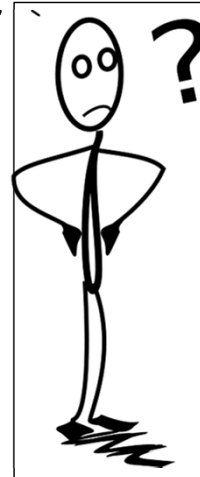


Nutrition for the Hospitalized Patient

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Meet Our Patient

- 77 year old male
- s/p left hemicolectomy for colon cancer (stage II)
- 10 lb weight loss before surgery (156 from 166 lb usual body weight. Rehabbing at ECF.
- You admit him to your service on POD 21 for shortness of breath, suspected pneumonia, superficial surgical site infection
- Complains of fatigue, lack of appetite
- Weight now 142 lb (15% weight loss from usual)
- Eating 25-30% of regular trays at ECF



Objectives

- Identify factors that lead to malnutrition in the hospitalized patient
- Describe malnutrition in the hospitalized patient and effect on outcome.
- Determine reliable factors for nutrition assessment.
- Discuss common misconceptions in current practice that may contribute to nutrition problems.
- Describe appropriate options for nutrition interventions.

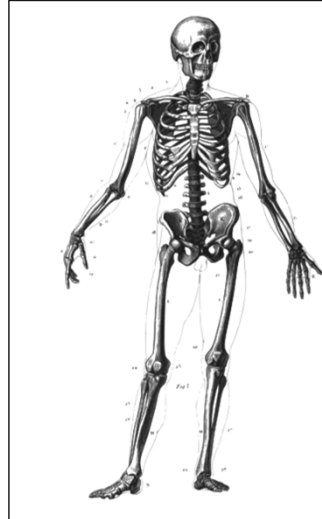
Nutrition for the Hospitalized Patient

Marcia Nahikian-Nelms, PhD, RDN, CNSC
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Division of Medical Dietetics
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“The Skeleton in the Hospital Closet” ..Malnutrition in our hospitals is not a new problem

- “I suspect, as a matter of fact, that one of the largest pockets of unrecognized malnutrition in America exists not in rural slums or urban ghettos, but in the private rooms and wards of big city hospitals.”

C.E. Butterworth, 1979



Weinsier RL et al. *Am J Clin Nutr.* 1979; 32: 418-26.

Contributors to Adult Malnutrition in Acute Care Settings

Personal

- Age
- Dementia/Depression
- Disease
- Overly restrictive therapeutic diet
- Inability to chew/swallow
- Limited mobility
- Sensory loss
- Multiple Medications
- Therapies:
vents/drains/NPO, etc.

Organizational

- Lack of recognition
- Lack of screening/assessment
- Lack of nutrition education
- Confusion re: responsibility
- Ht/Wt not measured/recorded
- Failure to measure/record food intake
- Inadequate nutrients provided
- Lack of feeding assistance staff
- Lack of care coordination
- Nutrition status low priority

Int J Nurs Stud 2007;44(6):1036-54

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Presence of Malnutrition and Impact on Outcomes

Physiological Consequences:

- Muscle wasting
- Impaired cardiac function
- Immune hypofunction and dysfunction
- Multi-organ dysfunction
- Impaired wound healing

Detsky et al. *JAMA*. 1994. Reilly J et al. *JPEN*. 1988 Cederholm et al, *American Journal of Medicine* 1995.

Malnutrition in U.S. Hospitals

Data from 2010 Healthcare Cost and Utilization Project (>1000 hospitals)

