

# *Nutritional Management*

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The icon ♦ denotes content of special importance for NCLEX®.

## MACRONUTRIENTS

### Carbohydrates

- A. Carbohydrates are the chief source of energy and contain carbon, hydrogen, and oxygen.
  - 1. Carbohydrates include sugars, starches, and cellulose.
  - 2. Simple sugars, such as fruit sugar, are easily digested.
  - 3. Starches, which are more complex, require more sophisticated enzyme processes to be reduced to glucose.
  - 4. One gram of carbohydrate provides 4 kilocalories.
  - 5. Glucose, which is converted sugar or starch, appears in the body as blood sugar.
    - a. It is “burned” as fuel by the tissues.
    - b. Some glucose is processed by the liver, converted to glycogen, and stored by the liver for later use.
- ◆ B. Ingesting too many carbohydrates crowds out other important foods; it prevents the body from receiving the necessary nutrients for healthy maintenance.
- ◆ C. Ingesting too few carbohydrates leads to loss of energy, depression, ketosis; it also leads to a breakdown of body protein.
- D. The amount and kind of carbohydrates that should be consumed for optimal health are determined by several factors.
  - 1. Differences in body structure; energy expenditure; basal metabolism rate; and general health status.
  - 2. The average American diet provides 45% of calories from carbohydrates; it is recommended that this proportion be increased to 50–65%.
  - 3. Simple (refined) sugars should be limited to 10% total calories.

### Fats or Lipids

- A. Fats or lipids are the second important group of nutrients.
  - 1. They provide energy.
  - 2. When oxidized, they are the most concentrated sources of energy.
  - 3. They furnish the calories necessary for survival; each fat gram provides 9 kilocalories.
- B. Fats also act as carriers for the fat-soluble vitamins A, D, E, and K.
- C. Consuming too much fat is unhealthy.
  - 1. The average American diet provides 35–40% of calories from fat.
  - 2. Fats should account for no more than 20–35% of daily calorie intake.

- D. Fatty acids are the basic components of fat, and comprise two main groups.
  - ◆ 1. *Saturated fatty acids* usually come from animal sources. It is recommended to substitute saturated fats with polyunsaturated and monounsaturated fats.
    - a. Saturated fats should be less than 10% of calories.
    - b. Cholesterol should be limited to 300 mg daily.
  - ◆ 2. *Unsaturated fatty acids* primarily come from vegetables, nuts, or seed sources and are liquid at room temperature.
    - a. This group contains three essential fatty acids.
    - b. These acids are called *essential* because they are necessary to prevent a specific deficiency disease.
    - c. The body cannot manufacture these acids. They are obtained only from the diet.
    - d. These acids are called linoleic acid, arachidonic acid, and linolenic acid.
    - e. A deficiency in this group would lead to skin problems, illness, and unhealthy blood and arteries.

### Proteins

- A. Proteins are complex organic compounds that contain amino acids.
- ◆ B. Protein is critical to all aspects of growth and development of body tissues. It is necessary for the building of muscles, blood, skin, internal organs, hormones, and enzymes.
- C. Each gram of protein provides 4 kilocalories.
  - 1. The RDA for protein is 56 g/day for men and 45 g/day for women.
  - 2. The optimal diet should be 10–12% protein rather than the 17% most Americans consume.
- D. Protein is also a source of energy.
  - 1. When there is insufficient carbohydrate or fat in the diet, protein is burned.
  - 2. When protein is spared, it is either used for tissue repair and maintenance or converted by the liver and stored as fat.
- ◆ E. When proteins are digested and broken down, they form 20 amino acids.
  - 1. Amino acids are absorbed from the intestine into the bloodstream.
  - 2. They are carried to the liver for synthesis into the tissues and organs of the body.
- F. Amino acids are the chemical basis for life. If just one is missing, protein synthesis will decrease or even stop.

- ◆ G. All but nine amino acids can be synthesized by the body. Eight are required by all humans; infants require one more—histidine.
  - 1. These nine must be obtained from the diet.
  - 2. If all nine are present in a particular food, the food is a *complete protein*.
  - 3. Foods that lack one or more essential amino acids are called *incomplete proteins*.
- ◆ 4. Most meat and dairy products are complete proteins.
- 5. Most vegetables and fruits are incomplete proteins.
- ◆ 6. When several incomplete proteins are ingested, they should be combined carefully so that the result will be a balance yielding complete protein. For example, the combination of beans and rice is a complete protein food.
- H. Protein deficiency can affect the entire body—organs, tissues, skin, and muscles, as well as certain body processes.

## Water

- A. While not specifically a nutrient, water is essential for survival.
  - 1. Water is involved in every body process, from digestion and absorption to excretion.
  - 2. It is a major portion of circulation and is the transporter of nutrients throughout the body.
- B. Body water performs three major functions.
  - 1. Water gives form to the body, accounting for 50–75% (average 60%) of the body mass.
  - 2. It provides the necessary environment for cell metabolism.
  - 3. It maintains a stable body temperature.
- C. Almost all foods contain water that is absorbed by the body.
- D. The average adult body (male weighing 70 kg) contains approximately 40 L of water and loses about 3 L per day.
  - 1. If a person suffers severe water depletion, dehydration and salt depletion can result and can eventually lead to death.
  - 2. A person can survive longer without food than without water.

## MICRONUTRIENTS

### Vitamins

- A. Vitamins are organic food substances and are essential in small amounts for growth, maintenance, and the functioning of body processes.
- B. Vitamins are found only in living things—plants and animals—and usually cannot be synthesized by the human body.
- C. Vitamins can be grouped according to the substance in which they are soluble.
- ◆ D. The fat-soluble group includes vitamins A, D, E, and K.
- E. The water-soluble vitamins include the B-complex vitamins, vitamin C, and the bioflavonoids.
- F. Vitamins have no caloric value, but they are as necessary to the body as any other basic nutrient.
  - 1. Currently, there are about 20 substances identified as vitamins.
  - 2. Recent research is concerned with identifying even more of these substances because they are so essential to survival.
- G. The most commonly used guidelines are the listings of the Recommended Dietary Allowances (RDA), based on standards established by the National Academy of Sciences. (See **Table 4-1**.)

## Minerals

- A. Minerals are inorganic substances, widely prevalent in nature, and essential for metabolic processes.
- B. Minerals are grouped according to the amount found in the body. These are both major minerals and trace minerals.
- ◆ C. Major minerals include calcium, magnesium, sodium, potassium, phosphorus, sulfur, and chlorine, all of which have a known function in the body.
- D. Trace minerals include iron, copper, iodine, manganese, cobalt, zinc, fluorine, selenium, and molybdenum. Their function in the body remains unclear.
- E. There remains another group of trace minerals found in scanty amounts in the body and whose function is also unclear.

◆ **Table 4-1 FOODS RICH IN FAT AND WATER-SOLUBLE VITAMINS**

#### Foods rich in fat-soluble vitamins

Vitamin A—liver, egg yolk, whole milk, butter, fortified margarine, green and yellow vegetables, fruits

Vitamin D—fortified milk and margarine, fish oils

Vitamin E—vegetable oils and green vegetables

Vitamin K—egg yolk, leafy green vegetables, liver, cheese

#### Foods rich in water-soluble vitamins

Vitamin C—citrus fruits, tomatoes, broccoli, cabbage

Thiamine (B<sub>1</sub>)—lean meat such as beef, pork, liver; whole-grain cereals and legumes

Riboflavin (B<sub>2</sub>)—milk, organ meats, enriched grains

Niacin—meat, beans, peas, peanuts, enriched grains

Pyridoxine (B<sub>6</sub>)—yeast, wheat, corn, meats, liver, kidney

Cobalamin (B<sub>12</sub>)—lean meat, liver, kidney

Folic acid—leafy green vegetables, eggs, liver

<b>Table 4-2 ESSENTIAL BODY NUTRIENTS</b>	
<b>Carbohydrates</b>	Monosaccharides Glucose, fructose, galactose Disaccharides Sucrose, lactose, maltose Polysaccharides Starch, dextrin, glycogen, cellulose, hemicellulose
<b>Fats</b>	Linoleic acid, linolenic acid, arachidonic acid
<b>Proteins</b>	Amino acids Phenylalanine, lysine, isoleucine, leucine, methionine, valine, tryptophan, threonine, histidine
<b>Vitamins</b>	Fat-soluble Vitamins A, D, E, and K Water-soluble Vitamins B <sub>1</sub> , B <sub>2</sub> , B <sub>6</sub> , B <sub>12</sub> , niacin, pantothenic acid, folacin, biotin, choline, mesoinositol, para-aminobenzoic acid, and vitamin C
<b>Minerals</b>	Major elements Calcium, chlorine, iron, magnesium, phosphorus, potassium, sodium, sulfur Trace elements
<b>Water</b>	

- F. Minerals form 60–90% of all inorganic material in the body, and are found in bones, teeth, soft tissue, muscle, blood, and nerve cells.
- G. Minerals act on organs and in metabolic processes.
  - 1. They serve as catalysts for many reactions, such as controlling muscle responses, maintaining the nervous system, and regulating acid–base balance.
  - 2. They assist in transmitting messages, maintaining cardiac stability, and regulating the metabolism and absorption of other nutrients.
- H. Even though they are considered separately, all minerals work synergistically with other minerals, and their actions are interrelated.
  - 1. A deficiency in one mineral will affect the action of others in the body.
  - 2. Adequate minerals must be ingested because a mineral deficiency can result in severe illness.
  - 3. Excessive amounts of minerals can throw the body out of balance and may be toxic to the body.
- I. Adequate diet can supply sufficient minerals.  
(See Table 4-2.)

## ASSIMILATION OF NUTRIENTS

### Gastrointestinal Tract

- A. The main functions of the gastrointestinal system.
  - 1. Secretion of enzymes and electrolytes to break down raw materials that are ingested.
  - 2. Movement of ingested products through the system.

- 3. Complete digestion of nutrients.
- 4. Absorption of nutrients into the blood.
- 5. Storage of nutrients.
- 6. Excretion of the end products of digestion.
- B. When nutrients reach the stomach, both mechanical and chemical digestive processes occur.
  - 1. Nutrients are churned, and peristaltic waves move the material through the stomach.
  - 2. At intervals, with relaxation of the pyloric sphincter, they move into the duodenum.
  - 3. This chemical action creates hydrochloric acid, which provides a medium for pepsin to split protein into proteoses and peptones.
  - 4. The digestive process produces other chemical actions.
    - a. Lipase, a fat-splitting enzyme.
    - b. Rennin, an enzyme that coagulates the protein of milk.
    - c. The intrinsic factor, which acts on certain food components to form the antianemic factor.
  - C. Nutrients then move into the duodenum and the jejunum.
    - 1. Intestinal juices provide a large number of enzymes.
      - a. These break down protein into amino acids.
      - b. They form and convert maltase to glucose.
      - c. They split nucleic acids into nucleotides.
    - 2. The large intestine provides for the absorption of nutrients and the elimination of waste products.
      - a. Vitamins K and B<sub>12</sub>, riboflavin, and thiamine are formed.
      - b. Water is absorbed from the fecal mass.

