Nutrition in Organ Transplant

Dawn Lowery, MS, RDN, LD
Manager – Clinical Nutrition

UAB MEDICINE
FOOD AND NUTRITION SERVICES

Objectives

- Review nutrition assessment and nutrition intervention in all stages of transplant
  - Role of the registered dietitian
  - Nutrition diagnosis and malnutrition status
  - Estimating nutrition needs
  - Post-transplant complications and challenges
  - Nutrition support
  - Post-op recovery and discharge process

UAB MEDICINE
FOOD AND NUTRITION SERVICES

Nutrition Assessment for the Transplant Patient

Role of the Registered Dietitian
Nutrition Diagnosis and Determining Malnutrition Status
Estimating Nutrition Needs

UAB MEDICINE
FOOD AND NUTRITION SERVICES

Standard of Practice for Registered Dietitians

- Standard of practice for registered dietitians (RDNs) in clinical practice is to provide medical nutrition therapy for numerous conditions and diseases, including
  - Cardiovascular disease
  - Critical illness
  - Diabetes
  - Gastrointestinal disorders
  - Malnutrition
  - Organ transplant
  - Pulmonary disorders
  - Renal disorders

Commission on Dietetic Registration
the credentialing agency for the Academy of Nutrition and Dietetics

UK MEDICINE FOOD AND NUTRITION SERVICES

Role of the Registered Dietitian

- Nutrition assessment / reassessment
- Oral supplement recommendations
- Nutrition support (tube feeding or TPN)
- Diet education
- DNI education

CONSULTS	DEPARTMENT PROTOCOL
Provider-ordered	Low BMI
24-hour admission screen	NPO > 5 days
Interdisciplinary referral	ICU > 72 hours
Braden score < 10	Reassessment
Automatic tube feeding pathway	
Nutrition support (TPN)	

UK MEDICINE FOOD AND NUTRITION SERVICES

Defining Malnutrition

- ***Nutrition imbalance or undernutrition that can occur in "those adults who lack adequate calories, protein, or other nutrients needed for tissue maintenance and repair."***
- Detection is key—the Academy of Nutrition and Dietetics and A.S.P.E.N. have created diagnostic criteria for malnutrition in adults in all settings (acute illness, chronic illness, or social/environmental situations).
- Approximately 15-60% of adults are malnourished depending on criteria used to identify and patient population.
- Malnutrition contributes to increased morbidity and mortality, decreased function and quality of life, increased frequency and length of hospital stay, and higher healthcare costs.

UK MEDICINE FOOD AND NUTRITION SERVICES

Malnutrition Criteria

NON-SEVERE			
	Acute Illness / Injury	**Chronic Illness**	**Social / Environmental**
Weight Loss	1-2% in 1 week 5% in 1 month 7.5% in 3 months	5% in 1 month 7.5% in 3 months 10% in 6 months 20% in 1 year	5% in 1 month 7.5% in 3 months 10% in 6 months 20% in 1 year
Energy Intake	<75% estimated needs for >7 days	<75% estimated needs for ≥1 month	<75% estimated needs for ≥3 months
Body Fat	Mild depletion	Mild depletion	Mild depletion
Muscle Mass	Mild depletion	Mild depletion	Mild depletion
Edema	Mild	Mild	Mild
Grip Strength	N/A	N/A	N/A

Malnutrition Criteria

SEVERE			
	Acute Illness / Injury	**Chronic Illness**	**Social / Environmental**
Weight Loss	>2% in 1 week >5% in 1 month >7.5% in 3 months	>5% in 1 month >7.5% in 3 months >10% in 6 months >20% in 1 year	5% in 1 month 7.5% in 3 months 10% in 6 months 20% in 1 year
Energy Intake	≤50% estimated needs for ≥5 days	≤75% estimated needs for ≥1 month	≤50% estimated needs for ≥1 month
Body Fat	Moderate depletion	Severe depletion	Severe depletion
Muscle Mass	Moderate depletion	Severe depletion	Severe depletion
Edema	Moderate to severe	Severe	Severe
Grip Strength	Not recommended in ICU	Reduced for age/gender	Reduced for age/gender

