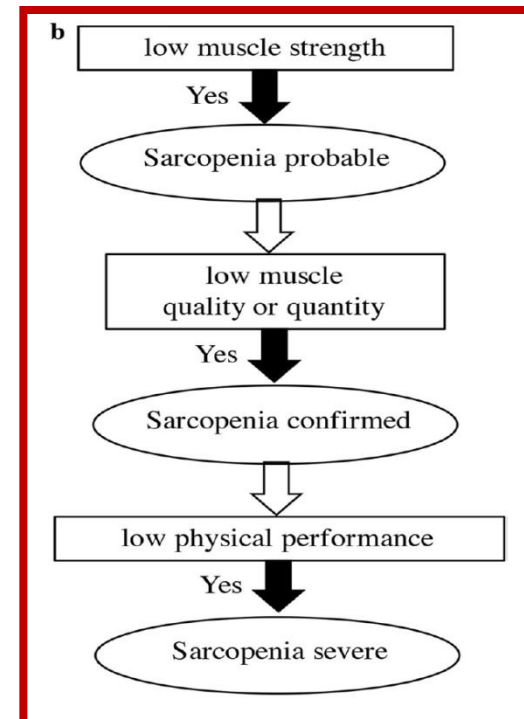
Delirium, falls and incontinence are examples of geriatric syndromes...”

SARCOPÉNIA

EWGSOP [2010]



EWGSOP2 [2019]



REPORT

Sarcopenia and diagnosis

Geriatric syndróna

Definition

Age and Ageing 2010; 39: 412–423

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EWGSOP [2010]

EWGSOP2 [2019]

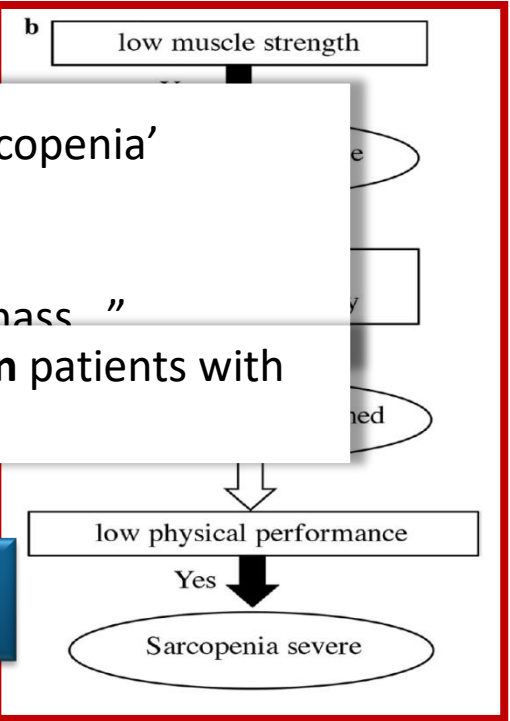
“In 1989, **Irwin Rosenberg** proposed the term ‘sarcopenia’
(Greek ‘sarx’ or flesh + ‘penia’ or loss)

to describe this age-related decrease of muscle mass.”

In 1892, **Sir William Osler** reported “**rapid loss of flesh**” in patients with prolonged **sepsis**