### The Accessory Organs

- A. The accessory organs of the gastrointestinal tract play an important role in the utilization of nutrients.
- B. The liver plays a major role in the metabolism of carbohydrates, fats, and proteins.
  - 1. Liver converts glucose to glycogen and stores it.
  - 2. It reconverts glycogen to glucose when the body requires higher blood sugar.
  - 3. The process of releasing carbohydrates (end products) into the bloodstream is called glycogenolysis.
  - 4. Fats are metabolized through the process of oxidation of fatty acids and the formation of acetoacetic acid.
  - 5. Lipoproteins, cholesterol, and phospholipids are formed, and carbohydrates and protein are converted to fats.

**Table 4-3 MAJOR ENZYMES OF DIGESTION**

Enzyme	Source/Secretion	Substance Acted On
Ptyalin	Oral/Saliva	Starch
Maltose	Oral/Saliva	Maltose
Pepsin	Gastric	Protein
Lipase	Gastric	Fat
Rennin	Gastric	Casein (protein in milk)
Trypsin	Pancreatic	Protein
Steapsin	Pancreatic	Fat
Amylopsin	Pancreatic	Starch
Amylase	Intestinal	Starch
Maltase	Intestinal	Maltose
Lactase	Intestinal	Lactose
Sucrase	Intestinal	Sucrose
Erepsin	Intestinal	Protein
Enterokinase	Intestinal	Protein

- 6. Proteins are metabolized in the liver, and deamination of amino acids takes place.
- 7. The formation of urea and plasma proteins is completed.
- 8. The interconversions of amino acids and other compounds occur in the liver.
- C. The gallbladder's primary function is to act as a reservoir for bile.
  - 1. Bile emulsifies fats through constant secretion.
  - 2. Secretion rate is 500–1000 mL every 24 hours.
- D. The pancreas secretes pancreatic juices that contain enzymes for the digestion of carbohydrates, fats, and proteins (**Table 4-3**).
  - 1. Enzymes are secreted as inactive precursors that do not become active until secreted into the intestine.
  - 2. In the intestine, the enzyme trypsin acts on proteins to produce peptones, peptides, and amino acids.
  - 3. Pancreatic amylase acts on carbohydrates to produce disaccharides.
  - 4. Pancreatic lipase acts on fats to produce glycerol and fatty acids.

## GASTROINTESTINAL DYSFUNCTIONS

- A. Dysphagia (difficulty swallowing) occurs in 60% of stroke clients and 50% of clients with Parkinson's disease.
  - 1. Dysphagia may also occur in cerebral palsy, multiple sclerosis, polio, and myasthenia gravis.
  - 2. Most serious complication is aspiration of liquid or food into lungs.

- B. Gastrointestinal hemorrhage may cause a rise in serum ammonia, which may lead to altered neurologic function.
- C. Intestinal obstruction—cessation of peristalsis (ileus) results in altered GI movement and absorption.

## NUTRITIONAL CONCEPTS

### Normal and Therapeutic Nutrition

- A. Normal nutrition.
  - 1. A guide for determining adequate nutrition is the U.S. Department of Agriculture recommended daily dietary allowances.
    - a. The guide is scientifically designed for the maintenance of healthy people in the United States.
    - b. The values of the caloric and nutrient requirements given in the guide are used in assessing nutritional states.
    - c. Stress periods in the life cycle, which require alterations in the allowances, should be considered during the planning of menus.
  - 2. The basic food groups are described in the My Plate Food Guide 2011. (See **Appendix 4-2**, MyPlate Food Guide 2011).
    - a. Choices in these food groups are offered to meet the nutrient recommendations during the life cycle. (Caloric requirements are not included.)
    - b. The basic nutrients in each food group should be related to dietary needs during the life cycle when menus are planned for each age group.
- B. Therapeutic nutrition.
  - 1. The therapeutic or prescription diet is a modification of the nutritional needs based on the disease condition and/or the excess or deficit nutrition state.
  - 2. Combination diets, which include alterations in minerals, vitamins, proteins, carbohydrates, and fats, as well as fluid and texture, are prescribed in therapeutic nutrition.
  - 3. Although not all such diets will be included in this review, study of the selected diet concepts will enable you to combine two or more diets when necessary.
- ◆ C. Normal and therapeutic nutrition considerations.
  - 1. Cultural, socioeconomic, and psychological influences, as well as physiological requirements, must be considered for effective nutrition.
  - 2. In any given situation, the nutrition requirements must be considered within the context of the biopsychosocial needs of an individual.

### Diet Related to Heart Disease Risk

- A. The lipid hypothesis, introduced in the 1950s, suggested diet and cholesterol (especially saturated fat) presented risk for heart disease.
  - 1. Total cholesterol over 200 and ratio of high-density lipoproteins (HDL), the “good” cholesterol, to low-density lipoproteins (LDL) or “bad” cholesterol, predict risk.
  - 2. Goal is to reduce saturated fat in diet.
- B. High concentration of homocysteine in blood is also associated with risk for heart disease.
  - 1. An amino acid forms when diet has a high concentration of meat and dairy products.
  - 2. Excess levels damage artery walls, causing the blood vessel to trap circulating cholesterol.
  - 3. Increasing daily intake of B vitamins (folic acid, pyridoxine and B<sub>12</sub>) will reduce homocysteine levels.

### Nutritional Problems in the Hospital

- A. Nutrition is frequently neglected as a viable component of client management.
- B. For clients who seem to be stable on admission and give no history of nutritionally related food problems, the usual hospital diet is adequate.
  - ◆ 1. These clients must be reassessed periodically to prevent nutritional problems from developing.
  - 2. A periodic assessment is especially important for clients hospitalized for a long period of time. (See **Appendix 4-1**, Nutritional Assessment Parameters.)
  - 3. Studies conducted at various medical centers support the claim that as many as 50% of hospitalized clients suffer from malnutrition and become more malnourished the longer they remain in a hospital.
- C. For clients identified as having a nutritional problem, a client care plan must be developed.
  - 1. The cause of depletion must be determined.
  - 2. Research indicates that poor food intake is the leading cause of malnutrition.
  - ◆ 3. Reasons for poor food intake.
    - a. The client may feel fear, anxiety, or depression prior to or during hospitalization.
    - b. Some clients may not be capable of feeding themselves or may have poor-fitting dentures.
    - c. Treatment and therapy may limit the capability of a client to eat or interfere with a client's appetite.

- d. Although the desire for food is present, shortly after eating a certain food a client may have cramps, pain, gas, or diarrhea or feel nauseous and/or vomit.
- D. As clients become more and more malnourished, they lose the ability to handle foodstuffs metabolically.
  - 1. As intake decreases below nutritional requirements, the body cannot generate the epithelium of the gastrointestinal tract from the crypt cells.
  - 2. The villi and microvilli needed to metabolize and absorb food flatten and become ineffective.
  - 3. This condition leads to malabsorption, resulting in malnutrition.
- E. Malabsorption—the osmotic gap.
  - 1. The management of clients with malabsorption and maldigestion can be complex. It consists of treatment of the underlying disease, management of accompanying symptoms, and correction of nutritional deficits.
  - 2. Because many diseases may lead to malabsorption, there is no one nonspecific or generally recommended treatment. As a result, knowing the exact diagnosis is essential for successful therapy.
  - 3. Most clients presenting with malabsorption have only mild or moderate weight loss. If the underlying disease causing the malabsorption can be treated, most clients can continue with normal or slightly modified dietary intake.
  - 4. Dietary restrictions in some diseases leading to malabsorption can result in full restoration of mucosal function and nutritional status of the client.

### Instituting Therapeutic Regimens

- A. Check that a complete nutritional assessment has been completed on the client. (See **Appendix 4-1**, Nutritional Assessment Parameters.)
- B. Evaluate the status of the client's gastrointestinal tract to determine if modifications in nutrients are necessary.
  - 1. Can the client split intact protein into the peptides and amino acids needed for absorption?
  - 2. Can the client tolerate the osmotic load of monosaccharides or disaccharides?
  - 3. Is the client fat intolerant, or does the client need special fat? Is the client lactose intolerant?

- C. Check that therapeutic diet is ordered.
- D. Be aware of compliance by the client.
  - 1. The nurse can best determine the client's actual intake.
  - 2. The nurse should ensure that the client is not receiving inappropriate foods from other sources.
  - 3. The nurse should check that the client is actually eating the foods prescribed.
- E. If the prescribed diet is not meeting the client's needs, consider an alternative method of feeding.
  - 1. If oral feedings prove inadequate, then alternative methods such as nasogastric, nasoduodenal, or nasojejunal tube feeding should be considered.
  - 2. A variety of delivery systems and methods of enteral feeding are now available for adequate care of the client.
  - 3. When other methods have failed, parenteral nutrition may be the management of choice.
    - a. This can be administered peripherally, using isotonic concentrations of glucose, crystalline amino acids, and fats.
    - b. It can be administered through a central, high-flow vein in which hypertonic glucose is given, supplemented with crystalline amino acids, fats, electrolytes, vitamins, and trace elements.
- F. Be alert to clients' nutritional needs so that no client becomes or remains malnourished or develops any kind of nutritional problem. (See **Table 4-4**.)
  - 1. Elicit food preferences from the client.
  - 2. Send request to the diet kitchen for the specific diet and keep diet sheets or diet requests up to date.
  - ◆ 3. Check all diet trays before serving to ensure the diet provided is the one ordered.
  - 4. Ensure that hot food is hot and cold food is cold.
  - 5. Keep food trays attractive. Avoid spilling liquids on tray.
  - ◆ 6. Position the client in a chair or up in bed (unless otherwise ordered) to assist in feeding.
  - 7. Assist the client with cutting meat and opening milk cartons as needed.
  - 8. Feed the client if necessary.
- G. Administer ordered fluids and tabulate fluid intake.

### Nutritional Guidelines for Managing Clients

- A. An adequate diet must include carbohydrates, fats, proteins, vitamins, and minerals.
  - 1. Carbohydrates are the chief source of energy, and diets not sufficient in carbohydrates lead to a low energy level, use of protein for energy, and ketosis.

