Medical Surgical Nursing

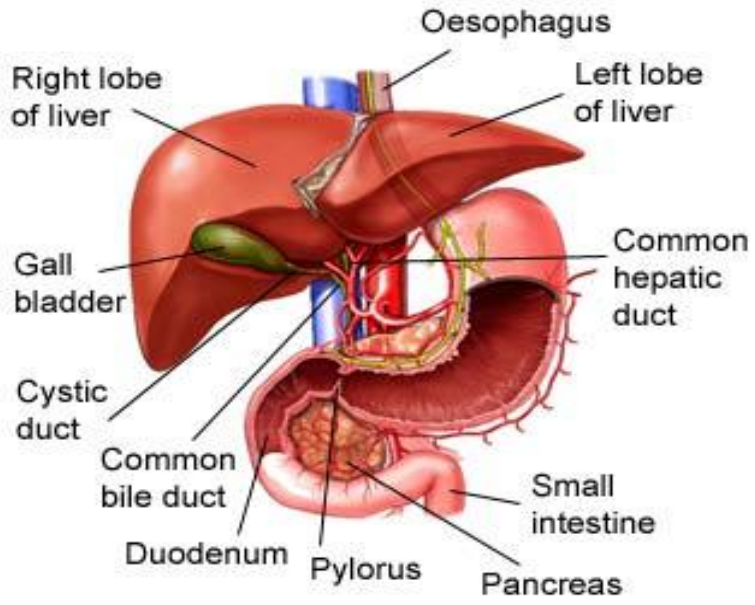
Part III

Dr. Nasser Abu-El-Noor

2013

Chapter 39

Management of Patients with Hepatic Disorders

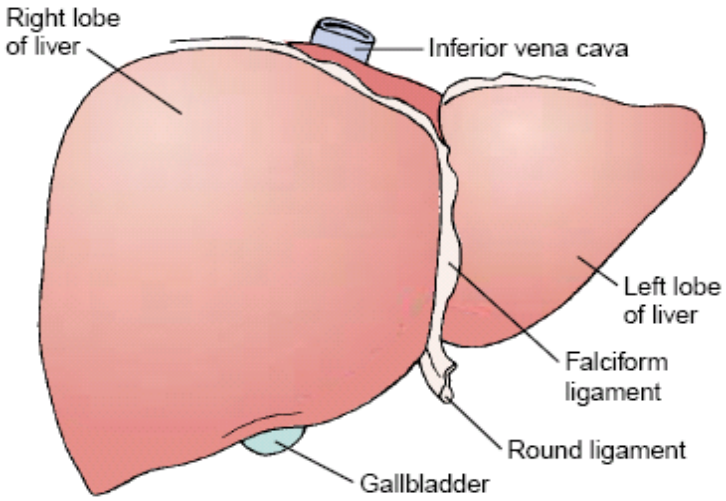


Learning Objectives

- Identify the metabolic functions of the liver and the alterations in these functions that occur with liver disease .
- Explain liver function tests and the clinical manifestations of liver dysfunction in relation to pathophysiologic alterations of the liver .
- Relate jaundice, portal hypertension, ascites, varices, nutritional deficiencies, and hepatic coma to pathophysiologic alterations of the liver .
- Describe the medical, surgical, and nursing management of patients with esophageal varices .
- Compare the various types of hepatitis and their causes, prevention, clinical manifestations, management, prognosis, and home health care needs .
- Use the nursing process as a framework for care of the patient with cirrhosis of the liver .
- Compare the nonsurgical and surgical management of patients with cancer of the liver .

- Describe the postoperative nursing care of the patient undergoing liver transplantation

Anatomic and Physiologic Overview



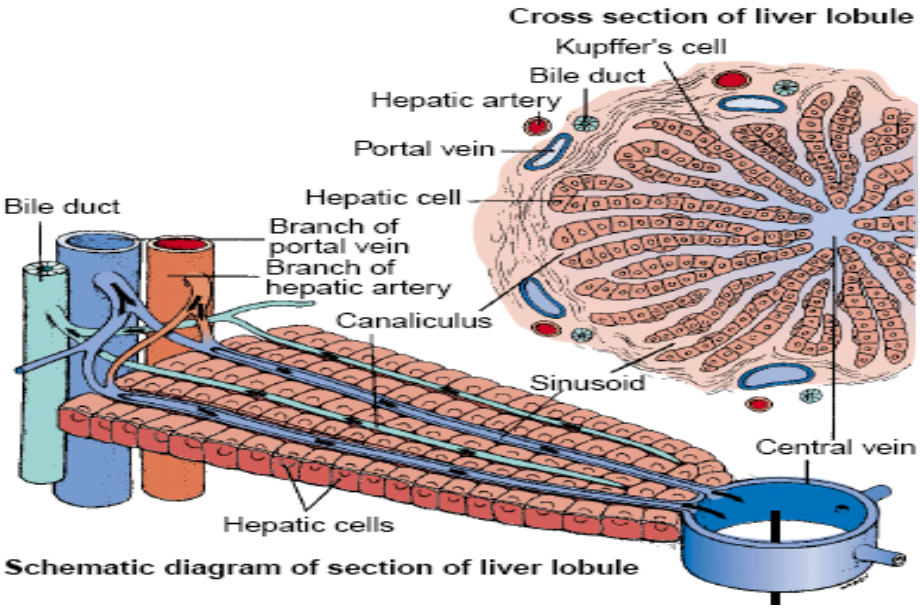
IGURE 39-1 The liver and biliary system.

- The liver, the largest gland of the body (1.4-1.8kg), can be considered a chemical factory that manufactures, stores, alters, and excretes a large number of substances involved in metabolism .
- The location of the liver is essential in this function, because it receives nutrient-rich blood directly from the gastrointestinal (GI) tract and then either stores or transforms these nutrients into chemicals that are used elsewhere in the body for metabolic needs .
- The liver is especially important in the regulation of glucose and protein metabolism .
- The liver manufactures and secretes bile, which has a major role in the digestion and absorption of fats in the GI tract. It removes waste products from the bloodstream and secretes them into the bile .
- The bile produced by the liver is stored temporarily in the gallbladder until it is needed for digestion, at which time the gallbladder empties and bile enters the intestine

ANATOMY OF THE LIVER

- The liver is located behind the ribs in the upper right portion of the abdominal cavity. It weighs about 1,500 g and is divided into four lobes .

- A thin layer of connective tissue surrounds each lobe, extending into the lobe itself and dividing the liver mass into small units called lobules
- The circulation of the blood into and out of the liver is of major importance in its function. The blood that perfuses the liver comes from two sources.
- Approximately 75% of the blood supply comes from the portal vein, which drains the GI tract and is rich in nutrients. The remainder of the blood supply enters by way of the hepatic artery and is rich in oxygen. Terminal branches of these two blood supplies join to form common capillary beds, which constitute the sinusoids of the liver
- The sinusoids empty into a venule that occupies the center of each liver lobule and is called the central vein. The central veins join to form the hepatic vein, which constitutes the venous drainage from the liver and empties into the inferior vena cava, close to the diaphragm. Thus, there are two sources of blood flowing into the liver and only one exit pathway 10
- •In addition to hepatocytes, phagocytic cells belonging to reticuloendothelial system are present in the liver. Other organs that contain reticuloendothelial cells are the spleen, bone marrow, lymph nodes, and lungs. In the liver, these cells are called Kupffer cells. Their main function is to engulf particulate matter (such as bacteria) that enters the liver through the portal blood .



Schematic diagram of section of liver lobule

- The smallest bile ducts, called canaliculi, are located between the lobules of the liver. The canaliculi receive secretions from the hepatocytes and carry them to larger bile ducts, which eventually form the hepatic duct. The hepatic duct from the liver and the cystic duct from the gallbladder join to form the common bile duct, which empties into the small intestine. The sphincter of Oddi, located at

the junction where the common bile duct enters the duodenum, controls the flow of bile into the intestine.

