



2021 SCSG GI SYMPOSIUM

GI Diseases & Nutrition

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Agenda

- Malnutrition
- Basics of nutrition support
- Nutrition for pancreatitis
- Liver disease nutrition overview
- Ileostomy diet troubleshooting

MALNOURISHED HOSPITALIZED PATIENTS ARE ASSOCIATED WITH HIGHER COSTS, LONGER STAYS & INCREASED MORTALITY*

2.2 million

hospital stays involved malnutrition in 2016



30-day readmissions are

1.6x higher in patients with malnutrition as compared to patients with no malnutrition



MALNUTRITION IS ASSOCIATED WITH:

Economic Burden



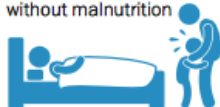
Hospital stays involving malnutrition accounted for

\$49 billion

Human Cost

Protein-calorie malnutrition related stays have

3x higher in-hospital deaths than those without malnutrition



Longer Hospital Stays

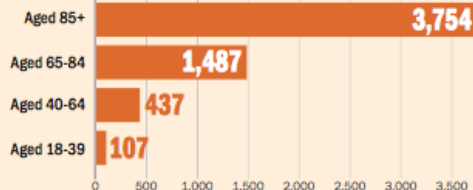


Protein-calorie malnutrition related hospital stays were

2x longer

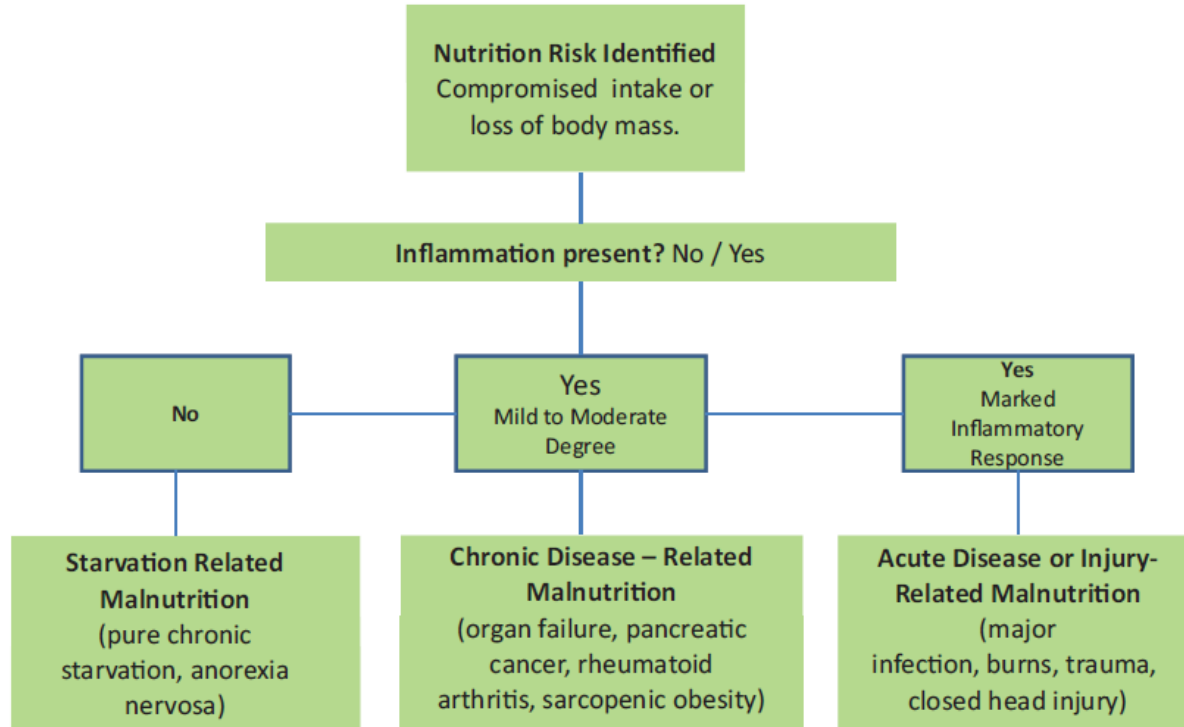
Rate of malnutrition is highest with older adults

Protein-Calorie Malnutrition Related Hospital Stays Per 100,000 Population



UNDERSTAND THE IMPACT OF MALNUTRITION. Learn more at nutritioncare.org/malnutrition

