

TOTAL NUTRITIONAL SUPPORT: PARENTERAL/ENTERAL FEEDING

Nutritional status is a key factor in patient's overall immune function and a patient's ability to mount a stress response. Underfeeding a patient may lead to increased nosocomial infections, poor wound healing, respiratory muscle dysfunction, and respiratory failure. Overfeeding patients, in contrast, may increase physiological stress and lead to problems such as hyperglycemia, fluid overload, azotemia, and hepatic dysfunction. Therefore, measuring energy expenditure and determining the patient's caloric requirements and feeding status should be included in a thorough nutritional assessment. Specifically designed nutritional therapy can be administered by the parenteral or enteral route when the use of standard diets via the oral route is inadequate or not possible or enteral route when the use of standard diets via the oral route is inadequate or not possible to prevent/correct protein-calorie malnutrition.

Enteral nutrition is preferred for the patient who has a functional GI tract but is unable to consume an adequate nutritional intake or for whom oral intake is contraindicated/impossible. Feeding may be done via NG or orogastric tube, esophagostomy, gastrostomy, duodenostomy, or jejunostomy.

Parenteral nutrition may be chosen because of altered metabolic states or when mechanical or functional abnormalities of the GI tract prevent enteral feeding. Amino acids, fat, carbohydrates, trace elements, vitamins, and electrolytes may be infused via a central or peripheral vein.

CARE SETTING

May be any setting, including community/home care

RELATED CONCERNS

Burns: thermal/chemical/electrical (acute and convalescent phases)

Cancer

COPD

Fluid and electrolyte imbalances

Inflammatory bowel disease

Pancreatitis

Psychosocial aspects of care

Renal failure: chronic

Surgical intervention

Patient Assessment Database

Clinical signs listed here depend on the degree and duration of malnutrition and include observations indicative of vitamin, mineral, and protein/calorie deficiencies.

ACTIVITY/REST

May exhibit: Muscle wasting (temporal, intercostal, gastrocnemius, dorsum of hand); thin extremities, flaccid muscles, decreased activity tolerance

CIRCULATION

May exhibit: Tachycardia, bradycardia
Diaphoresis, cyanosis

ELIMINATION

May report: Diarrhea or constipation; flatulence associated with food intake
May exhibit: Abdominal distension/increased girth, ascites; tenderness on palpation
Stools may be loose, hard-formed, fatty, or clay-colored

FOOD/FLUID

May report: Recent weight loss/weight loss of 10% or more of body weight within previous 6 mo
Problems with chewing, swallowing, choking, or saliva production
Changes in the taste of food; anorexia, nausea/vomiting; inadequate oral intake (NPO) status for 7–10 days, long-term use of 5% dextrose intravenously

May exhibit: Actual weight (measured) as compared with usual or pre-illness weight is less than 90% of ideal body weight for height, sex, and age or equal to or greater than 120% of ideal or usual body weight (patient risk in obesity is a tendency to overlook protein and calorie requirements). A distorted actual weight may occur because of the presence of edema, ascites, organomegaly, tumor bulk, anasarca, amputation
Edentulous or ill-fitting dentures
Bowel sounds diminished, hyperactive, or absent
Thyroid, parotid enlargement
Lips dry, cracked, red, swollen; angular stomatitis
Tongue may be smooth, pale, slick, coated; color often magenta, beefy red; lingual papillae atrophy/swelling
Gums swollen/bleeding, multiple caries
Mucous membranes dry, pale, red, swollen

NEUROSENSORY

May exhibit: Lethargy, apathy, listlessness, irritability, disorientation, coma
Gag/swallow reflex may be decreased/absent, e.g., cerebrovascular accident (CVA), head trauma, nerve injury
Loss of balance and coordination

RESPIRATION

May exhibit: Increased respiratory rate; respiratory distress
Dyspnea, increased sputum production
Breath sounds; crackles (protein deficiency/related fluid shifts)

SAFETY

May report: Recent course of radiation therapy (radiation enteritis)
May exhibit: Hair may be fragile, coarse, lackluster, falling out (alopecia), decreased pigmentation may be present
Skin dry, scaly, tented; “flaky paint” dermatosis; edema; draining or unhealed wounds, pressure sores; ecchymoses, perifollicular petechiae, subcutaneous fat loss
Eyes sunken, dull, dry, with pale conjunctiva; Bitot’s spots (triangular, shiny, gray spots on the conjunctiva seen in vitamin A deficiency) or scleral icterus
Nails may be brittle, thin, flattened, ridged, spoon-shaped

SEXUALITY

May report: Loss of libido
Amenorrhea

TEACHING/LEARNING

May report: History/presence of conditions causing protracted protein/caloric losses, e.g., malabsorption or short-gut syndrome, diarrhea, acute pancreatitis, renal dialysis, fistulas, draining wounds, thermal injuries; problems with chewing/swallowing (e.g., CVA or Parkinson’s disease)
Presence of factors known to alter nutritional requirements/increase energy demands, e.g., single or multiorgan failure; sepsis; fever; AIDS, cancer; trauma; extensive burns; use of steroids, antitumor agents, immunosuppressants
Use of treatments that greatly alter intake and medications that cause untoward drug/nutrient interactions, e.g., laxatives, anticonvulsants, diuretics, antacids, narcotics, immunosuppressants, radiation, high-dose chemotherapy
Illness of psychiatric origin, e.g., anorexia nervosa/bulimia
Educational/social factors, e.g., lack of nutrition knowledge, kitchen facilities, reduced/limited financial resources

Discharge plan considerations: **DRG projected mean length of inpatient stay: 6.1 days**, depending on underlying disease process
necessitating therapy

May require assistance with solution preparation, therapy supplies, and maintenance of feeding device for home nutritional care

Refer to section at end of plan for postdischarge considerations.

