

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

STATEMENT OF THE PROBLEM

The metabolic response to stress, surgical or traumatic injury mobilizes amino acids from lean tissues to support wound healing, immunologic response and accelerated protein synthesis. The goal of aggressive early nutrition is to maintain host defenses by supporting this hypermetabolism and preserve lean body mass. The route of nutrient administration affects these responses, and the benefits of early enteral feeding have been clearly shown. Laboratory and clinical studies reveal beneficial affects of early nutrition on the gut mucosa, immunologic integrity, survival of septic peritonitis, pneumonia, and abscess formation.

Therefore the question arises as to the route to deliver nutrition to the surgical or traumatized hypermetabolic patient with multisystem injuries including severe head injuries, burns, and blunt and penetrating mechanisms. There are certainly risks and benefits to enteral and parenteral nutrition in this complicated patient population. The purpose of this review is to determine the benefits and the risks of the route of nutrition in the severely injured patient through peer reviewed publications over the past 25 years and to develop recommendations and guidelines from the conclusions of these studies based on the scientific methodology of these studies.

In the management of the critical care patient it is very difficult to outline any one factor in the over all care of the patient. This is easily demonstrated with nutrition support. When reviewing nutrition support of the critically ill patient the timing, route of administration, formula selection, and monitoring all must be considered. As such, evidence also has demonstrated that management of stress gastritis prophylaxis overlaps the management of nutrition support and must be considered together. With in the past 4 years, EBM has demonstrated the critical importance of intense glucose / insulin management and the improved outcomes. It is clear nutrition support, and glucose management must be managed together. The group has brought 4 protocols together and overlapped them. There are basic principles for very critical care patient on a surgical service, as well as some very important exceptions as well. These will be addressed.

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**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

Contents:

Authors

- | | |
|---|-----------------------|
| 1. Flow Diagram | Diaz, Pousman, Jensen |
| 2. Total Parental Nutrition | Diaz, Mills, Binkley |
| 3. Total Enteral Nutrition | Pousman, Diaz, Mills |
| a. Gastric Residual Volume Protocol | |
| 4. ICU Glucose Management & Intense Insulin Therapy | O'Neill, May, Miller |
| 5. Nutritional Supplements in Critical Care | Diaz, Mills |
| 6. Stress Gastritis Prophylaxis | O' Neill |
| 7. Addendum | |
| a. EAST Recommendations for Trauma | |
| b. ASPEN Recommendations | |
| 8. References | |

Disclaimer:

These protocols have been developed to assist in the decision-making processes for patient management in the intensive care units at Vanderbilt University Hospital. In no way are they intended to substitute for the independent clinical judgment of the treating physicians and staff. They have been prepared with the expectation that departure from the guidelines is appropriate at the discretion of the physician, based on each individual patient's condition and the attendant circumstances

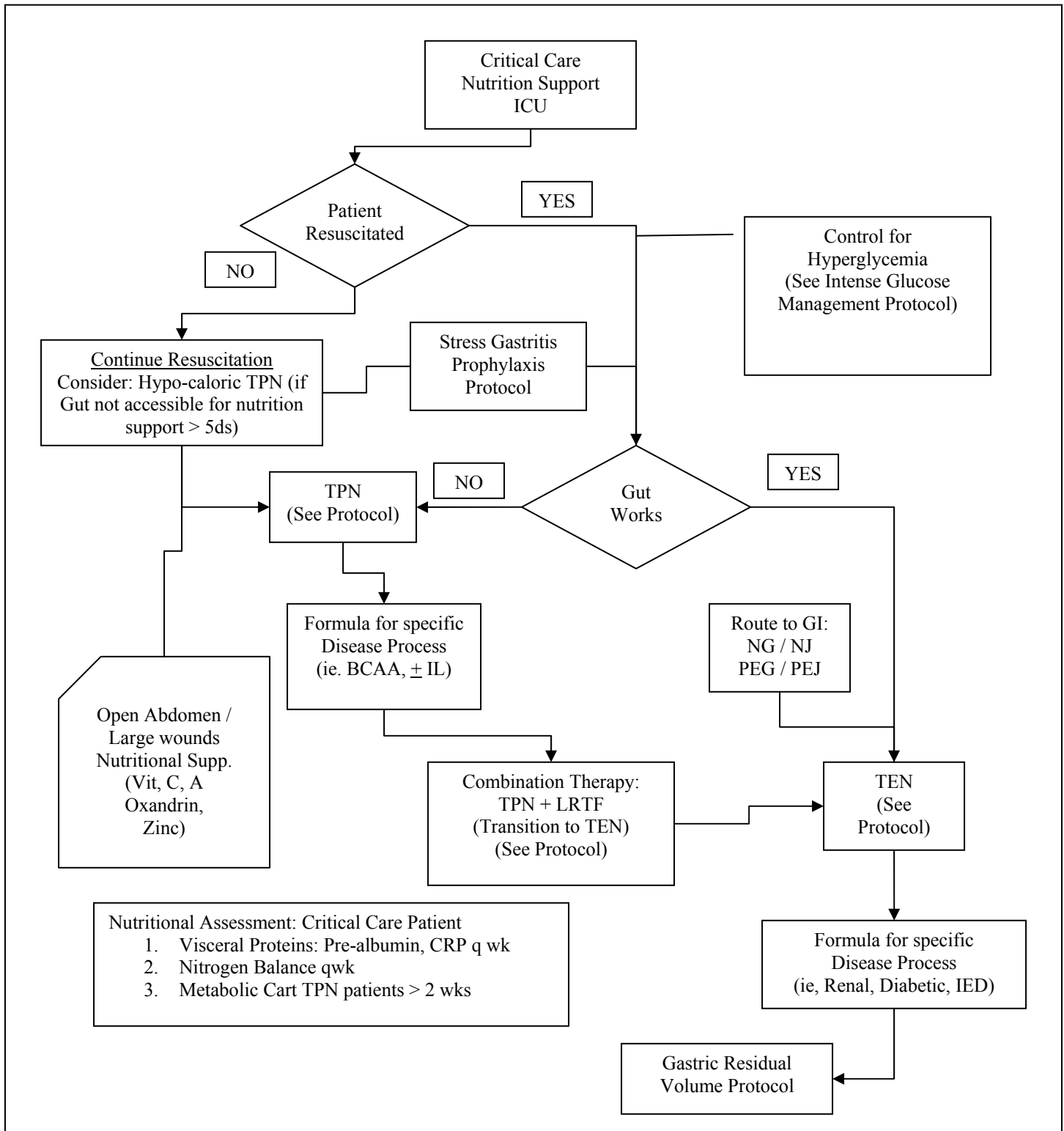
**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

1. Flow Diagram

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004



Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

2. Total Parenteral Nutrition

- a. Definitions: IV Nutrition Support using a formulation of amino acids, carbohydrates, lipids, electrolytes, MVI, minerals, and supplemental medications (Insulin or H2 blockers)
- b. Patient Selection: Inability to use the gut at goal feeds within 5 days
- c. Patient Exclusion: Ability to use the gut at goal feeds or oral intake within 5 days.
- d. IV Access: Central Access (TLC, PICC, Hickman, Port-A-Cath)
- e. Formula Selection: Based on patients requirements, critical illness, organ failure, and co-morbid disease.
- f. Estimating Nutritional needs:
 - i. Ideal Body Weight (IBW) will be used for nutritional estimates for the majority of patients. Patients greater than 120% of IBW/Ht, Registered Dietitian will calculate best weight estimate.
- To calculate IBW/Height: Range Plus or Minus 10%
 - i. Males: $2.3 \times (\text{inches over } 5') + 50\text{kg}$
 - ii. Females: $2.3 \times (\text{inches over } 5') + 45\text{kg}$
- Nutritional Calculations: to formulate TPN prescription
 - i. Energy: 25-30 kcal/kg {aim for 25cals/kg}
 - ii. Protein: 1.0 to 1.8 grams protein/kg {aim for 1.5gram protein/kg}
 - iii. Lipids: 30 to 70 grams /day (5-13ml/hr) 20 to 30% total
- Monitoring/ Management of patient care.
 - i. Labs: Basic Metabolic Panel, C- Reactive Protein, Mg and Phos Day 1, 2 & PRN { LFT's, Pre-albumin, Triglyceride levels check q Thursdays as routine}
 - ii. Metabolic Carts in patients on TPN greater than 2 weeks

TPN Protocol:

- A. The Adult Nutrition Support Service should be consulted to assist with prescribing parental nutrition. (ASPEN guidelines)
- B. All TPN is to be ordered or reordered daily, according to the age appropriate order form. Orders must be received by the appropriate time:
 - 1. Adult Medicine and Surgical units by 5 pm
- B. Monitoring (refer to TPN orders in WIZORDER)
 - 1. Blood glucose: See Intense glucose control Protocol for all ICU patients
 - a. For non-unit patients: Blood Glucose testing, adult every 6 hr x 72 hours. testing Thereafter, renewal is required.

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

2. Labs: Day after nighttime TPN starts: sodium, potassium, carbon dioxide, glucose, blood urea nitrogen, Creatinine, Prealbumin, C-Reactive Protein.

Day 2 of TPN: sodium, potassium, carbon dioxide, glucose, blood urea nitrogen, creatinine, calcium (ionized), phosphorus, magnesium, SGOT, alkaline phosphatase.