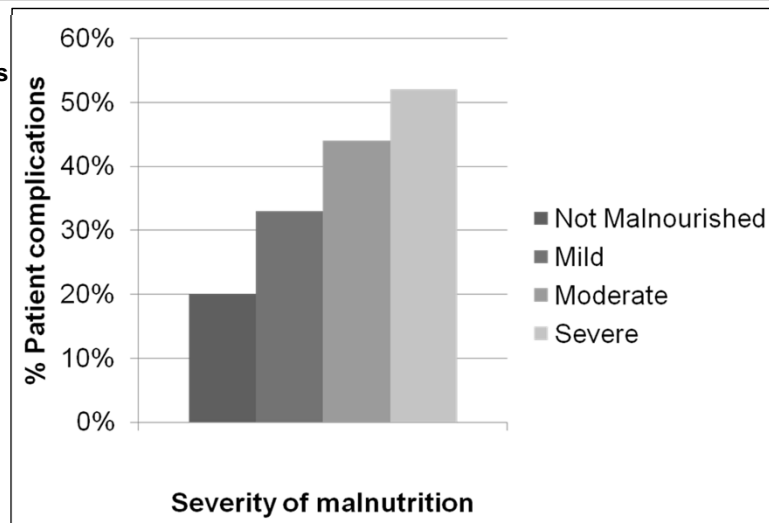
Malnutrition diagnosis from ICD 9 codes

➔ 1.2 million discharges w/malnutrition dx
Longer LOS: 12.6 vs 4.4 days ($p < 0.0001$)
Higher costs: ~\$27,000 vs ~\$9,400 ($p < 0.0001$)
Twice as many discharged with home care
Death 5 times more common

Corkins MR et al, JPEN 2014

More complications in malnourished patients

N = 100 patients

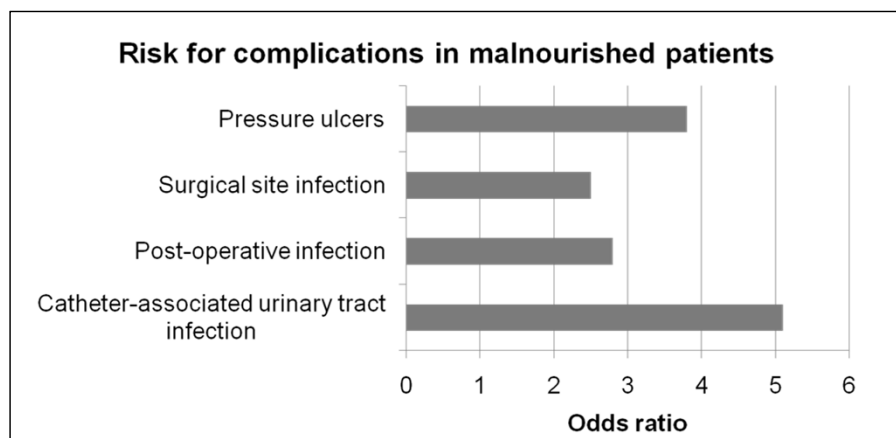


Sungurtekin H, *J Am Coll Nutr.* 2004;23227-232.

Impact on Outcomes

- Impaired wound healing
- Increased morbidity/mortality
- Increased muscle/function loss
- Higher infection/complications
- Lower quality of life
- Increased length of stay
- Increased admissions/readmissions
- Higher healthcare costs

Increased risk of post-surgical complications



Pre-existing malnutrition increases risk for post-surgical complications by 2- to 5-times.

Fry DE, et al. *Arch Surg.* 2010;145:148-151.

Lean Body Mass Loss Correlates with Mortality

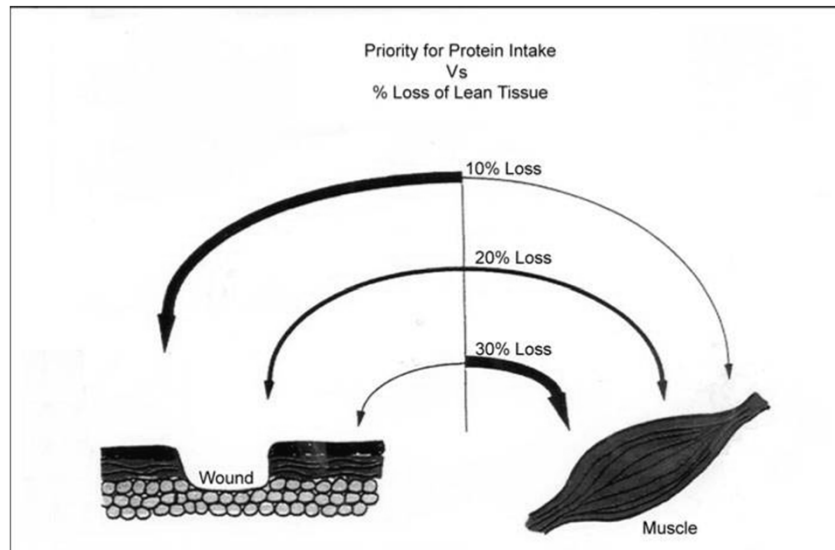
Complications relative to loss of lean body mass*

| Lean body mass (% loss of total)* | Complications (related to lost lean mass) | Associated, mortality, % |
|-----------------------------------|---|--------------------------|
| 10 | Impaired immunity, increased infection | 10 |
| 20 | Decreased healing, weakness, infection, thinning of skin | 30 |
| 30 | Too weak to sit, pressure sores develop pneumonia, no healing | 50 |
| 40 | Death, usually from pneumonia | 100 |

*Assuming no preexisting loss.