DIAGNOSTIC STUDIES

Weight: Ideal body weight (IBW): Men—106 lb for first 5' plus 6 lb for each additional inch of height. Women—100 lb for first 5' plus 5 lb for each additional inch of height. 120% of IBW is obese, 70%–79% of IBW is moderately underweight. Weight may be inaccurate as a result of factors such as edema, ascites.

Anthropometrics: Includes measurement of weight-to-height ratio, osteometry, and ratios of lean-to-fat weight:

Triceps skin-fold measurement: Estimates subcutaneous fat stores; fat reserves less than 10th percentile suggest advanced depletion; levels less than the 30th percentile suggest mild-to-moderate depletion.

Midarm muscle circumference: Measures somatic muscle mass and is used in combination with triceps skin-fold measurement; a decrease of 15–20 percentiles from the expected value suggests a significant reduction.

Visceral proteins: (Note: Recent research questions the reliability of serum albumin and transferrin as markers for malnutrition.)

Serum albumin (the classic marker measured): Values of 2.7–3.4 g/dL indicate mild depletion; 2.1–2.7 g/dL, moderate depletion; and less than 2.1 g/dL, severe depletion. Decreased levels are due to poor protein intake, nephrotic syndrome, sepsis, burns, HF, cirrhosis, eclampsia, protein-losing enteropathy; above-normal values (more than 4.5 g/dL) are seen in dehydration. (Serum prealbumin has a shorter half-life than albumin, so body stores turn over quickly, theoretically making it a more sensitive indicator of improvement/change in protein status.)

Serum transferrin: More sensitive to changes in visceral protein stores than albumin; levels of 150–200 mg/dL reflect mild depletion; 100–150 mg/dL, moderate depletion; and 100 mg/dL, severe depletion. Elevated values are seen with iron deficiency, pregnancy, hypoxia, and chronic blood loss. Decreased values are seen with pernicious anemia, chronic infection, liver disease, iron overload, and protein-losing enteropathy.

Thyroxine-binding prealbumin: Reflects repaid changes in hepatic protein synthesis and thus is a more sensitive indicator of visceral protein depletion. Decreased levels less than 200 mEq/mL are noted with cirrhosis, inflammation, and surgical trauma.

Amino acid profile: Alterations reflect an imbalance of plasma proteins with depressed levels of branched-chain amino acids (common with hepatic encephalopathy or sepsis).

Tests of immune system:

Total lymphocyte count: Less than 1500 cells/mm³ indicates leukopenia and results from decreased generation of T cells, which are very sensitive to malnutrition. Less than 800 cells/mm³ indicates severe depletion. Levels are also altered by severe stress, renal failure, cancer, infection, and administration of corticosteroids.

Tests of micronutrients:

Potassium: Deficiency occurs with inadequate intake and with loss of potassium-containing fluids (e.g., urine, diarrhea, vomiting, fistula drainage, continuous NG suctioning). Potassium is also lost from cells during muscle wasting and is excreted by the kidneys.

Sodium: Levels depend on state of hydration/presence of active loss as may exist in excessive diuresis, GI suctioning, burns.

Phosphorus: May be decreased, reflecting inadequate intake or increased cellular uptake; may be elevated in renal failure.

Magnesium: Deficiency is common in alcoholics, chronic vomiting, diarrhea; may be elevated in renal failure.

Calcium: Levels are decreased with conditions associated with hypoalbuminemia, e.g., renal failure (majority of calcium is bound to albumin). Absorption is decreased by fat malabsorption and low-protein diet.

Zinc: Deficiency is seen in alcoholic cirrhosis; or may be secondary to hypoalbuminemia and GI losses (diarrhea).

Tests reflecting protein (nitrogen) loss:

Nitrogen balance studies: Nitrogen (protein) excretion via urine, stool, and insensible losses often exceeds nitrogen intake in the acutely ill, reflecting catabolic response to stress and use of endogenous protein stores for energy production (gluconeogenesis). BUN may be severely decreased as a result of chronic malnutrition and depletion of skeletal protein stores.

24-hr creatinine excretion: Because Cr is concentrated in muscle mass, there is a correlation between lean body mass and 24-hr Cr excretion. Actual values are compared with ideal values (based on height and weight) times 100, known as the Cr height index: 60%–80% indicates moderate depletion; less than 60%, severe depletion.

Tests of GI function (include Schilling test, D-xylose test, 72-hr stool fat, GI series): Determine malabsorption.

Chest x-ray: May be normal or show evidence of pleural effusion; small heart silhouette.

ECG: May be normal or demonstrate low voltage, dysrhythmias/patterns reflective of electrolyte imbalances.

NURSING PRIORITIES

1. Promote consistent intake of adequate calorie and protein requirements.
2. Prevent complications.
3. Minimize energy losses/needs.
4. Provide information about condition, prognosis, and treatment needs.