* Barnett M., Bailey MK, Owens PL. Non-maternal and Non-neonatal Inpatient Stays in the United States Involving Malnutrition, 2016. ONLINE. August 30, 2018. U.S. Agency for Healthcare Research and Quality. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6111111/>



ASPEN/AND 2012 Malnutrition Diagnostic Criteria

- Set of 6 standard diagnostic characteristics to identify and document adult malnutrition in clinical settings
- Diagnostic Criteria
 - Energy Intake
 - Weight Loss
 - Physical Exam
 - Body Fat
 - Muscle Mass
 - Fluid Accumulation (must be nutritionally related)
 - Hand-grip strength (functional status)

Nutrition Biomarkers

What about albumin & prealbumin?

- Traditional serum protein markers (albumin, prealbumin, transferrin, retinol-binding protein) are a reflection of the acute-phase response (increases in vascular permeability and reprioritization of hepatic protein synthesis) and **do not accurately represent nutrition status in acute care settings¹**
- Albumin and prealbumin are better reflective of disease severity and the presence of inflammation²

1. McClave et al. 2016;40(2):159- 211.

2. Jensen et al. 2019;43(1):32-40.

NPO vs Nutrition Support & Enteral Flora

- EN preserves gut mucosal barrier function helping to prevent bacterial translocation
- Recent studies show that long-term fasting alters gut flora, resulting in growth of Enterococcus, Pseudomonas, and Candida¹⁻²
 - NPO may increase risk of infection
- PN only recommended when patients have failed trial of EN³⁻⁴

If the gut works, use it!

- Enteral nutrition supports both structure and function of the gut¹
- Modulate stress and systemic immune response and attenuate disease severity¹

Structure	Function
Maintain villous height	Tight junctions between the intraepithelial cells
Support mass of secretory IgA-producing immunocytes (B cells and plasma cells) that compose GALT	Stimulate blood flow
	Release trophic endogenous agents (eg, CCK, gastrin, bombesin, bile salts)

Critical Care Nutrition Assessment

Energy

- 25-30 kcal/kg/d actual body weight (BMI <30)
- 11-14 kcal/kg/d actual body weight (BMI 30-50)
- 22-25 kcal/kg/d ideal body weight (BMI >50)

Protein

- 1.2-2.0 gm/kg/d actual body weight (BMI < 30)
- 2.0 gm/kg/d ideal body weight (BMI 30-40)
- up to 2.5 gm/kg/d ideal body weight (BMI >40)

Critical Care Bundle Statement

- Assess patients on admission to the intensive care unit (ICU) for nutrition risk, and calculate both energy and protein requirements to determine goals of nutrition therapy.
- *Initiate enteral nutrition (EN) within 24-48 hours following the onset of critical illness and admission to the ICU, and increase to goals over the first week of ICU stay.*
- Take steps as needed to reduce risk of aspiration or improve tolerance to gastric feeding (use prokinetic agent, continuous infusion, chlorhexidine mouthwash, elevate the head of bed, and divert level of feeding in the gastrointestinal tract).
- Implement enteral feeding protocols with institution-specific strategies to promote delivery of EN.
- Do not use gastric residual volumes as part of routine care to monitor ICU patients receiving EN.
- Start parenteral nutrition early when EN is not feasible or sufficient in high-risk or poorly nourished patients.

Enteral Nutrition (EN) Indications & Contraindications

- EN is indicated whenever oral intake is insufficient to meet nutritional requirements for a prolonged period.
- EN is contraindicated with:
 - Total bowel obstruction, ileus, mesenteric ischemia
 - Severe malabsorptive state- intractable diarrhea related to permanent intestinal damage or intractable vomiting
 - Proximal high output enterocutaneous fistula
 - Hemodynamically unstable/high dose vasopressors

Gastric Residual Volumes (GRV's)

- GRV's should not be used as part of routine care to monitor ICU patients receiving EN.
- No correlation with PNA, regurgitation or aspiration
- Using GRV's leads to increased incidence of clogging, inappropriate cessation of EN, consumption of nursing time and lead to reduced volume of EN delivered
- Instead → daily physical examinations (abdominal distention, emesis, nausea), abdominal radiological films, eval for risk factors for aspiration