Demling RH. Nutrition, anabolism, and the wound healing process: an overview. *Eplasty*. 2009;9:65-94.

Patients with lean body mass loss do not use ingested protein for healing



Demling RH. Nutrition, anabolism, and the wound healing process: An overview. *Eplasty*. 2009;9:65-94.

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How do we determine if our patient is at nutrition risk?

- **Nutrition assessment -**
Systematic steps to obtain, verify, and interpret data to identify nutrition related problems, their causes, and significance.
- **Nutritional risk – attempt to predict potential nutritional problems based on the client's current health status**

SGA:
Subjective
Global
Assessment
NRS-2002:
Nutrition Risk
Screening
MUST:
Malnutrition
Universal
Screening Tool
MNA:
Mini Nutritional
Assessment
(elderly)

Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.):
Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient.
(2009 – currently under revision)

- **“Traditional nutrition assessment tools (albumin, prealbumin, and anthropometry) are not validated in critical care.**
- **Before initiation of feedings, assessment should include evaluation of weight loss and previous nutrient intake prior to admission, level of disease severity, comorbid conditions, and function of the gastrointestinal (GI) tract.”**

Ferrie & Allmann-Farinelli, 2013. Nutr Clin Prac 28: 463-483.

Plasma protein concentrations most likely are not useful indicators of nutritional status

- | | |
|---------------------------|---------------------------------------|
| • Albumin | Changes with inflammation |
| • Prealbumin | |
| • Transferrin | • ↑↑ CRP, lactoferrin, ceruloplasmin |
| • Retinol binding protein | • ↓↓ albumin, prealbumin, transferrin |
| • C-reactive protein | |
| • Fibronectin | |

Historical reliance on these indices continue to be used and appear to have no correlation with patient outcomes.

Nutrition Assessment for Mr. X

- Ht. 5'7" Wt. 142#
- BMI 22.2 (Normal weight = 18.5–24.9)
- Usual Body Weight
 - Preillness - 166#
 - Weight prior to initial surgery – 156#
- 15% weight change
- Classified as a severe weight loss

| Time frame | Significant weight loss | Severe weight loss |
|------------|-------------------------|--------------------|
| 1 week | 1-2% UBW | >2 % UBW |
| 1 month | 5 % UBW | >5 % UBW |
| 3 months | 7.5 % UBW | >7.5 % UBW |
| 6 months | 10 % UBW | > 10 % UBW |

Previous nutritional intake

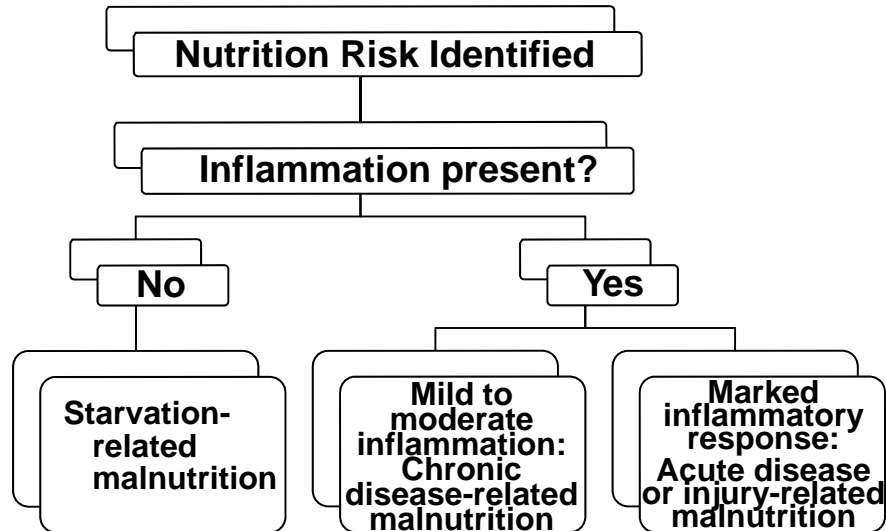
Factors to consider

- Changes in appetite
- Changes in taste
- Presence of nausea, vomiting, diarrhea, constipation
- Ability to chew and swallow
- Previous diets followed at home
- Factors that may impact quality of diet at home

