Surgical Nutrition  
Preop and Postop Nutritional Assessment and Treatment  
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Malnutrition  
- 30-55% of hospitalized patients  
- 50% not identified  
- 69% undergo decline in nutritional status during hospital stay  
  Somanchi, JPEN 2013 35:209
- Improving nutrition screening  
  - 33% standard nutritional screening protocol – questionnaire  
  - 51-54% other methods including laboratory tests  

International guideline committee  
Defining malnutrition  
1. Starvation related malnutrition  
2. Chronic disease related malnutrition  
3. Acute disease related malnutrition  
Nutr Clin Pract 2010

Consequences of disease related malnutrition  
- Morbidity and mortality  
  Infectious complications, pressure ulcers, pneumonia, nosocomial infections, hospital and post hospital mortality  
- Length of stay  
- Cost  

How To Identify Malnutrition  
- Nutritional Risk Screening  
  height, wt, body frame, albumin  
  Funk, J Am Diet Assoc 1995
- Nutrition Risk Index (NRI)  
  VA, NEJM 1991
- Prognostic Nutrition Index (PNI)  
- Prognostic Inflammatory and Nutrition Index (PINI)  
  Ingenbleck

Nutritional screening tools for hospitalized patients  
- Malnutrition Universal Screening Tool (MUST)  
  BAPEN 2003; BMI, wt loss, projected nutrient intake  
- Nutritional Risk Screening (NRS 2000)  
  ESPEN 2003; wt loss, food intake, BMI, severity of disease  
- Mini Nutritional Assessment (MNA)  
  Nestle 1990; screen: food intake, wt loss, mobility, BMI, psych assessment: life situation, medications, self view, MAC, etc  
- Short Nutritional Assessment Questionnaire (SNAQ)  
  Dutch 2005
- Malnutrition Screening Tool (MST)  
  Australia 1999; wt loss, appetite  
- Subjective Global Assessment (SGA)  
  Denky 1987
SUBJECTIVE Global Assessment

- Detsky, JPEN 1984 “eyeball test”
  1) Weight loss in 6 months
     - >10% severe
     - 5-10% moderate
     - <5% mild
  2) Dietary intake
  3) Gastrointestinal symptoms
     - nausea, vomiting, diarrhea, anorexia
     - daily, within 2 weeks
  4) Functional capacity
     - bedridden, less than fully active, fully active
  5) Physical signs
     - subcutaneous fat loss, muscle wasting

SGA rating:
- A well-nourished
- B mild-moderate malnourished
- C severely malnourished

Medicare coding for malnutrition

At least two:
- Unintentional weight loss > 5% one month, > 10% six-month
- Albumin <3.0 or Prealbumin <12
- Underweight less than 90% IBW or BMI less than 18
- Poor oral intake for at least the previous 2 weeks
- Presence of a pressure ulcer or nonhealing wound

Thirty-day mortality rate by preoperative serum albumin level for all operations and 3 subspecialties

Thirty-day morbidity rate by preoperative serum albumin level for all operations and 3 subspecialties

Changes in Serum Albumin Levels Postoperatively

- 4.0 → 2.7 g/dL esophageal cancer surgery Seike 2011
- 4.23 → 3.32 g/dL CABG, age >65 DiMarion-Ghalili 2002
- 1.56 g/dL total joint surgery Puskas/May 1996
- 4.30 → 3.10 g/dL total joint surgery Greene 1991
- 0.5 g/dL “average” postop Doweiko JPEN, 1991
Table 1. Common Equations for Healthy People and Critically Ill Patients 11-23.

Frankenfield D C, Ashcraft C M JPEN J Parenter Enteral Nutr 2011;35:563-570
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Table 2. Median Prealbumin, C-Reactive Protein, and Percent Calories Delivered at 3 Time Points in 62 Enterally Fed Adults With Repeated Measures of Prealbumin and C-Reactive Protein a.