Transplant-Related Malnutrition

- End-stage organ failure requiring organ transplant
  - Anorexia of chronic disease
  - Muscle wasting
  - Nausea, vomiting
  - Difficulty chewing or swallowing
  - Limited access to food
  - Early satiety
  - Depression
  - Fatigue
  - Restricted diets
  - Hypermetabolic state
  - Nutrient malabsorption
- Malnutrition can result from these medical problems, which makes nutrition assessment and therapy crucial to the transplant patient
- Nutrition needs will be individualized based on underlying disease state, nutrition status at time of evaluation and/or transplant surgery, post-op complications, etc.

Nutrition Requirements for Transplant Patients

Pre-Transplant Evaluation	Post-Transplant Evaluation
Inpatient or Outpatient	***Inpatient***
• Nutrition assessment • Diet education • Follow-up for optimization PRN	• Nutrition assessment • Follow-up for recovery PRN • Discharge teaching

Nutrition Assessment Overview

- Subjective details and history
  - Appetite and weight history
- Objective data
  - Medical and surgical history
  - Wounds/skin breakdown
  - Labs and medications
- Anthropometrics
  - BMI
  - Physical assessment
- Estimated nutrition needs individualized for patients
  - Weight gain
  - Weight loss
  - Weight maintenance

Estimating Nutrition Needs

- Indirect calorimetry
  - Gold standard, but not always available
  - Some limitations
- Predictive equations
  - Harris-Benedict, Mifflin St. Jeor, Penn State, etc.
- Simplistic formulas
  - Kcal/kg
  - Grams protein/kg
- Ongoing evaluation recommended (serial reassessments; 24-hour UUN)

Estimating Nutrition Needs

	PRE-TRANSPLANT
	Calories
Weight Maintenance	BEE x 1.2-1.3 or 30 kcal/kg (depending on activity level)
Weight Gain	BEE x 1.5 or 35-40 kcal/kg
Weight Loss	500-1000 kcal deficit (depending on current intake and ability to exercise)
	Protein
Maintenance	0.8-1.2 g/kg/day
Repletion	1.3-2.0 g/kg/day
Dialysis	HD: 1.2-1.5 g/kg/day PD: 1.5 g/kg/day

Estimating Nutrition Needs

Post-Transplant Factors

- Hypercatabolism from surgical stress and high-dose steroids
- Wound/incision healing
- Losses from drains, fistulas, wounds, and/or dialysis
- Hyperglycemia
- Hyperlipidemia

Other Complications

- Rejection
- Infection
- Renal insufficiency
- Fluid retention
- Dysphagia

	IMMEDIATE POST-TRANSPLANT
Calories	BEE x 1.3-1.5
Protein	1.5-2.0 g/kg

Which Weight?

- Lowest recorded weight/dry weight, especially with
  - Edema
  - Anasarca
  - Aggressive volume resuscitation
- If BMI ≥ 30, us ideal body weight (IBW)
  - Males: 106# for first 5' + 6# per inch for rest of inches
  - Females: 100# for first 5' + 5# per inch for rest of inches

Nutrition Diagnosis

- Identification and documentation of existing nutrition problems that the registered dietitian can resolve or improve
  - Standardized terminology ("PES Statement")
    - **Problem** – Inadequate energy intake
    - **Etiology** – Nausea/vomiting
    - **Signs & Symptoms** – PO intake of 50% or less and 10# weight loss in 1 month
- Nutrition intervention will address the identified nutrition problems

Nutrition Intervention for the Transplant Patient

Post-Transplant Complications
Enteral and Parenteral Nutrition Support

UAB MEDICINE
FOOD AND NUTRITION SERVICES

Benefits of Nutrition Intervention

- Numerous studies have shown that nutrition intervention leads to significant improvements in patient outcomes.
  - Pressure ulcer incidence reduced by 25%
  - Avoidable readmissions reduced by 28%
  - Overall complications reduced by 14%
  - Average length of stay reduced by ~2 days