♦ **Table 4-4 RECOMMENDED NUTRIENT REQUIREMENTS FOR HEALING\***

**Total calories**

2800 for tissue repair; 6000 for extensive repair

**Protein**

50–75 g/day early in postoperative period

100–200 g/day if needed for new-tissue synthesis

**Carbohydrate**

50–65% of calories or sufficient in quantity to meet calorie needs and allow protein to be used for tissue repair

**Fat**

20–35% or not excessive; it leads to poor tissue healing and susceptibility to infection

**Vitamins**

Vitamin C—up to 1 g/day

Vitamin B—increased above normal

Vitamin K—normal amounts

Vitamin A—stimulates immune response

Vitamin E—400 U, increases O<sub>2</sub> to tissues

**Minerals**

Normal amount for tissue repair and healing

Zinc—tissue repair

Selenium—cell repair

Calcium/magnesium—maintains electrical stimulation and relaxes nerves

\*Diet will be individualized—depends on assessment of client's needs.

- 2. Fats provide the most concentrated source of energy and are carriers for fat-soluble vitamins.
- 3. Proteins are essential for building body tissue and are necessary for tissue repair.
- 4. Vitamins are essential for growth, maintenance, and functioning of body processes.
- 5. Minerals are essential for metabolic processes.
- B. Digestion takes place throughout the gastrointestinal tract.
  - 1. The gastrointestinal system breaks down raw materials through the secretion of enzymes and electrolytes.
  - 2. Mechanical and chemical digestive processes are necessary for nutritional synthesis.
  - 3. Nutrients are absorbed through the large intestine.
  - 4. The liver plays a major role in nutritional metabolism.
- C. Nutritional needs are based on a client's disease condition and excess or deficit of a nutritional state.
  - 1. Therapeutic diets are used to alter health status.
  - 2. Combination diets, which include alteration of all the major nutrients, are prescribed for certain disease conditions.

- D. Alternative methods of providing nutrients must be instituted when clients are unable to ingest or assimilate foods orally.
1. Enteral feedings provide life-sustaining nutrients when other oral methods cannot be utilized.
  2. Parenteral nutrition may be administered peripherally, using isotonic concentrations, or centrally with intravenous catheter placement.

#### INTAKE MEASUREMENTS

Ice cream cup (3 oz)	90 mL
Jello cup (3 oz)	90 mL
Ice chips (8 oz) melted to 50%	120 mL
Coffee cup (5 oz)	150 mL
Soup bowl (5 oz)	150 mL
Drinking glass (8 oz)	240 mL

## Administering Therapeutic Diets

### Restricting Dietary Carbohydrates

- ◆ A. Hypoglycemia occurs when most of the glucose moves from the blood into the cells and results in abnormally low blood glucose levels (< 70 mg/dL).
  1. Foods prescribed are high protein, moderate-complex carbohydrates in five or six meals/day.
  2. Foods limited are simple carbohydrates—for example, sugar, syrup, candy. Complex carbohydrates or starches have higher nutritional values and more fiber.
- ◆ B. Diabetic guidelines.
  1. Nutrition is the cornerstone of disease management.
    - a. Normal weight must be maintained and may dramatically reduce symptoms.
    - b. Diet together with insulin supplement or oral medication and exercise complete the regimen.
  2. Goal of dietary therapy is to have a well-balanced diet and to count carbohydrates (CHO) because CHO raises blood sugar.
    - a. Diabetics do not have to give up their favorite foods; they must learn the amounts that are allowed and substitutions permitted.
    - b. General guidelines for nutrient balance are:

<b>Carbohydrate</b>	50–60% (40% from complex CHOs)
<b>Fat</b>	20–30%
Saturated fat	10%
Cholesterol	Limit to 300 mg or less
<b>Protein</b>	10–20%

- Consume 20–35 grams of fiber daily (including soluble and insoluble)
- c. Dietary ratio: 5:2:1 carbohydrate to fat to protein (according to the American Dietetic Association).
  - ◆ C. Carbohydrate counting is a nutritional tool used to maintain blood glucose levels.
    1. Count grams of carbohydrates (type 1 diabetics require more accurate monitoring).
    2. Measure servings or choices (more often used with type 2 diabetics). One carbohydrate serving = 15 g carbohydrate with vegetables is counted as one-third serving of carbohydrate.
    3. Use the glycemic index, which describes how much the blood glucose level rises with a specific food when compared with an equivalent amount of glucose. Foods with a higher glycemic index enter bloodstream rapidly, causing glucose to spike. (See **Table 4-5**.)
    - a. Particular foods (most sugars and items made with white flour) have a higher glycemic index than others.
    - b. By combining certain foods, the client may lower the glycemic index and do better at stabilizing blood glucose levels.
    - c. Combining a starch with protein or fat will lower the glycemic index.
    - d. Eating raw and whole foods and fruit rather than juices will lower glycemic index.
    - e. Keeping a chart and building individual glycemic indices by monitoring blood glucose levels after food consumption will improve stabilizing blood glucose levels.

**Table 4-5 THE GLYCEMIC INDEX OF COMMON FOODS**

Low	Moderate
(Recommended in abundance)	(Recommended in moderation)
Green vegetables	Whole-grain breads
Tomatoes	Whole-grain pasta
Beans and peas	Oatmeal
Dried apricots	Sweet potatoes
Berries	Grapes
Grapefruit	Apples
Nuts	Oranges
Rye and barley	Carrots
High	
(Not recommended at all or very sparingly)	
Most sugars	White potatoes
White breads	Corn
Crackers, rice cakes, and chips	Pineapple
Most cold cereals	Raisins
White rice	Ripe bananas

4. The client may choose any method to monitor carbohydrate consumption, but monitoring is essential if blood sugar levels are to remain within normal limits.
- D. Level of activity must be assessed to determine energy requirements.
1. Increased activity uses more carbohydrates.
  2. Most adults require 30 cal/kg of ideal body weight.

#### **Restricting Dietary Protein**

- A. A restricted-protein diet is utilized for renal impairment because protein is processed through the kidneys. (See **Table 4-6**.)
1. End products (nitrogenous waste) of protein metabolism are controlled by limiting protein intake.
  2. Protein processing uses up calcium reserves.
  3. Conditions utilizing restricted protein diets.
    - a. Pyelonephritis.
    - b. Glomerulonephritis, if oliguria is present.
    - c. Kidney insufficiency.
    - d. Dialysis management.
    - e. Encephalopathy due to liver failure.

◆ **Table 4-6 FOODS HIGH IN PROTEIN**

Food	Protein (Grams)
<b>Dairy and eggs</b>	
Cottage cheese, ½ cup	14.0
Milk, 1 cup	8.5
Cheddar cheese, 1 oz	7.1
Egg, 1 medium	6.1
Ice cream, ½ cup	2.4
<b>Meat and fish</b>	
Tuna, canned, drained, 4 oz	32.0
Chicken, 4 oz cooked	31.2
Hamburger, 4 oz cooked	30.7
Sirloin steak, 4 oz cooked	26.7
<b>Grains</b>	
Whole-wheat flour, ½ cup	8.0
Spaghetti, 1 cup cooked	6.0
Cornmeal, ½ cup	5.5
Rice, brown, 1 cup cooked	5.0
Rice, white, 1 cup cooked	4.0
<b>Legumes</b>	
Soybeans, ½ cup cooked	12.0
Peanut butter, 1 oz	7.1
Lima beans, ½ cup cooked	6.1
Cashews, 1 oz	4.8

**Table 4-7 FOODS HIGH IN PURINE**

Meat extracts
Shellfish
Liver and other organ meats
Sardines, mussels, anchovies
Chicken, turkey
Beans, lentils
Peas
Spinach
Cauliflower
Asparagus

- B. A PKU diet is an amino acid metabolism abnormality diet utilized for phenylketonuria (PKU), galactosemia, and lactose intolerance.
1. Reduce and/or eliminate the offending enzyme in the food intake of protein and utilize substitute nutrient foods.
  2. Avoid milk and milk products as they constitute the main source of enzymes for the three diseases.
  3. Employ substitutes to meet daily allowances.

#### **Low-Purine Diet**

- A. Prevents uric acid stones; also utilized for gout clients. (See **Table 4-7**.)
- B. *Restrict purine*, which is the precursor of uric acid.
- C. *Allow foods* such as milk, tea, fruit juices, carbonated beverages, breads, cereals, cheese, eggs, fat, and most vegetables.
- D. *Restrict foods* such as glandular meats, gravies, fowl, fish, and high meat quantities.

#### **Restricted Dietary Fat**

- A. A restricted-cholesterol diet decreases cardiovascular disease risk and diabetes mellitus. (See **Table 4-8**.)
1. Blood cholesterol level is reduced and/or maintained at a normal level by restricting foods high in cholesterol.

**Table 4-8 FOODS HIGH IN CHOLESTEROL**

Beef liver	Bacon
Organ meats	Chicken
Eggs	Lobster
Sardines	Turkey
Veal	Ice cream
Lamb	Hot dogs
Beef	White fish
Pork	

2. Lipid level goals—cholesterol: 160–200 mg/dL; LDL < 100 mg/dL; HDL > 45 for males and > 55 for females; triglycerides < 150.
  - a. Total cholesterol.
 

< 200	desirable
> 240	high
  - b. LDL (bad cholesterol).
 

< 100	optimal
160–189	high
> 190	
  - c. HDL (good cholesterol).
 

< 40	low
> 60	high
  - d. Triglycerides.
 

< 150	normal
200–499	high
> 500	
3. Restrict total fat to 30% of calories; restrict saturated fat to 10% (or less) of calories.
- ◆ 4. The average person should consume 250–300 mg of cholesterol per day. (One egg has 275 mg of cholesterol; one 3-ounce serving of hamburger has 50 mg of cholesterol.)
5. Substitute trans fats and saturated fat with monounsaturated fats (found in plant products); increase essential fatty acids.
6. Decrease high-cholesterol foods found in animal products—for example, egg yolks, shellfish, organs and red meat, and pork.
7. Encourage low-cholesterol foods, such as vegetable oils, raw or cooked vegetables, fruits, lean meats, and fowl.
- B. A modified-fat diet is utilized according to individual tolerance in specific diseases and conditions and for those wishing to lose weight.
  1. Attempt to lower fat content in diet to reduce irritation of diseased organs and to reduce fat content where there is inadequate absorption.
  2. Modified-fat diets are appropriate for the following conditions:
    - a. Malabsorption syndromes.
    - b. Cystic fibrosis.

- c. Obstructive jaundice.
- d. Liver disease.
- ◆ C. A polyunsaturated-fat diet is utilized primarily for cardiovascular diseases.
  1. Reduce intake of saturated fats and increase intake of foods rich in polyunsaturated fats. (Physician usually prescribes caloric level as well as restrictions.)
  2. Limit foods originating from animal sources and selected plants, such as peanuts, olives, avocado, coconuts, chocolate, and cashew nuts.
  3. Allow foods originating from vegetable sources (except for those named above), butter substitute, corn/soybean/safflower oil, fresh ground peanut butter, and nuts (except cashews).