Davis C J et al. JPEN J Parenter Enteral Nutr 2011;36:197-204
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Table 3. Median Prealbumin, C-Reactive Protein, and Percent Calories Delivered at 3 Time Points in 62 Enterally Fed Adults With Repeated Measures of Prealbumin and C-Reactive Protein a.

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Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.)

- Calories: 25-30 Kcal/kg/day
- Protein: 1.2-2.0 g/kg/day
- Serum protein markers (albumin, prealbumin, transferrin, C-reactive protein) are not validated for determining adequacy of protein provision and should not be used in the critical care setting in this manner
- Obese patients:
  Adjusted Body Wt: IBW + 0.25(Actual Wt – IBW)

How Many Calories?

TPN FOR THE SURGICAL PATIENT?

Mortality

Major complications
Enteral nutrition (EN) is the preferred route of feeding over parenteral nutrition (PN) for the critically ill patient who requires nutrition support therapy.

### Enteral vs Parenteral Nutrition Meta-analyses

- **Braunschweig**: Am J Clin Nutr, 2001
  - 1033 patients, 20 studies

- **Gramlich**: Nutrition, 2004
  - 856 patients, 13 studies

- **Peter**: Crit Care Med, 2005
  - 2430 patients, 30 studies

- **Koerte**: Am J Gastroenterol, 2007
  - 2005 patients, 32 studies
    - no diff in mortality, increased infections parenteral

- **Simpson, Doig**: Intensive Care Med, 2003
  - 559 patients, 9 studies
    - lower mortality with parenteral, increased infections parenteral

### Enteral vs Parenteral Nutrition - Mortality

### Enteral vs Parenteral Nutrition - Hospital Length of Stay
Enteral vs Parenteral Nutrition - Infections

- Rice EDEN study (2012) JAMA
- Randomized, multicenter, acute lung injury mechanically ventilated
- 1,000 pts
- Trophic feeds: 10ml/h (10-20 kcal/h)
- Full feeding group: start at 25ml/h, advanced to goal increasing rate by 25ml/h every 6h, GRV~400ml
- Trophic fed group advanced to full energy rates after 7 days

Trophic vs Full Feeds

- Rice EDEN study (2012) JAMA
- Randomized, multicenter, acute lung injury mechanically ventilated
- 1,000 pts
- Trophic feeds: 10ml/h (10-20 kcal/h)
- Full feeding group: start at 25ml/h, advanced to goal increasing rate by 25ml/h every 6h, GRV~400ml
- Trophic fed group advanced to full energy rates after 7 days

When To Start Nutritional Support

- ASPEN Guidelines - ICU

- If a patient is not able to tolerate/calce the first 7 days following the start of TPN as evidenced by clinical response and full energy in the first 7 days, TPN should be continued for at least 7 days. (Grade C) (Grade C)
- If there is evidence of progressive malnutrition or infection, TPN should be continued for at least 14 days. (Grade C) (Grade C)
When To Start Nutritional Support
ASPEN Guidelines - Surgery

• B3. If a patient is expected to undergo major upper GI surgery and EN is not feasible, PN should be provided under very specific conditions:
  • If the patient is malnourished, PN should be initiated 5-7 days preoperatively and continued into the postoperative period. (Grade: B)
  • PN should not be initiated in the immediate postoperative period but should be delayed for 5-7 days (should EN continue not to be feasible). (Grade: B)
  • PN therapy provided for a duration of <5-7 days would be expected to have no outcome effect and may result in increased risk to the patient. Thus, PN should be initiated only if the duration of therapy is anticipated to be ≥7 days. (Grade: B)

Early vs Late Parenteral Nutrition in Critically Ill Adults
EPaNIC Trial

- Randomized, Multicenter, ICU Patients
- 4,640 patients, nutritionally at risk (NRS)
- Early TPN within 48h
- Late initiation received TPN after 7 days if EN not sufficient
- All patients had attempt at EN if unable to eat

