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 judgement or dictate care of individual patients.

ICU ENTERAL FEEDING GUIDELINES

Initiation of Feeding

1. Enteral feeding should be initiated within 12-24 hours of admission to ICU, unless the patient is hemodynamically unstable, inadequately 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.
2. Patients receiving enteral feedings should be placed in the semi-recumbent position with the head of bed (HOB) 30-45º unless otherwise indicated.
3. A bowel regimen should be started, as appropriate, once enteral support is initiated.
4. Patients receiving therapeutic hypothermia for 24 hours can begin enteral nutrition (EN) during the rewarming process.

Estimated Needs

1. Energy needs should be estimated as outlined below and will be confirmed by a Registered Dietitian (RD). Estimated energy intake should be adjusted according to the severity and type of illness.
   a. Energy requirements may be determined either through empiric formulas (25-30 kcal/kg/d), published predictive equations, or the use of indirect calorimetry.

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 kcal x (weight (kg + 40 kcal x (%TBSA burned)
Cancer	Inactive, nonambulatory: 25-30 Weight gain, nutritional repletion: 30-35 Hypermetabolic, stressed: 35 *Use Actual Body Weight 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

   b. In the critically ill obese patient, permissive underfeeding or hypocaloric enteral feeding remains controversial and further research is necessary to determine the minimal amount of nutrition required to achieve therapeutic benefit in clinical outcome.

2. Protein needs should be estimated as below and will be confirmed by a RD. Estimated protein needs should be adjusted according to the severity and type of illness.
   a. For patients with a BMI <30, protein requirements should be in the range of 1.2-2.0 gm/kg actual body weight. For patients with a BMI >30, protein requirements should be in the range of 1.2-2.0 gm/kg/day of adjusted body weight.
   b. Patients receiving hemodialysis or continuous renal replacement therapy (CRRT) should receive increased protein up to a maximum of 2.5 gm/kg/d.

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Daily protein intake based on disease condition

Clinical Condition	Protein needs (gm/kg /day)
Normal (nonstressed)	0.8 – 1.0
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 – 1.54
Peritoneal Dialysis	1.3 – 1.5
Infection, major surgery, cancer	1.24 – 2.0
Burns / Sepsis / Multiple Trauma / Traumatic Brain Injury	1.5 – 2.5
CRRT/CVVHD	1.2 – 2.5

Formula Selection

1. 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 the 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 CO_2-retaining patients who are difficult to wean from mechanical ventilation, but should not be used routinely.
   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 despite 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 Medium-Chain Triglyceride (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 low 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

1. It is preferred that patients receive continuous enteral feeding. EN should start at 20ml/hr and if tolerating advance to goal rate within 4 hours, reaching the goal rate as determined by RD.
2. EN tolerance is determined by physical examination, passage of flatus and stool, radiology evaluation, absence of abdominal pain, discomfort, and distention.
    a. Gastric residuals
        i. Literature does not support the use of gastric residuals in monitoring and determining tolerance of EN. Do not check gastric or post pyloric residuals.
    b. Emesis
        i. Check HOB/ patient position, reduce rate by 20-25 ml/hr, obtain KUB to rule out ileus/obstruction, add gastric motility agent, anti-emetic, consider small bowel feeding, change to elemental formula if malabsorption is presumed.
        ii. Consider TPN only if nausea/vomiting persists.
    c. Abdominal distention
        i. Diagnosed by visual inspection, palpation, patient report. Order radiologic examination to rule out ileus, obstruction, fluid filled loops of bowel and ascites.
        ii. If intestinal appearance and function are normal, continue EN.
        iii. If found to have poor motility with bowel dilation discontinue TFs, consider TPN.
    d. Diarrhea: greater than 3 liquid stools per day for 2 consecutive days
        i. Do not stop TFs for incidence of diarrhea. Feeding should be continued while evaluating etiology (enteral medications, Clostridium difficile, or other infectious etiologies).
        ii. If diarrhea persists, after evaluation of etiology, consider alternative tube feed formula, addition of fiber supplement (i.e. Benefiber, Metamucil), or use of anti-diarrheal agent.
        iii. If it is determined that the patient exhibits gastrointestinal absorption difficulty, the use of peptide based or elemental formula may be justified.
    e. Constipation: difficulty passing or no bowel movement >3 days
        i. Check for signs of dehydration.
        ii. Increase the amount of free water.
        iii. Ensure an adequate bowel regimen has been ordered
        iv. Rectal exam with disimpaction.
        v. Consider KUB to rule out obstruction/impaction
    f. Inappropriate cessation of EN 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. Contact physician when receiving “NPO after midnight” order for timing of surgery or procedure.
    g. In the cases of prolonged of frequent NPO status, consider increasing TF goal rate to ensure adequate volume delivery to meet calorie and protein goals.
    h. Blue food coloring or any coloring agent and glucose oxidase strips, as surrogate markers for aspiration, should not be used in the critical care setting.

