DISCLAIMER: These guidelines are intended to serve as a general statement regarding appropriate patient care practices based upon the available medical literature and clinical expertise at the time of development. They should not be considered to be accepted protocol or policy, nor are intended to replace clinical judgment or dictate care of individual patients.

ICU ENTERAL FEEDING GUIDELINES

Initiation of Feeding

- Ventilated patients should receive an orogastric tube (OGT), nasogastric tube (NGT) or Dobhoff tube (DHT). The correct position of the tube should be confirmed by auscultation and KUB. Patients at high risk for aspiration should receive small bowel feeding access. For patients requiring chronic enteral nutrition support, feeding access should be obtained as per the physician's discretion.
- Enteral feeding should be initiated within 12-24 hours of admission to ICU, unless the patient is not hemodynamically stable, adequately resuscitated, or the gastrointestinal (GI) tract is believed to be non-functioning. Patients with recent abdominal surgeries require prior discussion with the surgeon before commencing enteral feeding.
- 3. Patients receiving enteral feedings should be placed in the semi-recumbent position with the HOB 30-45°, unless otherwise indicated.
- 4. A bowel regimen should be started, as appropriate, once enteral support is initiated.
- 5. Patients receiving therapeutic hypothermia for 24 hours can begin enteral nutrition (EN) during the rewarming process.

Estimated Needs

- 6. Energy needs will be estimated by a Registered Dietitian (RD). Estimated energy intake should be adjusted according to the severity and type of illness.
 - a. Energy requirements may be calculated either through simplistic formulas (25-30 kcal/kg/d), published predictive equations, or the use of indirect calorimetry.
 - i. Harris-Benedict Equation
 - 1. Men: 66 + (13.7 x weight (kg)) + (% x height (cm)) (6.8 x age)
 - 2. Women: 665 + (9.6 x weight (kg)) + (1.8 x height (cm)) (4.7 x age)

Based on disease condition		
Clinical Condition	Energy (Kcal/Kg/day)	
Maintenance	25	
Stressed/MICU	25-30	
Trauma/General Surgery	30	
Trauma/ICU	30-35	
Burns	Curreri Formula: 25 *(weight (kg)) + 40 *(%TBSA burned)	
Cancer	Inactive, nonambulatory 25-30 Wt gain, nutritional repletion 30-35 Hypermetabolic, stressed 35 *Use Actual BW unless BMI >29.9, then use Ideal	
Obesity BMI >29.9	Mifflin St. Jeor Equation: Men: (10 x kg) + (6.25 x cm) – (5 x age) + 5 Women: (10 x kg) + (6.25 x cm) – (5 x age) - 161	

ii. Based on disease condition

- b. In the critically ill obese patient, permissive underfeeding or hypocaloric feeding with enteral nutrition (EN) has been shown to be of benefit in some studies. This practice, however, remains controversial and further research is necessary to determine the minimal amount of nutrition required to achieve therapeutic benefit in clinical outcome.
- Protein needs will be estimated by a RD. Estimated protein needs should be adjusted according to the severity and type of illness. Protein provision will be included in total calorie intake in critically ill patients while they are in ICU.
 - a. For patients with a BMI <30, protein requirements should be in the range of 1.2-2.0 g/kg actual body weight per day. Protein should be provided in a range ≥2.0 g/kg ideal body weight per day for Class I and II patients (BMI 30-40), ≥2.5 g/kg ideal body weight per day for Class III (BMI ≥ 40).</p>

- b. Patients receiving hemodialysis or continuous renal replacement therapy (CRRT) should receive increased protein, up to a maximum of 2.5 g/kg/d.
- c. Daily protein intake based on disease condition

Clinical Condition	Protein needs (g/Kg IBW/day)
Normal (nonstressed)	0.8
Mild stress	1-1.2
Critical Illness/injury/moderate stress	1-1.5
Acute Renal Failure (undialyzed)	0.8-1
Acute Renal Failure (dialyzed)	1.2-1.4
Peritoneal Dialysis	1.3-1.5
Infection, major surgery, cancer	1.4-1.6
Burn/Sepsis/ multiple trauma/CHI	1.5-2
CRRT/CVVHD	1.7-2.5
Lower protein requirements may be necessary in hepatic encephalopathy	