Parenteral Nutrition Support

- When a patient is unable to receive nutrition via the GI tract, it is necessary to pursue parenteral nutrition (or IV nutrition) bypassing the GI tract
- Provider must choose to obtain central access (for TPN) or peripheral access (for PPN)

GI Motility

-The literature supports that bowel sounds and evidence of bowel function (ie, passing flatus or stool) are not required for initiation of EN. GI dysfunction in the ICU setting occurs in 30%–70% of patients, depending on the diagnosis, premorbid condition, ventilation mode, medications, and metabolic state¹

-Bowel sounds are indicative only of contractility and do not necessarily relate to mucosal integrity, barrier function, or absorptive capacity

-Ileus may be propagated by repeated and prolonged periods for which patients are NPO²

-Remaining NPO after midnight for diagnostic tests and procedures affects 25%–33% of ICU patients and accounts for up to 25% of cessation time¹

-Feeding in the 24 hours following surgery helps reduce postoperative ileus, attenuate dysmotility, and prevent bowel wall edema

Feed Early!

- *Feeding a patient early after a bowel resection (and other gastrointestinal surgeries) allows for stronger anastomoses and may reduce postoperative ileus*
- Major surgeries in the abdomen and pelvis are most likely to cause post-op ileus¹
- Feeding in the 24 hours following surgery helps reduce postop ileus, attenuate dysmotility, and prevent bowel wall edema²
- Meta-analysis completed on 15 studies involving 1240 patients³
 - Feeding within 24 hours of gastrointestinal surgery makes anastomoses stronger with greater collagen and fibrin deposition and fibroblast infiltration
 - Significant reduction (45%) postop complication
 - No worsening effect on anastomotic dehiscence

1. Delaney et al. Am J Surg. 2010;199(3):299-304

2. McClave et al. 2016;40(2):159- 211

3. Osland et al. JPEN. 2011;35(4):473-487

Early Postoperative Feeding within 24 hours

- Oral intake, including clear liquids, should be initiated within hours after surgery in most patients and regular solid foods within 24 hours of the operation.
 - Immunonutrition
- **Early Feeding = Reduction in Mortality and Complications**
 - Early (within 24h post-op) vs traditional (no intake within 24h post-op)

*Lewis, et al.*¹

13 RCTs

1,173 patients undergoing gastrointestinal surgery

RR 0.42, 95% CI 0.18-0.96 (~60% reduction in mortality risk)

*Osland et al.*²

15 RCTs

1,240 patients undergoing elective resectional surgery

1. Lewis, et al. J Gastrointest Surg. 2009;13(3):569-75.

2. Osland, et al. JPEN 2011;35(4):473-87.

Meta-analysis of 15 studies analyzed a total of 1352 patients¹

- --> Early feeding tolerated without nausea or vomiting, decreases LOS and decreases length of post-op ileus.
- **Fun fact:** No evidence that clear liquid diet is better tolerated as initial diet choice. A significant disadvantage of clear liquid diet is increased risk of aspiration because of oral dispersion and poor bolus formation in mouth to prepare for swallowing²

1. Ng et al. J Clin Nutr. 2006;15:696-709.

2. Warren et al. Nutr in Clin Practice. 2011;26(2):115-125.

Nutrition Support Transitions

- Feeding plan must be established and adequate prior to discontinuing current nutrition support method
 - Example -> Pt is on TPN and started on CLD -> wait until diet adv to FLD and tolerated prior to weaning.
 - Example -> Pt is on TPN and started on EN TF trickles -> wait until tolerance established and can titrate TF until TPN d/c
- 60% of nutrition needs must be met by new feeding modality prior to stopping prior feeding.
- CLD does NOT meet nutrition needs of any patient
- Suggestions:
 - Decrease volume of TPN
 - change TFs to nocturnal feedings to provide off time to stimulate appetite

Increasing EN decreases pneumonia rates

Meissner Study¹ → Increased volume of EN infused = decrease in PNA

Kudsk Study² → PN vs EN → PNA reduced by $\frac{2}{3}$ with EN

Taylor Study³ → Conservative vs aggressive protocol of volume EN infused → infections sig reduced & PNA rates reduced by $\frac{1}{3}$

Pneumonia and bacterial colonization of the upper respiratory tree is more closely associated with aspiration of contaminated oropharyngeal secretions than regurgitation and aspiration of contaminated gastric contents⁴⁻⁶.