### Vitamins

- A. An increased-vitamin diet is necessary for treatment of specific vitamin deficiencies.
  1. Provide a high-vitamin diet for clients with burns, healing wounds, raised temperatures, and infections. Also used for pregnant clients. (See **Table 4-9**.)
  2. Evaluate diseases, such as cystic fibrosis and liver disease, that require water-soluble vitamins. (See Table 4-1 for water-soluble vitamins.)
- B. Total low-vitamin diets are not generally prescribed, although specific vitamins might be decreased for periods of illness.

### Minerals

- A. Sodium restriction.
  1. Correct and/or control the retention of sodium and water in the body by limiting sodium intake. May be done by restriction of salt in the diet or in combination with medications.
  2. Restrict salt in cooking or at the table. In clients requiring dietary modification in salt intake, any product containing sodium, such as sodium bicarbonate, may be prohibited.
  3. The typical diet provides 4–6 g of sodium per day.

**Table 4-9 MAJOR FOOD SOURCES OF VITAMINS**

Vitamin A	Vitamin B Group	Vitamin C	Vitamin D	Vitamin E	Vitamin K
Dairy products (milk)	Pork, beef, fish, liver, organ meats	Fruits and vegetables: citrus (oranges, grapefruit, lemons), strawberries, bell peppers, cantaloupe, broccoli, greens	Foods fortified with vitamin D—milk	Vegetable oils Nuts, seeds	Meats Egg yolk
Liver	Eggs		Egg yolk	Green vegetables, especially leafy vegetables	Liver
Egg yolk			Fish		Vegetable oils Tomatoes
Dark green and dark yellow vegetables and fruits: carrots, sweet potato, spinach, cantaloupe, broccoli, water-melon, leaf lettuce	Peanuts, nuts grains Legumes, beans, spinach Green, leafy vegetables Yeast Oatmeal			Wheat germ; whole-grain products	Cauliflower Peas Potatoes Cheese

◆ **Table 4-10 FOODS HIGH IN SODIUM**

Table salt and all prepared salts, such as celery salt  
 Smoked meats and salted meats  
 Most frozen or canned vegetables with added salt  
 Butter, margarines, and cheese  
 Quick-cooking cereals  
 Shellfish and frozen or salted fish  
 Seasonings and sauces  
 Canned soups  
 Chocolates and cocoa  
 Beets, celery, and selected greens (spinach)  
 Foods with salt added, such as potato chips and popcorn

◆ **Table 4-11 FOODS HIGH IN POTASSIUM\***

Fruit juices such as orange, grapefruit, banana, and apple  
 Instant, dry coffee powder  
 Egg, legumes, whole grains  
 Fish, especially fresh halibut and codfish  
 Pork, beef, lamb, veal, chicken  
 Milk, skim and whole, instant breakfast mix, soy milk  
 Sports drinks (Gatorade, etc.)  
 Molasses  
 Dried dates, prunes, apricots, dates, raisins, figs, avocado, bananas, coconut, melon, kiwi, mango, nectarines, oranges, orange juice, papaya, pears, plantains, pomegranate, yams  
 Bamboo shoots, baked or refried beans, beets, broccoli (cooked), Brussels sprouts, cabbage (raw), carrots (raw), chard, greens (except kale), kohlrabi, olives, mushrooms (canned), potatoes (white and sweet), parsnips, pickles, pumpkin, rutabaga, sauerkraut, spinach (cooked), squash (acorn, butternut, hubbard), tomato, tomato sauce, tomato juice, and vegetable juice cocktail  
 Peanut butter, nuts or seeds, cookies, chocolate  
 Bouillon and meat broths  
 Whole-grain breads, wheat bran, granola, and granola bars

\*These foods have greater than 250 mg of potassium per serving and should be avoided or eaten in very small portions.

- ◆ 4. Sodium dietary restrictions. (See **Table 4-10**.)
  - a. **Mild:** 2–3 g sodium (no added salt provides 3 g sodium per day).
  - b. **Moderate:** 1500 mg sodium.
- 5. Conditions utilizing low sodium in their management.
  - a. Ménière's disease.
  - b. Edema in congestive heart failure.
  - c. Right ventricular failure.
  - d. Hypertension.
  - e. Cirrhosis with edema.
  - f. Portal hypertension.
  - g. Uremia.
  - h. Dialysis management.
  - i. Pregnancy-induced hypertension.
- B. Potassium management.
  - 1. Replace potassium loss from the body with specific foods high in potassium or a potassium supplement. Severe loss is managed with intravenous therapy. (See **Table 4-11**.)
  - 2. Avoid no specific foods unless there is a sodium restriction because some foods high in potassium are also high in sodium.
  - 3. Conditions requiring low potassium.
    - a. Glomerulonephritis.
    - b. Dialysis management.
  - 4. Conditions requiring increased potassium.
    - a. Diabetic acidosis.
    - b. Burns, after the first 48 hours.
    - c. Vomiting.
    - d. Extended high temperature.
    - e. Use of diuretic drugs.
- C. Enhanced-calcium diet. (See **Table 4-12**.)
  - 1. Used to prevent or correct postmenopausal osteoporosis and prevent and treat hypertension.
  - 2. Increase normal adult intake of 1 g/day to 1.5 g/day.

3. Recommend use of fortified low-fat and nonfat dairy products.

4. Lactose-intolerant clients should use green, leafy vegetables and nonliquid dairy products (cheese, yogurt).

D. Iron supplements. (See **Table 4-13**.)

- 1. Replace a deficit of iron caused by inadequate intake or chronic blood loss. Women especially tend to be low in iron.
- ◆ 2. Suggested iron intake is 18 mg/day.
- 3. Conditions utilizing high iron in their management.
  - a. Peptic ulcer disease.
  - b. Diverticulosis.
  - c. Ulcerative colitis.
  - d. Anemias: nutritional, pernicious.

**Table 4-12 FOODS HIGH IN CALCIUM**

Milk, cream  
 Cottage cheese  
 Mustard greens, turnip greens  
 Kale  
 Shrimp, clams, oysters  
 Salmon  
 Cheese  
 Ice cream

**Table 4-13 FOODS HIGH IN IRON**

Organ meats, especially beef liver
Red meat, turkey, chicken
Fish, shellfish
Blackstrap molasses
Egg yolk
Lima beans, legumes
Sunflower seeds
Almonds, pecans, cashews
Dried fruits, apricots, prunes, raisins
Leafy vegetables, broccoli, Brussels sprouts
Peas
Kidney beans
Brewer's yeast
Cheese—Swiss, ricotta, Roquefort
Wild rice
Yogurt
Wheat germ
Bananas

- e. Hemorrhage.
- f. Postgastrectomy syndrome.
- g. Malabsorption syndrome.
- h. Crohn's disease.
- i. Increased for pregnancy and lactation.

**Fiber Control**

- ◆ A. A high-fiber (roughage) diet is an important constituent of our diet. The average person eats 20 g of fiber per day; 30–40 g is recommended.
  - 1. High-fiber foods help a person lose weight, keep the heart healthy, and lower the risk of developing colon cancer (examples are bran, cereals, beans, fruits, and vegetables).
  - 2. Foods low in carbohydrates are usually high in residue, and vice versa.
- B. There are two types of fiber.
  - 1. Insoluble fibers are found in the cell walls of plants; they do not dissolve in water. They speed up elimination of waste products.
  - 2. Soluble fibers (oat bran) dissolve in water. They decrease cholesterol levels and slow absorption of glucose so blood sugar levels are reduced in diabetes.
- ◆ C. A low-residue diet (foods high in fiber) is utilized for certain diseases and conditions.
  - 1. Low-residue foods include ground meat, fish, broiled chicken without skin, creamed cheeses, limited fat, warm drinks, refined strained cereals, and white bread.

2. Conditions that require a low-residue diet.
  - a. Crohn's disease.
  - b. Postoperative colon and rectal surgery.
  - c. Diverticulitis—while inflammatory period lasts.
  - d. Diarrhea and enteritis.

**Bland Food Diets**

- ◆ A. A bland diet promotes healing of the gastric mucosa. It eliminates food sources that are chemically and mechanically irritating. (See **Table 4-14**.)
- 1. Bland diets are presented in stages with the gradual addition of certain foods.
- 2. Frequent, small feedings during active stress periods are important.
- B. Move from bland to regular diet and establish regular meals and food patterns when condition permits.
- C. Bland diets may be appropriate for the following conditions:
  - 1. Duodenal and gastric ulcers.
  - 2. Chronic pancreatitis.
  - 3. Prostate surgery, postoperative.
  - 4. Stomach surgery, postoperative.

**Preoperative and Postoperative Diets**

- ◆ A. A high-protein preoperative diet is essential for the maintenance of normal serum protein levels during and following surgery.
- B. This diet also restores nitrogen balance if protein-depleted for burn victims, the elderly, and severely debilitated clients.
- 1. Provide adequate carbohydrates to maintain liver glycogen and adequate amino acids to promote wound healing.
- 2. Provide a 2500-calorie diet that is high in carbohydrates, moderate in protein with high-protein supplements.

**Table 4-14 BLAND DIET ALLOWANCES****Foods allowed**

Milk, butter, eggs (not fried), custard, vanilla ice cream, cottage cheese

Cooked refined or strained cereal, enriched white bread

Jello; homemade creamed, pureed soups

Baked or broiled potatoes

**Examples of foods that are eliminated**

Spicy and highly seasoned foods

Raw foods

Very hot and very cold foods

Gas-forming foods (varies with individuals)

Coffee, alcoholic beverages, carbonated drinks

High-fat foods (some butter and margarine allowed)

3. Instruct client that an elemental diet is low in residue and contains a synthetic mixture of CHO, amino acids, and essential fatty acids with added minerals and vitamins. It is bulk free and easily assimilated and absorbed.

#### **Postoperative Surgical Diet**

- ◆ A. Provide 2800 total calories for tissue repair and even more calories for extensive repair.
- B. Fluid intake: 2000–3000 mL/day for uncomplicated surgery and 3000–4000 mL/day for sepsis or renal damage. Seriously ill clients with drainage can require more fluid.

#### **Postoperative Diet Progression**

- ◆ A. Nothing by mouth the day of surgery.
- B. A clear-liquid diet is 1000–1500 mL/day and composed of water, tea, broth, Jello, and juices (apple, cranberry) or 7-Up. Avoid juices with pulp.
- C. A full-liquid diet lacks many nutrients, so it is used temporarily. It includes clear liquids, milk and milk products, custard, puddings, creamed soups, sherbet, ice cream, and any fruit juice.
- D. A surgical soft diet is full liquid and, in addition, pureed vegetables, eggs (not fried), milk, cheese, fish, fowl, tender beef, veal, potatoes, and cooked fruit. Do not include gas-formers.
- E. General diet: Take into consideration specific alterations necessary for client's health status.