Nutrition Support

- Supplemental care designed to
  - Provide fuel to preserve lean body mass
  - Support the patient during stress response
- Also termed ***medical nutrition therapy*** (MNT), in which feeding is thought to
  - Help reduce the metabolic response to stress
  - Favorably influence immune response

Enteral vs. Parenteral Nutrition Support

- Enteral nutrition (EN) is preferred over parenteral nutrition (PN) in critically ill patients due to
  - Reduced infection rates
  - Reduced ICU length of stay
- Decision algorithm
  - Inadequate PO intake 2-3 days post-transplant?
    - Functional gut?
      - Yes → PO supplementation or EN
      - No → PN
  - Monitor PO tolerance and/or return of gut function
    - Transition from PN to EN or from EN to PO

Oral Nutrition Supplements

Boost VHC 520 kcal, 22 g protein 	**Ensure Clear** 240 kcal, 8 g protein 	**Ensure High Protein** 160 kcal, 16 g protein 
Carnation Breakfast Essentials 240 kcal, 10 g protein 	**Ensure Compact** 220 kcal, 9 g protein 	**Ensure Plus High Protein** 350 kcal, 20 g protein 

Oral Nutrition Supplements

Gelatein 20 (Sugar-Free) 80 kcal, 20 g protein **Gelatein Plus** 160 kcal, 20 g protein 	**Kate Farms Peptide 1.5** 500 kcal, 24 g protein 	**Magic Cup** 290 kcal, 9 g protein 
Glucerna Shake 220 kcal, 10 g protein 	**Kate Farms Standard 1.4** 455 kcal, 19 g protein 	**Nepro** 425 kcal, 19 g protein 

Nutritional Additives

Banatrol TF (PO or Tube) 45 kcal, 2 g protein 	**LiquaCel** 100 kcal, 16 g protein 
Juven 95 kcal, 2.5 g protein 	**ProSource TF20 (Enteral Tube Only)** 80 kcal, 20 g protein 

Supplements and Additives by Needs / Disease State

High Calorie / High Protein	Diarrhea / Loose Stool	Vegan / Allergen-Free
• Boost VHC • Ensure Plus High Protein	• Banatrol TF	• Kate Farms Peptide 1.5 • Kate Farms Standard 1.4
Low Carb / Appropriate for Diabetes	**Low Volume**	**Protein Modular / Wound Healing**
• Ensure High Protein • Gelatein Plus • Glucerna Shake • Nepro	• Gelatein 20 & Gelatein Plus • Liquacel • Magic Cup	• ProSource TF20 • Juven
Clear Liquid	**Low K+/Phos / Appropriate for Renal**	
• Ensure Clear • Gelatein 20 & Gelatein Plus	• Nepro	

Enteral Nutrition

- Initiate EN within 24-48 hours for critically ill patient unable to maintain PO intake
  - Increase to goal rate as soon as possible over 24-48 hours
  - Advance slower if patient at risk for refeeding syndrome or has other complications
  - Post-pyloric access recommended
- Avoid holding/stopping feeds if possible
  - Minimize NPO status before tests or procedures to prevent inadequate delivery of nutrients
  - Gut atrophy may be caused by prolonged NPO status

Tube Feeding Formulas

STANDARD	SPECIALIZED
Osmolite 1.5 	Glucerna 1.5 
Jevity 1.5 	Nepro 
TwoCal HN 	Pivot 1.5 

Tube Feeding Formulas

PEPTIDE-BASED / ELEMENTAL	VEGAN / ALLERGEN-FREE
Vital 1.5 	Kate Farms Standard 1.4 
Vital AF 1.2 	Kate Farms Peptide 1.5 
Vital High Protein 	

Tube Feeding Formulas by Needs / Disease State

Standard	**Diarrhea / Loose Stool**	**Renal**
• Osmolite 1.5 • Jevity 1.5 • TwoCal HN	• Vital 1.5 • Vital AF 1.2	• Nepro
High Protein	**Critically Ill**	**Vegan / Allergen-Free**
• Vital AF 1.2 • Vital High Protein • Pivot 1.5	• Vital AF 1.2 • Vital High Protein • Glucerna 1.5	• Kate Farms Peptide 1.5 • Kate Farms Standard 1.4
Diabetes	**Low Volume**	
• Glucerna 1.5	• TwoCal HN	