Mr. X

- Prior to surgery, reported decrease in appetite.
- NPO after surgery x 3 days
- Clear Liquids x 2 days
- Discharged to ECF after one meal of regular diet
- Admission from ECF, indicates 25-50% of meals consumed

Proposed new definitions for malnutrition



White et al, JPEN 2012

Malnutrition criteria

- 1. Insufficient energy intake
- 2. Weight loss
- 3. Loss of muscle mass
- 4. Loss of subcutaneous fat
- 5. Localized or generalized fluid accumulation that may sometimes mask weight loss
- 6. Diminished functional status as measured by handgrip strength or reduction in ADLs

2 or more of six criteria needed to diagnose malnutrition

Insufficient energy intake

| Type of malnutrition | Acute illness or injury-related | Chronic disease-related | Social or environmental cause |
|----------------------|---|--|---|
| Moderate | <75% of est. energy requirement for >7 days | <75% of est. energy requirement for ≥1 month | <75% of est. energy requirement for ≥3 months |
| Severe | ≤50% of est. energy requirement for ≥5 days | ≤75% of est. energy requirement for ≥1 month | ≤50% of est. energy requirement for ≥1 month |

White et al, JPEN 2012

Weight loss

| Type of malnutrition | Acute illness or injury-related | | Chronic-disease related | | Social or environmental cause | |
|----------------------|---------------------------------|----------|-------------------------|----------|-------------------------------|----------|
| | % | Time | % | Time | % | Time |
| Moderate | 1-2 | 1 week | 5 | 1 month | 5 | 1 month |
| | 5 | 1 month | 7.5 | 3 months | 7.5 | 3 months |
| | 7.5 | 3 months | 10 | 6 months | 10 | 6 months |
| | | | 20 | 1 year | 20 | 1 year |
| Severe | >2 | 1 week | >5 | 1 month | >5 | 1 month |
| | >5 | 1 month | >7.5 | 3 months | >7.5 | 3 months |
| | >7.5 | 3 months | >10 | 6 months | >10 | 6 months |
| | | | >20 | 1 year | >20 | 1 year |

White et al, JPEN 2012

**Physical assessment....
One look is worth a thousand
words**

**Muscle wasting
Fat wasting
Fluid accumulation**

**Nutrition for the
Hospitalized Patient**

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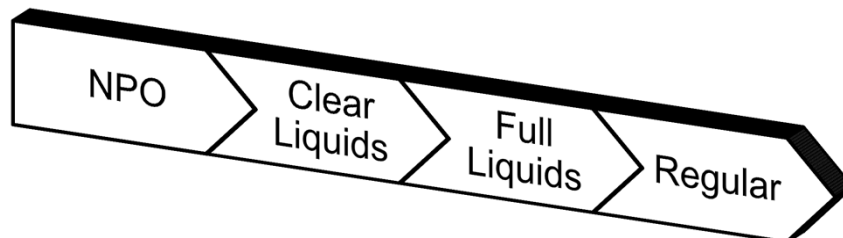
Nutrition Support

- **Modification to prescribed oral diet**
- **Oral Supplements**
- **Enteral Nutrition (via feeding tubes)**
- **Parenteral Nutrition (TPN/PN)**

Decision making – Nutrition support for the hospitalized patient

- **Which patients need nutrition support?**
 - **Malnourished**
 - **Unable to maintain volitional intake (5-7 days for well-nourished, <24 hrs for malnourished)**
 - **Consider inflammatory state, disease severity, comorbid conditions, and function of the gastrointestinal (GI) tract.**

The Old Paradigm



MYTHBUSTERS

Author: Lišiak

Myth - clear liquid diets should be first

- Randomized trials of patients on clear liquid vs. regular diet after open abdominal surgery—no difference in nausea and vomiting
- 147 patients given tea, water, isotonic drink after removal of NGT - Patients were then fed based on their appetite and preferences. By POD 1, 27% were eating and tolerating solid foods. By POD 2, the number had risen to 81.3% and by POD 3, 97.1% were tolerating solid foods

Kawamura, et al. Int J Colorectal Dis. 2009

Patients Know Best – Are “Fast Track” or ERAS* Protocols OK?