Q Tuesday labs: sodium, potassium, carbon dioxide, glucose, blood urea nitrogen, creatinine, calcium (ionized), phosphorus, magnesium, SGOT, alkaline phosphatase, total bilirubin, Pre-albumin and C-Reactive Protein.

3. Other tests and studies as requested by the TPN Team.

- C. Infuse all TPN solutions except those with 10% dextrose ("peripheral TPN") via a central venous catheter (CVC) or centrally placed peripherally inserted central catheter (PICC). Peripheral solutions may be infused via central or peripheral venous catheters.

NOTE: X-ray confirmation of newly inserted CVC or PICC placement is mandatory before beginning infusion.

- D. Always infuse TPN via an infusion pump.

- E. Change units (bag or bottle) of TPN and/or related components every 24 hours:

1. All TPN will arrive on the unit at approximately the same time each evening:

- a. Medical and Surgical units by 8:00 p.m.

2. The new TPN bag and related components are to be started at approximately the same time every evening and in enough time that greater than six (6) hours of hang time precedes morning lab draws:

- a. Medical and Surgical units between 8 and 10 p. m.

3. A separate TPN MAR will arrive with the new TPN bag and will include the exact admixture contents of the solution.

- F. Tubing change schedule:

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

Tubing containing TPN, Amino Acids & Dextrose only: every 72 hours

Tubing containing lipids: every 24 hours

- G. Avoid opening or breaking the line unless absolutely necessary.
- H. Avoid administration of medications via TPN line. In patient populations with limited venous access, compatible drugs may be infused with TPN only under the following conditions:
- a. a multi-line infusion pump or a closed system is used;
 - b. drug is compatible with the TPN and with the lipids (when lipids are used);
 - c. TPN is infused on the continuous mode.

EXCEPTION: In pediatrics, incompatible drugs may be given via the TPN line when:

- a. TPN is discontinued;
 - b. line is flushed before and after the drug;
 - c. patient is monitored for fluctuations in blood glucose when TPN is interrupted for greater than one hour.
- I. In line filtration for TPN is required to minimize risk of bacterial contamination or infusion of particulate matter. A 1.2 micron filter can be used for dextrose-amino acid solutions or 3-N-1 TPNs.
- J. When piggyback administration of lipids or amino acids is necessary (vs. multi-line pump administration), use an in-line Y-set (pediatrics or adults) or other secure needleless connector. Separate infusions of lipids do not need filtration.
- K. Give lipids continuously with peripheral TPN.
- L. With central TPN, lipids may be given on a continuous or intermittent basis.
- M. Maximum lipid infusion rates:
- 20% = 60 ml/hr.
- Pediatrics: Varies with age, weight, and underlying disease process. No greater than 4 gm/kg day.
- N. Infection Prevention:

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

1. Store TPN solutions under refrigeration until 1 hour prior to use.
2. DO NOT add insulin or any other additives to solutions outside the pharmacy.
3. Ascertain aseptic placement of CVC prior to initiating TPN. If line was placed under emergent conditions, it should be changed (over wire method is acceptable) by the physician.

IV. Nursing Implications:

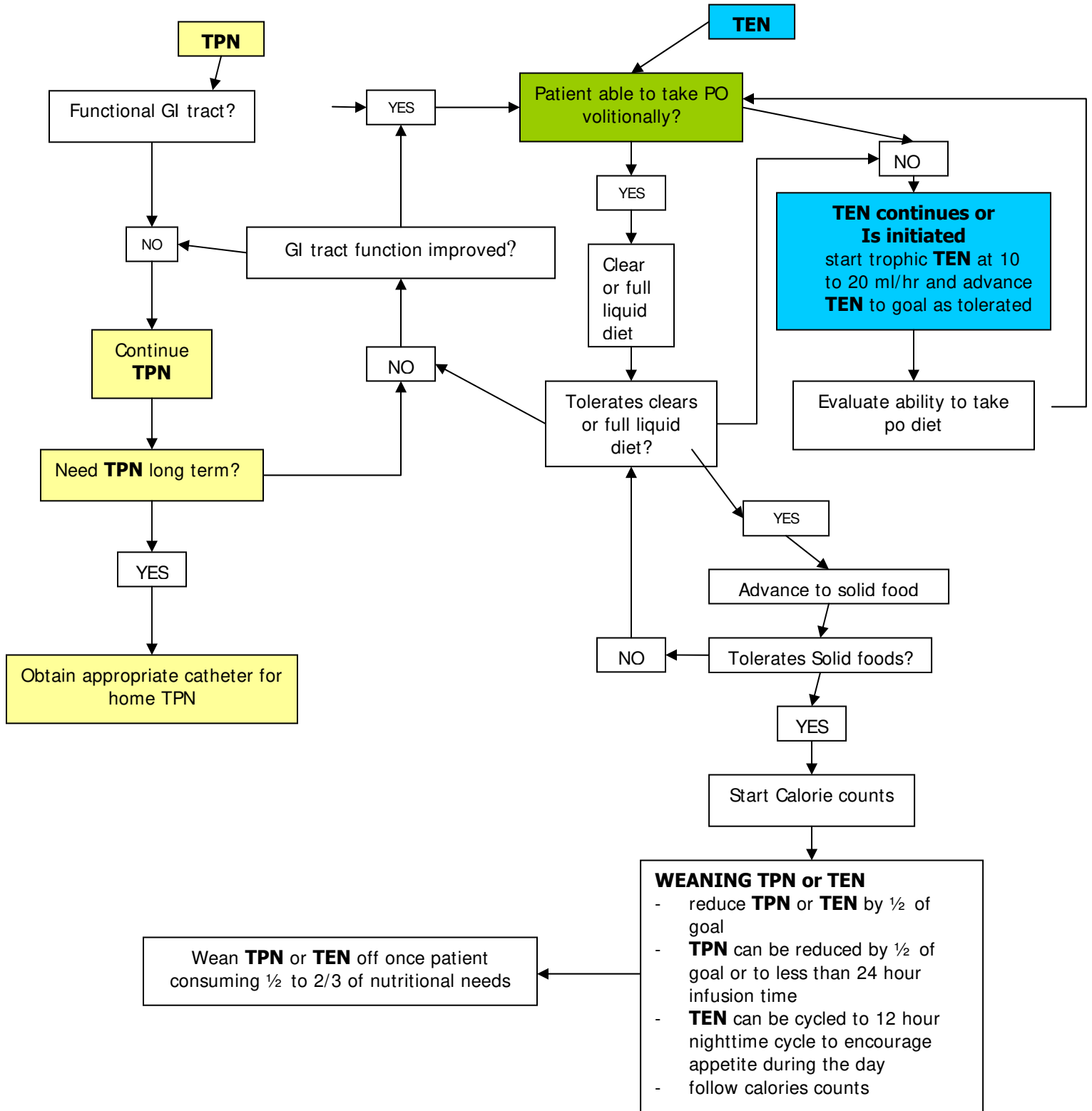
Notify the physician for any of the following:

- A. Critical lab values
 - B. Signs and symptoms of CVC infection or infiltration;
 - C. Signs and symptoms of acute lipid intolerance: fever, chills, vomiting, urticaria, chest/back pain with onset during infusion;
 - D. Signs and symptoms of rapid infusion reaction to lipids: palpitations, tachypnea, wheezing, cyanosis, nausea, pain at injection site, headache, oily taste in mouth;
 - E. Signs and symptoms of fluid volume overload or dehydration.
- WEANING OF TPN:
 - i. IN a patient receiving enteral feeding: Once pt is receiving TF's at 50% of goal rate with good tolerance the TPN may be reduced to ½ of goal and then weaned off as TF rate advances to goal or as per clinician judgment.
 - ii. IN a patient receiving a P.O. diet: Once patient is orally consuming 50% of estimated needs, as documented by calorie count results, the TPN may be reduced to ½ of goal and then weaned off per clinician judgment.