Formula Selection

- 8. ICU patients should receive a standard EN formula unless otherwise indicated by past medical history or current medical condition.
 - a. Immune Enhancing Nutrition (IEN) should be used in the head and neck cancer and upper gastrointestinal cancer populations. There is, however, conflicting data supporting its use in trauma and burn population. Please see the Immune Enhancing Nutrition EBM guideline for further recommendations (www.surgicalcriticalcare.net).
 - b. Polymeric (whole protein) formulas should be used unless the patient demonstrates intolerance, or gastrointestinal complications (i.e. short bowel syndrome, pancreatitis, Crohn's disease, etc.).
 - c. Soluble fiber may be beneficial for the fully resuscitated, hemodynamically stable critically ill patient receiving EN who develops diarrhea. Both soluble and insoluble fiber should be avoided in patients at high risk for bowel ischemia or severe dysmotility.
 - d. Fluid restricted, calorically dense formulations could be considered for patients with acute respiratory failure without evidence of hypernatremia. High-lipid, low-carbohydrate specialty formulas designed to manipulate the respiratory quotient may be utilized in the CO₂ retaining patients who are difficult to wean from mechanical ventilation, but should not be routinely used.
 - e. ICU patients with acute renal failure or acute kidney injury should be placed on standard enteral formulations, and standard ICU recommendations for protein and calorie provision should be followed. If significant electrolyte abnormalities exist or develop, that are not being corrected by usual ICU care and renal replacement therapy, a specialty formulation designed for renal failure (with appropriate electrolyte profile) may be considered.
 - f. EN is the preferred route of nutrition therapy in ICU patients with acute and/or chronic liver disease. Standard enteral formulations should be used in ICU patients with acute and chronic liver disease. Branched chain amino acid formulations (BCAA) should be reserved for the rare encephalopathic patient who is unmanageable to standard treatment with antibiotics and Lactulose.
 - g. Patients with severe acute pancreatitis may be fed enterally by the jejunal route. Tolerance to EN may be enhanced by early initiation of EN, displacing the level of infusion more distally, or changing the EN delivered to a peptide-based, increased MCT or nearly fat-free elemental formulation. When EN is not feasible, the use of parenteral nutrition (PN) should be considered.
 - h. For patients with a history of diabetes, The American Diabetes Association suggests either a standard (50% carbohydrate) or a lower carbohydrate content (33-40%) formula should be used. It is appropriate to start with a standard formula with close monitoring of blood glucose, however if glycemic control is difficult to achieve then it is reasonable to switch to a diabetic or low carbohydrate formula.

Tolerance

- 9. It is preferred that patients receive continuous enteral feeding during the acute phase. EN should start at 20ml/hr, increasing by 10 mL Q4H, reaching the "goal rate" as determined by the RD within 48-72 hours.
- 10. EN tolerance should be monitored by multiple markers (pain and/or distention, physical exam, passage of flatus and stool, abdominal radiographs).
 - a. Gastric residuals
 - i. Gastric residuals should be checked Q4H.
 - 1. <u>If GRV 200-500 mL</u>: return residual amount, continue formula at previous infusion rate, increasing to goal rate by 10 mL Q4H, consider adding gastric motility agent.
 - If GRV >500 mL: Clinically examine for signs of intolerance: abdominal distention, fullness, discomfort, or presence of emesis. Return 200 mL, discard the remainder, and hold TF x 2 hours. Recheck residuals after 2 hours, if GRV remains >200 mL: Continue to hold TF, Check HOB, patient position, Consider KUB to rule out ileus/obstruction, Consider gastric motility agent, small bowel feeding, changing to elemental formula if absorption issue is presumed, changing to volume restricted formula or decreasing goal rate, total parenteral nutrition (TPN).
 - b. Emesis, abdominal distention
 - i. Check HOB/ patient position; consider holding TF x 2 hours, KUB to rule out ileus/obstruction, gastric motility agent, anti-emetic, small bowel feeding, elemental formula if absorption issue is presumed, volume restricted formula or decreasing goal rate, TPN.
 - c. Diarrhea: >500mL every 8 hours or >3 stools per day for at least 2 consecutive days
 - i. Warrants further evaluation for etiology (enteral medications, *Clostridium difficile*, or other infectious etiologies).
 - ii. Persistent diarrhea (where *C. difficile* has been excluded) may benefit from the use of a soluble fiber-containing enteral formula or the addition of soluble fiber (i.e. Benefiber, Metamucil).
 - iii. If it is determined that the patient exhibits gastrointestinal absorption difficulty, the use of a peptide based or elemental formula may be justified.
 - d. Constipation: difficulty passing or no bowel movement >3 days.
 - i. Check for signs of dehydration.
 - ii. Increase the amount of free water.
 - iii. Ensure adequate bowel regimen ordered.
 - iv. Rectal exam with disimpaction.
 - v. Consider KUB to rule out obstruction.
 - e. Inappropriate cessation of EN should be avoided. Holding EN for GRV <200 mL in absence of other signs of intolerance should be avoided. The time period that a patient is made NPO prior to, during, and immediately following the time of diagnostic tests or procedures should be minimized to prevent inadequate delivery of nutrients.
 - f. In the cases of prolonged or frequent NPO status, consider increasing TF goal rate to ensure adequate volume delivery to meet total calorie and protein goals.
 - g. Blue food coloring and glucose oxidase strips, as surrogate markers for aspiration, should not be used in the critical care setting.