IAP/APA evidence-based guidelines for the management of acute pancreatitis (2012)

- 21. Enteral tube feeding should be the primary therapy in patients with predicted severe acute pancreatitis who require nutritional support.(GRADE 1B, strong agreement)
- 22. Either elemental or polymeric enteral nutrition formulations can be used in acute pancreatitis.(GRADE 2B, strong agreement)
- 23. Enteral nutrition in acute pancreatitis can be administered via either the nasojejunal or nasogastric route.(GRADE 2A, strong agreement)
- 24. Parenteral nutrition can be administered in acute pancreatitis as second-line therapy if nasojejunal tube feeding is not tolerated and nutritional support is required.(GRADE 2C, strong agreement)

International Consensus Guidelines for Nutrition Therapy in Pancreatitis

1. ***For mild to moderate diseases, NPO with a gradual advancement to diet within 3-4 days are recommended (Grade C)***
2. Nutrition therapy is not generally needed for mild to moderate disease unless complications ensue (Grade A)
3. Nutrition therapy should be considered in any patient regardless of disease severity if the anticipated duration of being NPO is > 5-7 days (Grade B)
4. ***Early nutrition therapy is indicated for severe pancreatitis (Grade A)***
5. ***Enteral nutrition is generally preferred over parenteral nutrition (Grade A)***
6. EN maybe used in the presence of pancreatic complications such as fistulas, ascites, and pseudocysts (Grade C)
7. Post pyloric tube is not necessarily required. NGT maybe used for administration of EN (Grade B)

Malnutrition

- Inadequate nutrition
- Multifactorial

Sarcopenia

- Loss of skeletal muscle mass and function
- Primary (aging)
- Secondary (chronic disease related)

Frailty

- Physical weakness
- Characteristics: weight loss, exhaustion, reduced physical activity, slowness, weakness

Liver Frailty Index

Inputs: For instructions, see [i](#) below.

1. Gender: Male Female

2. [i](#) Dominant hand grip strength (kg):

attempt 1: attempt 2: attempt 3: Avg: kg

3. [i](#) Time to do 5 chair stands:

sec

4. [i](#) Seconds holding 3 position balance:

Side: SemiTandem: Tandem: Total: sec

Results: [refresh results](#)

The Liver Frailty Index is _____

Decimal precision:

2



Malnutrition & Liver Disease

- Increased nutrition needs
 - Metabolic effect of ascites, protein losses, inflammation, infection
- Inadequate oral intake
 - Nausea and anorexia, delayed gastric emptying, abdominal pain, altered gut motility, dysgeusia, early satiety
- Metabolic alterations
 - Inhibition of muscle growth (myostatin increased), corticosteroid use, altered glucose, lipid and protein metabolism, decreased glycogen levels, reduced storage capacity of nutrients
- Malabsorption/maldigestion
 - Reduced bile flow, microbiome changes, SIBO, ETOH, pancreatic insufficiency

Troubleshooting Poor Oral Intake

- ✓ Liberalize sodium restriction
- ✓ Allow more palatable food options
- ✓ Provide oral nutrition supplement
- ✓ Minimize NPO time
- ✓ Small, frequent meals and snacks
- ✓ Bedtime snack
- ✓ Appetite stimulant
- ✓ May need supplemental TFs

Micronutrient Alterations in ESLD

- Dietary intake imbalance
- High losses (diuretics, dialysis, CRRT)
- ETOH history (B1, Folic acid, B6, B12, Zinc, Se)
- Cholestatic liver (increased risk fat-soluble vitamins (A,D,E,K) -> fat malabsorption secondary to decreased bile acid production and reduced synthesis of carrier and transport proteins in the liver)

Diet for Pre-Transplant or ESLD

- High energy (up to 40 kcal/kg)
- No protein restriction
- Limit salt
- Avoid fasting >3-6 hours
- Late evening snack with 50 gm complex carb
- Oral nutrition supplements as needed
- Participate in regular physical activity
- Prebiotic (artichokes, garlic onion, asparagus, apples, bananas, oats, flaxseed) and probiotic foods (yogurt, kefir, tempeh, sourdough bread)
- Eat fiber (reduces waste products)