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

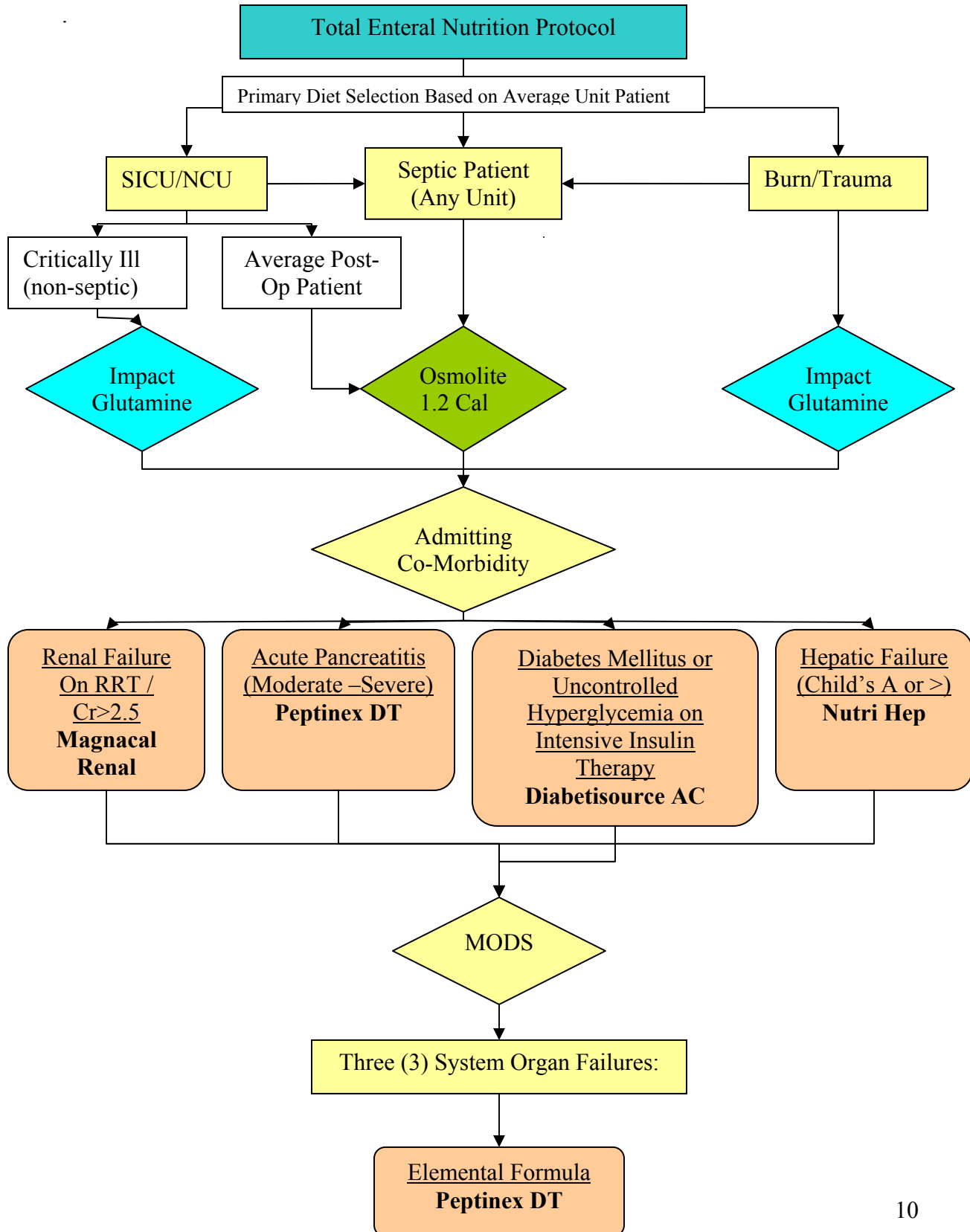
Combination Feeding (TPN + TEN) Protocol



**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

2. Total Enteral Nutrition (See Flow Diagram)



Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

Definitions:

- Regurgitation – Effortless passage of gastric contents into the oropharynx
- Reflux – Simple passage of gastric contents into the esophagus
- Emesis / Vomiting – Passage of gastric contents into the oropharynx that is associated with retrograde peristalsis and abdominal muscle contractions.
- Penetration – Entry of material into the larynx above the true vocal cords.
- Aspiration – Inhalation of material into the airway below level of true vocal cords.
- Microaspiration – Aspiration of small volume that is usually asymptomatic and clinically undetected.
- Macro aspiration – Aspiration of large volume that is usually witnessed or detected by clinical observation.
- Silent aspiration – Aspiration occurring in the absence of acute symptoms.
- Symptomatic aspiration – Aspiration accompanied by acute clinical symptoms of coughing, choking, dyspnea, or respiratory distress.

I. Patient Selection

Any critically – ill patient who is anticipated to remain unable to take po nutrition for ≥ 5 days with significant comorbid disease.

Any patient who has or had PO intake that is inadequate to meet current nutritional needs. (i.e $< 50\%$ of estimated required calories for > 5 days)

****All appropriate patients will have enteral nutrition initiated by 48 hours unless high risk * (see below) then early enteral nutrition defined as within 24 hours of admission, will be initiated. Caloric goal to be reached by 72 hours after initiation.***

High Risk Patients =

- CNS injury/disease with $GCS \leq 8$
- Burns $\geq 30\%$ TBSA
- Major Abdominal Surgery/Trauma (Grade IV Liver, Splenectomy with associated small or large bowel injuries, perforated viscus with peritoneal soilage, pancreatectomy)
- Major Thoracic Trauma or surgery in patient with chronic lung disease
- Renal Failure patients requiring Renal Replacement Therapy
- Malnourished or immunodeficient patients expected to be NPO > 72 hours

II. Patient Exclusion – * Patients at risk of non-occlusive bowel necrosis -

Any patient with ongoing resuscitation (fluids &/or inotropic, vasoactive

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

support to maintain MAP > 60 mmHg) Enteral feeds should be started once end-points of resuscitation are met. Enteral access should still be pursued and obtained early.

Relative Contraindications: Peritonitis

Intestinal Obstruction
Mesenteric Ischemia
Severe Pancreatitis - *Controversial*
Major GI Bleed
Complicated enteroenteric fistula(e)
Severe malabsorptive states
Any patient requiring neuromuscular blockade
Patient requiring increasing dosage of fluids &/or inotropic, vasoactive support to maintain MAP > 60 mmHg
Patient requiring prone positioning for ventilator support. (Consider jejunal feeds)

***Patients with contraindications for TEN will have TPN initiated and transition to TEN as soon as clinically possible.**

III. Access – (Gastric access (i.e. NGT/OGT) should be the initial or preferred access). Gastric access will be adequate for most patients and will be confirmed by radiography NOT auscultation alone.

****Consider long term access (i.e. PEG with or without PEJ) for patients who will require TF > 4 weeks.***

Post-pyloric placement will be determined to be necessary by one of the following:

- Gastric outlet obstruction
- Gastroparesis with persistent high gastric residuals despite prokinetic agents or recurrent emesis.
- Severe Active Pancreatitis (usually requires endoscopic placement for jejunal feeds)
- Attending physician preference

* Patients requiring post-pyloric access will have DHT placed. If unsuccessful after 2 attempts as confirmed by radiography, endoscopic placement will be obtained. (Naso-jejunal or PEJ) OR reconsider gastric feeds.

IV. Formula Selection - All delivered full strength

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

- Polymeric : standard formula
- Diabetic: DM patients with poor glucose control &/or pts with stress – induced, steroid – induced hyperglycemia requiring insulin infusion.
- Renal : for CRF/ARF patients
- Elemental :
 1. Proven intolerance to polymeric formula
 2. Patients with pancreatitis or pancreatic surgery/injury
 3. Inadequate absorptive function
- Hepatic Formula – for hepatic encephalopathy
- Immune - Enhancing :
***Avoid Immune Enhancing formulas in actively septic patients.**
reserved for critically – ill surgical/burn patients in SIRS / CARS who are believed to be at risk of severe sepsis and sepsis – related morbidity (i.e. MOF). These diets should NOT be used in the actively septic patient as data suggests that there is increased morbidity and mortality associated with their use in this subset. Duration of formula is for up to 10 days or > if pt remains at significant risk of infectious complications.

V. Caloric Goals – All patients will be weighed on admission to ICU and then q twice / week recorded in kg.

Ideal body weights (IBW) will be utilized to calculate caloric goals;

IBW Males = 106 lb for 5'0" + 6 lbs/inch > 5'

IBW Females = 100 lb for 5'0" + 5 lbs/inch > 5'

Body Mass Index (BMI) = weight (kg)/height (m²)

BMI < 18.5 kg/m² = Underweight

BMI = 25 – 29.9 kg/m² = Overweight

BMI ≥ 30 kg/m² = Obese

BMI ≥ 40 kg/m² = Morbid Obesity

Initial caloric goals = 25 - 35 kcal/kg of IBW

***An exception may be patients with SCI who may require a reduction in initial caloric requirement which is inversely related to level of injury (i.e the higher the lesion, the lower the energy expenditure)**

Protein Requirement = 1.5 – 1.8 g/kg/d utilizing IBW for all patients.

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

- Severe Hepatic Encephalopathy: protein restrict to 0.6 g/kg /d x 3 days and increase to ≤ 1.2 g /kg/d; reduce if mental status deteriorates.
- Renal failure: If patient on RRT, full protein supplementation at 1.5 – 1.8g/kg/d should be instituted. If not on RRT, consider reducing initial protein intake to 1 – 1.3 g/kg/d and follow BUN daily. If patient oliguric, start at ≤ 0.6 g/kg/d and follow daily BUN.

Free water replacement = ~ 1 cc / kcal

Additional fluids may be necessary for large insensible losses (fever, diarrhea, GI output, and tachypnea)

Fluid restriction may be necessary in CHF, renal failure, hepatic failure with ascites, CNS injury, and electrolyte abnormality.

VI. Rate of administration - ** Bolus feeds are discouraged in a critical care setting and are absolutely contraindicated with jejunal feeding.*

****Head of bed to be elevated ≥ 30 degrees at all times****

Initiate feeds at rate of 25 cc/hr and advance by 25 cc/h q 4 hr to goal.
GASTRIC (i.e. via OGT/NGT/PEG) residuals will be checked q 4 hr for patients receiving GASTRIC FEEDS.

VII. Intolerance and Stopping Feeds – (See Flow Diagram)

***Immediate cessation of feeding should occur in the event that witnessed regurgitation &/or aspiration has been verified**

*** *The use of food dyes to assist in identifying regurgitation or aspiration is absolutely contraindicated.****

Gastric Residual Volumes (GRV): There is no correlation between GRV and risk of aspiration. Instead patients at high risk of aspiration should be identified and appropriate surveillance for complications associated with TEF followed. Monitor physical assessment and trends in GRV.