FUNCTIONS OF THE LIVER

1-Glucose Metabolism

- After a meal, glucose is taken up from the portal venous blood by the liver and converted into glycogen, which is stored in the hepatocytes .
- Subsequently, the glycogen is converted back to glucose and released as needed into the bloodstream to maintain normal levels of blood glucose .
- Additional glucose can be synthesized by the liver through a process called gluconeogenesis. For this process, the liver uses amino acids from protein breakdown or lactate produced by exercising muscles .

2. Ammonia Conversion

- Use of amino acids from protein for gluconeogenesis results in the formation of ammonia as a byproduct. The liver converts this metabolically generated ammonia into urea .
- Ammonia produced by bacteria in the intestines is also removed from portal blood for urea synthesis. In this way, the liver converts ammonia, a potential toxin, into urea, a compound that can be excreted in the urine .

3. Protein Metabolism

- The liver synthesizes almost all of the plasma proteins (except gamma globulin), including albumin, alpha and beta globulins, blood clotting factors, specific transport proteins, and most of the plasma lipoproteins .
- Amino acids serve as the building blocks for protein synthesis .
- Vitamin K is required by the liver for synthesis of prothrombin and some of the other clotting factors .

4. Fat Metabolism

- Fatty acids can be broken down for the production of energy and the production of ketone bodies .
- Ketone bodies are small compounds that can enter the bloodstream and provide a source of energy for muscles and other tissues .
- Breakdown of fatty acids into ketone bodies occurs primarily when the availability of glucose for metabolism is limited, as during starvation or in uncontrolled diabetes .

- Fatty acids and their metabolic products are also used for the synthesis of cholesterol, lecithin, lipoproteins, and other complex lipids .

5. Vitamin and Iron Storage

- Vitamins A, B, and D and several of the B-complex vitamins are stored in large amounts in the liver .
- Iron and copper, are also stored in the liver .
- Because the liver is rich in these substances, liver extracts have been used for therapy for a wide range of nutritional disorders .

7. Drug Metabolism

- The liver metabolizes many medications
- Metabolism generally results in loss of activity of the medication, although in some cases activation of the medication may occur.
- One of the important pathways for medication metabolism involves conjugation (binding) of the medication with a variety of compounds, such as glucuronic or acetic acid, to form more soluble substances .
- The conjugated products may be excreted in the feces or urine, similar to bilirubin excretion .

8. Bile Formation

- Bile is continuously formed by the hepatocytes and collected in the canaliculi and bile ducts .
- It is composed mainly of water and electrolytes such as sodium, potassium, calcium, chloride, and bicarbonate, and significant amounts of lecithin, fatty acids, cholesterol, bilirubin, and bile salts .
- Bile is collected and stored in the gallbladder and is emptied into the intestine when needed for digestion .
- Bile also serves as an aid to digestion through the emulsification of fats by bile salts .
- Bile salts are synthesized by the hepatocytes from cholesterol. After conjugation or binding with amino acids, they are excreted into the bile .
- The bile salts, together with cholesterol and lecithin, are required for emulsification of fats in the intestine, which is necessary for efficient digestion and absorption .

- Bile salts are then reabsorbed, primarily in the distal ileum, into portal blood for return to the liver and are again excreted into the bile.

9. Bilirubin Excretion

- Bilirubin is a pigment derived from the breakdown of hemoglobin by cells of the reticuloendothelial system .
- Hepatocytes remove bilirubin from the blood and modify it to be more soluble in aqueous solutions .
- The conjugated bilirubin is secreted by the hepatocytes into the adjacent bile canaliculi and is eventually carried in the bile into the duodenum .
- In the small intestine, bilirubin is converted into urobilinogen, which is in part excreted in the feces and in part absorbed through the intestinal mucosa into the portal blood .
- Some of the urobilinogen enters the systemic circulation and is excreted by the kidneys in the urine .

Gerontologic Considerations

- The most common change in the liver in the elderly is a decrease in its size and weight, accompanied by a decrease in total hepatic blood flow. Results of liver function tests do not normally change in the elderly; abnormal results in an elderly patient indicate abnormal liver function and are not the result of the aging process itself .
- The immune system is altered in the aged, and a less responsive immune system may be responsible for the increased incidence and severity of hepatitis B in the elderly and the increased incidence of liver abscesses secondary to decreased phagocytosis by the Kupffer cells .

Age-Related Changes of the Hepatobiliary System

- Steady decrease in size and weight of the liver, particularly in women .
- Decrease in blood flow .
- Decrease in replacement/repair of liver cells after injury .
- Reduced drug metabolism .
- Rapid progression of hepatitis C infection and lower response rate to therapy .
- Decline in drug clearance capability .

- Increased prevalence of gallstones .
- Decreased gallbladder contraction after a meal .
- More severe complications of biliary tract disease.

ASSESSMENT HEALTH HISTORY

- If liver function test results are abnormal, the patient may need to be evaluated for liver disease. So look if the client :
    - Was exposed to hepatotoxic substances or infectious agents .
    - Patient's occupational, recreational, and travel nhistory may assist in identifying exposure to hepatotoxins
    - Patient's history of alcohol and drug use
    - Lifestyle behaviors (Injectable drug use, sexual practices (
    - Current and past medical conditions, previous blood transfusion .

PHYSICAL EXAMINATION

- Assess the patient for pallor, jaundice (skin, mucosa, and sclerae), and the extremities are assessed for muscle atrophy, edema, and skin excoriation secondary to scratching .
- Observe the skin for petechiae or ecchymotic areas (bruises), spider angiomas, and palmar erythema .
- Assess male patient for unilateral or bilateral gynecomastia and testicular atrophy due to endocrine changes .
- Asses patient's cognitive status (recall, memory, abstract thinking) and neurologic status are assessed .
- Palpate abdomen to assess liver size and to detect any tenderness over the liver. A palpable liver presents as a firm, sharp edge with a smooth surface
- Tenderness of the liver implies recent acute enlargement with consequent stretching of the liver capsule .
- Enlargement of the liver is an abnormal finding requiring evaluation .

FIGURE 39-3 Technique for palpating the liver. The examiner places one hand under the right lower rib cage and presses downward with light pressure with the other hand.

Diagnostic Evaluation

Liver Function Tests

- More than 70% of the parenchyma of the liver may be damaged before liver function test results become abnormal .

1. Serum enzyme activity (ie, alkaline phosphatase, lactic dehydrogenase, serum aminotransferases (
2. Serum concentrations of proteins (albumin and globulins ,(
3. Bilirubin, ammonia, clotting factors, and lipids .
4. Serum aminotransferases (also called transaminases) are sensitive indicators of injury to the liver cells and are useful in detecting acute liver disease such as hepatitis .

    A. Alanine aminotransferase (ALT) (formerly called serum glutamic-pyruvic transaminase [SGPT]) (10-40 U/L (
    B. Aspartate aminotransferase (AST) (formerly called serum glutamic-oxaloacetic transaminase [SGOT]) (5-35 U/L (
    C. Gamma glutamyl transferase (GGT) (also called G-glutamyl transpeptidase) (10-48 U/L (
    D. .Lactic Dehydirgenase (LDH) (100-200 U/L).

These studies measure the ability of the liver to conjugate and excrete bilirubin. Results are abnormal in liver and biliary tract disease and are associated with jaundice clinically.

