

Malnutrition

Risk

- Rate approximately 5% in general population and 10–20% in surgical pts; increases to 40% or more in severely ill hospital admissions.
- Risk increases with severity of underlying disease, presence of malignancy (especially GI), and advancing age (in older [>75 y] hip fracture pts baseline on presentation is 30%).
- Hospitalized pts lose an average of 5% body weight over the course of admission.

Perioperative Risks

- Postop complications are significantly higher in the malnourished.
- Severe undernutrition may result in CHF, respiratory failure, and immunologic dysfunction.

Worry About

- Need for early postop nutritional supplementation, particularly enteral if possible.
- Infection risk: Care should be taken with invasive procedures and sterile technique.

- Intraop problems may include low cardiac output and respiratory failure.

Overview

- Results from inadequate intake of macronutrients (carbohydrate, protein, fat); referred to as PCM.
- There are two types of PCM:
 - MF-PCM, which results in uniform loss of fat and muscle mass in all tissues and a concomitant loss of H_2O in proportion to nonaqueous mass.
 - Stress-induced HAF-PCM, which results from neurohumoral modulation leading to depletion of visceral protein (in excess of muscle mass) and fat and is associated with an expansion of extracellular fluid compartment. Stress may be surgery, infection, inflammation, trauma, or neoplasia.
- In hospitalized pts, marasmic kwashiorkor type (i.e., wasting of muscle and fat with hypoalbuminemia) is most common.

Etiology

- Decreased dietary intake: Advanced age, physical debilitation, GI-related illnesses, neck mass
- Increased metabolic demands and nutrient loss: stress (physical and psychological), disease states (particularly GI and respiratory illness, such as emphysema), infections, burns, liver failure
- Conditions associated with N/V
- Malignant conditions, especially those involving the GI tract

Usual Treatment

- Early PO intake postop is advantageous, especially in GI malignancies; enteral intake reduces infections.
- Enteral nutrition via G-tube or J-tube preferable to TPN if direct PO intake not possible but gut can still be use (e.g., esophageal surgery).
- TPN value is inconclusive but probably indicated in severe malnutrition states. TPN reduces noninfectious complications but increases infectious complication rates in most studies.

Assessment Points

System	Effect	Assessment by Hx	Test
CV	Decreased preload and stroke volume		ECHO
RESP	Decreased FRC and diaphragmatic activity		CXR Expiratory spirogram
GI	Decreased gastric motility Gastric ulceration Gastric and intestinal atrophy	Anorexia, vomiting	Generally not needed
GENERAL	Malnutrition	Preadmission weight loss $>10\%$ of body weight in 6 mo or 5% in 1 mo, edema, anorexia, vomiting, diarrhea, decreased food intake, chronic illness	BMI <20 kg/m ² Voluntary hand-grip test Anthropometric measurements (midarm muscle circumference or triceps skinfold thickness: both <15 th percentile of reference data)
IMMUNE	Impaired cell-mediated immunity Surgical wound infection and sepsis		Abnormally low lymphocyte count ($<1500/mm^3$) Anergy to a battery of four or five standard skin antigens
RENAL	Decreased body mass Decreased Cr clearance and impaired ability to concentrate urine	Decreased UO	Serum Cr/BUN
HEPAT	Decreased protein synthesis		Decreased serum albumin (<3.5 mg/dL) and decreased serum transferrin (<200 mg/dL)
PNS	Decreased peripheral nerve conduction and sensory abnormalities	Tingling and numbness in extremities	Generally not needed

Key Reference: Corish CA, Kennedy NP: Protein-energy undernutrition in hospital in-patients, *Br J Nutr* 83(6):575–591, 2000.

Perioperative Considerations

Preinduction

- Use of a malnutrition risk assay (e.g., Nutrition Risk Score/Mini Nutritional Assessment); Mini Nutritional Assessment score $<17/30$ = protein-energy malnutrition) for screening will help to identify at-risk pts.
- Nutritional and caloric supplementation in the days before surgery may be beneficial if possible.
- Consider prophylaxis for aspiration of gastric contents if GI process is responsible for malnutrition (e.g., malignancy, obstruction).

Monitoring

- Routine

Induction

- If respiratory muscle weakness or fatigue is suspected, avoidance of long-acting NMDBs may be prudent.

Maintenance

- Pts receiving TPN should continue to receive it in the OR because abrupt discontinuation may result in severe hypoglycemia. Many sources recommend a rate reduction of 50% intraop. Alternatively, TPN may be replaced with dextrose during surgery.
- Standard hydration and UOP monitoring.

Extubation

- Respiratory muscle failure may preclude early extubation; careful attention to respiratory status warranted in PACU.

Adjuvants

- Hepatic drug metabolism may be impaired.
- Decreased binding (volume of distribution) of protein-bound drugs in hypoalbuminemic pts.

Anticipated Problems/Concerns

- Because edema is prominent feature of HAF-PCM, interpretation of anthropometric measurements like arm circumference may be unreliable.
- Serum markers like albumin, transferrin, and prealbumin can be unreliable in a wide array of disease states and do not correlate well with outcomes and complications.
- Pts with end-stage chronic obstructive lung disease usually have malnutrition; initiation of feeding periop may precipitate acute respiratory failure and refeeding syndrome (electrolyte/nutrient abnormalities associated with refeeding; most dangerous is hypophosphatemia but also thiamine deficiency, decreased K, decreased Mg, decreased Na, and decreased P).