DISCHARGE GOALS

1. Nutritional intake adequate for individual needs.
2. Complications prevented/minimized.
3. Fatigue alleviated.
4. Condition, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

NURSING DIAGNOSIS: Nutrition: imbalanced, less than body requirements

May be related to

Conditions that interfere with nutrient intake or increase nutrient need/metabolic demand, e.g., cancer and associated treatments, anorexia, surgical procedures, dysphagia/difficulty swallowing, depressed mental status/level of consciousness

Possibly evidenced by

Body weight 10% or more under ideal
Decreased subcutaneous fat/muscle mass, poor muscle tone
Changes in gastric motility and stool characteristics

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Nutritional Status (NOC)

Demonstrate stable weight or progressive weight gain toward goal with normalization of laboratory values and no signs of malnutrition.

ACTIONS/INTERVENTIONS	RATIONALE
<p>Nutrition Therapy (NIC)</p> <p>Independent</p> <p>General</p> <p>Assess nutritional status continually, during daily nursing care, noting energy level; condition of skin, nails, hair, oral cavity; desire to eat/anorexia.</p>	<p>Provides the opportunity to observe deviations from normal patient baseline, and influences choice of interventions.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Nutrition Therapy (NIC)</p> <p>Independent</p> <p>General</p> <p>Weigh daily and compare with admission weight.</p> <p>Document oral intake by use of 24-hour recall, food history, calorie counts as appropriate.</p> <p>Ensure accurate collection of specimens (urine and stool) for nitrogen balance studies.</p> <p>Administer nutritional solutions at prescribed rate via infusion control device as needed. Adjust rate to deliver prescribed hourly intake. Do not increase rate to “catch up” if infusion slows.</p> <p>Be familiar with electrolyte content of nutritional solutions.</p> <p>Schedule activities with adequate rest periods. Promote relaxation techniques.</p>	<p>Establishes baseline, aids in monitoring effectiveness of therapeutic regimen, and alerts nurse to inappropriate trends in weight loss/gain.</p> <p>Identifies imbalance between estimated nutritional requirements and actual intake.</p> <p>Inaccurate collection can alter test results, leading to improper interpretation of patient’s current status and needs.</p> <p>Nutrition support prescriptions are based on individually estimated caloric and protein requirements. A consistent rate of nutrient administration ensures proper utilization with fewer side effects, such as hyperglycemia or dumping syndrome. <i>Note:</i> Continuous and cyclic infusion of enteral formulas are generally better tolerated than bolus feedings and result in improved absorption.</p> <p>Metabolic complications of nutritional support often result from a lack of appreciation of changes that can occur as a result of refeeding, e.g., hyperglycemic, hyperosmolar nonketotic coma (HHNC), electrolyte imbalances.</p> <p>Conserves energy/reduces calorie needs. (Refer to ND: Fatigue.)</p>
<p>Total Parenteral Nutrition (TPN)</p> <p>Administration (NIC)</p> <p>Observe appropriate “hang” time of parenteral solutions per protocol.</p> <p>Monitor fingerstick glucose per protocol (e.g., qid during initiation of therapy).</p>	<p>Effectiveness of IV vitamins diminishes and solution degrades after 24 hr.</p> <p>High glucose content of solutions may lead to pancreatic fatigue, requiring use of supplemental insulin to prevent HNC. <i>Note:</i> Fingerstick determination of glucose level is more accurate than urine testing because of variations in renal glucose threshold.</p>
<p>Enteral Tube Feeding (NIC)</p> <p>Assess GI function and tolerance to enteral feedings: note bowel sounds; reports of nausea/vomiting, abdominal discomfort; presence of diarrhea/constipation; development of weakness, lightheadedness, diaphoresis, tachycardia, abdominal cramping.</p>	<p>Because protein turnover of the GI mucosa occurs approximately every 3 days, the GI tract is at great risk for early dysfunction and atrophy from disease and malnutrition. Intolerance of formula/presence of dumping syndrome may require alteration of rate of administration/concentration or type of formula, or possibly change to parenteral administration.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Enteral Tube Feeding (NIC)</p> <p>Independent</p> <p>Check gastric residuals if bolus feedings are done and as otherwise indicated; hold feeding/return aspirate per protocol for type/rate of feeding used if residual is greater than predetermined level.</p> <p>Maintain patency of enteral feeding tubes by flushing with warm water before and after feeding and as indicated, e.g., between multiple doses of medications or when checking gastric residuals.</p> <p>Transitional</p> <p>Stress importance of transition to oral feedings as appropriate.</p> <p>Assess gag reflex, ability to chew/swallow, and motor skills when progressing to transitional feedings.</p> <p>Provide self-help utensils as indicated, e.g., plate guard, utensils with built-up handles, lidded cups.</p> <p>Create optimal environment, e.g., remove noxious stimuli, bedpans, soiled linens. Provide cheerful, attractive tray/ table, soft music, companionship.</p> <p>Allow adequate time for chewing, swallowing, savoring food; provide socialization and feeding assistance as indicated.</p> <p>Offer small, frequent feedings; incorporate patient likes/ dislikes in meal planning as much as possible, and include "home foods," as appropriate.