#### **Mechanical Soft Diet**

- A. A mechanical soft diet is used when clients are edentulous, have poorly fitted dentures, have difficulty chewing, or do not chew food thoroughly.
- B. Any food that can be easily broken down can be included in this diet. It allows clients variations in taste that are not allowed on a soft diet (chili beans).

#### **Puree Diet**

- A. A puree diet provides food that has been mashed or blended to a smooth consistency.
  1. Mainly used for clients with dysphagia or who are unable to chew.
  2. Often used with small babies.
  3. Some hospitals provide this type of diet for gastrostomy feedings.
- B. When assisting clients with this type of diet, talk with them about the meal, describing the different foods; when the texture is all the same, distinguishing between foods is difficult.
- C. Do not mix all pureed foods together or feed the client out of one bowl or dish. Try to keep foods separate and feed alternately, with dessert being last.

◆ **Table 4-15 SUMMARY OF DIETARY CONTROL FOR DISORDERS**

#### **Malabsorption syndromes**

Cystic fibrosis: high calorie, high protein, with vitamin and mineral supplements; if diet has increased fats (not recommended), add extra enzymes

Ulcerative colitis: high protein, high calorie, low lactase, low residue

Crohn's disease: low residue, high protein, and vitamin–mineral supplements

Diverticulosis: high fiber

Constipation: high fiber with liquids

Diarrhea: low residue

#### **Liver, biliary, and pancreatic problems**

Liver involvement: high calories, high protein, high carbohydrates, low-to-moderate fat intake

Gallbladder: low fat and exclude any foods that cause problems (fatty foods, gas-forming vegetables)

Pancreatitis: high protein, high carbohydrate, low fat, and decreased alcohol intake

#### **Genitourinary problems**

Urinary tract infection: increase acid ash, reduce alkali ash (citrus, milk, vegetables)

Renal failure: high carbohydrates, limited protein, low potassium

Chronic renal failure: low protein, low salt, restricted fluids

Renal calculi: acid ash diet for stones formed of exalate or phosphate; alkali ash when stones formed of uric acid or cystine; force fluids

#### **Specific disorders**

Gout: restrict foods high in purine, increase fluid intake, high carbohydrate, control of calories

Hyperthyroidism: high carbohydrate, high protein, restrict caffeine

Phenylketonuria (PKU): restrict phenylalanine. (Phenylalanine is found in all natural protein foods; meat, milk, etc. are eliminated.)

Obesity: restrict calories but nutritionally sound with adequate protein, complex carbohydrates, and limited fat. (Fat and carbohydrates are retained to ensure protein utilization.)

## **Providing Nutrients Through Enteral Feeding**

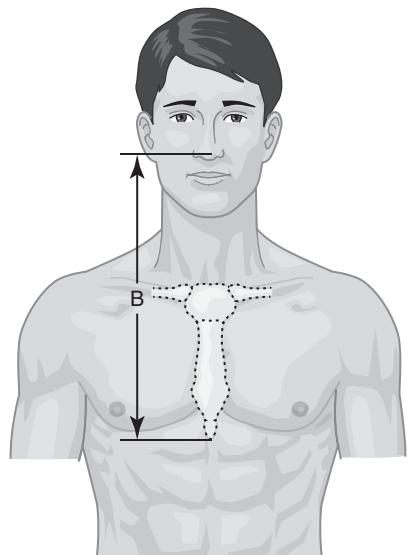
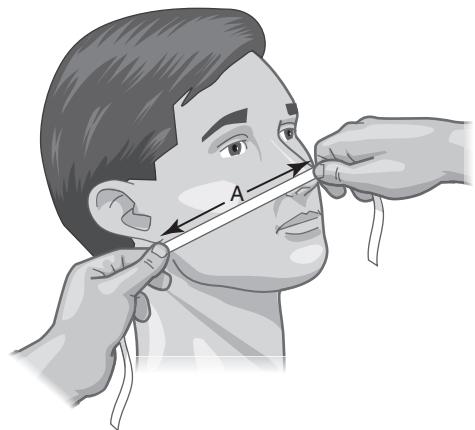
#### **Assessment**

- A. Assess overall status.
  1. Weight change/loss; temperature.
  2. Presence of sepsis; trauma.
  3. Mental state.
  4. Other medically related nutritional problems (e.g., diabetes, hyperlipidemia, alcoholism).
  5. For all of the following procedures, identify client using three methods.
- B. Evaluate oral intake.
- C. Assess nutritional requirements.
- D. Assess status of GI tract.
- E. Assess capacity to chew and swallow; assess risk for aspiration.
- F. Assess for presence of gag reflex.
- G. Evaluate respiratory or thoracic conditions.

- H. Check for renal complications.
- I. Check for vomiting and/or diarrhea.
- J. With high-protein diets, assess for fluid and electrolyte imbalance.

#### Implementation

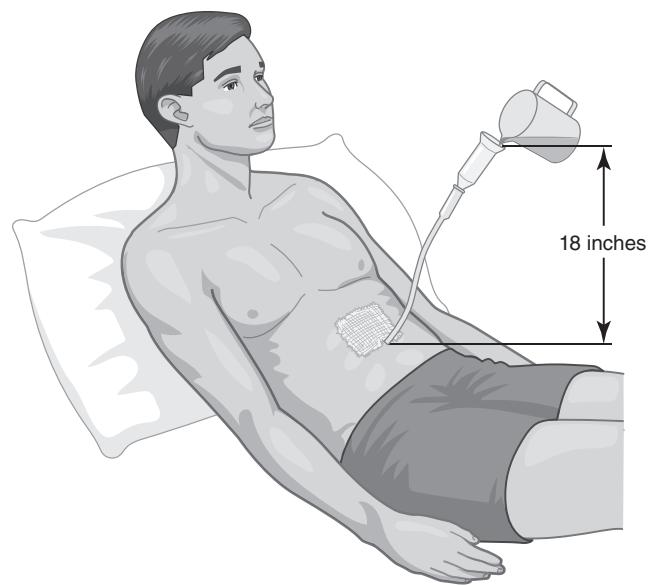
- A. Inserting a large-bore nasogastric (NG) tube.
- ❖ **PROCEDURE** ❖
1. Check order for tube feeding.
  2. Warm feeding to room temperature.
  3. Discuss procedure with the client.
  4. Demonstrate and display items to be used in order to allay the client's fear and to gain cooperation.
  5. Perform hand hygiene and don gloves.
  6. Position the client at 45-degree angle or more.
  7. Examine nostrils and select the more patent.
  - ◆ 8. Measure from tip of nose to earlobe to xiphoid process of sternum (NEX). (See **Figure 4-1**.) If tube is to go below stomach, small flex-tube is used. Mark point on tube with tape.



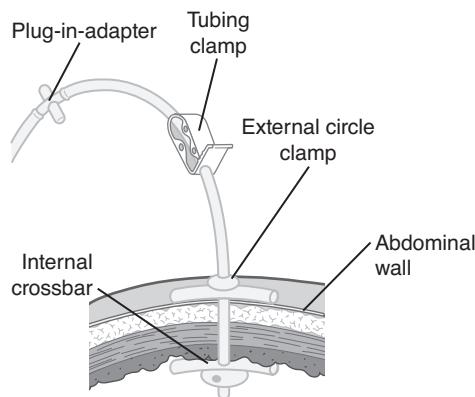
**Figure 4-1** Nasogastric tube measurement and placement. A: Tip of nose to ear lobe. B: Tip of ear lobe to xiphoid.

- 9. Lubricate first 10 cm of tube with water-soluble lubricant and stylet if used.
  - 10. Insert tube through nostril to back of throat and ask client to swallow. Sips of water may aid in pushing tubing past oropharynx.
  - ◆ 11. Instruct client to flex head forward to help prevent tube entering client's airway.
  - 12. Continue advancing tube until taped mark is reached.
  - 13. Tape securely to nose and cheek.
  - 14. Check position of tube.
  - ◆ a. The most accurate method is to aspirate gastric contents, sometimes difficult with small-bore tubes, and check the pH. If pH is acidic (gastric contents are usually pH 5 or less, greenish to tan or off-white), tube is in the stomach. If NG tube is in respiratory tree, the gastric contents will be pH 6 or more, clear to light yellow.
  - ◆ b. It is no longer considered safe practice to place proximal end of NG tube in a glass of water and observe for bubbling.
  - c. Obtain x-ray to confirm correct placement.
  - 15. Remain with and talk with client until anxiety is decreased and client is comfortable.
- B. Irrigating a nasogastric (NG) tube.
- ❖ **PROCEDURE** ❖
1. Obtain a disposable irrigation set or emesis basin for irrigation solution, a 50-mL syringe, and a normal saline irrigation solution.
  2. Perform hand hygiene and don gloves.
  3. Place client in semi-Fowler's position.
  4. Disconnect NG tube from suction, if necessary, and check for tube placement.
  5. Draw up 20–30 mL normal saline into the irrigating syringe.
  6. Gently instill the normal saline into the NG tube. Do not force the solution.
  7. Withdraw the irrigation solution and empty into basin.
  8. Repeat the procedure twice.
  9. Record on I&O sheet the irrigation solution that has not been returned.
- ◆ C. Administering an enteral feeding (TPN).
- ❖ **PROCEDURE** ❖
1. Check order from the physician for appropriate formula (calories and/or amount).
  2. Check early in shift to ensure adequate formula is available.
  3. Warm formula to room temperature—DO NOT use microwave oven.
  4. Assemble feeding equipment. If using bag, fill with ordered amount of formula.
  5. Explain procedure to the client and assure privacy.