Pigment Studies	Normal
1. Serum bilirubin, direct	1. 0–0.3 mg/dL (0–5.1 µmol/L)
2. Serum bilirubin,total	2. 0–0.9 mg/dL (1.7–20.5 µmol/L)
3. Urine bilirubin	3. 0(0)
4. Urine urobilinogen	4. 0.05–2.5 mg/24 h (0.09–4.23 µmol/24 h)
5. Fecal urobilinogen (infrequently used)	5. 40–200 mg/24 h (0.068–0.34 mmol/24 h)

CLINICAL FUNCTIONS

- Proteins are manufactured by the liver. Their levels may be affected in a variety of liver impairments

  • Albumin: Cirrhosis

  Chronic hepatitis

  Edema, ascites

  • Globulin: Cirrhosis

  Liver disease

  Chronic obstructive jaundice

  Viral hepatitis

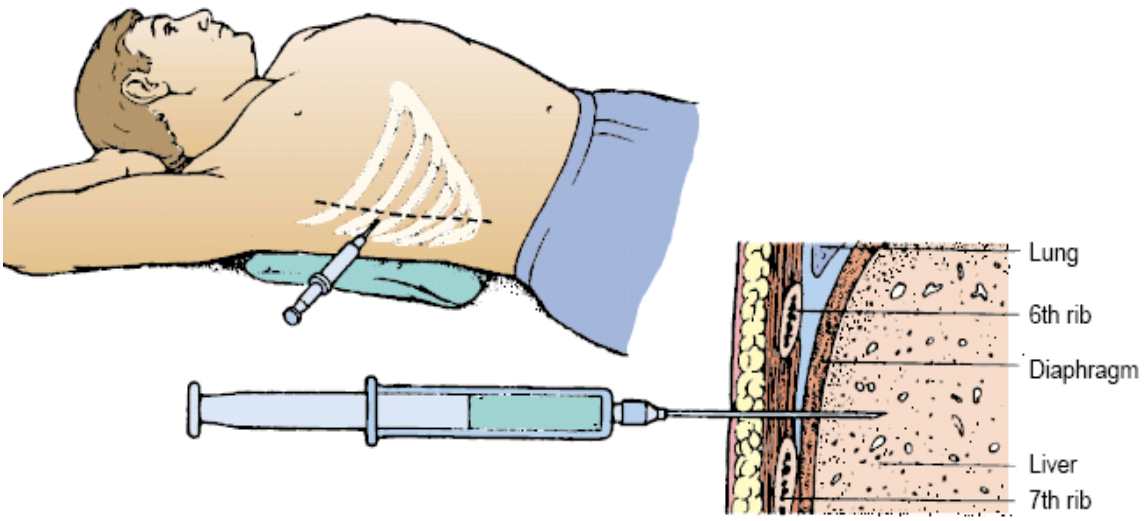
Test	Normal
Protein Studies	
•Total serum protein	7.0–7.5 g/dL (70–75 g/L)
•Serum albumin	4.0–5.5 g/dL (40–55 g/L)
•Serum globulin	1.7–3.3 g/dL (17–33 g/L)
Serum protein electrophoresis	
•Albumin	4.0 –5.5 g/dL (40–55 g/L)
•α1-Globulin	0.15–0.25 g/dL (1.5–2.5 g/L)

•α2-Globulin	0.43–.75 g/dL (4.3–7.5 g/L)
•β-Globulin	0.5–1.0 g/dL (5–10 g/L)
•γ-Globulin	0.6–1.3 g/dL (6–13 g/L)
•Albumin/globulin (A/G) ratio	A > G or 1.5:1–2.5:
Serum Aminotransferase or Transaminase Studies	
•AST (SGOT)	10–40 units (4.8–19 U/L)
•ALT (SGPT)	5–35 units (2.4–17 U/L)
•GGT, GGTP	10–48 IU/L
•LDH	100–200 units (100–225 U/L)
The studies are based on release of enzymes from damaged liver cells. These enzymes are elevated in liver cell damage. Elevated in alcohol abuse. Marker for biliary cholestasis.	
Cholesterol	
• Ester	60% of total (fraction of total cholesterol: 0.60)
•HDL (high-density lipoprotein)	HDL Male: 35–70 mg/dL, Female: 35–85 mg/dL
•LDL (low-density lipoprotein)	LDL < 130 µg/dL
Cholesterol levels are elevated in biliary obstruction and decreased in parenchymal liver disease	

ADDITIONAL STUDIES	CLINICAL FUNCTIONS
• Barium study of esophagus	• For varices, which indicate increased portal blood pressure
• Abdominal x-ray	• To determine gross liver size • To show size and shape of liver; to show replacement of liver tissue with scars, cysts, or tumor.
• Liver scan with radiotagged iodinated rose bengal, gold, technetium, or gallium	•To determine anatomic changes in liver tissue

• Liver biopsy (percutaneous or transjugular) • Ultrasonography • Computed tomography (CT scan)	•To show size of abdominal organs and presence of masses •To detect hepatic neoplasms; diagnose cysts, abscesses, and hematomas; and distinguish between obstructive and nonobstructive jaundice. Detects cerebral atrophy in hepatic encephalopathy.

LIVER BIOPSY



- Liver biopsy is the removal of a small amount of liver tissue, usually through needle aspiration .
- It permits examination of liver cells .
- Liver biopsy is especially useful when clinical findings and laboratory tests are not diagnostic .
- Bleeding and bile peritonitis after liver biopsy are the major complications.

NURSING ACTIVITIES	RATIONALE
• Ascertain that results of coagulation tests (prothrombin time, partial thromboplastin time, and platelet count) are available a) and that compatible donor blood is available.	• Many patients with liver disease have clotting defects and are at risk for bleeding.
• Check for signed consent; confirm that informed consent has been provided.	• 2. Procedure should be done with agreement of patient
• Measure and record the patient's pulse, respirations, and blood pressure immediately before biopsy.	• Pre-biopsy values provide a basis on which to compare the patient's vital signs and evaluate status after the procedure.
• Describe to the patient in advance: steps of the procedure; • Support the patient during the procedure.	• Explanations allay fears and ensure cooperation. • Encouragement and support of the nurse enhance comfort and promote a sense of security.
• Expose the right side of the patient's upper abdomen (right hypochondriac). • Instruct the patient to inhale and exhale deeply several times, finally to exhale, and to hold breath at the end of expiration. The physician promptl introduces the biopsy needle by way of the transthoracic (intercostal) transabdominal (subcostal) route, penetrates the liver, aspirates, and withdraws.	• The skin at the site of penetration will be cleansed and a local anesthetic will be infiltrated. • Holding the breath immobilizes the chest wall and the diaphragm; penetration of the diaphragm thereby is avoided, and the risk of lacerating the liver is minimized.

Post-procedure

- Immediately after the biopsy, assist the patient to turn onto the right side; place a pillow under the costal margin, and caution the patient to remain in this position and immobile, for several hours. Instruct the patient to avoid coughing or straining .

- Measure and record the patient's vital sings at a15-minute intervals for the first hour, then every 30 minutes for the next 1 to 2 hours or until the patient's condition stabilizes .

- **Complications**

  –Pneumothorax

  –Peritonitis

  –Hemorrhage

OTHER DIAGNOSTIC TESTS

- Ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI) are used to identify normal structures and abnormalities of the liver and biliary tree .

- A radioisotope liver scan may be performed to assess liver size and hepatic blood flow and obstruction .

- Laparoscopy (insertion of a fiber-optic endoscope through a small abdominal incision) is used to examine the liver and other pelvic structures .

Hepatic Dysfunction

- Results from damage to the liver's parenchymal cells, either directly from primary liver diseases or indirectly from obstruction of bile flow .

- Liver dysfunction may be acute or chronic; chronic dysfunction is far more common than acute .

- The most common cause of parenchymal damage is malnutrition, especially that related to alcoholism. The parenchymal cells respond to most noxious agents by replacing glycogen with lipids, producing fatty infiltration with or without cell death or necrosis .

- This is commonly associated with inflammatory cell infiltration and growth of fibrous tissue .