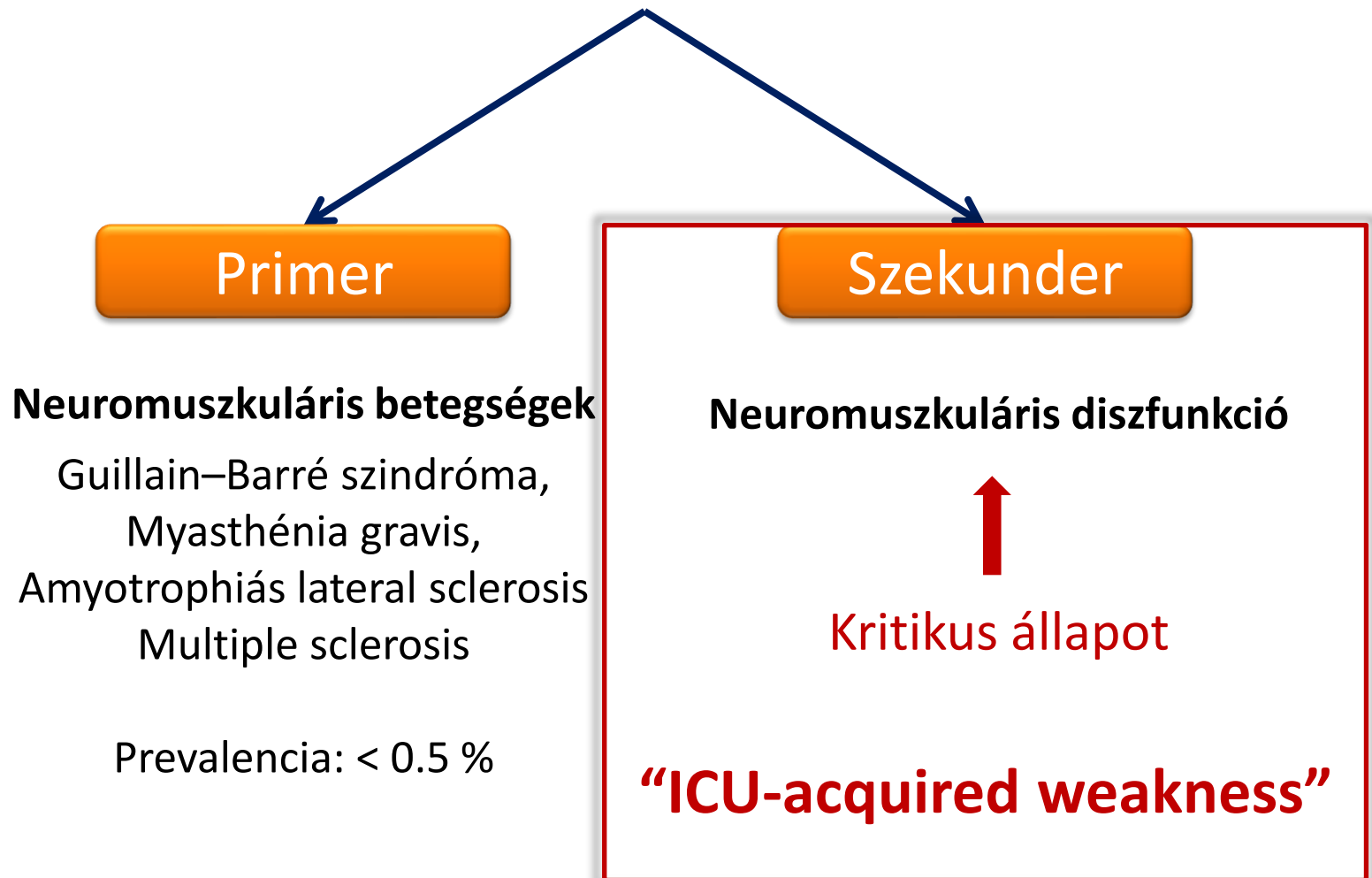
Yes

Kritikus állapotú betegek



Izomgyengeség az intenzív osztályon

Damian MS, Wijdicks EFM Neuromuscul Disord.2019; 29:85–96



ICU-acquired weakness

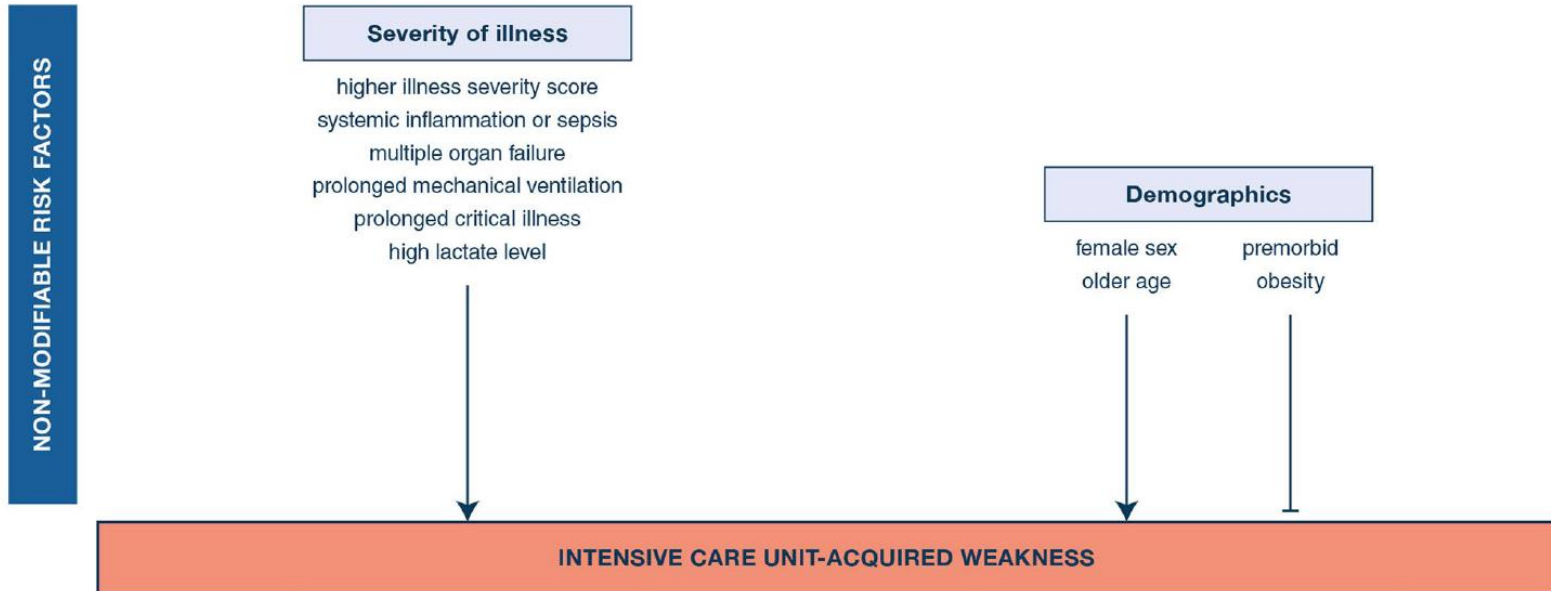
Intensive Care Med (2020) 46:637–653

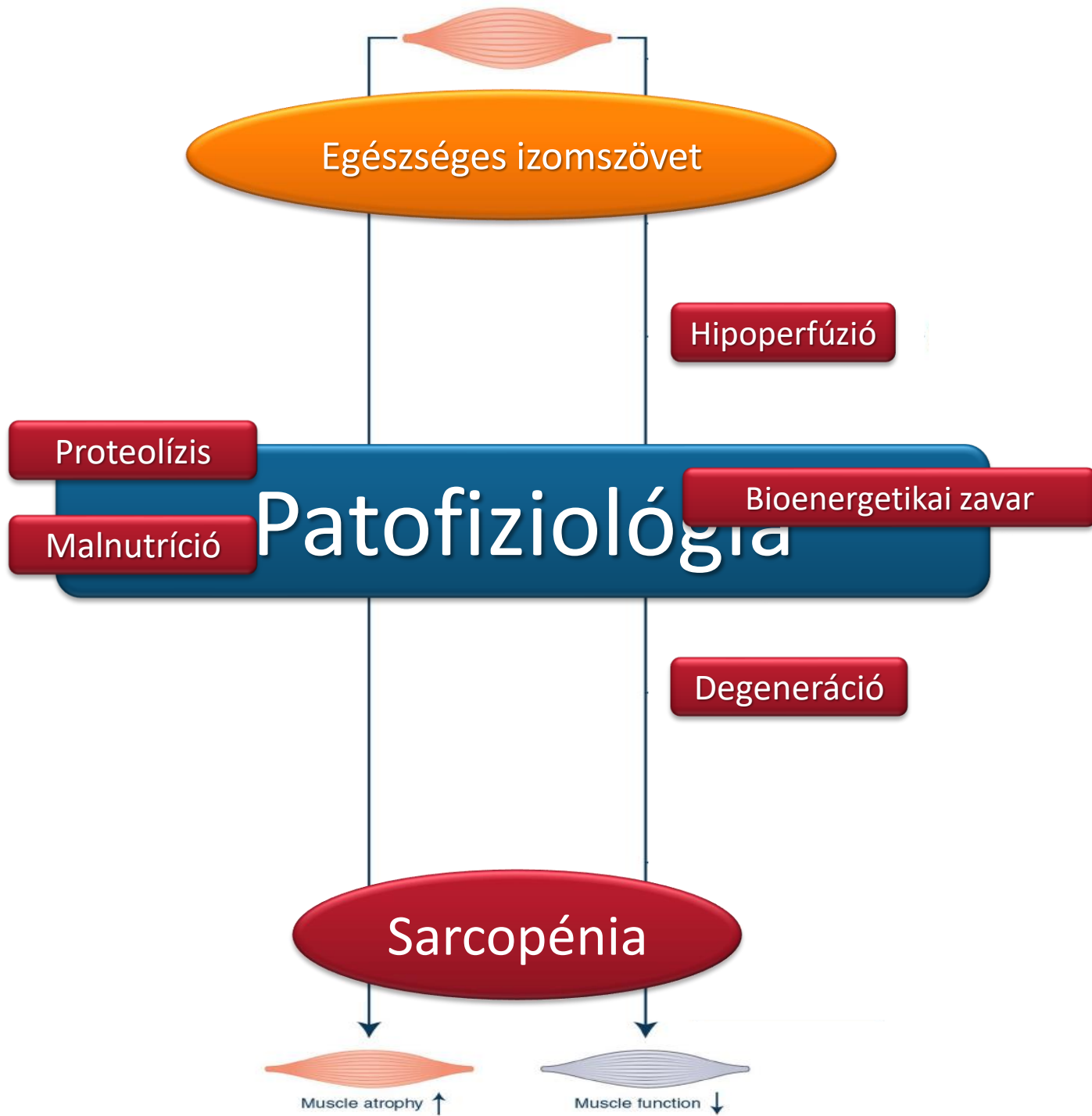
Ilse Vanhorebeek¹ , Nicola Latronico^{2,3}  and Greet Van den Berghe^{1*} 

- **Generalizált, szimmetrikus végtag** - (proximálisan inkább mint disztálisan) illetve **légzőizom vesztés/ gyengeség** (arc / szemizmok nem érintettek) – **REKESZIZOM !!**
- Fenotípusai:
 1. **„Critical Illness Polyneuropáthia” (CIP)**
motoros/szenzoros/vegetatív rostok
NCS: CMAP/SNAP csökkent – axonalis degeneráció – EMG: megtartott CMAP
 2. **„Critical illness myopáthia” (CIM)**
motoros rostok – NCS: CMAP csökkent/SNAP ok – EMG: csökkent CMAP
 3. **„Critical Illness Neuromyopáthia”** – külön entitás vs spektrumbetegség ?
 4. **Immobilizáció okozta izomatrófia**
EP: ok, de izom átmérő/hossz/erő csökkenés – sarcomer rövidülés 4 óra alatt
1 hét alatt izomerő csökkenés kb 10% egészségesekben
- Prevalencia: **43 %** (interquartile range 25–75%)

Rizikófaktorok

Ilse V. et al. Intensive Care Med (2020) 46:637–653





Izomgyengeség klinikai jelentősége

Ilse V. et al. Intensive Care Med (2020) 46:637–653

INTENSIVE CARE UNIT-ACQUIRED WEAKNESS

```
graph TD; A[INTENSIVE CARE UNIT-ACQUIRED WEAKNESS] --> B[SHORT-TERM COMPLICATIONS]; B --- C[Mechanical ventilation]; B --- D[Extubation failure]; B --- E[Swallowing disorders];
```