A review of medications that may cause gastric dysmotility is essential

**** DO NOT CHECK SMALL BOWEL RESIDUALS****

The technique to check GRV is via continuous low wall suction via an OG/NGT for a minimum of 15 minutes and record output.

- Check after 6 hrs. of initiating feeds.

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

- If GRV is ≤ 300 ml; replace residual and increase rate by 25 cc/h or to goal. Once at goal, check GRV q 12 hrs.
- If GRV ≥ 300 ml; assess proper (gastric) placement of tube with KUB, replace residual amount.
If tube is gastric, continue with feeds at current rate and re-check residual in 2 hrs.
- If GRV ≥ 300 cc; hold feeds for 2 hrs and recheck GRV after 2 hrs. If GRV remains > 300 cc replace residual and perform physical exam to identify other signs of possible intolerance (i.e. gastric tympany, distension, diminished or absent bowel sounds), continue to hold feeds and recheck GRV after 2 hrs.
Consider adding prokinetic agent;
1. erythromycin 200 mg IV or per tube q 6 hr x 2 days; if patient with documented or possible history of diabetic gastroparesis allow patient to remain on erythromycin .
2. metoclopramide 10 mg IV q 6 hr x 2 days.

**Consider switching stress gastritis prophylaxis if receiving H2RA to PPI as this may further decrease gastric secretions, if this does not work then add either erythromycin or metoclopramide for 3 days.*

- If residual remains ≥ 300 ml and patient with no physical signs of intolerance; replace residual and restart feeds at 25 cc/hr less than previous rate (min 10 cc/hr). Recheck residual in 2 hours.
- If residuals persistently ≥ 300 ml and/or physical signs of intolerance present, and or emesis; consider small bowel access and feedings or TPN.
- If GRV < 300 cc; replace residual and restart feeds at 25 cc/hr less than previous rate (min 10 cc/hr). Recheck GRV in 6 hrs. If GRV is < 300 cc, increase rate by 25 cc/hr or to target.

*** For patients receiving post-pyloric feeds, reflux into the stomach is still possible therefore it is advised to check a gastric residual via an OG/NGT or gastric port of PEG/PEJ tube q 6 hrs x 24hs then discontinue if GRV contains enteral feeding material and is consistently < 300 ml. If > 400 ml and contains enteral feeding material, continue to check GRV or use continuous gastric suctioning if gastric access is present (i.e OG/NGT).**

- In patients receiving small bowel feeding with persistent high gastric residuals; Maintain feeds, rule out small bowel migration of gastric access by: confirmation with KUB, check pH, & check glucose of aspirate.
- If gastric migration has been ruled out and GRV remains > 300 cc, continue with feeds and increase per guidelines. Observe clinically for

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

abdominal distension, emesis, cramping etc. If any signs of intolerance, hold feeds and check KUB.

Emesis – * *A review of medications that may cause nausea/vomiting is essential.*

- Reduce rate by half x 2 hrs and observe clinically..
- If emesis continues, hold feeds x 6 hrs, place NGT/OGT if not already in place and apply low – continuous wall suction, examine abdomen and check KUB. Consider anti-emetic therapy.
- If emesis resolves, restart feeds at rate 25 cc/hr < previous rate (min of 10 cc/hr)

Abdominal cramping/distension –

**A review of medications that may cause cramping is essential*

- Examine patient and continue feeds if mild; re-evaluate in 6 hrs.
- Moderate cramping/distension – stop feeds and obtain KUB.
- Severe or persistent cramping/distension – stop feeds, obtain KUB, consider checking bladder pressure, CBC, electrolytes with magnesium & phosphate, ABG with lactate.
- Consider changing formula to low fiber if present.

Diarrhea – * *Medications are primary etiology especially elixirs with sorbitol.*

Also consider CDiff in patients with antibiotic exposure, evaluate medications with sorbitol, stool softeners, cathartics, and consider adding lactobacillus replacement (lactinex). Also r/o fecal impaction with digital rectal exam.

- Mild = 1 -2 loose stools or ≤ 200 cc q 12 hr shift – continue with feeding
- Moderate - 4 stools or ≤ 300 cc q 12 hr shift – maintain feeds, consider lomotil, paregoric, immodium if infectious etiology is excluded and re-evaluate in 6 hrs. Replace insensible loss.
- Severe - > 4 stools or ≥ 300 cc q shift- decrease feeds by half, replace insensible loss with IV hydration, if receiving anti-diarrheal; hold if CDiff positive otherwise increase to q loose stool max 4 doses. If persists, consider switch to elemental formula or fiber-containing formula

The Open Abdomen Patient.

1. Patients being managed with an open abdomen can be considered for enteral nutrition support as long as the GI tract is in continuity, and the patient has been resuscitated.
2. Post – pyloric enteral access is highly recommended due to prolong gastroparesis after visceral manipulation during surgery.
3. Typically, only low rate tube feeds (10-20 cc/hr) will be tolerated during the early course.

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

4. If the patient is not anticipated to meet enteral nutritional goals in 5 days combination therapy (TPN plus low rate tube feeds) is strongly recommended.

Pre-Operative Protocol for Enteral Nutrition

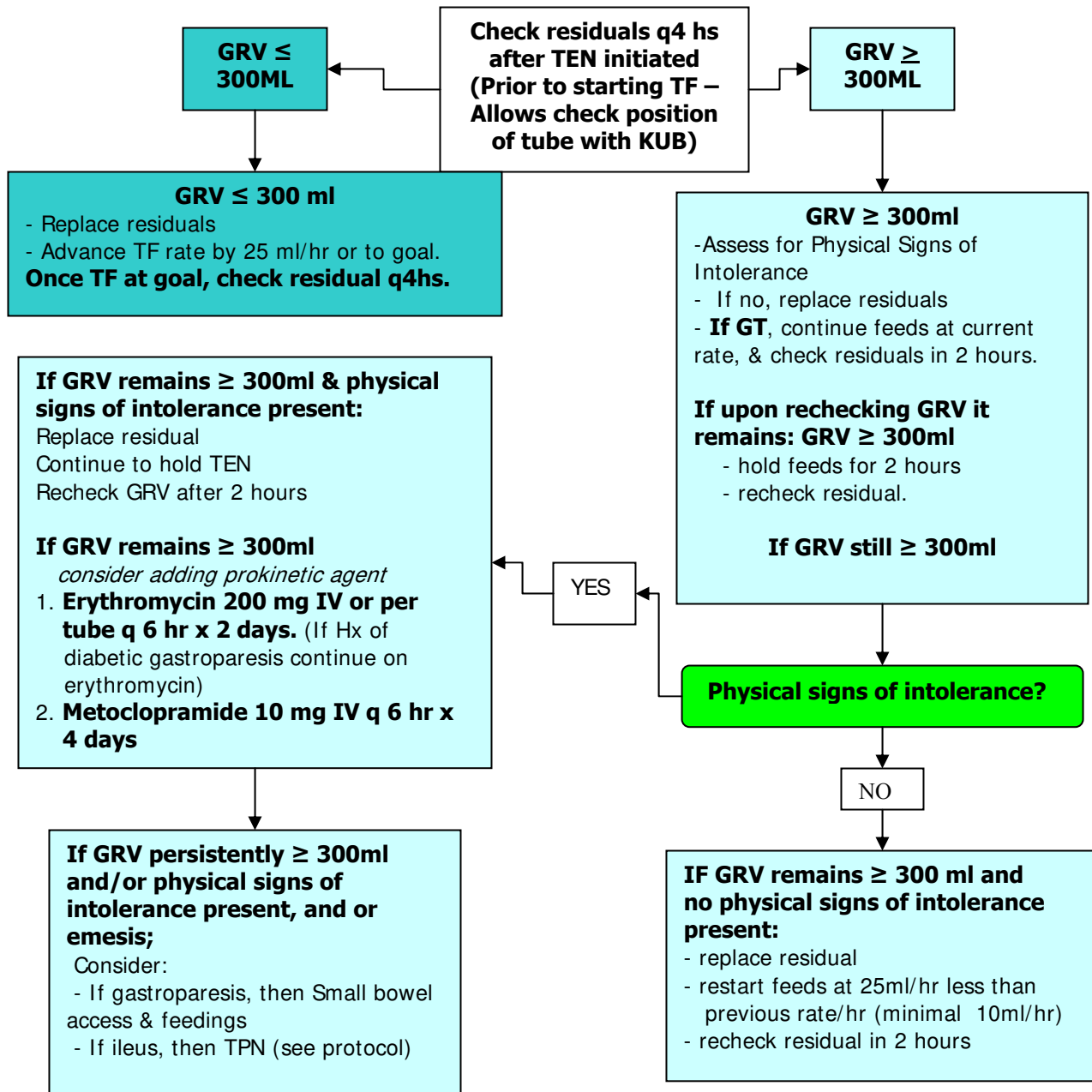
Patients undergoing bedside or operative procedures –

- For Non-Abdominal Surgery: Gastric Feeds / Post-Pyloric Feeds – Feeds will be turned off just prior to departure to Operating Room or bedside procedure. Gastric tube will be flushed and aspirated.
- For Abdominal Surgery: Patient should be npo 6 hours to planned anesthesia. Gastric tube will be flushed and aspirated prior to departure to the Operating Room.
- For Upper GI Endoscopy - Gastric Feeds / Post-Pyloric Feeds – Feeds will be turned off 4 hours prior to “elective endoscopy”.