Among the most common and significant symptoms of liver disease are the following :

1. Jaundice, resulting from increased bilirubin concentration in the blood

2. Portal hypertension, ascites, and varices, resulting from circulatory changes within the diseased liver and producing severe GI hemorrhages and marked sodium and fluid retention

3. Nutritional deficiencies, which result from the inability of the damaged liver cells to metabolize certain vitamins ;

4. Hepatic encephalopathy or coma, reflecting accumulation of ammonia in the serum due to impaired protein metabolism by the diseased liver

I. JAUNDICE

- When the bilirubin concentration in the blood is abnormally elevated, all the body tissues, including the sclerae and the skin,become yellow-tinged or greenish-yellow, a condition called jaundice .
- Becomes clinically evident when the serum bilirubin level exceeds 2.5 mg/dL.
- There are several type of jaundice:

–Hemolytic

–Hepatocellular

–obstructive

1. Hemolytic Jaundice

- Results from increased destruction of the red blood cells, too much bilirubin reaches the liver, although functioning normally, cannot excrete the bilirubin as quickly as it is formed .
- Occurs with patients with hemolytic transfusion reactions and other hemolytic disorders .
- Prolonged jaundice, however, even if mild, predisposes to the formation of pigment stones in the gallbladder, and extremely severe jaundice (levels of free bilirubin exceeding 20 to 25 mg/dL) poses a risk for brain stem damage .

2. Hepatocellular Jaundice

- •caused by the inability of damaged liver cells to clear normal amounts of bilirubin from the blood. The cellular damage may be from infection, such as in viral hepatitis or other viruses that affect the liver (eg, yellow fever virus, Epstein-Barr virus), from medication or chemical toxicity (eg, carbon tetrachloride, chloroform, phosphorus, certain medications), or from alcohol .
- •Cirrhosis of the liver is a form of hepatocellular disease that may produce jaundice. It is usually associated with excessive alcohol

3. Obstructive Jaundice

- Caused by occlusion of the bile duct by a gallstone, an inflammatory process, a tumor, or pressure from an enlarged organ .
- The obstruction may also involve the small bile ducts within the liver (ie, intrahepatic obstruction), caused, for example, by pressure on these channels from inflammatory swelling of the liver or by an inflammatory exudate within the ducts themselves. Intrahepatic obstruction resulting from stasis and inspissation (thickening) of bile within the canaliculi may occur after the ingestion of certain medications ,
- These include phenothiazines, antithyroid medications, sulfonylureas, tricyclic antidepressant agents, nitrofurantoin, androgens, and estrogens .
- Whether the obstruction is intrahepatic or extrahepatic, and whatever its cause may be, bile cannot flow normally into the intestine but is backed up into the liver substance. It is then reabsorbed into the blood and carried throughout the entire body, staining the skin, mucous membranes, and sclerae. It is excreted in the urine, which becomes deep orange and foamy .
- Because of the decreased amount of bile in the intestinal tract, the stools become light or clay-colored. The skin may itch intensely, requiring repeated soothing baths. Dyspepsia and intolerance to fatty foods may develop because

of impaired fat digestion in the absence of intestinal bile. AST, ALT, and GGT levels generally rise only moderately, but bilirubin and alkaline phosphatase levels are elevated .

4. Hereditary Hyperbilirubinemia

- Results from several inherited disorders can also produce jaundice. Gilbert's syndrome is a familial disorder characterized by an increased level of unconjugated bilirubin that causes jaundice .
- Other conditions that are probably caused by inborn errors of biliary metabolism include Dubin–Johnson syndrome (chronic idiopathic jaundice, with pigment in the liver) and Rotor's syndrome (chronic familial conjugated hyperbilirubinemia without pigment in the liver.

II. PORTAL HYPERTENSION

- Obstructed blood flow through the damaged liver results in increased blood pressure (portal hypertension) throughout the portal venous system .
- It is commonly associated with hepatic cirrhosis, but can also occur with noncirrhotic liver disease .
- Portal hypertnesion leads to :

  –Splenomegaly (enlarged spleen (

  –Ascites

  –Varices .

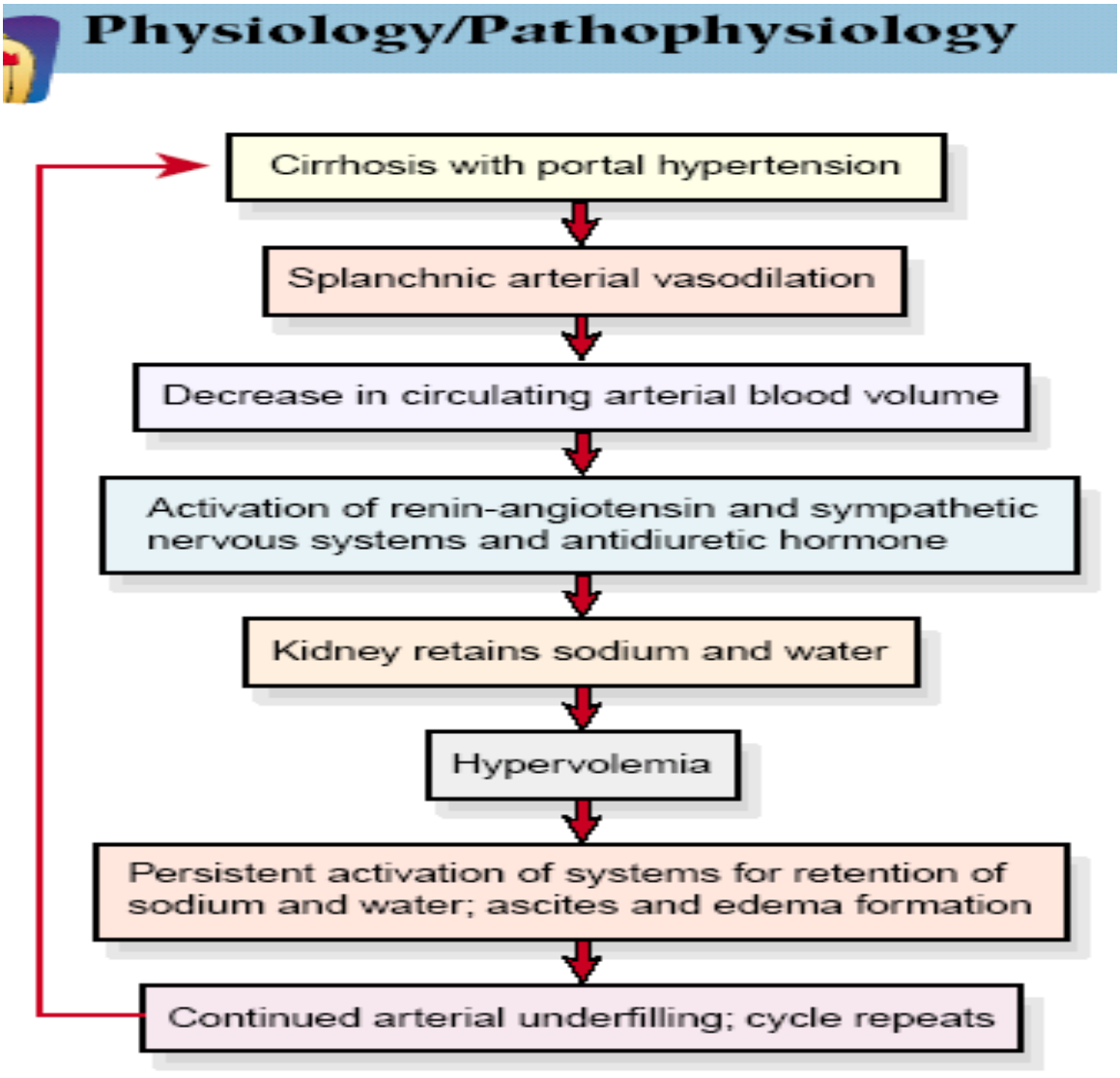
III. ASCITES - Pathophysiology

- Caused by portal hypertension and the resulting increase in capillary pressure and obstruction of venous blood flow through the damaged liver .
- The failure of the liver to metabolize aldosterone increases sodium and water retention by the kidney. Sodium and water retention, increased intravascular fluid volume, and decreased synthesis of albumin by the damaged liver all contribute to fluid moving from the vascular system into the peritoneal space
- Loss of fluid into the peritoneal space causes further sodium and water retention by the kidney in an effort to maintain the vascular fluid volume, and the process becomes self-perpetuating .
- As a result of liver damage, large amounts of albumin-rich fluid, 15 L or more, may accumulate in the peritoneal cavity as ascites .