Adjunctive Therapy

- 11. Orlando Health does not support the use of herbal products or probiotics (including herbal remedies, nutraceuticals, etc.) in the acute care setting. There is a lack of consistent outcome effect for the use of probiotics in the ICU population.
- 12. The addition of enteral glutamine to an EN regimen (not already containing supplemental glutamine) may be considered in the mixed ICU patients.
- 13. Protein supplementation may be added to assure estimated protein needs are met.
- 14. Hospital formulary modulars (i.e. Juven®, ProPass®, Healthy Shot Double Protein®, MCT Oil) may be added based on patient's disease state and needs.

Assessing Adequacy

- 15. Ongoing assessment of enteral support adequacy should be performed.
 - a. Monitor BMP, CMP, blood glucose levels.
 - b. Prealbumin and albumin can be used as nutrition indicators in ICU patients on a PRN basis as these molecules can be affected by conditions other than nutritional status (i.e. infection, inflammation). Per MD discretion check prealbumin levels once acute inflammatory phase begins to improve and patient has received enteral nutrition consistently at goal for >72 hours; trend weekly with other inflammatory markers (i.e., CRP, WBC, procalcitonin)
 - c. Patients tolerating calorie and protein intakes at the rate determined by a predictive equation may require further monitoring of protein and calorie intake, in certain populations.
 - d. Indirect Calorimetry (i.e. Metabolic Cart Study) may be used to better assess patient's resting energy expenditure (REE) and substrate utilization to more accurately manipulate the respiratory quotient (RQ) when clinically indicated. Patients must be mechanically vented, receiving EN at the determined goal rate consistently for ≥24 hours prior to study. Factors that affect REE (i.e. caffeine, sedatives, general anesthesia) and RQ (i.e., hyperand hypo-ventilation, ketoacidosis, hypothermia) and sources of error (i.e., FiO₂ >60%, presence of chest tubes with air leaks (bronchopleural fistula), hemodialysis, high PEEP) will be taken into account.
 - e. Nitrogen balance may be calculated following collection of a 24 hour urine specimen. Patients in positive nitrogen balance excrete less nitrogen than is being consumed and incorporate nitrogen into newly formed protein. The 24 hour UUN (urine urea nitrogen) may be used on conjunction with the Metabolic Cart Study to ensure appropriate nutritional support.

References

- <u>Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically III</u> <u>Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral</u> <u>Nutrition (A.S.P.E.N.).</u> Journal of Parenteral and Enteral Nutrition. Vol. 33. No. 3. May/June, 2009. pp. 277-316.
- 2. <u>Nutrition in the Intensive Care Unit.</u> Section XVII. Chapter 69. pp. 467-477.
- 3. <u>Development of Evidence-Based Guidelines and Critical Care Nurses' Knowledge of Enteral Feeding.</u> Critical Care Nurse. Vol. 27. No. 4, August, 2007. pp. 17-29.
- 4. <u>Nutritional Assessment in Critically III Patients.</u> <u>www.surgicalcriticalcare.net</u>.