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

Gastric Residual Volume (GRV) Protocol



Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

VIII. Monitoring Nutrition – All patients requiring TEN/ TPN will have an initial serum prealbumin and C-reactive protein (CRP) drawn and then weekly q Monday.

Indirect calorimetry &/or nitrogen balance studies may be considered for patients requiring protracted nutritional support of who are otherwise difficult to assess.

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

4. ICU Glucose Management & Intense Insulin Therapy

Tight Glycemic Control Order Set (moribund patients excluded from glycemic control protocol)

Background: The tight glucose control in intensive care study (Van den Berghe *et al.* N Eng J Med 2001, 345: 1359) demonstrated that strict maintenance of normoglycemia (80-110 mg/dl) during critical illness ***independently improved morbidity and mortality***.

During critical illness, glycemic control with supplemental insulin requires continuous evaluation and adjustment. This simple maneuver appears to be as important as optimizing traditional vital signs in improving patient outcome.

Initial Blood Glucose Measurement: (per accucheck by standard finger stick; RN may take drop of blood from admission lab draw to run on accucheck machine; do not draw and waste blood for accucheck only) on admission and Q 6h (default)

1. Blood glucose ≤ 60 mg/dl?
 - a. administer $\frac{1}{2}$ ampule iv Dextrose (50%)
 - b. contact Trauma Resident
 - c. re-check accucheck Q 15 min after iv dextrose therapy and reassess
 - d. review home medications and premorbid conditions that predispose hypoglycemia; correct cause if possible
2. Blood glucose **61 – 79 mg/dl**?
 - a. Re-check accucheck Q 1h x 2 to confirm stable blood glucose
 - b. If stable, blood glucose monitoring (per accucheck) Q 6h x 24 hrs
 - c. RN may d/c accuchecks if normoglycemia (61 – 110 mg/dl) is maintained x 24 hrs
3. Blood glucose **80 – 110 mg/dl**?
 - a. Blood glucose monitoring (per accucheck) Q 6h x 24 hrs
 - b. RN may d/c accuchecks if normoglycemia (61 – 140 mg/dl) is maintained x 24 hrs
4. Blood glucose **> 111 mg/dl**?
 - a. Yes – choose patient **Category** below and continue

Category 1

Non-critically injured patients

Non-mechanically ventilated patients

No pre-morbid history of diabetes mellitus

1. Blood glucose **111 – 250 mg/dl**, begin **Subcutaneous Insulin Therapy**
2. Blood glucose **> 250 mg/dl**, begin **Continuous Insulin Infusion Therapy**
3. Begin home antihyperglycemic therapy as soon as possible (if applicable); contact MD for orders

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

Category 2

Mechanically ventilated

Critically injured patient requiring intensive resuscitative measures

Intravenous steroid therapy

- Known or suspected adrenal insufficiency
- Spinal cord injury
- History of chronic steroid use

Known or suspected active infection

Premorbid history of diabetes mellitus

1. Blood glucose > **111 mg/dl**, begin **Continuous Insulin Infusion Therapy**
2. Blood glucose < 110 mg/dl; see **Initial Blood Glucose Measurement** section

Subcutaneous Insulin Therapy (based on Q 6h accucheck measurements)

1. Subcutaneous Insulin dose (units of regular insulin) calculated as:
$$\frac{\{[\text{blood glucose (mg/dl)}] - 100\}}{10}$$
2. Is blood glucose level (6h after dose of insulin) higher than initial level?
 - a. No
 - i. Blood glucose level **≤ 60 mg/dl?**
 1. contact Trauma Resident
 2. administer ½ ampule iv Dextrose (50%)
 3. hold next insulin dose and reassess
 4. change Subcutaneous Insulin dose (divide by a higher number; check with MD for order)
 - ii. Blood glucose level **61 – 110 mg/dl?**
 1. continue Q 6h monitoring
 2. administer insulin per Subcutaneous Insulin dose
 - iii. Blood glucose level **111 – 250 mg/dl?**
 1. contact Trauma Resident
 2. adjust Subcutaneous Insulin dose {divide by a smaller number (8, 6, etc.)}
 3. continue Q 6h monitoring and reassess
 - iv. Blood glucose level **> 251 mg/dl?**
 1. contact Trauma Resident
 2. reassess patient
 3. begin **Continuous Insulin Infusion Therapy**
 - b. Yes
 - i. Blood glucose level **< 250 mg/dl?**
 1. divide Subcutaneous Insulin dose by 8 (or adjust denominator depending on the severity of hyperglycemia)

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

2. reassess Q 4-6h and adjust insulin dose, dosing interval, or change to iv route accordingly
- ii. Blood glucose level > **251 mg/dl**?
 1. contact Trauma Resident
 2. begin **Continuous Insulin Infusion Therapy**

Continuous Insulin Infusion Therapy (based on Q 1h accucheck measurements)

1. Regular insulin in 0.9% sodium chloride (1 U/ml) given through large-bore peripheral or central venous access.

<u>Blood glucose level (mg/dl)</u>	<u>Initial Insulin infusion (U/hr)</u>
> 351	14 (plus 0.1 U/kg iv bolus)
280 – 350	10
240 – 279	8
200 – 239	6
170 – 199	4
140 – 169	3
111 – 139	2

2. Adjust insulin infusion based on Q 1h accuchecks to maintain blood glucose 80 – 110 mg/dl
3. Change interval accucheck measurements to Q 2h when blood glucose adequately controlled (i.e., 80 – 110 mg/dl) for 8 hrs
4. If blood glucose < **80 mg/dl**
 - a. notify Trauma Resident immediately; MD to assess patient for continued intravenous insulin protocol (with scale adjustment) versus instituting **Subcutaneous Insulin Therapy**
 - b. if appropriate, initiate **Subcutaneous Insulin Therapy** and reassess for glycemic control with Q 4-6h accucheck measurements

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

5. Nutritional Supplements in Critical Care

1. Indications for Anabolic Steroids (Oxandrolone)

- Full thickness Burns > 15% TBSA
- Clinical or Expected Loss of lean body mass plus est. 20% TBSA Burn of wound(s)
- Dose 10 mg bid po for min of 30 days
- Contraindicated in liver disease

2. Open Abdomen Protocol - Nutrient Supplements

- Also indicated in large Burns or wound(s) > 20% TBSA
- Vit C 500 mg/day for 10 days and then d/c {do not give in renal failure}
- Zinc Sulfate 220 mg/day for 10 days and then d/c {do not give in renal failure}
- Vit A 10,000 IU/day for 10 days and then d/c {do not give in liver failure}
- In protracted critical illness, Vit levels should be checked prior to starting a repeat course of Nutrient Supplements

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

5. Stress Gastritis Prophylaxis

Background: Critically ill patients are at risk of GI hemorrhage from primarily gastric or duodenal ulcers. Increased gastric acidity and a decrease in gastric mucosal barrier are believed to be the cause. The longer the gastric pH remains below 4 the greater the risk of hemorrhage. Patients most at risk include:

- critical illness (sepsis, burn, trauma including neuro-trauma) requiring > 48 hours of mechanical ventilation
- coagulopathy
- prior history of GI hemorrhage
- organ dysfunction (renal, hepatic, cardiac)
- hypotension/shock.

As many as 20% of patients may develop clinical GI hemorrhage and if surgery is required mortality can approach 70%.

Purpose: Standardize the prevention and care of GI hemorrhage

Indications: Patients @ **HIGH RISK:** (Require Prophylaxis)

- Mechanical Ventilation > 48 hours
- Coagulopathy
- History of previous GI Hemorrhage
- CNS Injury (SAH / CVA – Hemorrhagic or Ischemic)
- SCI – Requiring Steroid Protocol
- Sepsis with or without Organ Dysfunction
- Vasopressor / Inotropic Rx

Other patients @ Moderate Risk:

- Chronic NSAID or Aspirin use
- High dose prolonged steroid Rx
- ICU stay > 10 days

Protocol: * The administration of gastric nutrition reduces, does not eliminate the risk of GI hemorrhage. Any patient predicted to be mechanically ventilated > 48 hours and *without* a contraindication to gastric enteral nutrition, is encouraged to have nasogastric nutrition initiated within 72 hours of admission when a nasoenteric tube is insitu.

High Risk Patient Identified:

- Patient with **gastric** access (OGT/NGT) start Sucralfate 1 gm Q 6H.
- If NO gastric access; start Famotidine 20 mg IV Q 12 H (Adjust dose and interval for Ccr < 50 mg/dl) **UNLESS** patient on PPI for documented

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

GERD as outpatient. If so, start lansoprazole (Prevacid) or esomeprazole (Nexium).

- Patient on TPN; add Famotidine to TPN for 24 H (40 mg).