- With the movement of albumin from the serum to the peritoneal cavity, the osmotic pressure of the serum decreases.
- This, combined with increased portal pressure, results in movement of fluid into the peritoneal cavity.

Clinical Manifestations

- Increased abdominal girth and rapid weight gain are common presenting symptoms of ascites .
- The patient may be short of breath and uncomfortable from the enlarged abdomen, and
- Striae and distended veins may be visible over the abdominal wall .
- Fluid and electrolyte imbalances are common .



RE 39-4 Pathogenesis of ascites (arterial vasodilation theory).

Assessment and Diagnostic Evaluation

- The presence and extent of ascites are assessed by percussion of the abdomen. When fluid has accumulated in the peritoneal cavity, the flanks bulge when the patient assumes a supine position. The presence of fluid can be confirmed either by percussing for shifting dullness or by detecting a fluid wave. Daily measurement and recording of abdominal girth and body weight are essential to assess the progression of ascites and its response to treatment.

Medical Management A) DIETARY MODIFICATION

- The goal of treatment for the patient with ascites is a negative sodium balance to reduce fluid retention. Table salt, salty foods, salted butter and margarine, and all ordinary canned and frozen foods should be avoided .
- In the meantime, the taste of unsalted foods can be improved by using salt substitutes such as lemon juice, oregano, and thyme .

FIGURE 39-5 Assessing for abdominal fluid wave. The examiner places the hands along the side of the patient's flank, then strikes one flank sharply, detecting any fluid wave with the other hand. An assistant's hand is placed (ulnar side down) along the patient's midline to prevent the fluid wave from being transmitted through the tissues of the abdominal wall.

B) DIURETICS

- Use of diuretics along with sodium restriction is successful in 90% of patients with ascites. Spironolactone (Aldactone), an aldosterone blocking agent, is most

often the first-line therapy. When used with other diuretics, it helps prevent potassium loss .

- Daily weight loss should not exceed 1 to 2 kg .
- Possible complications of diuretic therapy include fluid and electrolyte disturbances (including hypovolemia, hypokalemia, hyponatremia .(

C) BED REST

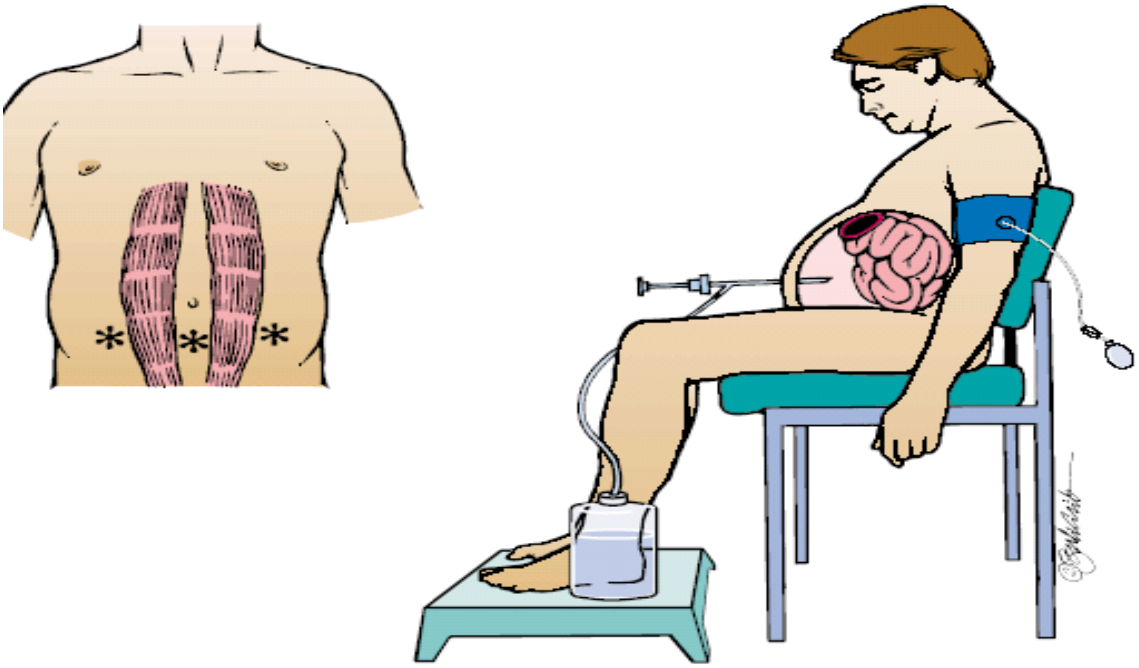
- •In patients with ascites, an upright posture is associated with activation of the renin-angiotensin-aldosterone system and sympathetic nervous system This results in reduced renal glomerular filtration and sodium excretion and a decreased response to loop diuretics. Bed rest may be a useful therapy, especially for patients whose condition is refractory to diuretics .

D) PARACENTESIS

- Paracentesis is the removal of fluid (ascites) from the peritoneal cavity through a small surgical incision or puncture made through the abdominal wall under sterile conditions. Ultrasound guidance may be indicated in some patients at high risk for bleeding
- Use of large-volume (5 to 6 liters) paracentesis has been shown to be a safe method for treating patients with severe ascites. This technique, in combination with the intravenous infusion of saltpoor albumin or other colloid, salt-poor albumin helps reduce edema by causing the ascitic fluid to be drawn back into the bloodstream and ultimately excretedd by the kidneys .
- **Preprocedure**

1. Prepare the pt by providing the information and instructions about the procedure
2. Instruct the patient to void .
3. Gather appropriate sterile equipment
4. Place patient in upright position on edge of bed with feet supported on stool, or place in chair. Fowler's position should be used for the patient confined to bed .
5. Monitoring of blood pressure during the procedure
6. The physician, using aseptic technique, inserts the trocar through a puncture wound below the umbilicus. The fluid drains from the abdomen through a drainage tube into a container .
7. Help the patient maintain position throughout procedure .

8. Measure and record blood pressure frequently .
9. Monitor the patient closely for signs of vascular collapse: pallor, increased pulse rate, or decreased blood pressure .



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Post-procedure

1. Return patient to bed or to a comfortable sitting position .
2. Measure, describe, and record the fluid collected .
3. Label samples of fluid and send to laboratory .
4. Continue to monitor vital signs every 15 minutes for 1 hour ,every 30 minutes over 2 hours, then every hour over 2 hours and then every 4 hours. Monitor temperature after procedure and every 4 hours .
5. Assess for hypovolemia, electrolyte loss, changes in mental status, and encephalopathy .
6. Check puncture site when taking vital signs for bleeding and leakage .
7. Provide patient education

Nursing Management

- Assessment and documentation of intake and output, abdominal girth, and daily weight to assess fluid status. The nurse monitors serum ammonia and electrolyte levels to assess electrolyte balance, response to therapy, and indicators of encephalopathy .
- PROMOTING HOME AND COMMUNITY-BASED CARE
- Teaching Patients Self-Care .
- Continuing Care .