SHORT-TERM COMPLICATIONS

Mechanical ventilation



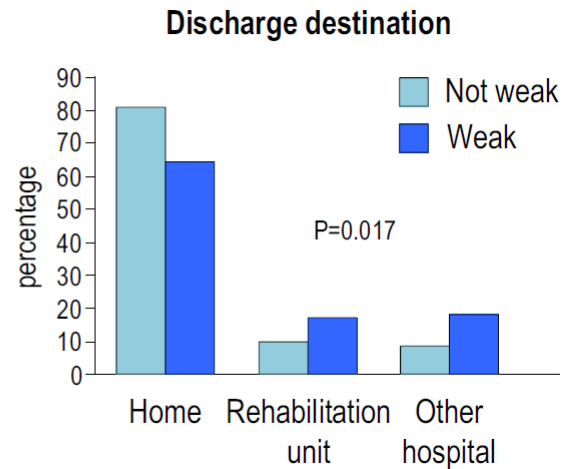
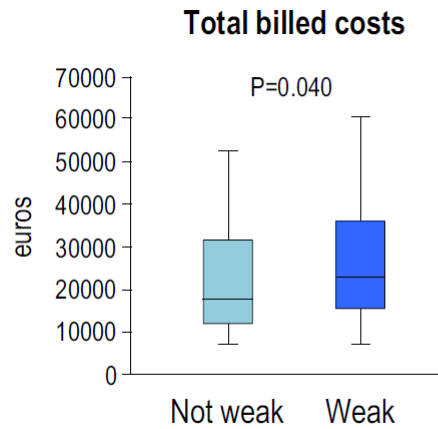
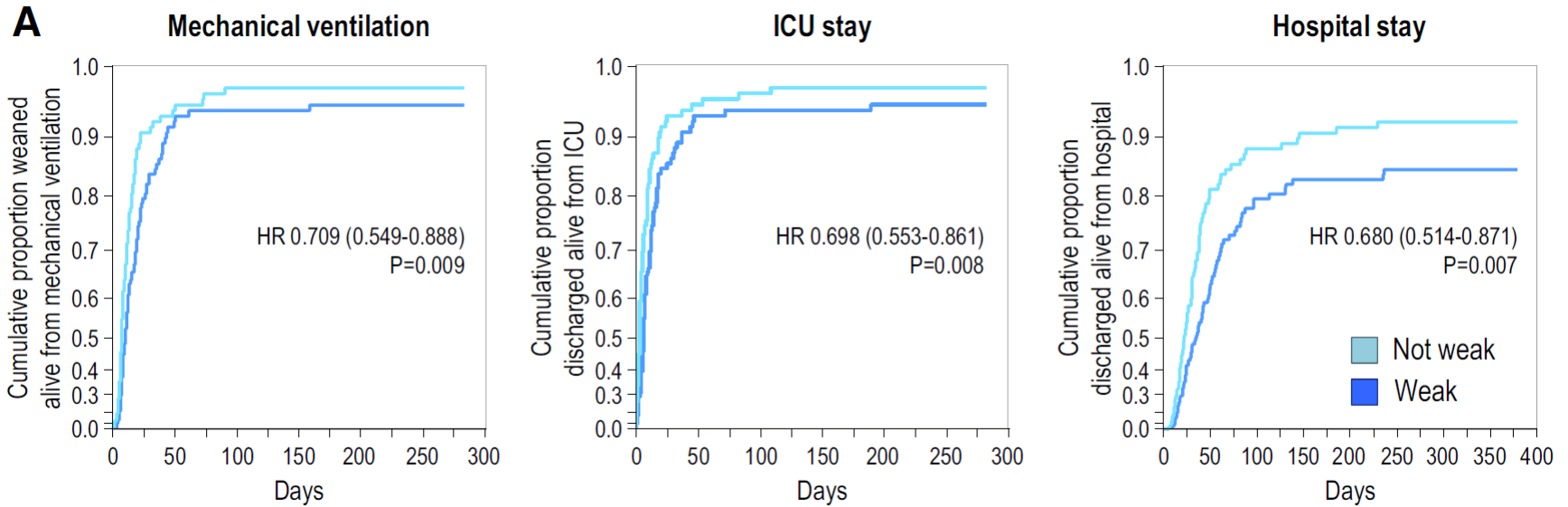
Extubation failure