Monitoring Tolerance of Enteral Nutrition

- Signs of intolerance
  - Vomiting, abdominal distention/discomfort, high NG output, diarrhea, reduced passage of flatus and stool
- Reduce aspiration risk
  - Raise head of bed up to 30-45˚
  - Use post-pyloric feeding tube
  - Run 24-hour continuous feeding regimen over bolus feeding regimen
  - Consider prokinetic agents (Reglan, erythromycin)

Diarrhea with Enteral Nutrition

- Stools will be somewhat loose with any tube feeding, but large volume or frequent watery stools is undesirable
  - Rule out other possible causes of diarrhea before altering tube feeding formula
    - Antibiotics, hyperosmolar meds (ex. sorbitol), *C. diff*
- Persistent diarrhea
  - Consider adding a mixed fiber-containing formulation ***(Banatrol)***
  - Probiotics can be used to increase gut flora ***(Lactobacillus acidophilus and bulgaricus)***
  - Consider switching to a peptide-based, elemental formula if malabsorption is suspected or no response to fiber ***(Vital 1.5, Vital AF 1.2)***

16. McClave et al. *JPEN J Parenter Enteral Nutr.* [illegible]

Other Considerations for Enteral Nutrition

- CRRT
  - High protein needs (1.5-2.0 g/kg or higher)
  - Nepro formula not appropriate due to low electrolyte content in setting of high losses during CRRT
- Propofol
  - Provides 1.1 kcal/mL
  - Low calorie formula often needed to prevent overfeeding
    - Vital High Protein, Vital AF 1.2
- Clevidipine
  - Provides 2 kcal/mL
  - Tube feeding should be held before and after medication

Parenteral Nutrition

Indications

- Gastrointestinal incompetency
  - Short bowel syndrome
  - Bowel obstruction
  - High output fistula
  - Severe ileus
- Unable to meet ≥ 60% estimated nutrition needs by PO/enteral route after 7-10 days

Contraindications

- Functioning GI tract
- Patient expected to receive EN or PO nutrition within 5-7 days
- When prognosis does not warrant aggressive nutrition support
- When risks outweigh benefits

Parenteral Nutrition

Initiation & Advancing to Goal PN

- If EN not feasible,
  - Initiate PN immediately for patients at nutrition risk or malnourished
  - Withhold PN for 7 days for previously healthy/well-nourished patients
- Start at ~1000 kcal/day and advance to goal calories in 2-3 days as tolerated

Weaning & Transitioning to EN

- Enteral or oral feedings should begin when GI function returns
- As tolerance improves and enteral feeds increase, reduce TPN gradually
- Discontinue TPN when ≥ 60% of target energy requirements are delivered via enteral route

16. McClave et al. *JPEN J Parenter Enteral*

Micronutrient Supplementation

- A combination of antioxidant vitamins and trace minerals is safe for use in critically ill patients. Can be used for non-healing wounds, pressure injuries, multiple surgical incisions, etc.
  - Multivitamin (Daily)
  - Ascorbic acid (500 mg BID)
  - Zinc sulfate (220 mg Daily x 10 days)

Post-Transplant Recovery and Discharge

CMS Documentation Guidelines
Discharge Education

UAB MEDICINE
FOOD AND NUTRITION SERVICES

CMS Documentation Guidelines

- CMS requires nutrition documentation on all organ transplant patients as part of ongoing multidisciplinary care.