</p> <p>Provide calorie-containing beverages when oral intake is possible, e.g., juices/Jell-O water, dietary supplements (Sustacal, Ensure), add Polycase to beverages/water.</p> <p>Collaborative</p> <p>Refer to nutritional team/registered dietitian.</p>	<p>Delayed gastric emptying can be caused by a specific disease process, e.g., paralytic ileus/surgery, shock; by drug therapy (especially narcotics); or the protein/fat content of the individual formula. <i>Note:</i> Replacement of gastric aspirate reduces loss of gastric acid/electrolytes.</p> <p>Enteral formulas contain protein that can clog feeding tubes (more likely with small-bore or silicone than with polyurethane tubes), necessitating removal/replacement of tube. <i>Note:</i> Cranberry juice or colas are not recommended because they may actually cause an obstruction by promoting formula coagulation. Pancrelipase (a pancreatic enzyme) may be effective in clearing tubing of persistent clog.</p> <p>Although patient may have little interest in food or desire to eat, transition to oral feedings is preferred in view of potential side effects/complications of nutritional support therapy.</p> <p>May require additional interventions, e.g., retraining by dysphagia expert (speech therapist) or long-term nutritional support.</p> <p>Patients with neuromuscular deficits, e.g., post-CVA, brain injury, may require use of special aids developed for feeding.</p> <p>Encourages patient's attempts to eat, reduces anorexia, and introduces some of the social pleasures usually associated with mealtime.</p> <p>Patients need encouragement/assistance to overcome underlying problems such as anorexia, fatigue, muscular weakness.</p> <p>May enhance patient's desire for food and amount of intake.</p> <p>Maximizes calorie intake when oral intake is limited/restricted.</p> <p>Aids in identification of nutrient deficits and need for parenteral/enteral nutritional intervention.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Enteral Tube Feeding (NIC)</p> <p>Collaborative</p> <p>Calculate basal energy expenditure (BEE) using formula based on sex, height, weight, age, and estimated energy requirements.</p> <p>Review results of indirect calorimetry test if available.</p>	<p>Provides an estimation of calorie and protein needs. <i>Note:</i> Although the BEE may more accurately determine individual needs, studies show that BEE is rarely measured and a standard formula for projecting energy requirements is to provide 30 Kcal/kg for weight maintenance, 25 Kcal/kg for weight loss, or 35 Kcal/kg for weight gain.</p> <p>Measures O₂ consumption at basal or resting metabolic rate to aid in estimating calorie/protein requirements.</p>
<p>Enteral Feeding/TPN Administration (NIC)</p> <p>Assist with insertion and confirm proper placement of infusion/feeding line (e.g., chest x-ray for central venous catheter or aspiration of gastric contents from feeding tube) before administration of solutions.</p> <p>Administer dextrose-electrolyte or dextrose–amino acid and lipid emulsions (3-in-1) solutions as indicated.</p> <p>Co-infuse lipid emulsions if 3-in-1 solutions are not used.</p> <p>Administer medications, as indicated, e.g.: Multivitamin preparations;</p> <p>Insulin;</p> <p>Diphenoxylate with atropine (Lomotil), camphorated tincture of opium (paregoric), and metoclopramide(Reglan).</p>	<p>Reduces risk of feeding-induced complications, including pneumothorax/hemothorax, hydrothorax, air embolus, arterial puncture (central venous line), or aspiration (NG tube).</p> <p>Solutions provide calories, essential amino acids, and micronutrients, usually combined with lipids for complete nutrition known as total nutrient admixtures (TNA). Solutions are modified to meet specific needs, e.g., renal and liver failure (lower protein), respiratory failure (higher fat). <i>Note:</i> 3-in-1 solution bags are larger (2–3 L) and can infuse over a 24-hr period, eliminating the need for frequent bag changes and reducing line manipulation/risk of contamination.</p> <p>Useful in meeting excessive calorie requirements (e.g., burns) or as a source of essential fatty acids during long-term hyperalimentation. <i>Note:</i> Lipid solutions may be contraindicated in patients with alterations in fat metabolism or in the presence of pancreatitis, liver damage, anemia, coagulation disorders, pulmonary disease.</p> <p>Water-soluble vitamins are added to parenteral solutions. Other vitamins may be given for identified deficiencies.</p> <p>High glucose content of solutions may require exogenous insulin for metabolism, especially in presence of pancreatic insufficiency or disease. <i>Note:</i> Insulin is usually now added directly to parenteral solution.</p> <p>GI side effects of enteral feeding may need to be controlled with antidiarrheal agents (Lomotil/paregoric) or peristaltic stimulants (Reglan) if more conservative measures such as alteration of rate/strength or type of formula are not successful.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Enteral Feeding/TPN Administration (NIC)</p> <p>Collaborative</p> <p>Monitor laboratory studies, e.g., serum glucose, electrolytes, transferrin, prealbumin/albumin, total protein, phosphate, BUN/Cr, liver enzymes, CBC, ABGs.</p>	<p>Serum chemistries, blood counts, and lipid profiles are performed before initiation of therapy, providing a baseline for comparison with repeat (monitoring) studies to determine therapy needs/complications. Untoward metabolic effects of TPN include hypokalemia, hyponatremia and fluid retention, hyperglycemia, hypophosphatemia, increased CO₂ production resulting in respiratory compromise, elevation of liver function tests, renal dysfunction.</p>