Adjunctive Therapy

1. 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.
2. The addition of enteral glutamine to an EN regimen (not already containing supplemental glutamine) should not be done as this has not been shown to have a benefit in critically ill patients.
3. Protein supplementation may be added to assure estimated protein needs are met.
4. Hospital formulary modular (i.e. Juven®, Prosource®, MCT Oil) may be added based on patient’s disease state and needs. Careful consideration should be given to septic patients and Juven®

supplementation, as it has shown to exacerbate the inflammatory response in sepsis. For hemodynamically stable ICU patients, soluble fiber (10 – 20 g 1 day) can be provided if there is evidence of diarrhea.

Assessing Adequacy

1. 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 an as needed basis as these molecules can be affected by conditions other than nutritional status (i.e. infection, inflammation). Per physician 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 $\geq$ 24 hours prior to study. Factors that affect REE (i.e. caffeine, sedatives, general anesthesia) and RQ (i.e., hyper-and 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 in conjunction with the Metabolic Cart Study to ensure appropriate nutritional support.

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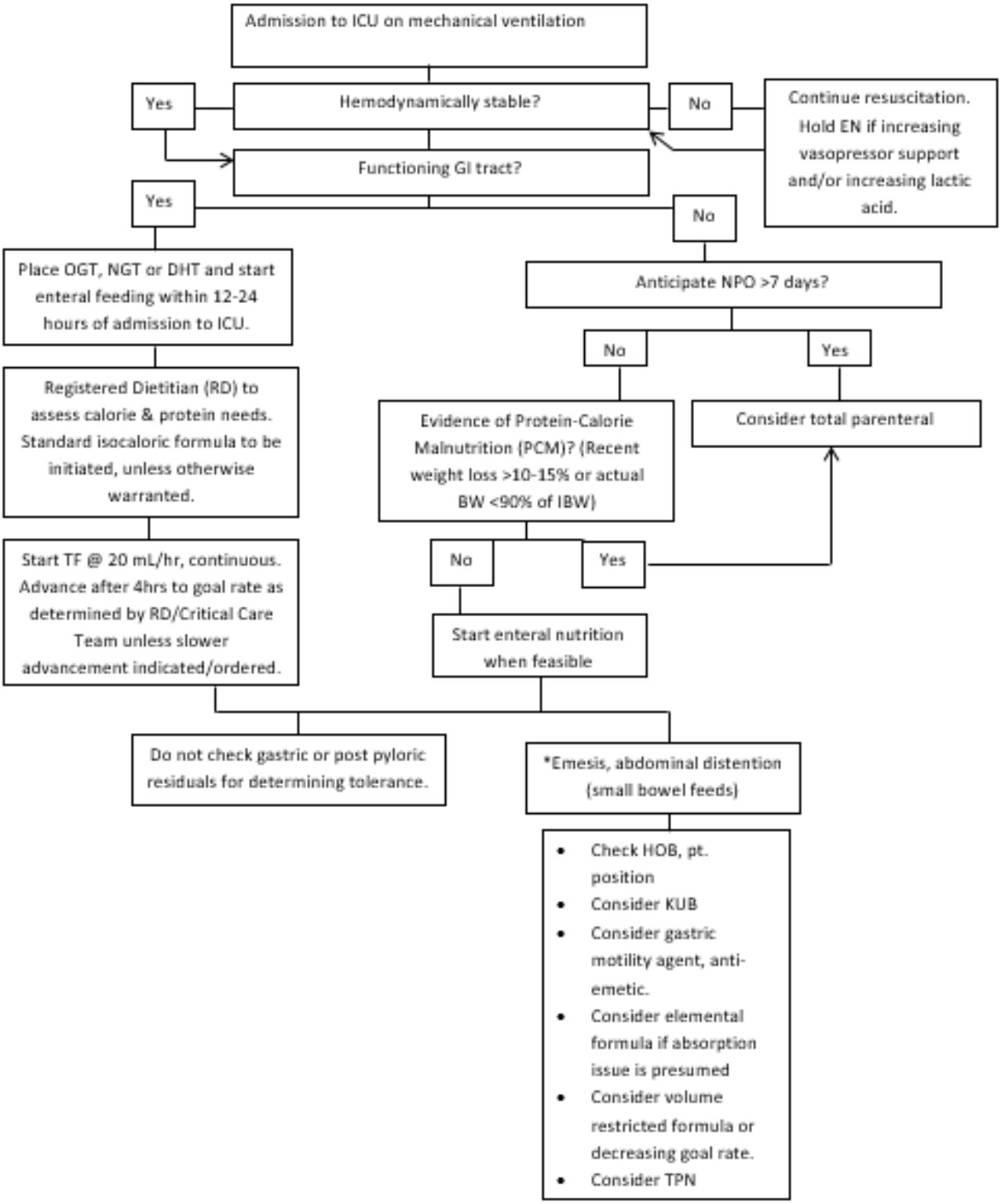

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