Swallowing disorders



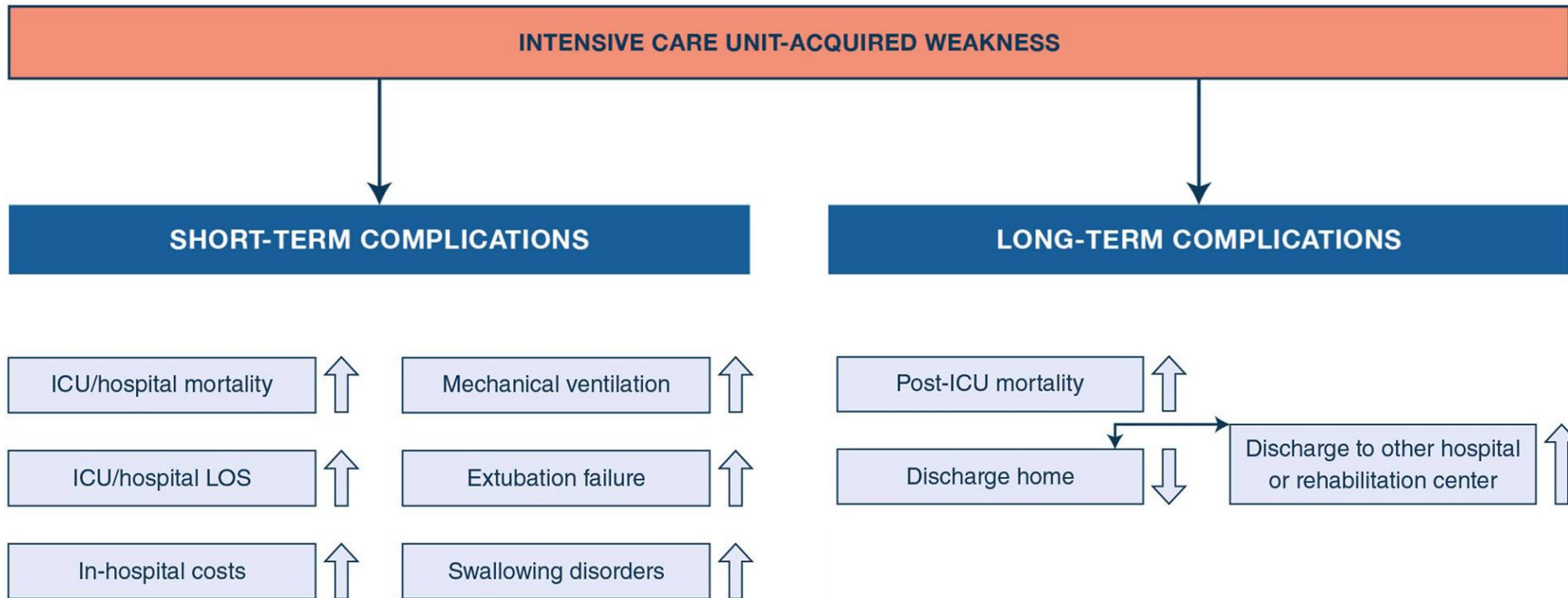
SHORT-TERM COMPLICATIONS



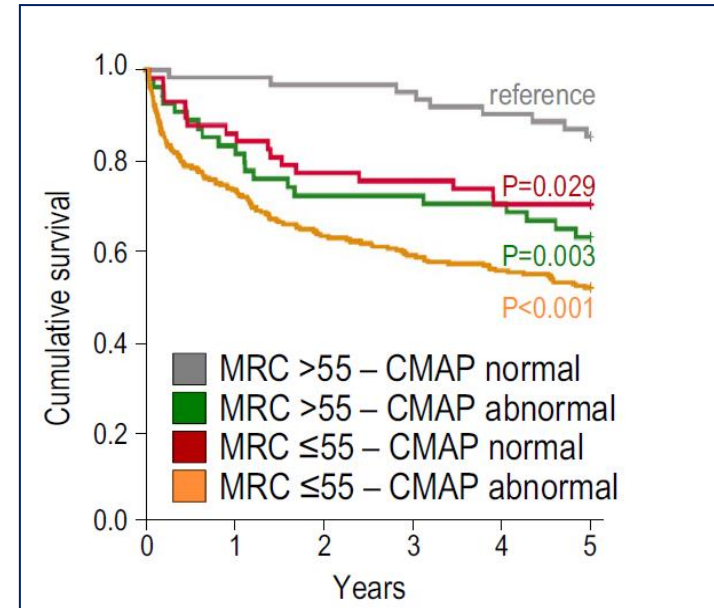
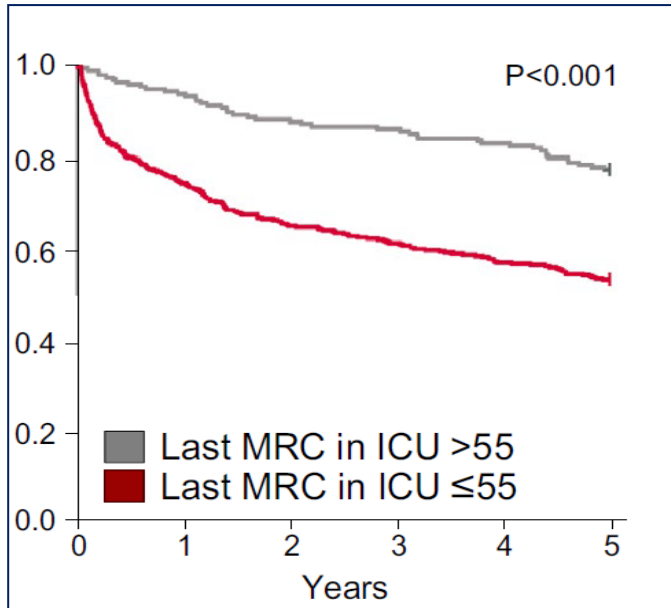
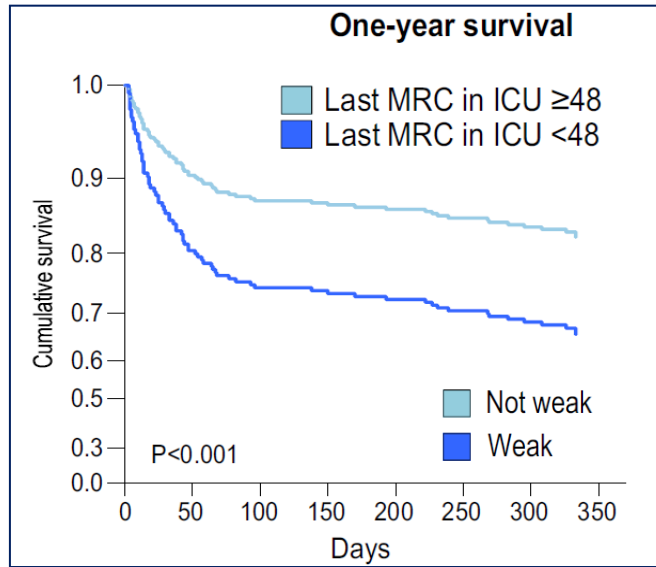
ICU-acquired weakness