Diet for Pre-Transplant or ESLD

- Avoid foods known to be bad for the liver...
 - Trans-fat: fried food, margarine, shortening, chips, doughnuts, baked goods, powdered creamers, microwave popcorn
 - Fructose and high fructose corn syrup: sugar-sweetened beverages, fruit juices, many processed foods
 - Saturated fats: butter, whole milk, full fat cheese, fatty cuts of meats
 - Omega-6 fats: vegetable oil, corn oil, soybean oil, safflower oil, sunflower oil

EASL Clinical Practice Guidelines on Chronic Liver Disease: Preop LT

- Screen for malnutrition and sarcopenia cirrhotic patients listed for transplantation or scheduled for elective surgery. Treat sarcopenia prior to elective surgery, as this will allow improvement in body protein status and clinical outcomes. (**Grade III, B2**)
- Screen for sarcopenic obesity, with body composition analysis, obese cirrhotic patients considered for surgery in order to identify those at higher risk for morbidity and mortality. (**Grade III, C1**)
- Preoperatively, if the treatment goal is maintenance of nutritional status, plan a total energy intake of 30 kcal/kg.BW/d and a protein intake of 1.2 g/kg.BW/d. If improvement of nutritional status is the goal, plan a total energy intake of 35 kcal/kg.BW/d and a protein intake of 1.5 g/kg.BW/d. (**Grade II-3, B1**)
- For preoperative nutrition, utilize standard nutrition regimens since specialized regimens (e.g.BCAA-enriched, immune-enhancing diets) have not been shown to improve morbidity or mortality in intervention trials. (**Grade II-1, B1**)

Ileostomy Nutrition Review

Normal ostomy output expected

- Ileostomy: 1200 ml (mature ~600-800 ml)
- Jejunostomy: up to 6 liters
- Colostomy: 200-600 ml

Diet for High-Output Ileostomy Patients

Carbohydrates

- Generous complex CHO intake (pasta, rice, potatoes, breads, etc)
- Avoid simple sugars in food & fluid (desserts, sweetened gelatin, NO standard Ensure/Boost)
- Avoid sugar alcohols in liquid meds & sugar free/diabetic foods

Salt

- Increase salt/salty food intake in those with end jejunostomies or ileostomies

Fluids

- Drink smaller amounts with meals
- Sip between meals
- Avoid hypertonic beverages
- Limit hypotonic fluids

Ileostomy Nutrition: Oral Rehydration Solutions (ORS)

- 2 cups Gatorade + 2 cups water + $\frac{1}{2}$ teaspoon salt
- 3 cups water + 1 cup orange juice + $\frac{3}{4}$ teaspoon salt + $\frac{1}{2}$ teaspoon baking soda
- $\frac{1}{2}$ cup grape juice or cranberry juice + $3\frac{1}{2}$ cups water + $\frac{1}{2}$ teaspoon salt
- 1 cup apple juice + 3 cups water + $\frac{1}{2}$ teaspoon salt
- $4\frac{1}{4}$ cups (1 liter) water + $\frac{1}{2}$ teaspoon table salt + 6 level teaspoons sugar (World Health Organization's ORS recipe)

Foods That May Cause Diarrhea (looser or more frequent stool)

Alcohol (including beer)	Fruit juice: apple, grape, orange	Peaches (stone fruit)
Apricots (and stone fruits)		Peas
Beans, baked or legumes	Fruit: fresh, canned, or dried	Plums (stone fruit)
Bran		Prune juice or prunes
Broccoli	Glucose-free foods	Soup
Brussels sprouts	containing mannitol or sorbitol	Spicy foods
Cabbage		Sugar-free substitutes
Caffeinated drinks (especially hot)	Gum, sugar free	Tomatoes
Chocolate	High-fat foods	Turnip greens/green leafy vegetables, raw
Corn	High-sugar foods	Wheat/whole grains
Fried meats, fish poultry	Licorice	Wine
	Milk and dairy foods	
	Nuts or seeds	

Foods That May Help Thicken Stool

Applesauce	Oatmeal (when OK to have fiber)	Saltines
Bananas		Tapioca
Barley (when OK to have fiber)	Pasta (sauces may increase symptoms)	White bread (not high fiber)
Cheese	Peanut butter, creamy	White rice, boiled
Marshmallows	Potatoes, no skin	Yogurt
	Pretzels	

Questions?

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