6. Check for presence of bowel sounds.
    - a. Now considered to be questionable; instead, assess that client does not have abdominal distention, nausea, or pain.
    - b. If client does have flatus or bowel elimination.
  7. Place the client on right side in high-Fowler's position.
  - ◆ 8. Aspirate stomach contents to determine amount of residual. If residual volume is greater than 200 mL, further assessment is indicated.
  - ◆ 9. Return aspirated contents to stomach to prevent electrolyte imbalance.
  10. Pinch the tubing to prevent air from entering stomach.
  11. Attach syringe to NG tube.
  12. Fill syringe with formula. (If using feeding bag, adjust drip rate to infuse over 30 minutes.)
  13. Hold tubing no more than 39 cm above client.
  - ◆ 14. Allow formula to infuse slowly (between 20 to 35 minutes) through the tubing.
  15. Follow tube feeding with water in amount ordered.
  16. Clamp end of the tube.
  17. Wash tray and return it to client's bedside—change syringe daily.
  18. Give water between feedings if tube feeding is the sole source of nutrition.
- D. Administering continuous tube feedings (Dobhoff, Keofeed tubes).
- ◆ PROCEDURE ◆
1. Complete steps 1 through 5 of previous skill.
  2. Elevate head of bed 30 degrees.
  - ◆ 3. Check length of exposed tubing—an increase may indicate tube has dislocated upward.
  4. Check patency of existing tube.
  - ◆ 5. Irrigate feeding tube with sterile water or saline at least every 8 hours.
  6. Administer formula at prescribed infusion rate (usually 60–80 mL/hr). Infusion pumps are used to maintain continuous flow.
  7. Avoid keeping formula at room temperature for longer than 4 hours to prevent spoilage and bacterial contamination.
  8. Turn off flow when placing client supine.
- E. Administering gastrostomy feeding.  
(See Figures 4-2 and 4-3.)
- ◆ PROCEDURE ◆
- ◆ 1. Assess gastric contents to determine amount per intermittent feeding. Further assessment is needed if residual is greater than 200 mL.
  2. Return aspirated contents to stomach.
  3. Feed slowly (flow by gravity) for intermittent feeding (usually 20–35 minutes). Keep at prescribed rate for continuous feeding.



**Figure 4-2** Gastrostomy feeding—tubing is held straight up from insertion point.



**Figure 4-3** PEG for gastrostomy feedings.

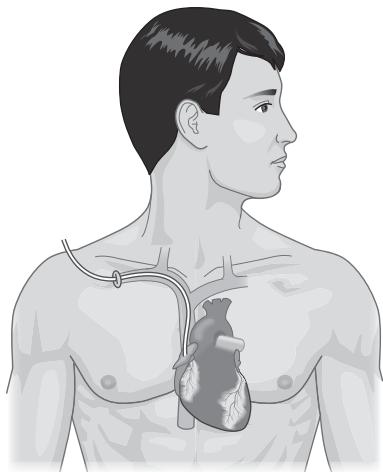
4. Observe gastrostomy tube insertion site for signs of dislodging or infection.
5. Provide site care; wash area with warm water and soap.
6. Apply skin protective barrier. Cover area with sterile dressing.

### Total Nutritional Alimentation, Also Called Total Parenteral Nutrition via Central Venous Catheter

◆ PROCEDURE ◆

◆ Assessment

- A. Assess nutritional needs of clients unable to ingest calories normally.



**Figure 4-4** Central venous catheter insertion for total nutritional alimentation (TNA)—right subclavian vein is preferred access to right atrium.

- B. Identify the caloric intake necessary to promote positive nitrogen balance, tissue repair, and growth; lipids included in formula.
- C. Observe for correct additives in each hyperalimentation bag.
- D. Check label of solution against physician's orders.
- E. Check rate of infusion on physician's orders.
- F. Assess ability of client to understand instructions during procedure.
- G. Confirm position of central venous line following insertion.
- H. Observe catheter insertion site for signs of infection, thrombophlebitis, or possible infiltration (**Figure 4-4**).
- I. Inspect dressing over central line to ensure a dry, noncontaminated dressing.
- J. Assess client for pneumothorax.

#### Implementation

- ◆ A. Teach Valsalva's maneuver if client does not have a cardiac disorder. This maneuver prevents air from entering the catheter during catheter insertion or tubing changes.
  1. Ask client to take a deep breath and bear down.
  2. Apply gentle pressure to the abdomen.
- B. Review physician's order for correct hyperalimentation solution additives. (See **Table 4-16**.)
  1. TNA bottles come directly from the pharmacy and are numbered sequentially.
  2. Each TNA bag label will include client's name, room number, additives, IV number, start time, date, and stop time.
  3. Inspect TNA bag for cracks, turbidity, or precipitates.

**Table 4-16 COMPOSITION OF HYPERALIMENTATION SOLUTIONS**

Amino acid—Freamine or Aminosol
Carbohydrates—10–35% glucose
Vitamins (become inactive when exposed to light)
Minerals and trace elements
Electrolytes (individualized)
Water
Hyperalimentation solution prepared in the pharmacy under a laminar flow hood
Lipids

- C. Assemble IV system with in-line filter and prime IV tubing and filter with solution.
- ◆ D. Position client in head-down position with head turned to opposite direction of catheter insertion site. Place a small roll between client's shoulders to expose insertion site.
- E. Cleanse insertion area with antimicrobial swabs.
- F. Perform hand hygiene, don a mask and sterile gloves, and assist physician as needed during catheter insertion.
- G. Instruct client in Valsalva's maneuver when stylet is removed from catheter and when IV tubing is connected to catheter.
  1. After tubing is connected, instruct client to breathe normally.
  2. Tape area between tubing and catheter hub.
- ◆ H. Turn on IV infusion pump, using normal saline solution at a slow rate of 10 drops/min until x-ray ensures accurate catheter placement. (Flush catheter with saline and heparinize with dilute heparin according to agency policy.)
- ◆ I. Prior to use confirm catheter placement via x-ray and change IV solution to hyperalimentation solution.
  1. Store hyperalimentation solution in refrigerator until 30 minutes before use. This prevents growth of organisms, but should be warmed to room temperature prior to use.
  2. Change solution every 12 to 24 hours to prevent growth of bacterial organisms.
- J. Use IV pump for administration. Time tape the bottle after adjusting flow rate. Be prepared to document on IV hourly infusion record.
- K. Observe for complications with TNA.
  1. Allergic responses to protein (chills, increased temperature, nausea, headache, urticaria, dyspnea).
  2. Air embolism—potentially fatal (respiratory distress, chest pain, dyspnea, hypotension).

3. Catheter-related infection (sepsis). Symptoms of fever, chills, erythema at insertion site.
4. Hyperglycemia—elevated glucose levels.
5. Hypoglycemia—decreased blood glucose levels.
- L. Take vital signs every 4 hours.
- ◆ M. Maintain central vein infusion.
  1. Apply 4 × 4 sterile gauze pad over IV site and occlude dressing with micropore or plastic tape.
  2. Change IV tubing, filter, and infusion pump cassette (if used) every 24 hours.
  3. Change extension tubing every 48 hours. Change solution every 12–24 hours (prevents growth of bacteria when using sugar in solution).
  4. Maintain IV flow rate at prescribed rate.
    - a. If rate is too rapid, hyperosmolar diuresis occurs (excess sugar will be excreted); if severe enough, intractable seizures, coma, and death can occur.
    - b. If rate is too slow, little benefit will be derived from the calories and nitrogen.
    - c. Do not correct an overload or deficit in flow, as doing so could result in complications for the client. Notify physician if this occurs.
- ◆ N. Check client's fingerstick blood sugar every 6 hours. If necessary, administer regular insulin according to prescribed "sliding scale."
- O. Maintain accurate I&O. Record on special TNA sheet at least every 4 hours.
- P. Weigh daily and record on graphic sheet and TNA sheet.

#### Dressing and Tubing Change

##### ◆ PROCEDURE ◆

- ◆ A. Maintain sterile technique for both procedures.
  1. Use sterile gloves, mask, drape, and equipment.
  2. Goal is to prevent contamination of site and prevent central line-associated bloodstream infection (CLABSI).
- B. Observe insertion site for erythema, drainage, etc., then cleanse with **chlorhexidine** gluconate – CHG (aka **ChloraPrep**). Cover with a patch or dressing impregnated with CHG.
- C. Change gauze dressings every 48 to 72 hours. Transparent dressing can be changed every 72 to 96 hours.
- D. Change tubing every 24 hours.
  1. Loosen tubing at catheter hub.

2. Tell client to hold breath and bear down while new tubing is inserted to prevent air from entering catheter causing air embolism.
3. Observe for signs of respiratory distress: air embolism, pneumothorax.
  - a. Cyanosis.
  - b. Hypotension.
  - c. Rapid, weak pulse.
  - d. Alterations in heart sounds.
  - e. Elevated central venous pressure (CVP).
4. Check vital signs frequently, including temperature.
5. If respiratory distress occurs—suspect air embolism.
  - a. Place client in Trendelenburg's position with client lying on left side.
  - b. Inform physician.
  - c. Administer oxygen at 6 L/min via nasal prongs.

#### Hyperalimentation for Children

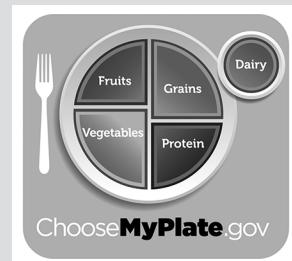
##### A. Examine solution.

- ◆ 1. Generally, there is a higher concentration of calcium, phosphorus, magnesium, and vitamins.
2. Usually, a 10% solution of dextrose with 2% amino acids is started—it can be increased to 25% if tolerated.
- B. Monitor patency of catheter (usually placed through internal or external jugular or scalp veins). Stopcocks are never used. Monitor constant infusion pump and filter.
- ◆ C. Obtain fingerstick blood samples. Sugar level will rise, but usually exogenous insulin is not required as the pancreas adapts to high glucose loads.
- D. Change the dressing every 96 hours and the tubing every 24 hours using aseptic technique.
  1. Stockinette can be used to keep scalp dressing secure.
  2. Tight-fitting T-shirt can keep chest site secure.
- E. Monitor for accurate rate of infusion.
  1. Do not "catch up" if infusion is behind.
  2. Positive pressure pumps can be used to maintain infusion rates, particularly when small amounts of solution are being infused.
- F. Observe the child when ambulating for accidents such as twisting or kinking the tubing, getting the tubing caught in the crib, or stepping on it.