Intensive Care Med (2020) 46:637–653

Ilse Vanhorebeek¹ , Nicola Latronico^{2,3}  and Greet Van den Berghe^{1*} 



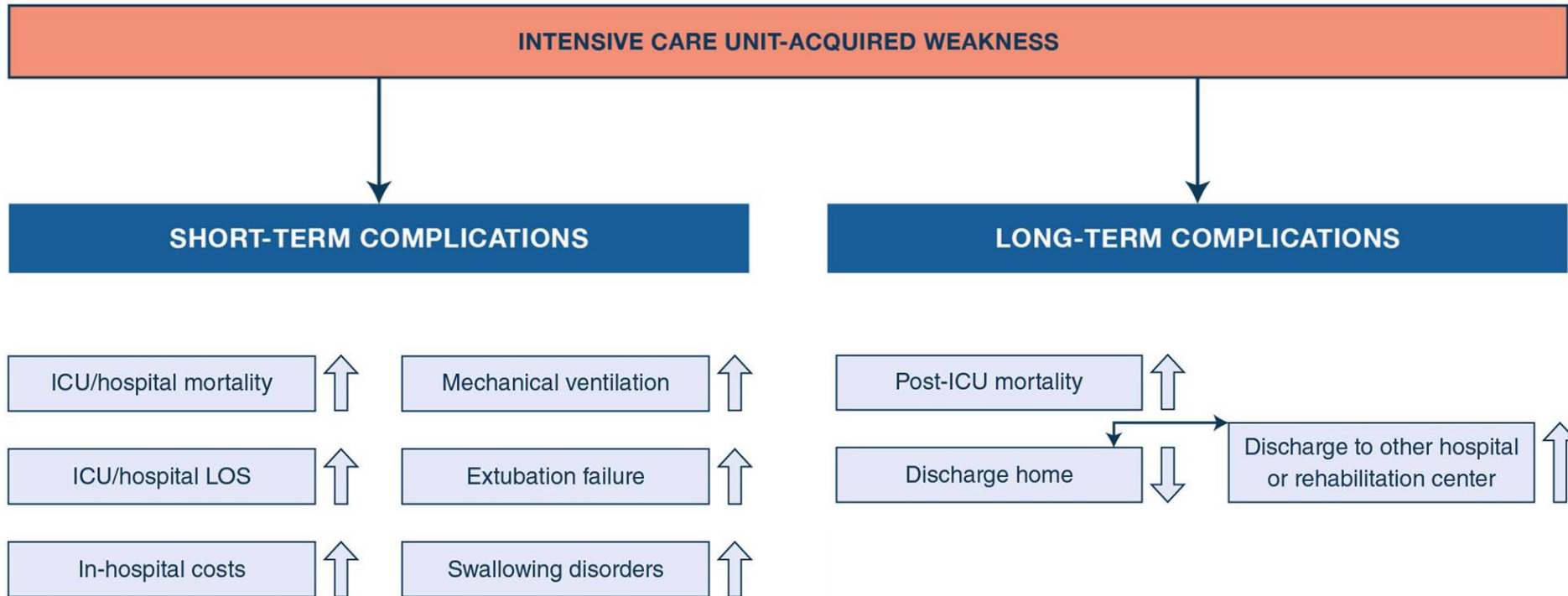
LONG-TERM COMPLICATIONS

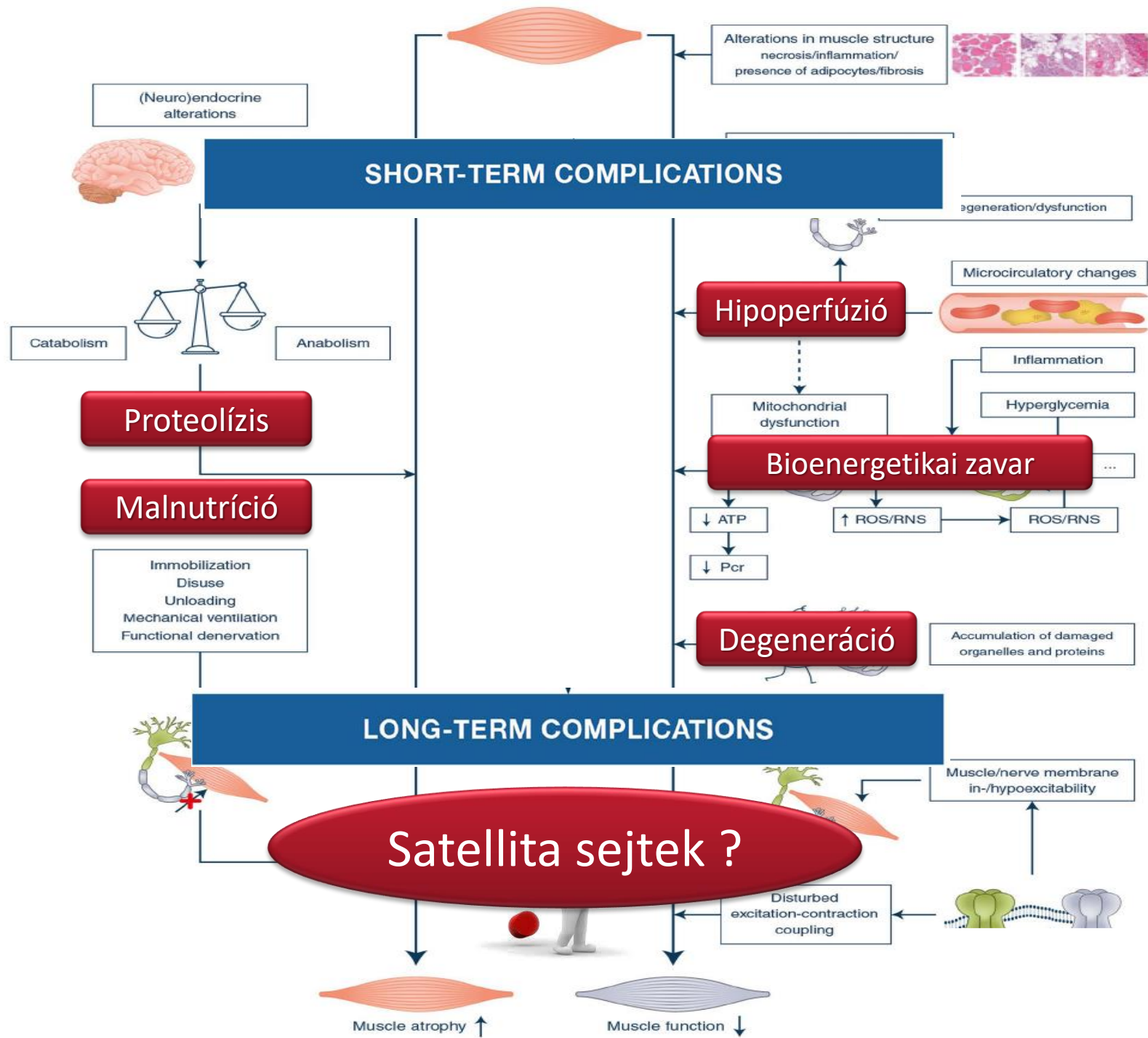


ICU-acquired weakness

Intensive Care Med (2020) 46:637–653

Ilse Vanhorebeek¹ , Nicola Latronico^{2,3}  and Greet Van den Berghe^{1*} 





Izomgyengeség kezelése

Ilse V. et al. Intensive Care Med (2020) 46:637–653

1. Szoros vércukor kontroll – csökkentette a CIPM EP jeleinek megjelenését

Hermans G. et al. Am J Respir Crit Care Med.2007;175:480–489

- célérték: ? 4.5-6 mmol/l vs **<10mmol/l**

NICE-SUGAR Study Investigators. N Engl J Med.2009; 360:1283–1297

2. Aggresszív, korai (<1 hét) teljes táplálás kerülése

- EN fokozatos felépítése – PN kerülése az első hétben

Hermans G. et al. Lancet Respir Med.2013; 1: 621–629

Casaer MP. Et al. N Engl J Med.2011; 365:506–517

- Aminósav pótlás kerülése : „*amino acid-induced suppression of autophagy*”

Gunst J. et al. Pharmacol Res.2018; 130:127–131

3. Szedáció optimalizálása – Immobilizáció kerülése – **korai rehabilitáció**

Fuke R. et al. BMJ Open.2018; 8:e019998

4. Neuromuskuláris elektromos stimuláció (NMES): ?

Zayed Y, Aust Crit Care. doi.org/10.1016/j aucc.2019.04.003

5. Gyógyszerek: anabolikus szteroidok, oxandrolone, növekedési hormon, propranolol, immunglobulin, glutamine – NEM javasolt!

Shepherd SJ et al. Crit Care Med.2016; 44:1198–1205

Izomgyengeség kezelése

Ilse V. et al. Intensive Care Med (2020) 46:637–653

1. Sz...
...”Unfortunately, there is currently still **no effective treatment** though **prevention** has been shown to work by targeting **specific risk factors...**”