- 145 patients who were allowed to eat within 24 hours after colorectal surgery
- POD 1, the most commonly preferred foods and beverages included: toast (80%), fruit juice (75%); broth (73%); fresh fruit (73%); potatoes (73%); egg (70%); coffee/tea (64%); ice cream (64%); crackers (64%); pudding, yogurt and sandwiches (61%). Most of these foods are not part of a clear or full liquid diet. On POD 2 similar foods and beverages as well as cooked vegetables; hot cereal; and casseroles were chosen.

*Enhanced Recovery After Surgery
(<http://www.erassociety.org>)

Early postoperative feeding significantly reduces post-operative complications

Objective

- Evaluate surgical outcomes following early feeding (within 24 hours of surgery)^a compared with traditional feeding^b

Subjects

- 1,240 patients in 15 studies

Design

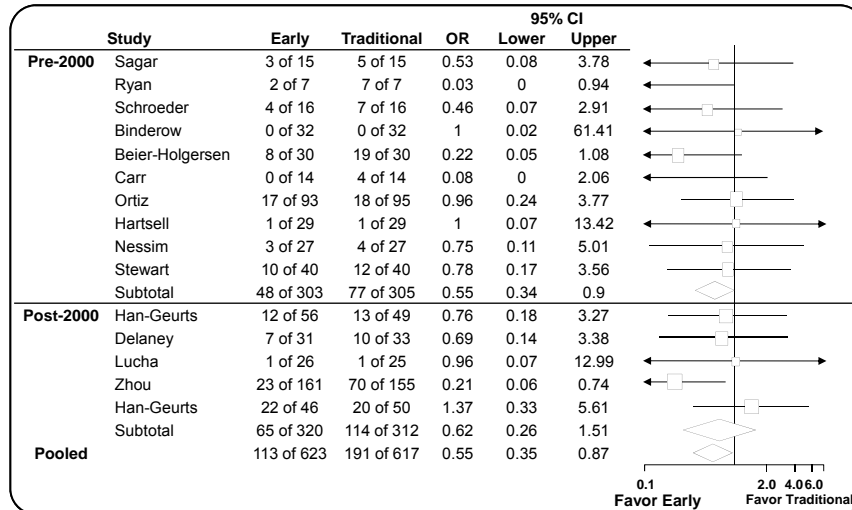
- Meta-analysis of randomized controlled trials of patients with GI tract resection

Study Outcomes

- Postoperative complication rates, mortality, tolerance of early feeding, resumption of bowel function, hospital length of stay

Osland E, et al. *JPEN J Parenter Enteral Nutr.* 2011;34:473-487.

Early Postoperative Feeding Significantly Reduces Postoperative Complications



Osland E, et al. *JPEN J Parenter Enteral Nutr.* 2011;34:473-487.

Myth - Bowel Sounds are Important

- **Why do we listen to bowel sounds?**
- **No evidence supports the clinical importance of bowel sounds**
 - **Bowel sounds require air / fluid interface**
- **Bowel sounds should not guide therapy**

Potential Factors Influencing Toleration of Diet and Enteral Feeding Post-op Setting

- Medications
 - Prokinetic agents
 - Narcotics
 - Sedative agents
 - Pressors
- Tube feeding

Factors influencing bowel sounds:

- Presence or absence of NG tube
- Visceral blood flow
- Ventilator
 - Ventilatory pressures
 - CPAP

Myth - Gastric Residuals Matter

Reignier 2011 Study ¹

| | GRV Used (n=102) | No GRVs (103) |
|----------------|------------------|---------------|
| Intolerance | 46.1% | 26.2% * |
| Vol EN infused | 1381 ml/d | 1489 ml/d * |
| Vomiting | 24.5% | 26.2% |
| VAP pneumonia | 19.6% | 18.4% |

Reignier 2013 Multicenter Study ²

| | GRV Used (n=215) | No GRVs (208) |
|-----------------|------------------|---------------|
| Intolerance | 64.2% | 41.8% * |
| Calorie Deficit | 518 kcal | 314 kcal * |
| Vomiting | 26.5% | 41.8% * |
| VAP pneumonia | 15.8% | 16.7% |

No change in clinically significant outcomes when you don't measure residuals

¹ Reignier (CC 2011) ² Reignier (JAMA 2013)

A practical approach to GRVs:

- Check residuals every 4-6 hours
- If the GRV is > 250 mL twice, a promotility agent (metoclopramide or erythromycin) should be considered
- Avoid automatic cessation for GRVs less than 500 mL in the absence of other signs of intolerance

Gastric vs. Postpyloric Feeding?