Patient Who Develops *Significant GI Hemorrhage Receiving Prophylaxis:

- Check Gastric pH Q 8 hrs.
- If pH < 4 for greater than 16 H then; start continuous famotidine infusion (40 mg famotidine in 250 cc NSS run at 1.7 mg / hr) after 20 mg IV bolus.
- If pH remains < 4 begin IV pantoprazole (Protonix); 40 mg IV Q 12 H
- Check Gastric pH Q 8 hrs.
- pH < 6 for > 16 H then;
- Pantoprazole 80 mg IV load then 8 mg / hr

Moderate Risk Patient:

- Consider prophylaxis

Low Risk Patient or tolerating PO diet/full gastric enteral feeds:

- NO prophylaxis or discontinue prophylaxis

**Defined as bleeding that requires transfusion &/or decrease in Hgb of ≥ 1 gram.*

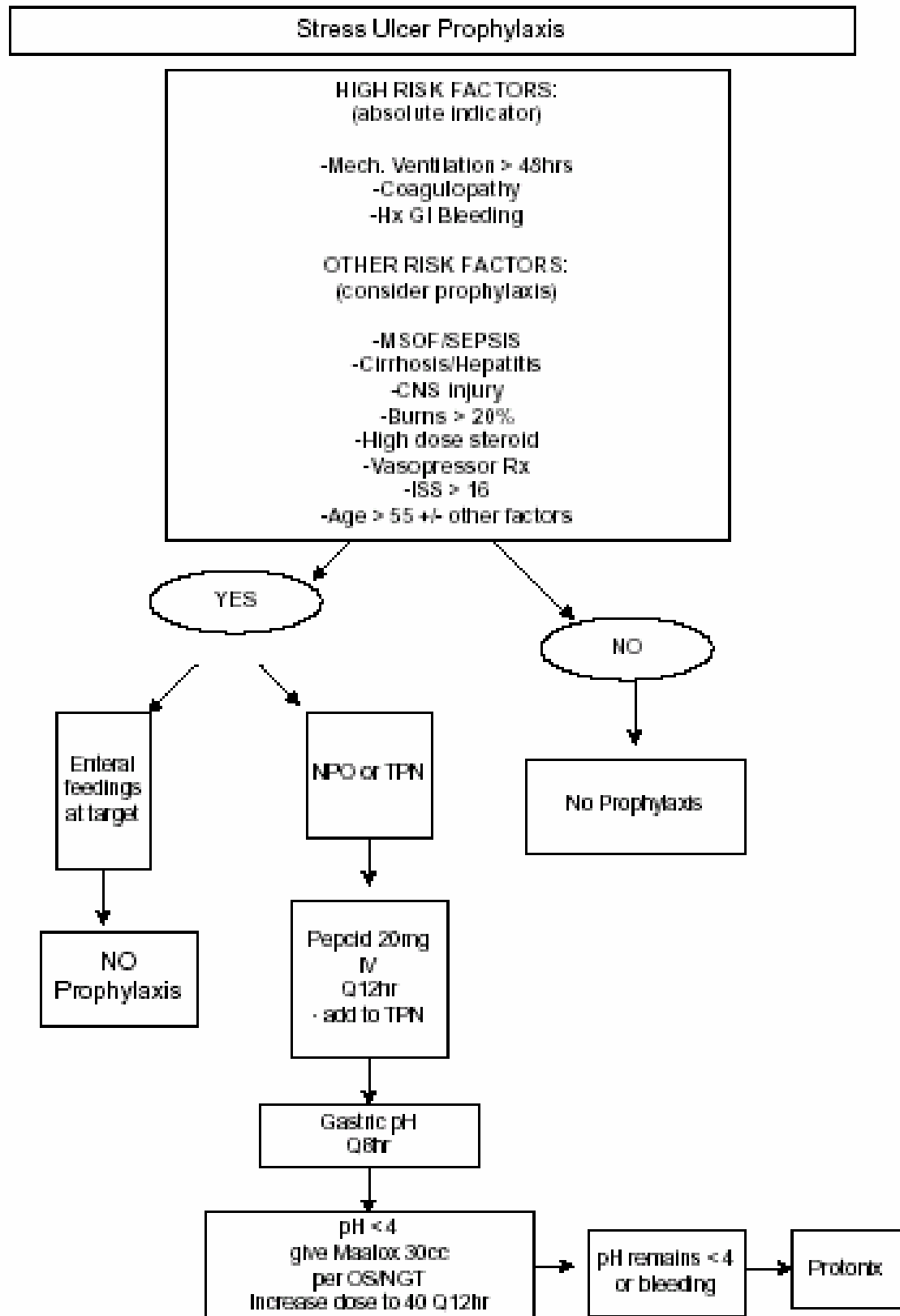
**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU
Revised: 11//2004**

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Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004



**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

Addendum:

EAST Nutrition PMG: RECOMMENDATIONS (2003)

Level I

Patients with *blunt and penetrating abdominal injuries* should, when feasible, be fed enterally because of the lower incidence of septic complications compared with parenterally fed patients.

B. Level II

Patients with *severe head injuries* should preferentially receive early enteral feeding, since outcomes are similar compared with parenterally-fed patients. If early enteral feeding is not feasible or not tolerated, parenteral feedings should be instituted.

C. Level III

1. In severely injured patients, TPN should be started by day 7 if enteral feeding is not successful.
2. Patients who fail to tolerate at least 50% of their goal rate of enteral feedings by post-injury day 7 should have TPN instituted but should be weaned when > 50% of enteral feedings are tolerated.

Early versus Delayed Enteral Feedings (EAST Recommendation 2003):

Level I

In severely injured blunt/penetrating trauma patients, there appears to be no outcome advantage to initiating enteral feedings within 24 hours of admission as compared to 72 hours after admission.

B. Level II

1. In burn patients, intragastric feedings should be started as soon after admission as possible, since delayed enteral feeding (>18 hours) results in a high rate of gastroparesis and need for intravenous nutrition.
2. Patients with severe head injury who do not tolerate gastric feedings within 48 hours of injury should be switched to postpyloric feedings, ideally beyond the ligament of Treitz, if feasible and safe for the patient.

C. Level III

1. Patients who are incompletely resuscitated should not have direct small bowel feedings instituted due to the risk of gastrointestinal intolerance and possible intestinal necrosis.
2. In patients undergoing laparotomy for blunt and penetrating abdominal injuries, direct small bowel access should be obtained (via nasojejunal feeding tube, gastrojejunal feeding tube, or feeding jejunostomy) and enteral feedings begun as soon as is feasible following resuscitation from shock

Site of Enteral Support: Gastric versus Jejunal (EAST Recommendations 2003)

A. Level I

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

No recommendations.

B. Level II

In critically injured patients, early gastric feeding is feasible, and clinical outcome is equivalent to patients fed into the duodenum. For this reason and because access to the stomach can be obtained more quickly and easily than the duodenum, an initial attempt at gastric feedings appears warranted.

C. Level III

Patients at high risk for pulmonary aspiration due to gastric retention or gastroesophageal reflux should receive enteral feedings into the jejunum.

Assessment of Energy and Substrate Requirements for the Trauma Patient

A. Level I

There appears to be no advantage to the routine use of calorimetry to determine the caloric requirements of burn patients.

B. Level II

1. For moderately to severely injured patients (ISS 25-30), energy requirements are estimated to be 25-30 total kcal/kg/day or 120% to 140% of predicted BEE (per Harris-Benedict equation).
2. There appears to be no consistent relationship between ISS and measured resting energy expenditure (MREE) in trauma patients.
3. For patients with severe head injury (GCS score <8), energy requirements may be met by replacing 140% of MREE (~30 total kcal/kg/day) in non-pharmacologically paralyzed patients and 100% of MREE (~25 kcal/kg/day) in paralyzed patients.
4. Within the first 2 weeks after spinal cord injury, nutritional support should be delivered at 20-22 total kcal/kg/day (55% to 90% of predicted BEE by Harris-Benedict equation) for quadriplegics and 22-24 total kcal/kg/day (80% to 90% of predicted BEE by Harris-Benedict equation) for paraplegics.
5. For patients with burns exceeding 20% to 30% TBSA, initial caloric requirements may be estimated by several available formulas.
6. The Curreri formula (25 kcal/kg + 40kcal/TBSA burn) overestimates caloric needs of the burn patient (as estimated by calorimetry) by 25% to 50%.
7. The Harris-Benedict formula underestimates the caloric needs of the burn patient (as estimated by calorimetry) by 25% to 50%.
8. In patients with burns exceeding 50% TBSA, TPN supplementation of enteral feedings to achieve Curreri-predicted caloric requirements is associated with higher mortality and aberrations in T-cell function.
9. Caloric requirements for major burns fluctuate during the hospital course but appear to follow a biphasic course with energy expenditure declining as the burn wound closes. Therefore, direct measurement of energy expenditure via calorimetry once or twice weekly may be of benefit in adjusting caloric support throughout the hospital course.

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

10. Intraoperative enteral feeding of the burn patient is safe and efficacious, leads to fewer interruptions in the enteral feeding regimen, and, therefore, more successful attainment of calorie and protein goals.
11. Approximately 1.25 grams of protein per kg body weight per day is appropriate for most injured patients.
12. Up to 2 grams of protein per kg body weight per day is appropriate for severely burned patients.
13. In the burn patient, energy as carbohydrate may be provided at a rate of up to 5 mg/kg/min (~25 kcal/kg/day); exceeding this limit may predispose patients to the metabolic complications associated with overfeeding. In the non-burn trauma patient, even this rate of carbohydrate delivery may be excessive.
14. Intravenous lipid or fat intake should be carefully monitored and maintained at <30 percent of total calories. Zero fat or minimal fat administration to burned or traumatically injured patients during the acute phase of injury may minimize the susceptibility to infection and decrease length of stay.
15. Proteins, fat, and carbohydrate requirements do not appear to vary significantly according to the route of administration, either enterally or parenterally.
16. Fat or carbohydrate requirements do not appear to vary significantly according to the type of injury, i.e., burned versus traumatically injured.