<p>NURSING DIAGNOSIS: Infection, risk for</p> <p>Risk factors may include</p> <p>Invasive procedures: insertion of venous catheter; surgically placed gastrostomy/jejunostomy feeding tube Malnutrition; chronic disease Environmental exposure: access devices in place for extended periods, improper preparation/handling/contamination of the feeding solution</p> <p>Possibly evidenced by</p> <p>[Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</p> <p>Immune Status (NOC)</p> <p>Experience no fever or chills. Demonstrate clean catheter insertion sites, free of drainage and erythema/edema.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p>Infection Protection (NIC)</p> <p>Independent</p> <p>Stress/model proper handwashing technique.</p> <p>Maintain sterile technique for invasive procedures, e.g., IV, urinary catheter insertion. Provide routine site/wound and perineal care as appropriate.</p> <p>Encourage frequent position changes and out of bed/ambulation as tolerated.</p> <p>Screen visitors/care providers for infectious processes, especially URI.</p>	<p>Reduces risk of cross-contamination.</p> <p>Prevents entry of bacteria, reducing risk of nosocomial infections.</p> <p>Limits stasis of body fluids, promotes optimal functioning of organ systems, GI tract.</p> <p>Reduces risk of transmission viruses that are difficult to treat.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Infection Protection (NIC)</p> <p>Independent</p> <p>Monitor/assist with respiratory exercises, use of adjuncts, e.g., incentive spirometer. Auscultate lungs for adventitious sounds.</p> <p>Assess vital signs, including temperature per protocol.</p> <p>Parenteral TPN Administration (NIC)</p> <p>Maintain an optimal aseptic environment during bedside insertion of central venous catheters and during changes of TPN bottles and administration tubing.</p> <p>Secure external portion of catheter/administration tubing to dressing with tape. Note intactness of skin suture.</p> <p>Maintain a sterile occlusive dressing over catheter insertion site. Perform central/peripheral venous catheter dressing care per protocol.</p> <p>Inspect insertion site of catheter for erythema, induration, drainage, tenderness.</p> <p>Refrigerate premixed solutions before use; observe a 24-hr hang time for amino acid or total nutrient admixtures solutions and a 12-hr hang time for IV fat emulsions.</p> <p>Monitor urinary output and serum glucose levels.</p>	<p>Promotes deep breathing to clear airways and reduce risk of pneumonia. Presence of wheezes suggests retained secretions, potential complications requiring intervention.</p> <p>A rise in pulse and temperature may provide warning of infectious process unless patient's immune system is too compromised to respond.</p> <p>Catheter-related sepsis may result from entry of pathogenic microorganisms through skin insertion tract or from touch contamination during manipulations of TPN system.</p> <p>Manipulation of catheter in/out of insertion site can result in tissue trauma (coring) and potentiate entry of skin organisms into catheter tract.</p> <p>Protects catheter insertion sites from potential sources of contamination. <i>Note:</i> Central venous catheter sites can easily become contaminated from tracheostomy/endotracheal secretions or from wounds of the head, neck, and chest.</p> <p>The catheter is a potential irritant to the surrounding skin and subcutaneous skin tract, and extended use may result in insertion site irritation and infection.</p> <p>TPN solutions and fat emulsions have been shown to support the growth of a variety of pathogenic organisms once contaminated.</p> <p>A rise in temperature or loss of glucose tolerance (glycosuria, hyperglycemia) are early indications of possible catheter-related sepsis.</p>
<p>Enteral Tube Feeding (NIC)</p> <p>Keep manipulations of enteral feeding system to a minimum and wash hands before opening system.</p> <p>Alternate nares for tube placement in long-term NG feedings.</p> <p>Provide daily/prn site care to abdominally placed feeding tubes.</p>	<p>Touch contamination of formula is caused by caregiver administration technique.</p> <p>Reduces risk of trauma/infection of paranasal tissue (especially important in facial trauma/burns).</p> <p>GI secretions leaking through or around gastrostomy/jejunostomy tube tracts can cause skin breakdown severe enough to require removal of the feeding tube.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Enteral Tube Feeding (NIC)</p> <p>Independent</p> <p>Refrigerate reconstituted enteral formulas before use; observe a hang time of 4–8 hr; discard unused formula after 24 hr.</p> <p>Infection Protection (NIC)</p> <p>Collaborative</p> <p>Aseptically prepare parenteral solutions/enteral formulas for administration.</p> <p>Notify physician if signs of infection present. Follow protocol for obtaining appropriate culture specimens, e.g., blood, solutions, and change bottle/tubing as indicated.</p> <p>Administer antibiotics as indicated.</p>	<p>Enteral formulas easily support bacterial growth and can be contaminated during formula preparation. For example, bacterial growth has been shown to occur within 4 hr after contamination.</p> <p>TPN solutions should be prepared under a laminar flow hood in the pharmacy. Enteral formulas should be mixed in a clean environment in the dietary or pharmacy department, although with the advent of canned/modular formulas, this may not be necessary. <i>Note:</i> Additives to TPN solutions, as a rule, should not be made on the unit because of the potential for contamination and drug incompatibilities.</p> <p>Necessary to identify source of infection and initiate appropriate therapy. May require removal of TPN line and culture of catheter tip.</p> <p>May be given prophylactically or for specifically identified organism.</p>