**Appendix 4-I. NUTRITIONAL ASSESSMENT PARAMETERS**

Clinical Assessment	Normal	Abnormal
<b>Dietary Data</b>		
Appetite	Remains unchanged	Increased or decreased recently Particular cravings
Nutritional intake	Adequate foods and fluids to supply body nutrients  Nonallergic response to major food groups	Elimination of certain food categories that results in limited nutrients  Emphasis on some food groups (sugar) to the exclusion of others (vegetables)  Allergic response to certain foods
Caloric intake	Average 28 kcal/kg/day	Constant use of fad diets to lose weight Use of drugs or chemicals that interfere with appetite or nutrient assimilation  Fast-food or packaged foods  Missed meals, constant snacking, or overeating  Eating “on the run” or hurried
Meal patterns	3–6 home-prepared meals/day  Adequate time and calm atmosphere for meals	
<b>General Appearance</b>		
Physical factors	Alert, responsive, healthy-appearing eyes and skin	Listless, dull, nonresponsive  Skin and eyes appear unhealthy  Teeth or gums in poor condition or ill-fitting dentures  Swallowing impairs ingestion  Inadequate physical exercise to burn calories  Disease present that interferes with ingestion, digestion, assimilation, or excretion  Congenital condition, rehabilitation phase, condition or postsurgery condition that interferes with food assimilation
Presence of disease	Adequate chewing and swallowing capability Mouth and gums healthy so food can be ingested Physical exercise adequate for calorie intake No disease process that interferes with nutrient assimilation  No congenital condition or postsurgery condition that interferes with nutrient assimilation	
Elimination schedule	Regular, adequate elimination of foods  Absence of constant flatulence, discharge or mucus	Irregular or painful elimination  Presence of constant flatulence  Presence of discharge, blood, or mucus
<b>Anthropometric Measurements</b>		
Height	For bedridden patients, measure arm span—fully extend arms at a 90° angle to body and measure from tip of one middle finger to the tip of other middle finger for estimated height	Loss of 2–3 inches in height may indicate osteoporosis
Weight—compared to ideal and usual body weight	Ideal body weight 100 lb (female); 106 lb (male) for 5 feet height + 5 lb for each 1 inch over 5 feet (female) and 6 lb for each 1 inch over 5 feet (male)  Small frame minus 10%  Large frame plus 10%	Changed—markedly increased or decreased recently: important indicator of changed nutritional status  Loss of more than 10% weight for prior 6 months should be clinically evaluated  Less than 19—underweight 25 to 29—overweight 30 to 39—obese
Body mass index (ratio of weight in kilograms and height in meters)	19–24.9	If values change over months, may indicate a chronic condition
Triceps skinfold measurement (mm)	Standard values—male to female 12.5–16.5	
Circumference of upper arm (cm)	29.3–28.5	
Midarm muscle circumference (cm)	25.3–23.2	
<b>Biochemical Assessments*</b>		
Serum albumin	3.5–5.0 g/dL	Examples of possible disease conditions: Decrease signifies lowered nutritional status—protein deficient Reduced levels may indicate chronic diseases and protein deficiency Elevated levels—anemias, liver damage, lead toxicity
Serum transferrin binds iron to plasma and transports to bone marrow	200–430 mg/dL	Decrease related to iron deficiency (anemias and leukemia) Decreased—protein wasting diseases, malnutrition (< 10.7 indicates severe nutritional deficiency) Elevated—Hodgkin’s disease
Hemoglobin	Male—13.5–17 g/dL Female—12–15 g/dL	Nitrogen imbalance, inadequate renal functioning
Prealbumin (PA) serum	20–50 mg/dL	Inadequate protein intake
Blood urea nitrogen/creatinine	10:1–20:1	
24-hour urinary nitrogen	Positive balance	

\*Laboratory test parameters differ among laboratories. Check the reference range for the specific lab where the patient’s blood or urine was tested.

**Appendix 4-2. MYPLATE FOOD GUIDE, REVISED 2011**

MyPlate is divided into sections of approximately 30% grains, 30% vegetables, 20% fruits, and 20% protein, accompanied by a smaller circle representing dairy, such as a glass of low-fat/nonfat milk or a yogurt cup.

**Milk**

**Foods Included:** milk: low- or nonfat, calcium-rich types

**Contribution to Diet:** Milk is a leading source of calcium, which is needed for bones and teeth. It also provides a high-quality protein, riboflavin, vitamin A (if milk is whole or fortified), and other nutrients.

**Amounts Recommended:** Three cups.

Cheese may replace part of the milk. To substitute, figure the amount on the basis of calcium content. Common portions of various kinds of cheese and ice cream and their milk equivalents in calcium are

2.5-cm cube cheddar-type cheese	= $\frac{1}{2}$ cup milk
$\frac{1}{2}$ cup cottage cheese	= $\frac{1}{3}$ cup milk
2 tablespoons cream cheese	= 1 tablespoon milk
$\frac{1}{2}$ cup ice cream or ice milk	= $\frac{1}{3}$ cup milk

**Meat and Beans**

**Foods Included:**

- Lean meats
- Poultry and eggs
- Fish and shellfish
- Beans, dry peas, lentils, nuts, seeds, tofu, peanut butter

**Contribution to Diet:** Foods in this group are valued for their protein, which is needed for growth and repair of body tissues, muscle, organs, blood, skin, and hair. These foods also provide iron, thiamine, riboflavin, and niacin.

**Amounts Recommended:** Choose 5.5 to 6.5 oz every day.

*Count as a serving:* 62–93 g (not including bone weight) cooked lean meat, poultry, or fish. Count as alternates for  $\frac{1}{2}$  serving meat or fish: 1 egg,  $\frac{1}{2}$  cup cooked dry beans, dry peas or lentils, or 2 tablespoons peanut butter.

**Vegetables and Fruits**

**Foods Included:** all vegetables and fruit: fresh, frozen, canned, dried, juices. This guide emphasizes those that are valuable as sources of vitamin C and vitamin A.

**Sources of Vitamin C**

**Foods Included:**

*Good sources:* grapefruit or grapefruit juice, orange or orange juice, cantaloupe, guava, mango, papaya, raw strawberries, broccoli, Brussels sprouts, green pepper, sweet red pepper.

*Fair sources:* honeydew melon, lemon, tangerine or tangerine juice, watermelon, asparagus tips, raw cabbage, cauliflower, collards, garden cress, kale, kohlrabi, mustard greens, potatoes and sweet potatoes cooked in the jacket, rutabagas, spinach, tomatoes or tomato juice, turnip greens.

**Sources of Vitamin A**

**Foods Included:** Dark-green and deep-yellow vegetables and a few fruits—namely, apricots, broccoli, cantaloupe, carrots, chard, collards, cress, kale, mango, persimmon, pumpkin, spinach, sweet potatoes, turnip greens and other dark-green leaves, winter squash.

**Contribution to Diet:** Fruits and vegetables are valuable chiefly because of the vitamins and minerals they contain. In this plan, this group is counted on to supply nearly all of the vitamin C needed and more than half of the vitamin A. Vitamin C is needed for healthy gums and body tissues. Vitamin A is needed for growth, normal vision, and healthy condition of skin and other body surfaces.

**Amounts Recommended:** Choose 2.5 cups vegetables and 2 cups fruit.

*Count as one serving:*  $\frac{1}{2}$  cup of vegetable or fruit; or one medium apple, banana, orange, or potato,  $\frac{1}{2}$  medium grapefruit, a slice of cantaloupe, or the juice of one lemon.

**Grains (At Least Half Should Be Whole Grains)**

**Foods Included:** All breads and cereals that are whole grain, enriched, or restored; check labels to be sure. Specifically, this group includes whole wheat and rye breads, cooked cereal, ready-to-eat whole-grain cereal, cornmeal, crackers, rolled oats, grains (wheat, corn, millet, oats, brown rice), whole-grain or enriched flour.

**Contribution to Diet:** Foods in this group furnish worthwhile amounts of protein, iron, several of the B vitamins, and energy.

**Amounts Recommended:** Choose 6 oz or more every day. If no cereals are chosen, include an extra serving of whole-grain bread or baked goods, which will make at least 6 oz from this group daily.

*Count as a serving:* one slice of bread; 31 g ready-to-eat cereal;  $\frac{1}{2}$  to  $\frac{3}{4}$  cup cooked cereal, cornmeal, grits, macaroni, noodles, rice, or spaghetti.

**Oils (Liquid, Not Solid)**

**Foods Included:** vegetable oils that have no trans fats (e.g., olive oil, flaxseed oil, cod liver oil)

**Contribution to Diet:** Major source of vitamin E and polyunsaturated fatty acids, including essential fatty acids omega-3 and -6).

**Amounts Recommended:** 6–8 tsp/day.

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## NUTRITIONAL MANAGEMENT REVIEW QUESTIONS

1. Evaluating the teaching plan for a client recently placed on a low-sodium diet by her physician, the nurse will know the client understands the plan when she states that she will
  1. Call the dietitian if she cannot remember it.
  2. Look at the list of foods she can have.
  3. Read the label on the food product.
  4. Cook without adding salt to the food.
2. The nurse asks a client to list the snacks he likes that are allowed on his low-fat, low-sodium, low-cholesterol diet. The nurse realizes that further dietary teaching is necessary when one of his choices is
  1. Buttermilk.
  2. A jam sandwich.
  3. An apple.
  4. Applesauce.
3. A client's physician has placed him on a low-potassium diet. Of the following foods, which ones should he avoid because they are high in potassium? List all that apply.
  1. Butter.
  2. Shellfish.
  3. Milk.
  4. Frozen vegetables.
  5. Orange juice.
  6. Dried dates.
4. The nurse will know that her teaching has been effective when the client responds that a low-fiber diet allows the inclusion of
  1. Whole-grain breads, seeds, and legumes.
  2. Fresh fruits and vegetables.
  3. Bran and whole-grain cereals.
  4. Cooked vegetables, fruits, and refined breads.
5. The nurse questions the dietary department about the lunch delivered for a client with the diagnosis of cirrhosis when she finds on his tray
  1. A tuna sandwich.
  2. French fries.
  3. A ham sandwich.
  4. A milkshake.
6. Clients with a history of pancreatitis have dietary restrictions. While evaluating diet history with these clients, the nurse will determine that they understand food restrictions when they avoid
  1. Noodles.
  2. Vegetable soup.
  3. Baked fish fillet.
  4. Cheddar cheese sandwiches.
7. A 28-year-old client has just learned that her pregnancy test is positive. The nurse will reinforce nutritional counseling by telling the client that her diet should
  1. Maintain iron intake and increase calorie intake by 500 calories.
  2. Increase iron and folic acid as well as calorie intake by 300 calories.
  3. Increase iron and multivitamins but maintain calorie intake.
  4. Decrease iron but increase calorie intake by 200 to 300 calories.
8. A client with cirrhosis and ascites is placed on a sodium-restricted diet to help control the ascites. For this plan to be effective, it is important that the client also
  1. Restrict his fluid intake.
  2. Increase his potassium intake.
  3. Increase his fluid intake.
  4. Decrease his potassium intake.
9. A client with acute pancreatitis required NG intubation due to persistent vomiting and paralytic ileus. Following NG tube removal, the feeding schedule would start with a diet that is
  1. NPO for 12 hours.
  2. High in protein.
  3. High in carbohydrates.
  4. Clear liquid.
10. The most appropriate sweetener for the insulin-dependent diabetes mellitus, type 1 (IDDM) client is
  1. Corn sugar.
  2. Honey.
  3. Sugar substitute.
  4. Fructose.