C. Level III

1. Provision of excess calories to trauma patients may induce hyperglycemia, excess CO₂ production, fluid/electrolyte abnormalities, lipogenesis, and hepatic steatosis.
2. Energy requirements for patients with less than 20% to 30% TBSA burns are similar to those of patients without cutaneous burns.
3. Protein requirements in burn patients and in those with severe CNS injuries may be significantly greater than anticipated, up to 2.2 grams/kg body weight per day. However, the ability to achieve positive nitrogen balance in a given patient varies according to the phase of injury. Provision of large protein loads to elderly patients or to those with compromised hepatic, renal, or pulmonary function may lead to deleterious outcomes.

Standard versus Enhanced Nutritional Support

A. Level I

No recommendations

B. Level II

No recommendations

C. Level III

1. The use of enteral formulations enhanced with “adequate” doses of arginine and glutamine appears to reduce length of stay and septic morbidity in severely injured trauma patients (ISS >20, ATI >25). The precise doses of and lengths of treatment with arginine and glutamine required to obtain this effect have not yet been determined.

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

Whether an additional benefit is gained from further supplementation with omega-3 fatty acids, nucleotides, and trace elements is unclear.

2. No recommendations can be made at this time regarding the role of enhanced enteral formulations in patients with severe burns.

Monitoring Nutritional Support in the Trauma Patient (East Recommendations 2003)

RECOMMENDATIONS

A. Level I

1. No recommendations

B. Level II

1. In head-injured patients, serum pre-albumin levels appear to correlate well with nitrogen balance. Albumin and transferrin levels correlate poorly with nitrogen balance. Retinol binding protein also correlates well with nitrogen balance but lags behind pre-albumin.

2. In multi-trauma patients, serum pre-albumin levels appear to correlate well with nitrogen balance. Albumin levels correlate poorly with nitrogen balance.

3. In burn patients, there are insufficient data to make any recommendations regarding the correlation between serum levels of pre-albumin, retinol binding protein, or transferrin and nitrogen balance. However, serum levels of these proteins must be interpreted with caution as they are affected not only by nutritional state but also by other factors (age, burn wound size, post-burn day and nitrogen intake). Albumin levels correlate poorly with nitrogen balance.

4. Nitrogen balance calculation in burn patients may not be accurate due to inability to account for nitrogen losses via the burn wound.

5. When calculating nitrogen balance in burn patients, use of urinary urea nitrogen instead of total urinary nitrogen may result in overestimation of nitrogen balance.

C. Level III

1. Nitrogen balance is the gold standard for monitoring the appropriateness of a trauma patient's nutritional prescription.

2. Serial determinations of serum levels of acute phase reactants (C-reactive protein, fibrinogen, alpha-1-glycoprotein, etc.), along with constituent proteins (pre-albumin, retinol binding protein, transferrin) may improve the latter's value as a nutritional monitoring tool.

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU
Revised: 11//2004

Addendum: ASPEN

Direct Excerpts from the ASPEN BOARD OF DIRECTORS JPEN Vol. 26, No. 1, Supplement, pp. 61SA-96SA.

Section XI: Specific Guidelines for Disease ----Practice Guidelines Adults

CARDIAC DISEASE: p. 62 SA

1. Patients with cardiac cachexia or who develop complications after CPB [cardiopulmonary bypass] are at nutrition risk, and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. The use of PN [parenteral nutrition] should be reserved for those cardiac patients having post operative complications that preclude use of the gastrointestinal tract. (C)
3. In the cardiac surgery patient, EN [enteral nutrition] should be deferred until the patient is hemodynamically stable. (C)

PULMONARY DISEASE: p. 64 SA

1. Patients with COPD [chronic obstructive pulmonary disease] or ARDS [acute respiratory distress syndrome] are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. Energy intake should be kept at or below estimated needs in patients with pulmonary disease and demonstrated carbon dioxide retention. (B)
3. Routine use of modified carbohydrate and fat nutrition formulations in patients with pulmonary disease is not warranted. (B)
4. Provision of a modified enteral formulation containing n-3 fatty acids may be beneficial in the patient with early ARDS. (B)
5. A fluid-restricted nutrient formulation should be used in patients with ARDS whose hemodynamic status necessitates fluid restriction. (B)
6. Serum phosphate levels should be monitored closely in patients with pulmonary disease

LIVER DISEASE: p. 67 SA

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

1. Patients with liver disease are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. Nutrition assessment in patients with liver disease should include screening for micronutrient deficiencies, including vitamins A, D, E, and K, and zinc. (B)
3. Patients with cirrhosis should divide their caloric intake into 4 to 6 meals per day, including a late evening snack. (B)
4. Protein restriction should be implemented for the acute management of overt hepatic encephalopathy. (A)
5. Protein restriction should not be implemented chronically in patients with liver disease. (B)
6. Use of branched-chain amino acid-enriched diets and SNS [specialized nutrition support] formulas is only indicated in chronic encephalopathy unresponsive to pharmacotherapy. (B)
7. Perioperative nutrition support should be used in patients undergoing liver resection for hepatocellular carcinoma associated with cirrhosis. (A)

PANCREATITIS: p. 69 SA

1. Patients with pancreatitis are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. SNS should not be used routinely in patients with mild to moderate acute pancreatitis. (B)
3. SNS should be used in patients with acute or chronic pancreatitis to prevent or to treat malnutrition when oral intake is anticipated to be inadequate for 5 to 7 days. (B)
4. EN is the preferred route of SNS in patients with pancreatitis and should be attempted before initiating PN. (A)
5. PN should be used in patients with pancreatitis if SNS is indicated and EN is not tolerated. (B)
6. Intravenous lipid emulsions are safe in acute pancreatitis provided triglyceride levels are monitored and remain below 400mg/dL. (B)

SHORT-BOWEL SYNDROME: p. 72 SA

1. Patients undergoing extensive bowel resection or with short bowel syndrome are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. Patient with SBS and an intact colon should receive diets rich in complex carbohydrates and low in fat. (A)
3. A low oxalate diet should be given to patients with SBS and an intact colon. (A)
4. Monthly vitamin B-12 injections should be given to patients with greater than 100cm of the terminal ileum resected. (A)
5. PN should be administered to patients with SBS if nutritional requirements cannot

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

be met by oral or EN feeding. (A)

INFLAMMATORY BOWEL DISEASE: p. 74 SA

1. Patients with IBD are at nutrition risk should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. EN should be used in CD [Crohn's disease] patients requiring SNS. (B)
3. PN should be reserved for those patients with IBD in whom EN is not tolerated. (B)
4. In cases of fistulae associated with CD, a brief course of bowel rest and PN should be attempted. (B)
5. Peri-operative SNS is indicated in patients with IBD who are severely malnourished and in whom surgery may be safely postponed. (B)
6. SNS and bowel rest should not be used as primary therapies for UC or CD. (A)

SOLID ORGAN TRANSPLANTATION: p. 75 SA

1. Patients in any stage of the transplant process are at nutrition risk, and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. In the perioperative transplant period, patients should receive energy substrate similar to that required in all postoperative patients. (B)
3. In the perioperative transplant period, patients should receive 1.5 to 2.0 g/kg per day protein. (B)
4. SNS should be provided to malnourished patients with complications or delayed oral intake after solid organ transplant. (B)
5. Metabolic and nutrition complications of transplantation, including obesity, hypertension, diabetes mellitus, hyperlipidemia, and osteoporosis, should be treated with appropriate dietary and pharmacologic interventions. (C)

GASTROINTESTINAL FISTULAE: p.77 SA-78 SA

1. Patients with enterocutaneous fistulae are at nutrition risk and should undergo formal nutrition assessment and development of a nutrition care plan. (B)
2. EN, proximal or distal to the fistula, should be used in patients who cannot meet their nutritional needs by oral intake and who are malnourished or expected to have inadequate oral intake for 7 to 14 days or more. (B)
3. When SNS is required, PN should be reserved for those patients in whom enteral intake must be restricted. (C)

RENAL DISEASE: p. 79 SA

1. Renal failure patients are at nutrition risk and should undergo nutrition screening to

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

- identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. Well-monitored patients with advanced chronic renal insufficiency but not on dialysis should receive diets restricted to 0.6 to 0.8 g of protein/kg per day. (A)
 3. Patients with CRF [chronic renal failure] on hemodialysis or peritoneal dialysis should receive 1.2 to 1.3 g of protein/kg per day. (B)
 4. Patient undergoing continuous hemofiltration should receive at least 1.0 g of protein/kg per day. (B)
 5. Patients with ARF {acute renal failure} receiving SNS should be given a balanced mixture of both essential and nonessential amino acids. (A)
 6. Patients with ARF who are severely malnourished or hypercatabolic should receive 1.5 to 1.8 g of protein/kg per day. (B)
 7. Intradialytic parenteral nutrition should only be considered in situations of gut failure or other unusual circumstances where EN and PN are not feasible. (C)
 8. Water-soluble vitamin supplementation is required for patients treated with hemodialysis. (A)
 9. Vitamin A status should be carefully monitored in patients with CRF. (A)