<p>NURSING DIAGNOSIS: Injury, risk for [multifactor]</p> <p>Risk factors may include</p> <p>External environment: catheter-related complications (air emboli and septic thrombophlebitis)</p> <p>Internal factors: aspiration; effects of therapy/drug interactions</p> <p>Possibly evidenced by</p> <p>[Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</p> <p>Risk Control (NOC)</p> <p>Be free of complications associated with nutritional support.</p> <p>Modify environment/correct hazards to enhance safety for in-home therapy.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Surveillance (NIC)</p> <p>Independent</p> <p>Parenteral Maintain a closed central IV system using Luer-Lok connections/taping of all connections.</p> <p>Administer appropriate TPN solution via peripheral or central venous route (including peripherally inserted central catheter [PICC] lines and tunneled catheters).</p> <p>Monitor for potential drug/nutrient interactions.</p> <p>Assess catheter for signs of displacement out of central venous position, i.e., extended length of catheter on skin surface; leaking of IV solution onto dressing; patient complaints of neck/arm pain, tenderness at catheter site, or swelling of extremity on side of catheter insertion.</p> <p>Inspect peripheral TPN catheter site routinely and change sites at least every other day, or per protocol.</p> <p>Investigate reports of severe chest pain/coughing in patients with central line. Turn patient to left side in Trendelenburg position if indicated and notify physician.</p> <p>Maintain an occlusive dressing on catheter insertion sites for 24 hr after subclavian catheter is removed.</p> <p>Enteral Assess gastrostomy or jejunostomy tube sites for evidence used of malposition.</p> <p>Collaborative</p> <p>Review chest x-ray as indicated.</p>	<p>Inadvertent disconnection of central IV system can result in lethal air emboli.</p> <p>Solutions containing high concentrations of dextrose (more than 10%) must be delivered via a central vein because they result in chemical phlebitis when delivered through small peripheral veins.</p> <p>Various interactions are possible; for example, digoxin (in conjunction with diuretic therapy) can cause hypomagnesemia; hypokalemia may result from chronic use of laxatives, mineralocorticosteroids, diuretics, or amphotericin.</p> <p>Central venous catheter tip may slip out of superior vena cava and migrate into smaller innominate and jugular veins, causing a chemical thrombophlebitis. Incidence of subclavian or superior vena cava thrombosis is increased with extended use of central venous catheters.</p> <p>Peripheral TPN solutions (although less hyperosmolar) can still irritate small veins and cause phlebitis. Peripheral venous access is often limited in malnourished patients, but site should still be changed if signs of irritation develop.</p> <p>Suggests presence of air embolus requiring immediate intervention to displace air into apex of heart away from the pulmonary artery.</p> <p>Extended catheter use may result in development of catheter skin tract. Once the catheter is removed, air embolus is still a potential risk until skin tract has sealed.</p> <p>Indwelling and mushroom catheters are still frequently for feeding tubes inserted via the abdomen. Migration of the catheter balloon can result in duodenal or jejunal obstruction. Improperly sutured gastrostomy tubes may easily fall out.</p> <p>Central parenteral line placement is routinely confirmed by x-ray.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Surveillance (NIC)</p> <p>Independent</p> <p>Consult with pharmacist in regard to site/time of delivery of drugs that might have action adversely affected by enteral formula.</p>	<p>Absorption of vitamin D is impaired by administration of mineral oil (inhibits micelle formation of bile salts) and by neomycin (inactivates bile salts). Aluminum-containing antacids bind with the phosphorus in the feeding solution, potentiating hypophosphatemia.</p>

<p>NURSING DIAGNOSIS: Aspiration, risk for</p> <p>Risk factors may include Presence of GI tube, bolus tube feedings, medication administration Increased intragastric pressure, delayed gastric emptying</p> <p>Possibly evidenced by [Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</p> <p>Respiratory Status: Ventilation (NOC) Maintain clear airway, be free of signs of aspiration.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Aspiration Precautions (NIC)</p> <p>Independent</p> <p>Confirm placement of nasogastric feeding tubes. Determine feeding tube position in stomach by x-ray, confirmation of pH of 0–5 of the gastric fluid withdrawn through tube, or auscultation of injected air before intermittent feedings. Observe for ability to speak/cough.</p> <p>Maintain aspiration precautions during enteral feedings, e.g.:</p> <ul style="list-style-type: none"> Keep head of bed elevated at 30–45 degrees during feeding and at least 1 hr after feeding; Inflate tracheostomy cuff during and for 1 hr after intermittent feeding. Interrupt feeding when patient is in prone position; 	<p>Malplacement of nasogastric feeding tubes may result in aspiration of enteral formula. Patients at particular risk include those who are intubated or obtunded and those who have had a CVA or surgery of the head/neck and upper GI system. <i>Note:</i> The reliability of the pH method is reduced if antacids or certain other medications have been given po/NG in the past 4 hr. Also when using auscultatory method to assess tube placement, air sounds can be transmitted to the epigastrium even if the tube is malpositioned (i.e., in lung or proximal jejunum).</p> <p>Reduces risk of regurgitation/gastric reflux.</p> <p>Aspiration of enteral formulas is highly irritating to the lung parenchyma and may result in pneumonia and respiratory compromise.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Aspiration Precautions (NIC)</p> <p>Independent</p> <p>Add blue food coloring to enteral formula as indicated.</p> <p>Monitor gastric residuals after bolus feedings (as previously noted in ND: Nutrition: imbalanced, less than body requirements).</p> <p>Note characteristics of sputum/tracheal aspirate. Investigate development of dyspnea, cough, tachypnea, cyanosis. Auscultate breath sounds.</p> <p>Note indicators of NG tube intolerance, e.g., absence of gag reflex, high risk of aspiration, frequent removal of NG feeding tubes.</p> <p>Collaborative</p> <p>Review abdominal x-ray if done.</p>	<p>Helps identify aspiration of enteral formula and/or tracheal esophageal fistula, if discovered in sputum/lung secretions. <i>Note:</i> Avoid use of methylene blue dye, which may cause false-positive guaiac test when assessing for GI bleeding.</p> <p>Presence of large gastric residuals may potentiate an incompetent esophageal sphincter, leading to vomiting and aspiration.</p> <p>Presence of formula in tracheal secretions or signs/symptoms reflecting respiratory distress suggest aspiration.</p> <p>May require consideration of surgically placed feeding tube/percutaneous endoscopic gastrostomy (PEG), jejunostomy for patient safety and consistency of enteral formula delivery.</p> <p>Confirmation of placement of gastric feeding tube may be obtained by x-ray.</p>