PRE-TRANSPLANT	POST-TRANSPLANT*
One (1) Note Required	**Three (3) Notes Required on Two (2) Separate Dates**
1. Nutrition Assessment	1. Nutrition Assessment 2. Discharge Diet Education 3. Depart Note *Includes living donors

Post-Transplant Discharge Education

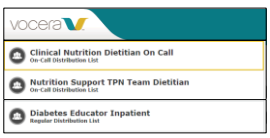
- Post-Transplant Diet
  - Immunosuppressant drug-nutrient interactions (grapefruit and grapefruit juice)
  - Food safety
- Carbohydrate-Controlled Diet
  - Hyperglycemia
  - Steroid-induced diabetes
- Sodium and Fluid Restriction
  - Fluid retention
- Gastroesophageal Reflux
  - Esophageal dysmotility (pre- and post-lung transplant)
- Any other diet orders prescribed by MD/SLP
  - Post-op dysphagia

Summary

- Nutrition as part of the multidisciplinary care team is highly beneficial, especially for transplant patients.
- Many factors and complications can affect a transplant patient's nutrition status
  - Frequent assessment and reassessment is key for quality care.
  - Consult your dietitian with any nutrition concerns.
- Nutrition education/documentation on transplant patients is crucial, especially for CMS guidelines.

Questions?

- Clinical Nutrition staff is available through Vocera Messaging / Vocera Web Console
  - ***Clinical Nutrition Dietitian On Call***
  - ***Nutrition Support TPN Team Dietitian***
  - ***Diabetes Educator Inpatient***



References

- Tappenden et al. Critical Role of Nutrition in Improving Quality of Care: An Interdisciplinary Call to Action to Address Adult Hospital Malnutrition. *Alliance to Advance Patient Nutrition, Med Surg Nursing*. 2013;22:147-165.
- Stratton RJ, et al. Enteral nutritional support in prevention and treatment of pressure ulcers: A systematic review and meta-analysis. *Ageing Res Rev*. 2005; 4:422-450.
- Bauer JD, et al. Nutritional status of patients who have fallen in an acute care setting. *J Hum Nutr Diet*. 2007; 20: 558-564.
- Milne et al. Protein and energy supplementation in elderly people at risk from malnutrition (Review). *Cochrane Database Syst Rev*. 2009 Apr 15 (2). CD003288.
- Brugler L, et al. The five-year evolution of a malnutrition treatment program in a community hospital. *J Qual Improv*. 1999; 25:191-206.
- Smith PE, et al. High-quality nutritional interventions reduce costs. *Healthcare Financial Management*. 1997; 51:66-69.
- Academy of Nutrition and Dietetics: Revised 2017 Scope of Practice for the Registered Dietitian Nutritionist. *J Acad Nutr Diet*. 2018;118:141-165.
- Eliot et al. The Value in Interprofessional, Collaborative-Ready Nutrition and Dietetics Practitioners. *J Acad Nutr Diet*. 2015;115(10):1578-1588.
- Position of the Academy of Nutrition and Dietetics: Interprofessional Education in Nutrition as an Essential Component of Medical Education. *J Acad Nutr Diet*. 2017;117:1104-1113.
- Mueller et al. A.S.P.E.N. Clinical Guidelines: Nutrition Screening, Assessment, and Intervention in Adults. *JPEN J Parent Enteral Nutr*. 2011;35(1):16-24.
- White et al. Consensus Statement: Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition: Characteristics Recommended for the Identification and Documentation of Adult Malnutrition (Undernutrition). *JPEN J Parent Enteral Nutr*. 2012;36(3):275-283.
- Hollander, et al. The optimal approach to nutrition and cystic fibrosis: latest evidence and recommendations. *Curr Opin Pulm Med*. 2017; 23:556-561.
- Zha et al. Protein Nutrition and Malnutrition in CKD and ESRD. *Nutrients*. 2017; 9:208.
- Okoshi et al. Cardiac Cachexia: Perspectives for Prevention and Treatment. *Arq Bras Cardiol*. 2017;108(1):174-80.
- Mazurak et al. Nutrition and the Transplant Candidate. *Liver Transplantation*. 2017;23:1451-1464.
- Hasse. Nutrition Assessmentand Support of Organ Transplant Recipients. *JPEN J Parent Enteral Nutr*. 2001;25(3):120-131.
- McClave et al. Guidelines for the Provision and Assessment of Nutrition Support Therapy in Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) *JPEN J Parent Enteral Nutr*. 2016;40(2):159-211.