- 11.** The diabetic client understands her diet when she says that she should obtain the greatest percentage of calories from
1. Fats.
  2. Complex carbohydrates.
  3. Simple carbohydrates.
  4. Protein.
- 12.** When a client is in early prehepatic coma, the dietary regimen will be changed to include how much protein per day?
1. 20 to 40 g.
  2. 50 to 70 g.
  3. 75 to 95 g.
  4. 100 to 120 g.
- 13.** The nurse will know the client understands his low-purine diet when he states
1. "I will need to limit the number of fruit servings each day."
  2. "Organ meats must be eliminated from my diet."
  3. "I can drink only white wine because red wine is high in purine."
  4. "Beef, chicken, and pork are high in purine; therefore, I can have them only once in a while."
- 14.** Which of the following statements would be correct when counseling a client about the postoperative diet he would receive following a simple surgical procedure?
1. A client undergoing major surgery may have a soft diet the day of surgery.
  2. Approximately 2800 calories is required daily for general tissue repair, so this will be his caloric intake.
  3. Daily fluid intake should be 1500 mL for an uncomplicated surgical procedure.
  4. A mechanical, soft diet should be given the first postoperative day.
- 15.** The nurse's diet instructions for a client with a colostomy will be
1. According to his own individual needs and similar to his preoperative diet.
  2. Low in fiber with a large amount of fluids.
  3. High in fiber with large amounts of fluids and supplemental vitamin K.
  4. Elimination of milk products.
- 16.** Discharge planning for a client with a partial colectomy will include which one of the following dietary principles?
1. High residue, force fluids.
  2. Low residue, no dairy products.
  3. High fiber, no spices.
  4. Regular, no dairy products.
- 17.** The nurse will know that the client understands presurgical instructions for hemorrhoid surgery if her diet is
1. Low roughage.
  2. High fiber.
  3. High carbohydrate.
  4. Low fiber.
- 18.** A client with chronic lymphocytic leukemia is started on chemotherapy. Many clients suffer nausea and vomiting with these drugs. The nurse should counsel the client to try a diet of
1. No liquid just before the treatments.
  2. Low-calorie foods that are high in bulk and fiber.
  3. High protein and fat.
  4. Fruits and vegetables.
- 19.** The nurse's discharge teaching for a client with acute pancreatitis will include advising him to take
1. Vitamin K.
  2. Fat-soluble vitamins.
  3. Vitamin C.
  4. Vitamin B<sub>12</sub>.
- 20.** A 54-year-old client has been diagnosed as having lung cancer. The tumor is inoperable, and the client will undergo radiation therapy. Because of the gastrointestinal (GI) complications associated with radiation, the client will be placed on a diet of
1. High protein, high carbohydrate, low residue.
  2. High protein, high residue.
  3. High protein, high residue, low sodium.
  4. Low protein, low residue, high calcium.
- 21.** A 53-year-old client with Crohn's disease is placed on total nutritional alimentation (TNA). The fluid in the present TNA bag should be infused by 8 AM. At 7 AM, the nurse observes that it is empty and another TNA bag has not yet arrived on the unit. The nursing action is to attach a bag of
1. D<sub>25</sub> and water.
  2. D<sub>5</sub> and water.
  3. D<sub>10</sub> and water.
  4. D<sub>45</sub> and water.
- 22.** A client has injured both eyes with a chemical and must have eye patches in place for several weeks. When her food tray arrives, the most helpful nursing intervention would be to
1. Feed the client or assign a nursing assistant to feed her.
  2. Explain that her tray is here and put her hands on it.

3. Tell her to think of a clock and describe which food is where and put the fork in her hand.
4. Ask her if she would prefer a liquid diet.
- 23.** A client will have a central vein infusion to maintain nutritional status while his GI tract is being bypassed. The nurse would expect that the site of catheter insertion for a protein and glucose concentration of 15% would be in the
1. Jugular vein.
  2. Right subclavian vein.
  3. Right subclavian artery.
  4. Left arm artery access.
- 24.** A client's physician has ordered intralipid therapy for his client. In carrying out this order, the nurse understands that monitoring for side effects is important.
- Which of the following side effects would necessitate that the nurse immediately notify the physician?
1. Dyspnea and chills.
  2. Hyperlipemia.
  3. Eczema-like rash and dry, scaly skin.
  4. Erythema and edema at the insertion site.
- 25.** A client has had abdominal surgery and the physician has ordered a bland diet 3 days postsurgery. Which of the following diet trays would have portions removed because it does not adhere to the dietary regimen?
1. Scrambled eggs, cereal, and white toast.
  2. Baked potato, cottage cheese, and coffee.
  3. Cream soup, Jello, and white toast.
  4. Cooked cereal, boiled egg, and milk.

## **NUTRITIONAL MANAGEMENT ANSWERS WITH RATIONALE**

1. (3) Clients should be instructed to read labels before purchasing canned, frozen, or processed foods because they are usually very high in sodium. A list of foods (2) will provide guidance, but she should know the sodium content of food. Not adding salt to foods (4) when cooking is also important, but not as critical as (3).

**NP:E; CN:PH; CA:M; CL:C**

2. (1) Buttermilk contains large amounts of fat and must be avoided. Fruits and whole grains are encouraged.

**NP:E; CN:PS; CA:M; CL:A**

3. The answer is 3 5 6—*milk* (3), *orange juice* (5), and *dried dates* (6). All are high in potassium, while the other three foods are high in sodium.

**NP:P; CN:H; CA:M; CL:A**

4. (4) Cooked vegetables and fruits as well as refined breads are included in a low-fiber diet. Bran, fresh fruits, and whole grains and seeds are included in a high-fiber diet.

**NP:E; CN:PH; CA:M; CL:C**

5. (3) Ham is high in sodium and can increase fluid retention, leading to edema. Cirrhosis clients are prone to edema as the osmotic pressures change due to a decrease in plasma albumin.

**NP:I; CN:PH; CA:M; CL:AN**

6. (4) Clients with this condition must not consume foods high in fat content because there are inadequate pancreatic enzymes to digest the fat. High fat content also causes pain 2 to 4 hours after ingestion. Suggested diet is high in calories and protein.

**NP:E; CN:PH; CA:M; CL:A**

7. (2) During pregnancy, iron supplements and folic acid must be added to the diet. Studies have found that

pregnant women cannot assimilate enough iron from their regular diet and they need folic acid to prevent neural tube defect. Calories are increased by 300 to be certain that the mother-to-be and fetus have enough nutritional intake.

**NP:I; CN:PH; CA:MA; CL:K**

8. (1) It is important that fluids be restricted as well, because unrestricted fluid intake leads to a progressive decrease in serum sodium from dilution. Electrolyte imbalance with potential neurologic complications could result.

**NP:P; CN:PH; CA:M; CL:AN**

9. (3) Foods that are high in carbohydrate are given, because those with high protein or fat content stimulate the pancreas. Alcohol is forbidden. There is no need for the client to be NPO.

**NP:P; CN:PH; CA:M; CL:A**

10. (3) Sugar substitute is the only calorie-free sweetener listed; the others are nutritive, with their average caloric value being 20 kcal per teaspoon. When an equal volume of honey and sugar are compared, honey provides about 1½ times as many kcal as does table sugar.

**NP:P; CN:PH; CA:M; CL:K**

11. (2) The diabetic's diet should be between 50 and 65% carbohydrate calories with only 5% of these being sucrose. Fat recommendation is less than 30% of calories and protein should be 0.8 mg/kg per day.

**NP:E; CN:PH; CA:M; CL:C**

12. (1) In the early stages, protein intake will be reduced to 20 to 40 g because high protein intake elevates blood ammonia. Protein will need to be reduced further if the coma state progresses.

**NP:P; CN:PH; CA:M; CL:A**

13. (2) Organ meats, wine, yeast, scallops, and mussels are all high in purine and must be eliminated from the diet of the client who has gout.

**NP:E; CN:PH; CA:M; CL:A**

14. (2) A daily intake of 2800 calories is required for usual/general tissue repair, whereas 6000 calories may be required for extensive tissue repair. Fluid intake is 2000 to 3000 mL/day for uncomplicated surgery. The diet progresses from nothing by mouth on the day of surgery to a general diet within a few days.

**NP:I; CN:PH; CA:S; CL:C**

15. (1) Diets are individualized and clients are generally able to eat the same foods they enjoyed preoperatively. Fresh fruits may cause diarrhea in some, but not all, individuals.

**NP:I; CN:PH; CA:S; CL:A**

16. (2) The low-residue diet will put less strain on the colon, and eliminating dairy products initially is important because these products cause mucus.

**NP:P; CN:PH; CA:S; CL:C**

17. (2) A high-fiber diet produces a soft stool without mechanically irritating the hemorrhoidal area. Foods include bran and complex carbohydrates.

**NP:E; CN:PH; CA:S; CL:A**

18. (1) Fluids given just before treatments may cause nausea and vomiting. Because of possible problems with constipation, the foods need to be high in bulk and fiber and high in protein and calories because of the weight loss (a side effect of chemotherapy). Fat in the diet may not be appealing with anorexia.

**NP:I; CN:PH; CA:M; CL:A**

19. (2) Because the client will be on a low-fat diet to decrease pancreatic activity, he will need supplements of the fat-soluble vitamins. A well-balanced diet should meet the other nutritional needs.

**NP:P; CN:PH; CA:M; CL:A**

20. (1) Clients undergoing external radiation therapy may develop GI irritation and can bleed. They need calories and protein but not rough, high-residue foods, as they can further irritate the GI tract.

**NP:P; CN:PH; CA:S; CL:AN**

21. (3) So that the client will not experience a sudden drop in blood sugar, the solution nearest most TNA solution concentrations is D<sub>10</sub>W. D<sub>25</sub>W and D<sub>45</sub>W could cause osmotic diuresis or fluid overload.

**NP:I; CN:PH; CA:M; CL:AN**

22. (3) The most helpful intervention is to assist the client to help herself, allowing her to be as independent as possible. Feeding her or changing the diet to liquid would not be as therapeutic.

**NP:I; CN:H; CA:M; CL:A**

23. (2) The most common placement site is the right subclavian vein. The jugular vein might be used as an alternative for high-concentration IV infusions, but it is more difficult to access. The arm is used for insertion of an arterial line for arterial blood gas samples and monitoring.

**NP:P; CN:PH; CA:M; CL:K**

24. (1) Dyspnea, chills, fever, and cyanosis are all side effects that necessitate stopping the infusion and notifying the physician. It may be an allergic reaction or the client's inability to tolerate the lipid infusion. Answer (2) is a liver function test and the physician should be notified if results are abnormal, but this would occur after the infusion. Eczema and dry skin are signs of fatty acid deficit. Erythema and edema need to be monitored and perhaps the IV insertion site changed.

**NP:E; CN:PH; CA:M; CL:AN**

25. (2) Coffee is one food eliminated from a bland diet because it is chemically irritating to the stomach. All of the other foods are allowed on a bland diet. Other foods eliminated are raw, spicy, gas-forming, very hot or very cold foods; alcohol; and carbonated drinks.

**NP:AN; CN:PH; CA:M; CL:N**