NICE-SUGAR Study Investigators. N Engl J Med.2009; 360:1283–1297

2. Aggresszív, korai (<1 hét) teljes táplálás kerülése

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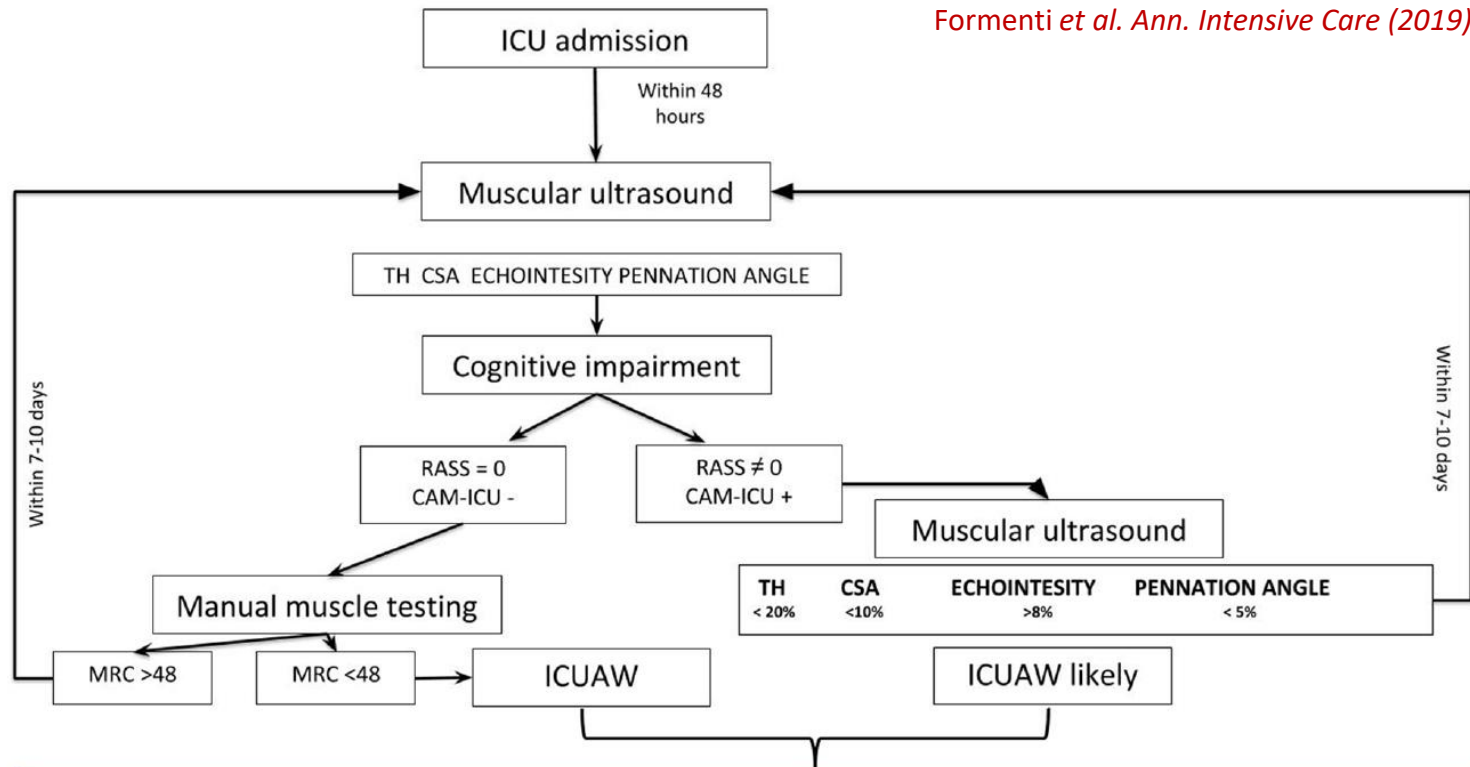
Zayed Y, Aust Crit Care. doi.org/10.1016/j aucc.2019.04.003

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Shepherd SJ et al. Crit Care Med.2016; 44:1198–1205

Összefoglalás

Formenti et al. *Ann. Intensive Care* (2019) 9:57



Optimize muscular load

Treat muscle inactivity

- Early-goal-direct mobilization
- Early muscle stimulation
- Daily review of what may hinder mobilization

Avoid excessive muscular load

- Adequate pain control
- Optimize tissue oxygenation

Potential pharmacological intervention

- Asses adequate nutritional/vitamin support
- Avoid drug side effects

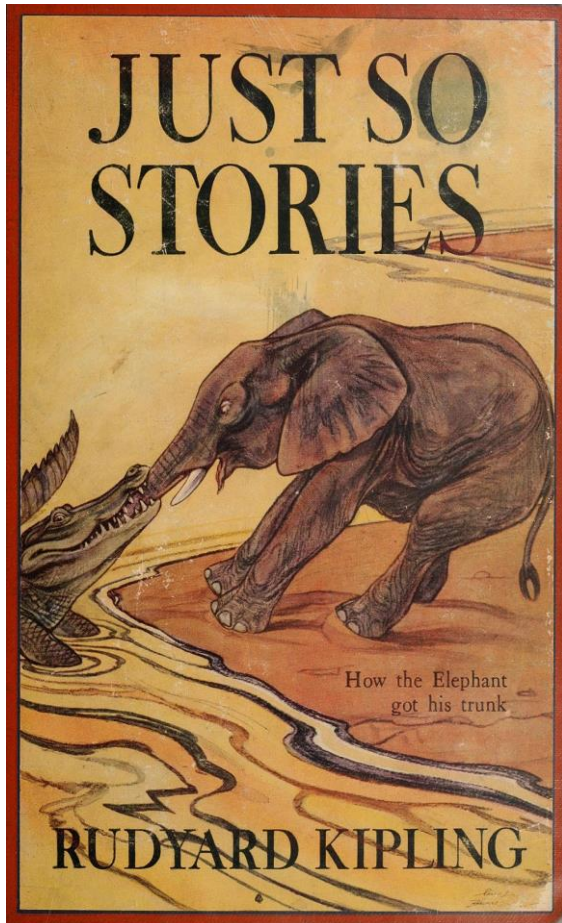
Metabolic support

- Early enteral nutrition
- Later Parenteral nutrition
- Glycemic control
- Electrolytes correction

CIP vs CIM

	Critical illness polyneuropathy	Critical illness myopathy
CMAP amplitude	Decreased	Decreased
CMAP duration	Normal	Increased
SNAP amplitude	Decreased	Normal
Nerve conduction velocity	Normal or near normal	Normal or near normal
EMG at rest	Fibrillation potentials/positive sharp waves	Fibrillation potentials/positive sharp waves
MUP voluntary muscle activation	Long duration, high amplitude, polyphasic ^a	Short duration, low amplitude ^a
Repetitive nerve stimulation	Absence of decremental response	Absence of decremental response
Direct muscle stimulation	Normal muscle excitability	Reduced muscle excitability
Nerve biopsy ^b	Primary distal axonal degeneration of sensory nerve fibers, no demyelination	Normal
Muscle biopsy	Denervation atrophy of type 1 and 2 muscle fibers	Spectrum of abnormalities: myofiber atrophy, angulated fibers, necrosis, fatty degeneration, focal or diffuse loss of thick filaments

ERAS és perioperatív táplálás



...”I Keep six honest serving-
men:
(They taught me all I knew)

Their names are *What* and
Where and *When*
And *How* and *Why* and
Who...”