Chart 39-3

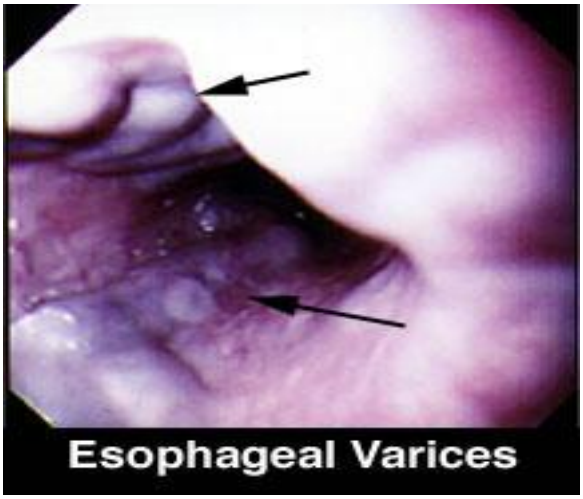
Home Care Checklist • Management of Ascites

At the completion of the home care instruction, the patient or caregiver will be able to:	Patient	Caregiver
• Make appropriate dietary choices consistent with dietary prescription and recommendations.	✓	✓
• State the importance of weighing self daily and keeping a daily record of weight.	✓	✓
• Maintain record of weight daily and identify daily weight-loss goals.	✓	✓
• List weight changes (loss or gain) that should be reported to the primary health care provider.	✓	✓
• Explain the rationale for monitoring and recording daily intake and output.	✓	✓
• Identify changes in output that should be reported to primary health care provider (decreasing urine output).	✓	✓
• Identify rationale for fluid restrictions (if needed), and comply with fluid restriction.	✓	✓
• Discuss importance of avoiding nonsteroidal anti-inflammatory agents, medications (eg, cough mixtures) containing alcohol, antibiotics or antacids containing salt.	✓	✓
• Describe effects, side effects, and monitoring parameters for diuretic therapy.	✓	✓
• Identify need to stop all alcohol intake as critical to well-being.	✓	✓
• Explain how to contact Alcoholics Anonymous or alcohol counselors in related organizations.	✓	✓
• Demonstrate how to care for skin, alleviate pressure over bony prominences by turning when in bed or chair, and decrease edema by position changes.	✓	✓
• Identify early signs and symptoms of complications (encephalopathy, spontaneous bacterial peritonitis, dehydration, electrolyte abnormalities, azotemia).	✓	✓

IV. ESOPHAGEAL VARICES

- Bleeding or hemorrhage from esophageal varices occurs in approximately one third of patients with cirrhosis and varices. The mortality rate resulting from the

first bleeding episode is 45% to 50%; it is one of the major causes of death in patients with cirrhosis



Clinical Manifestations

- The patient with bleeding esophageal varices may present with hematemesis, melena, or general deterioration in mental or physical status and often has a history of alcohol abuse .
- Signs and symptoms of shock (cool clammy skin, hypotension, tachycardia) may be present .

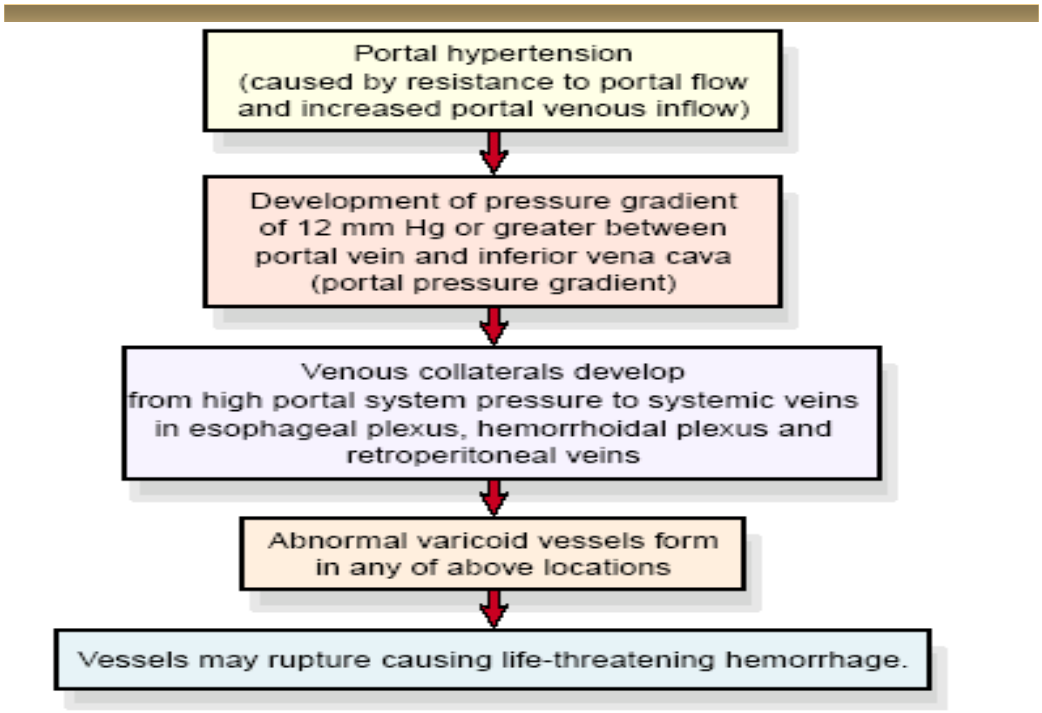


FIGURE 39-4 Pathogenesis of bleeding esophageal varices.

Assessment and Diagnostic Findings

- Endoscopy is used to identify the bleeding site, along with barium swallow, ultrasonography, CT, and angiography .
- Liver function tests

Medical Management

- Bleeding from esophageal varices can quickly lead to hemorrhagic shock and is an emergency. This patient is critically ill, requiring aggressive medical care and expert nursing care, and is usually transferred to the intensive care unit for close monitoring and management .

1. PHARMACOLOGIC THERAPY

- In an actively bleeding patient, medications are administered initially because they can be obtained and administered quickly; other therapies take longer to initiate. Vasopressin (Pitressin) may be the initial mode of therapy because it produces constriction of the splanchnic arterial bed and a resulting decrease in portal pressure .
- Combination of vasopressin and nitroglycerin (administered by the intravenous, sublingual, or transdermal route) has been effective in reducing or preventing the side effects (constriction of coronary vessels and angina) caused by vasopressin alone. Somatostatin and octreotide (Sandostatin) have been reported to be more effective than vasopressin in decreasing bleeding from esophageal varices

2. BALLOON TAMPONADE

- To control hemorrhage in certain patients, balloon tamponade may be used. In this procedure, pressure is exerted on the cardia (upper orifice of the stomach) and against the bleeding varices by a double-balloon tamponadeThe tube has four openings, each with a specific purpose: gastric aspiration, esophageal aspiration, inflation of the gastric balloon, and inflation of the esophageal balloon. The balloon in the stomach is inflated with 100 to 200 mL of air. An x-ray confirms proper positioning of the gastric balloon. Then the tube is pulled gently to exert a force against the gastric cardia.

Dangers and complication of tamponade balloon

- Displacement of the tube and the inflated balloon into the oropharynx can cause life-threatening obstruction of the airway and asphyxiation .
- This may occur if a patient pulls on the tube because of confusion or discomfort .

- It may also result from rupture of the gastric balloon, allowing the esophageal balloon to move into the oropharynx .
- Sudden rupture of the balloon causes airway obstruction and aspiration of gastric contents into the lungs .