This high risk subgroup of patients for whom Early EN was surgically contra-indicated, comprised the admission subgroups ‘Complicated Pulmonary/Esophageal Surgery’ and ‘Complicated Abdominal-Pelvic Surgery’ (N=517, EPaNIC II/III). Patients predictably received virtually no enteral nutrition (0 (0-163) kcal/day) by day 7. The duration of ICU stay of these patients was 6 (2-16) days in the Late PN group and 7 (3-19) days in the Early PN group.
Supplemental Parenteral Nutrition

  Prospective observational study surgical ICU, Negative energy balances were correlated with increasing number of complications
- Singer (2011) ICM
  TICACOS – prospective randomized tight calorie control study, ICU pts, trend toward lower mortality
- Heidegger, Berger, Switzerland; ESPEN guidelines
- SPN if insufficient EN by day 3 ICU
  Note randomized 305 pts out of 2555 – most excluded due to successful EN
  SPN 104% energy target, EN 77%
  SPN less infections but only starting after day 9
- Sick patients – 96% still in ICU after day 9
- Kotronoulas, Heyland (2011) CCM
  Observational study SPN no benefit

Just Say “No” to NPO

Early Versus Traditional Postoperative Feeding in Patients Undergoing Resectional Gastrointestinal Surgery: A Meta-Analysis
Emma Osland, Rossita Mohamad Yunus, Shahjahan Khan, and Muhammed Ashraf Memon
JPEN, July 2011; vol. 35, 4: pp. 473-487

Abstract
Background: A meta-analysis evaluating surgical outcomes following nutritional provision provided proximal to the anastomosis within 24 hours of gastrointestinal surgery compared with traditional postoperative management was conducted. Methods: Databases searched to identify randomized controlled trials comparing the outcomes of early and traditional postoperative feeding. Trials involving gastrointestinal tract resection followed by patients receiving nutritionally significant oral or enteral intake within 24 hours after surgery were included for analysis. Results: Fifteen studies involving a total of 1240 patients were analyzed. A statistically significant reduction (45%) in relative odds of total postoperative complications was seen in patients receiving early postoperative feeding (odds ratio [OR] 0.55; confidence interval [CI], 0.35–0.87, P = .01). No effect of early feeding was seen with relation to anastomotic dehiscence (OR 0.75; CI, 0.39–1.4, P = .39), mortality (OR 0.71; CI, 0.32–1.56, P = .39), days to passage of flatus (weighted mean difference [WMD] −0.42; CI, −1.12 to 0.28, P = .23), first bowel motion (WMD −0.28; CI, −1.20 to 0.64, P = .55), or reduced length of stay (WMD −1.28; CI, −2.94 to 0.38, P = .13); however, the direction of clinical outcomes favored early feeding. Nasogastric tube reinsertion was less common in traditional feeding interventions (OR 1.48; CI, 0.93–2.35, P = .10). Conclusions: Early postoperative nutrition is associated with significant reductions in total complications compared with traditional postoperative feeding practices and does not negatively affect outcomes such as mortality, anastomotic dehiscence, resumption of bowel function, or hospital length of stay.

Figure 3. Odds ratio (OR) for complications (nausea and vomiting excluded).

Figure 4. Odds ratios (ORs) for mortality.

Figure 5. Odds ratios (ORs) for anastomotic leak.
Immunomodulating Diets

- Arginine
- Omega-3 Fatty Acids
- Glutamine
Conclusions

- Malnutrition is a problem
- Use SGA to assess patients nutritional status
- Albumin and Prealbumin are most useful before our interventions
- Correct malnutrition Preoperatively if possible
- Routine Postoperative TPN can be Harmful except for severely malnourished patients
- If nutritional support is needed, use Enteral feedings
- If the enteral route is not available, can Delay Parenteral Nutrition for about one week
- Just say NO to NPO
- Consider using Arginine Preoperatively