<p>NURSING DIAGNOSIS: Fluid Volume, risk for imbalance</p> <p>Risk factors may include</p> <p>Active loss and/or failure of regulatory mechanisms (specific to underlying disease process/trauma); complications of nutrition therapy, e.g., high-glucose solutions, hyperglycemia (hyperosmolar nonketotic coma and severe dehydration)</p> <p>Inability to obtain/ingest fluids</p> <p>Possibly evidenced by</p> <p>[Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</p> <p>Fluid Balance (NOC)</p> <p>Display moist skin/mucous membranes, stable vital signs, individually adequate urinary output; be free of edema and excessive weight loss/inappropriate gain.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Fluid Management (NIC)</p> <p>Independent</p> <p>Assess for clinical signs of dehydration (e.g., thirst, dry skin/mucous membranes, hypotension) or fluid excess(e.g., peripheral edema, tachycardia, adventitious breath sounds).</p> <p>Incorporate knowledge of caloric density of enteral formulas into assessment of fluid balance.</p> <p>Provide additional water/flush tubing as indicated.</p> <p>Record I&O; calculate fluid balance. Measure urine specific gravity.</p> <p>Weigh daily or as indicated; evaluate changes.</p>	<p>Early detection and intervention may prevent occurrence of excessive fluctuation in fluid balance. <i>Note:</i> Severely malnourished patients have an increased risk of developing refeeding syndrome, e.g., life-threatening fluid overload, intracellular electrolyte shifts, and cardiac strain occurring during initial 3–5 days of therapy.</p> <p>Enteric solutions are usually concentrated and do not meet free water needs.</p> <p>With higher calorie formula, additional water is needed to prevent dehydration/HHNC.</p> <p>Excessive urinary losses may reflect developing HHNC. Specific gravity is an indicator of hydration and renal function.</p> <p>Rapid weight gain (reflecting fluid retention) can predispose/potentiate HF or pulmonary edema. Gain of more than 0.5 lb/day indicates fluid retention and not deposition of lean body mass.</p>
<p>Collaborative</p> <p>Monitor laboratory studies, e.g.:</p> <ul style="list-style-type: none"> Serum potassium/phosphorus; Hct; Serum albumin. <p>Dilute formula or change from hypertonic to isotonic formula as indicated.</p>	<p>Hypokalemia/phosphatemia can occur because of intracellular shifts during initial refeeding and may compromise cardiac function if not corrected.</p> <p>Reflects hydration/circulating volume.</p> <p>Hypoalbuminemia/decreased colloidal osmotic pressure leads to third spacing of fluid (edema).</p> <p>May decrease gastric intolerance, reducing occurrence of diarrhea and associated fluid losses.</p>

NURSING DIAGNOSIS: Fatigue

May be related to

Decreased metabolic energy production; increased energy requirements (hypermetabolic states, healing process)
Altered body chemistry: medications, chemotherapy

Possibly evidenced by

Overwhelming lack of energy, inability to maintain usual routines/accomplish routine tasks
Lethargy, impaired ability to concentrate

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Endurance (NOC)

Report increased sense of well-being/energy level.
Demonstrate measurable increase in physical activity.

ACTIONS/INTERVENTIONS	RATIONALE
<p>Energy Management (NIC)</p> <p>Independent</p> <p>Monitor physiological response to activity, e.g., changes in BP, or heart/respiratory rate.</p> <p>Establish realistic activity goals with patient.</p> <p>Plan care to allow for rest periods. Schedule activities for periods when patient has most energy. Involve patient/SO in schedule planning.</p> <p>Encourage patient to do whatever possible, e.g., self-care, sitting up in chair, walking. Increase activity level as indicated.</p> <p>Provide passive/active ROM exercises to bedridden patients.</p> <p>Keep bed in low position, pathways clear of furniture; assist with ambulation.</p> <p>Assist with self-care needs as necessary.</p>	<p>Tolerance varies greatly, depending on the stage of the disease process, nutritional state, and fluid balance.</p> <p>Provides for a sense of control and feelings of accomplishment.</p> <p>Frequent rest periods are needed to restore/conserves energy. Planning allows patient to be active during times when energy level is higher, which may restore a feeling of well-being and a sense of control.</p> <p>Increases strength/stamina and enables patient to become more active without undue fatigue.</p> <p>The development of healthy lean muscle mass depends on the provision of both isotonic and isometric exercises.</p> <p>Protects patient from injury during activities.</p> <p>Generalized weakness may make ADLs almost impossible for patient to complete.</p>
<p>Collaborative</p> <p>Provide supplemental O₂ as indicated.</p> <p>Refer to physical/occupational therapy.</p>	<p>Presence of anemia/hypoxemia reduces O₂ available for cellular uptake and contributes to fatigue.</p> <p>Programmed daily exercises and activities help patient maintain/increase strength and muscle tone and enhance sense of well-being.</p>

NURSING DIAGNOSIS: Knowledge, deficient [Learning Need] regarding condition, prognosis, treatment, self-care, and discharge needs

May be related to

Lack of exposure/recall, information misinterpretation
Cognitive limitation

Possibly evidenced by

Request for information, questions/statement of misconception
Inaccurate follow-through of instructions/development of preventable complications

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Knowledge: Disease Process (NOC)

Verbalize understanding of condition/disease process and individual nutritional needs.