NEUROLOGIC IMPAIRMENT: p. 81 SA

1. Patients with neurologic impairment are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. SNS should be initiated early in patients with moderate or severe TBI {traumatic brain injury}. (B)
3. When SNS is required, EN is preferred if it is tolerated. (C)
4. PN should be administered to patients with TBI if SNS is indicated and EN does not meet the nutritional requirements. (C)
5. Indirect calorimetry should be utilized, if available, to accurately determine nutrient requirements in patients with TBI and CVAs {cerebral vascular accident} (B)
6. Swallowing function should be evaluated to determine the safety of oral feeding and risk of aspiration before the initiation of an oral diet. (B)

CANCER: p. 83 SA

1. Patients with cancer are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. SNS should not be used routinely in patients undergoing major cancer operations. (A)
3. Preoperative SNS may be beneficial in moderately or severely malnourished

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

patients if administered for 7 to 14 days preoperatively, but the potential benefits of nutrition support must be weighed against the potential risk of the SNS itself and of delaying the operation. (A)

4. SNS should not be used routinely as an adjunct to chemotherapy. (A)
5. SNS should not be used routinely in patients undergoing head and neck, abdominal, or pelvic irradiation. (B)
6. SNS is appropriate in patients receiving active anticancer treatment who are malnourished and who are anticipated to be unable to ingest and/or absorb adequate nutrients for a prolonged period of time. (C)
7. The palliative use of SNS in terminally ill cancer patients is rarely indicated. (B)

CANCER: HEMATOPOETIC CELL TRANSPLANTATION: p. 84 SA

1. All patients undergoing conventional HCT with myeloablative conditioning regimens are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. When PN is used, it should be discontinued as soon as conditioning-related toxicities have resolved after stem cell engraftment. (A)
3. When gastrointestinal function returns post engraftment, EN should be used in patients in whom oral intake is inadequate to meet nutritional requirements. (B)
4. Pharmacologic doses of glutamine should not be used in patients undergoing HCT. (A)
5. Patients should receive dietary counseling regarding high risk foods and safe food handling during the period of immunocompromise. (B)
6. SNS is appropriate for patients undergoing HCT who develop moderate to severe GVHD {graft verse host disease} accompanied by poor oral intake. (C)

HIV/ACQUIRED IMMUNO-DEFICIENCY SYNDROME: p. 87 SA

1. Patients with HIV are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. Nutrition assessment of patients with HIV should include quantitative measurement of LBM using DEXA or BIA. (B)
3. Patients with AWS [AIDS wasting syndrome] should receive AWS directed therapy, including anabolic agents and/or resistance training, testosterone in hypogonadal men, and appetite stimulants for those with decreased appetite. (A)
4. SNS has a very limited role in AWS and should be reserved for patients receiving active, disease directed treatment who are unable to meet their nutrient requirements by oral feeding. (B)

CRITICAL CARE: BURNS: p. 89 SA

1. Patients with second or third degree burns are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

- development of a nutrition care plan. (B)
2. Adequate calories must be provided to address the hypermetabolism associated with acute burn injury. (A)
 3. When possible, the energy requirements of burn patients should be measured using indirect calorimetry. (B)
 4. Severely burned patients require increased intakes of protein until significant wound healing is achieved. (A)
 5. There is no current role for the routine use of specific nutrients and anabolic agents (eg, arginine, glutamine, omega-3 fatty acids, vitamins, trace minerals, antioxidants, growth hormone, oxandrolone, etc) in burn patients. (A)
 6. EN should be used in preference to PN in burn patients requiring SNS. (A)
 7. EN should be initiated as soon as possible in patients with moderate/severe burns. (A)
 8. PN should be reserved for patients who require SNS and in whom EN is contraindicated or is unlikely to meet nutritional requirements within 4 to 5 days. (B)

CRITICAL CARE: CRITICAL ILLNESS: p. 92 SA

1. Patients with critical illnesses are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. SNS should be initiated when it is anticipated that critically ill patients will be unable to meet their nutrient needs orally for a period of 5-10 days. (B)
3. EN is the preferred route of feeding in critically ill patients requiring SNS. (B)
4. PN should be reserved for those patients requiring SNS in whom EN is not possible. (C)

HYPEREMESIS GRAVIDARIUM: p. 93 SA

1. Pregnant women are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. SNS is indicated in women with hyperemesis gravidarum who are unable to achieve appropriate weight gain despite the use of noninvasive therapies. (B)
3. When SNS is indicated, EN should be initiated as a slow, continuous, isotonic EN infusion to minimize nausea and vomiting and establish adequate caloric intake. (B)
4. PN should be used to treat hyperemesis gravidarium when EN is not tolerated. (B)
5. When SNS is started in malnourished women with hyperemesis gravidarium, thiamin supplementation and careful monitoring for signs of development of refeeding syndrome should be instituted. (B)

PSYCHIATRIC DISORDERS: EATING DISORDERS p. 95 SA

1. All patients with anorexia nervosa are malnourished and should undergo formal

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

- nutrition assessment with development of a nutrition care plan. (B)
2. SNS should be initiated in patients with anorexia nervosa with severe malnutrition (greater than 30% recent weight loss or current weight less than 65% of ideal body weight) who are unable or unwilling to ingest adequate nutrition. (B)
 3. Upon initiation of SNS in patients with anorexia nervosa frequent fluid, electrolyte, and acid-base monitoring must be undertaken to avoid sequelae of the refeeding syndrome. (A)

PERIOPERATIVE NUTRITION SUPPORT: p. 96 SA

1. Preoperative SNS should be administered to moderately or severely malnourished patients undergoing major gastrointestinal surgery for 7 to 14 days if the operation can be safely postponed. (A)
2. PN should not routinely be given in the immediate postoperative period to patients undergoing major gastrointestinal procedures. (A)
3. Postoperative SNS should be administered to patients whom it is anticipated will be unable to meet their nutrient needs orally for a period of 7 to 10 days. (B)

Direct Excerpts from the ASPEN BOARD OF DIRECTIONS JPEN Vol. 26, No. 1, Supplement, pp 45SA- 60SA.

Section X: Life Cycle and Metabolic Conditions

PREGNANCY: p.45 SA

1. Pregnant women are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. In pregnant women who require SNS, baseline needs should be supplemented with an additional 300 kcal/day and 10 to 14 grams of protein during the second and third trimester. (B)
3. PN is indicated for pregnant patients at risk for malnutrition because of a nonfunctioning gastrointestinal tract or inability to tolerate EN. (C)
4. Maternal blood glucose should be maintained within the range of 90 to 120mg/dl. (C)
5. Intravenous lipid emulsions may be used safely in pregnant women to provide a source of isotonic nonprotein calories and avoid essential fatty acid deficiency. (C).
6. All women of child-bearing age who are capable of becoming pregnant should consume at least 0.4mg/d of folic acid, using specific supplementation if necessary. (A)

GERIATRICS: p.52 SA

1. Elderly patients (age greater than 65 years) are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)

**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

2. Age and life style parameters should be used to asses the nutrition status of elderly persons. (C)
3. Potential drug-nutrient interactions should be assessed in all elderly patients receiving medications. (B)
4. Diet and SNS prescriptions for elderly persons should take into consideration altered nutrient requirements observed in this age group. (B)

OBESITY: p.53 SA

1. Obese patients are at nutrition risk, and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (B)
2. When possible, energy requirements of obese patients should be assessed using indirect calorimetry because predictive equations have considerable limitations in estimating energy requirements in obese patients. (B)
3. Hypocaloric nutrition regimens with supplemental protein are recommended in the treatment of mild to moderately stressed obese patients. (A)

DIABETES MELLITUS: p. 55SA

1. Patients with diabetes mellitus are at nutrition risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan. (A)
2. In ambulatory, otherwise healthy people with diabetes mellitus, strict glucose control is recommended to decrease the incidence of diabetes-related complications. (A)
3. Blood glucose levels should be maintained in the 100 to 200mg/dl range in the hospitalized patients with diabetes mellitus. (A)
4. The macronutrient composition of EN and PN provided to patients with DM should be individualized and avoid administration of excess calories. (B)

ETHICAL AND LEGAL ISSUES: pp 57 SA-58SA

1. Legally and ethically, SNS should be considered a medical therapy. (A)
2. Care providers should be familiar with current evidence of the benfits and burdens of SNS. (C)
3. Patients should be encouraged to have living wills and/or advance directives and to discuss with their loved ones their wishes in the event of a serious or terminal accident or illness. (C)
4. Adult patients or their legally authorized surrogates have the right to accept or to refuse SNS. (A)
5. The benefits and burdens of SNS, and the interventions required to deliver it, should be considered before offering this therapy. (B)
6. Institutions should develop clear policies regarding the withdrawal or withholding of SNS and communicate these policies to patients in accordance with the Patient Self-Determination Act. (A)

Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

QUALITY OF LIFE: p59 SA

1. The subjective patient experience receiving SNS should be measured with an HRQOL tool. (B)
2. A nutrition support HRQOL tool should include generic and disease targeted measures for either cross-section and /or longitudinal observations. (C)

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Critical Care Nutrition
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Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

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**Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU**

Revised: 11//2004

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Critical Care Nutrition
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Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

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Critical Care Nutrition
Practice Management Guidelines
Vanderbilt University Medical Center
TICU, SICU, NCU, BICU

Revised: 11//2004

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