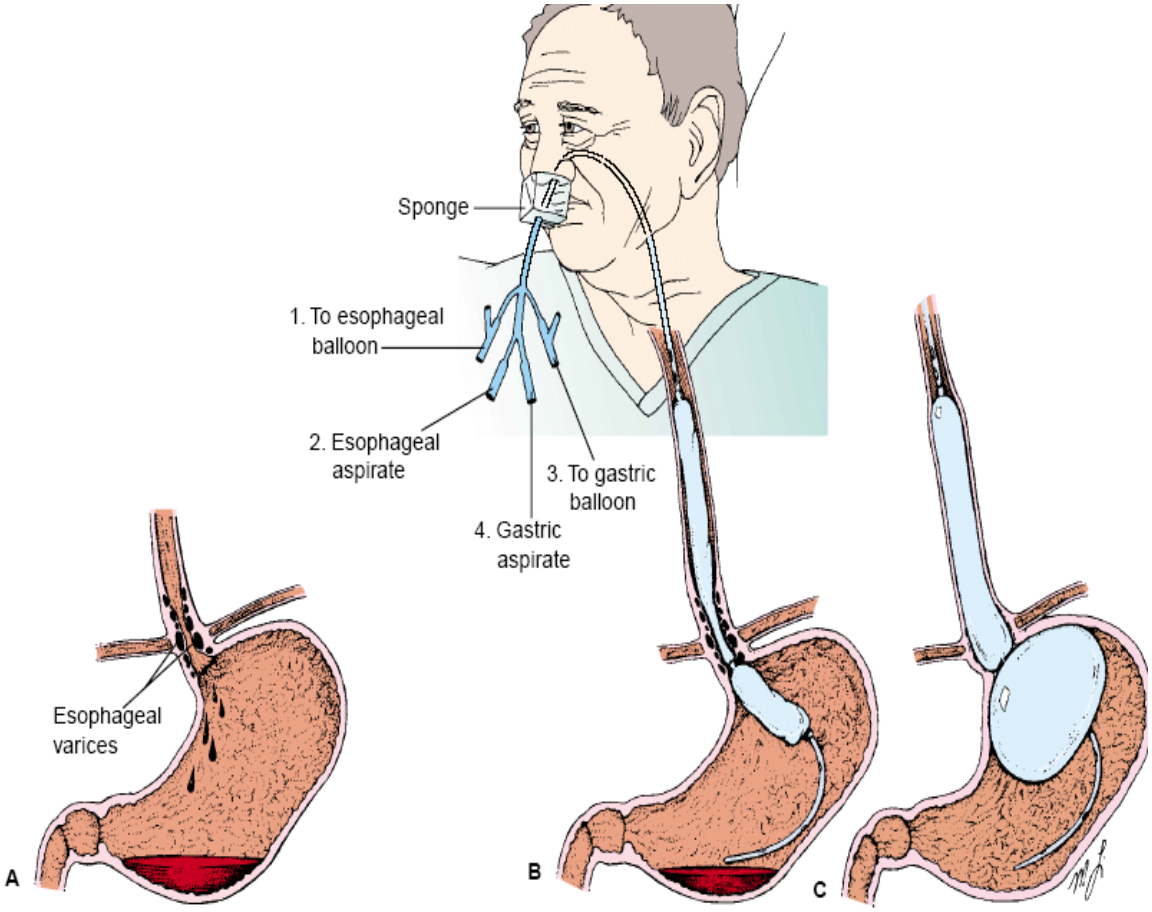


FIGURE 39-7 Esophageal balloon tamponade to treat esophageal varices. (A) Dilated, bleeding esophageal veins (varices) of the lower esophagus. (B) A four-lumen esophageal tamponade tube with balloons (uninflated) in place. (C) Compression of bleeding esophageal varices by inflated esophageal and gastric balloons. The gastric and esophageal outlets permit the nurse to aspirate secretions.

3. ENDOSCOPIC SCLEROTHERAPY

- A sclerosing agent is injected through a fiberoptic endoscope into the bleeding esophageal varices to promote thrombosis and eventual sclerosis. The procedure has been used successfully to treat acute GI hemorrhage. After treatment, the patient must be observed for bleeding, perforation of the esophagus, aspiration pneumonia, and esophageal stricture. Antacids may be administered after the procedure to counteract the effects of peptic reflux.

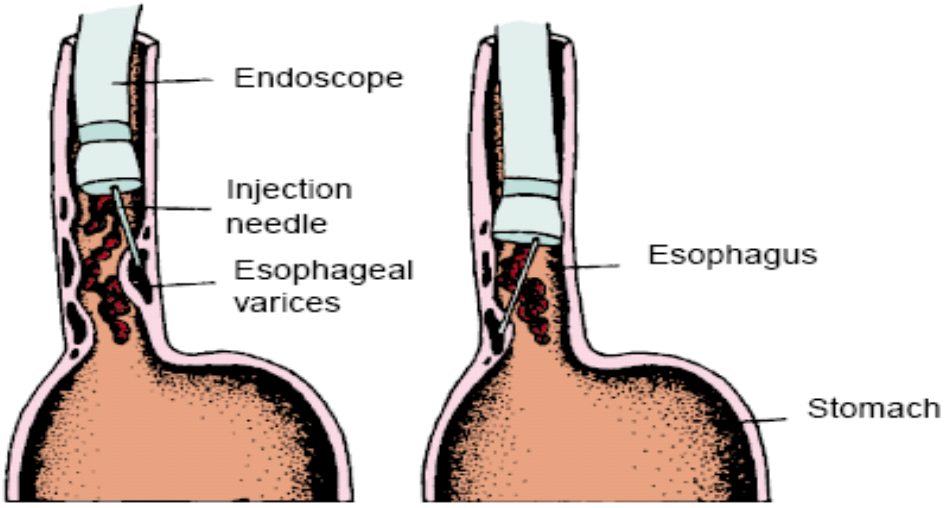
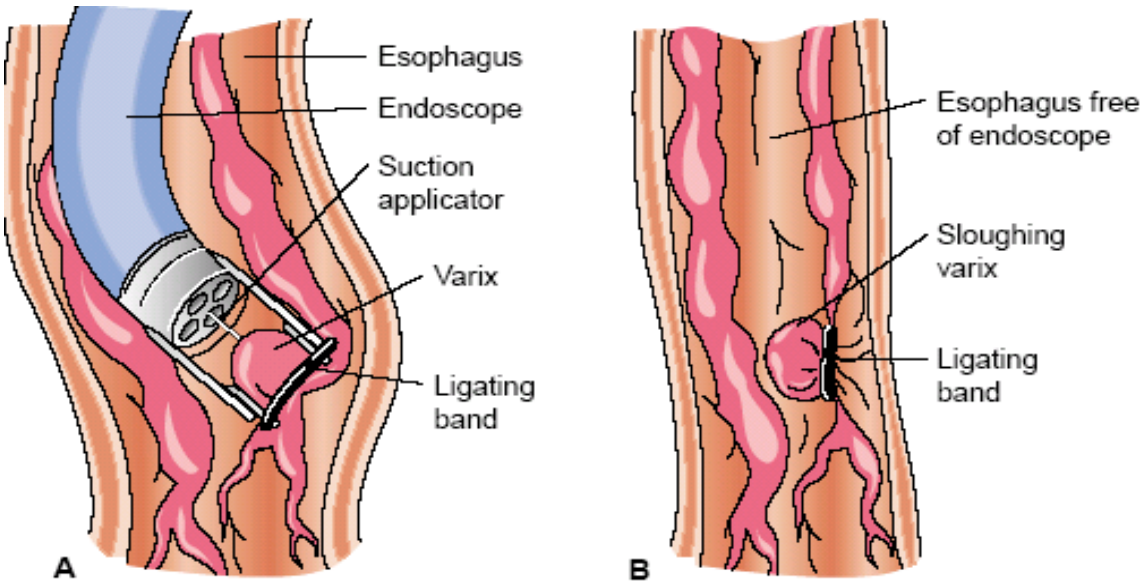


FIGURE 39-8 Endoscopic or injection sclerotherapy. Injection of sclerosing agent into esophageal varices through an endoscope promotes thrombosis and eventual sclerosis, thereby obliterating the varices.

4. Esophageal Banding Therapy (Variceal Band Ligation)

- A rubber band–like ligature is slipped over an esophageal varix via an endoscope. (B) Necrosis results and the varix eventually sloughs off .