Knowledge: Treatment Procedure (NOC)

Correctly perform necessary procedures and explain reasons for the actions.

ACTIONS/INTERVENTIONS	RATIONALE
<p>Teaching: Prescribed Diet (NIC)</p> <p>Independent</p> <p>Assess patient's/SO's knowledge of nutritional state. Review individual situation, signs/symptoms of malnutrition, future expectations, transitional feeding needs.</p> <p>Discuss reasons for use of parenteral/enteral nutrition support.</p> <p>Provide adequate time for teaching patient/SO when patient is going home on enteral/parenteral feedings. Document patient's/SO's understanding and ability/competence to deliver safe home therapy.</p> <p>Discuss proper handling, storage, preparation of nutritional solutions or blenderized feedings; also discuss aseptic or clean techniques for care of insertion sites and use of dressings.</p> <p>Review use/care of nutritional support devices.</p> <p>Review specific precautions depending on type of feeding, e.g., checking placement of tube, sitting upright for enteral feeding, maintaining patency of tube, anchoring of tubing and adequate length of tubing for nighttime feeding.</p>	<p>Provides information from which patient/SO can make informed choices. Knowledge of the interaction between malnutrition and illness is helpful in understanding need for special therapy.</p> <p>May experience anxiety regarding inability to eat and may not comprehend the nutritional value of the prescribed TPN/tube feedings.</p> <p>Generally, 3–4 days is sufficient for patient/SO to become proficient with tube feedings. Parenteral therapy is more complex, and patient/SO may require a week or longer to feel ready for home management; follow-up in the home is required.</p> <p>Reduces risk of formula-/solution-related problems, metabolic complications, and infection.</p> <p>Patient understanding and cooperation are key to the safe insertion and maintenance of nutritional support access devices and prevention of complications.</p> <p>Promotes safe self-care and reduces risk of complications.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Teaching: Prescribed Diet (NIC)</p> <p>Independent</p> <p>Discuss/demonstrate reinsertion of enterostomal feeding tube if appropriate.</p> <p>Identify signs/symptoms requiring medical evaluation, e.g., nausea/vomiting, abdominal cramping or bloating, diarrhea, rapid weight changes; erythema, drainage, foul odor at tube insertion site, fever/chills; coughing/choking or difficulty breathing during enteral feeding.</p> <p>Instruct patient/SO in glucose monitoring if indicated.</p> <p>Discuss signs/symptoms and treatment of hyperglycemia/hypoglycemia.</p> <p>Encourage use of diary for recording test results, physical feelings/reactions, activity level, oral intake if any, I&O, weekly weight.</p> <p>Recommend daily exercise/activity to tolerance, scheduling of adequate rest periods.</p> <p>Ascertain that all supplies are in place in the home before discharge; make arrangements as needed with suppliers, e.g., hospital, pharmacy, medical equipment company, laboratory.</p> <p>Refer to nutritional support team, home healthcare agency, and counseling resources. Provide with immediate access phone numbers.</p>	<p>Tube may be changed routinely or inserted only for feedings. Intermittent feedings enhance patient mobility and aid in transition to regular feeding pattern.</p> <p>Early evaluation and treatment of problems (e.g., feeding intolerance, infection, aspiration) may prevent progression to more serious complications.</p> <p>Timely recognition of changes in blood glucose levels reduces risk of hyperglycemic or hypoglycemic reactions in patient on hyperalimentation.</p> <p>Hyperglycemia is more common for patients receiving parenteral feedings and those who have pancreas or liver disease or are taking large doses of corticosteroids. Rebound hypoglycemia can occur when feedings are intentionally/accidentally discontinued.</p> <p>Provides resource for review by healthcare providers for optimal management of individual situation.</p> <p>Enhances gastric motility for enteral/transition feedings, promotes feelings of general well-being, and prevents undue fatigue.</p> <p>Provides for successful and competent home therapy.</p> <p>Patient/SO needs readily available support persons to assist with nutrition therapy, equipment problems, and emotional adjustments in long-term/home-based therapy.</p>

POTENTIAL CONSIDERATIONS following acute hospitalization (dependent on patient's age, physical condition/presence of complications, personal resources, and life responsibilities)

Fatigue—decreased metabolic energy production; increased energy requirements (hypermetabolic states, healing process); altered body chemistry, e.g., medications, chemotherapy.

Injury, risk for—catheter-related complications (catheter breaks, dislodgement, occlusion), effects of therapy (e.g., electrolyte/fluid shifts, diarrhea)/drug interactions, aspiration.

Infection, risk for—invasive tubes, environmental exposure, malnutrition, chronic disease.

Family Processes, interrupted—situational crises.