Gastric Feeding

Relatively easy
Residuals are a problem
Aspiration risks higher
Can be done safely
Keep HOB > 30



Author: Mikael Häggström

Jejunal feeding

Shorter time to goal
Increased nutrient delivery
Decreased VAP
Access can be difficult



Author: Samir

CC BY-SA 3.0

| Author | Journal yr | Study pop N | Outcome |
|------------|---------------|-------------------------------|---|
| Strong | JPEN 1992 | Gastric v Jejunal n=17 | No difference in aspiration |
| Montecalvo | CCM 1992 | Gastric v Jejunal | Jejunal: Goal faster Dec pneumonia |
| Kortbeek | J Trauma 1999 | Gastric v Jejunal n=80 | Jejunal: Goal faster |
| Kearns | CCM 2000 | Gastric v Jejunal n=44 | Jejunal: Goal faster no change VAP |
| Heyland | CCM 2001 | Gastric v Jejunal n=33 | Gastric more aspiration |
| Montejo | CCM 2002 | MRPCT | Jejunal: decrease complications |
| Neumann | CCM 2002 | Prospective descriptive n=60 | Gastric: goal faster, No increase aspiration |
| Davies | CCM 2002 | PRCT n=73 | Jejunal better tolerance decrease need for TPN |
| Meert | Chest 2004 | PRCT n=74 Pediatrics | Jejunal greater goal no change in aspiration |
| Methany | CCM 2006 | Prospective descriptive n=360 | Gastric increases aspiration pneumonia |
| Hsu CW | CCM 2009 | PRCT N=120 Medical ICU | Nasoduodenal goals earlier, less vomiting and less VAP |

But does my patient need enteral tube feeds? What about Oral Nutrition Supplements

Reduced 30-day readmission rates:

- 8.4 percent reduction for patients with any diagnosis
- 10.1 percent reduction for congestive heart failure pts
- 12.0 percent reduction for acute myocardial infarction pts

Length of stay reduction: 1.65 days on average

Cost Savings: 15.8 percent or \$3,079 in cost savings per hospitalization

Medicare administrative data

Philipson TJ, et. al. Impact of oral nutritional supplementation on hospital outcomes. Am J Manag Care. 2013 Feb;19(2):121-8.



But my patient can't eat and can't get a tube!

When is Parenteral Nutrition (PN) Indicated?

2009 ASPEN / SCCM Guidelines (Currently Under Revision)

- In the patient who was previously healthy prior to critical illness with no evidence of protein-calorie malnutrition, use of PN should be reserved and initiated only after the first 7 days of hospitalization (if EN is not available)
- If there is evidence of protein-calorie malnutrition on admission and EN is not feasible, it is appropriate to initiate PN as soon as possible following admission and adequate resuscitation.
- If patient malnourished preop, delay surgery, initiate PN 5 to 7 days pre-op, continue into post-op period.
- Initiate PN only if duration of therapy anticipated to be > 7 days (PN therapy for duration < 7 days should have no outcome benefit and may increase risk).

**Major Ongoing Questions in
Critical Care Nutrition**

**Supplemental PN to “Top UP” patients
unable to receive full enteral feeding**

**“Trophic” vs. Full EN in ICU patients
-trophic probably ok in non-surgical
patients for first days of ICU stay**

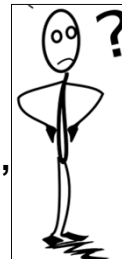
**“Immunonutrition” – enteral
formulations typically containing
supplemental arginine, glutamine,
omega-3 (fish oil), antioxidants**

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RD evaluation and therapeutic nutrition options for our patient

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RD and MD/DO Team Collaboration

- **Nutrition Assessment**
- **Oral Recommendations**
- **Feeding Tube Placement**
- **Parenteral Nutrition?**



- **Discharge and follow-up plans?**