5. TRANSJUGULAR INTRAHEPATIC PORTOSYSTEMIC SHUNTING

- Transjugular intrahepatic portosystemic shunting (TIPS) is a method of treating esophageal varices in which a cannula is threaded into the portal vein by the transjugular route. An expandable stent is inserted and serves as an intrahepatic

shunt between the portal circulation and the hepatic vein , reducing portal hypertension. Complications may include bleeding, sepsis, heart failure, organ perforation, shunt thrombosis, and progressive liver failure

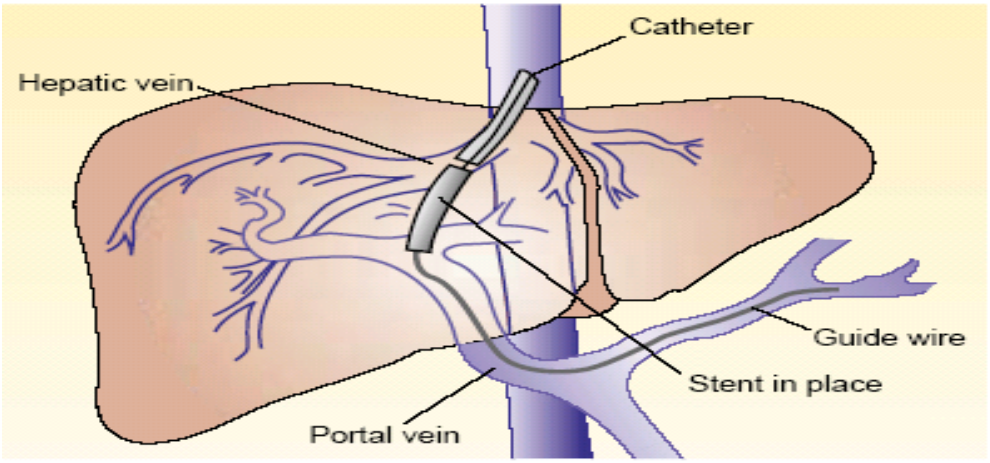


FIGURE 39-10 Transjugular intrahepatic portosystemic shunt (TIPS). A stent is inserted via catheter to the portal vein to divert blood flow and reduce portal hypertension.

6. SURGICAL MANAGEMENT

- Surgical decompression . Surgical Bypass Procedures of the portal circulation can prevent variceal bleeding if the shunt remains patent .
- The distal splenorenal shunt made between the splenic vein and the left renal vein after splenectomy. A mesocaval shunt is created by anastomosing the superior mesenteric vein to the proximal end of the vena cava or to the side of the vena cava using grafting material .
- The goal of distal splenorenal and mesocaval shunts is to drain only a portion of venous blood from the portal bed to decrease portal pressure; thus, they are considered selective shunts .
- The liver continues to receive some portal flow, and the incidence of encephalopathy may be reduced .
- These procedures are extensive and are not always successful because of secondary thrombosis in the veins used for the shunt as well as complications (eg, encephalopathy .
- Partial portacaval shunts with interposition grafts are as effective as other shunts but are associated with a lower rate of encephalopathy
- If the cause of portal hypertension is the rare Budd-Chiari syndrome or other venous obstructive disease, a portacaval or a mesoatrial shunt may be performed The mesoatrial shunt is required when the infrahepatic vena cava is thrombosed and must be bypassed .

Devascularization and Transection

- Devascularization and staplegun transection procedures to separate the bleeding site from the high-pressure portal system have been used in the emergency management of variceal bleeding. The lower end of the esophagus is reached through a small gastrostomy incision; a staple gun permits anastomosis of the transected ends of the esophagus. Rebleeding is a risk, and the outcomes of these procedures vary among patient populations .

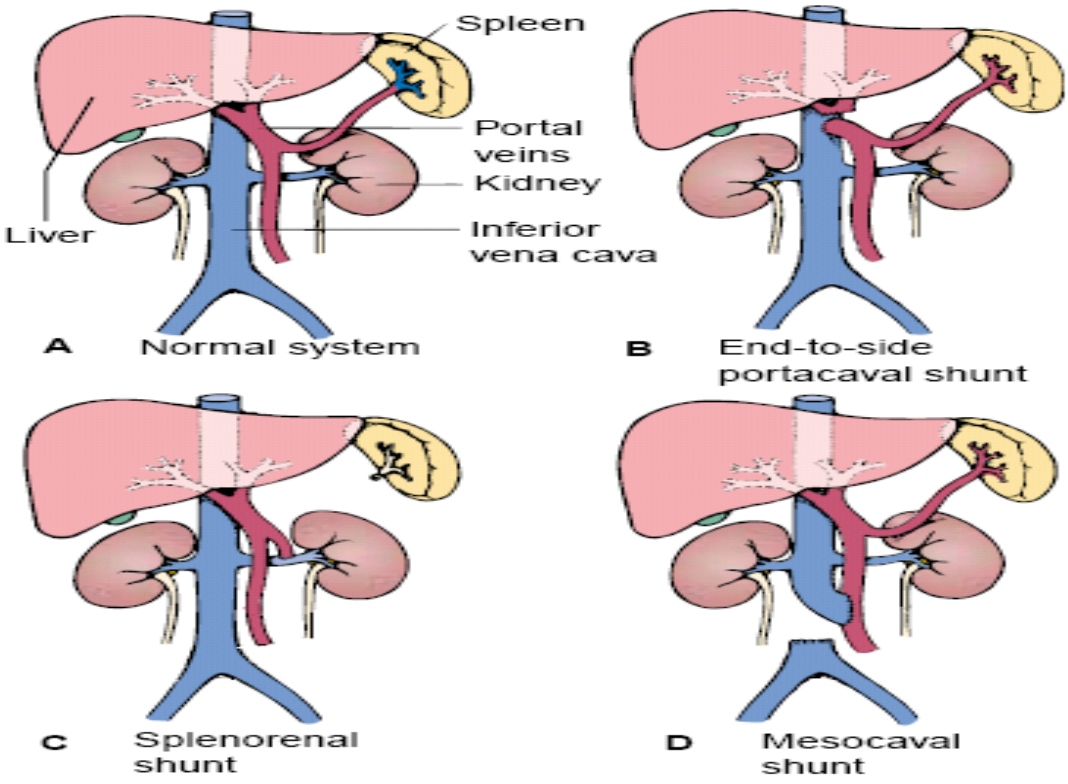


FIGURE 39-11 Portal systemic shunts. Normal portal system is shown in (A); examples of portal shunts to reduce portal pressure are shown in (B) to (D).

Nursing Management

- Monitoring the patient's physical condition and evaluating emotional responses and cognitive status .
- Monitor and record vital signs
- Assess the patient's nutritional and neurologic status .
- This assessment will assist in identifying hepatic encephalopathy resulting from the breakdown of blood in the GI tract and a rising serum ammonia level. Manifestations range from drowsiness to encephalopathy and coma .
- Complete rest of the esophagus may be indicated with bleeding, so parenteral nutrition is initiated. Gastric suction usually

- Vitamin K therapy and multiple blood transfusions often are indicated because of blood loss .
- A quiet environment and calm reassurance may help to relieve the patient's anxiety

Table 39-2 • Management Modalities and Nursing Care for the Patient With Bleeding Esophageal Varices

TREATMENT MODALITY*	ACTION	NURSING PRIORITIES
Nonsurgical Modalities		
Pharmacologic agents		
Vasopressin (Pitressin)	Reduces portal pressure by constricting splanchnic arteries	Observe response to therapy. Monitor for side effects: *vasopressin*—angina; nitroglycerin may be prescribed to prevent or treat angina.
Propranolol (Inderal)/nadolol (Corgard)	Reduces portal pressure by β-adrenergic blocking action	*propranolol and nadolol*—decreased pulse pressure, impaired cardiovascular response to hemorrhage.
Somatostatin/octreotide (Sandostatin)	Reduces portal pressure by selective vasodilation of portal system	Support patient during treatment.
Balloon tamponade	Exerts pressure directly to bleeding sites in esophagus and stomach	Explain procedure to patient briefly to obtain cooperation with insertion and maintenance of esophageal tamponade tube and reduce patient's fear of the procedure. Monitor closely to prevent inadvertent removal or displacement of tube, subsequent airway obstruction, and aspiration.
Injection sclerotherapy	Promotes thrombosis and sclerosing of bleeding sites by injection of sclerosing agent into the esophageal varices	Observe for aspiration, perforation of the esophagus, and recurrence of bleeding after treatment.
Variceal banding	Provides thrombosis and mucosal necrosis of bleeding sites by band ligation	Observe for recurrence of bleeding, esophageal perforation.
Transjugular intrahepatic portosystemic shunting (TIPS)	Reduces portal pressure by creating a shunt within the liver between the portal and systemic venous system.	Observe for rebleeding and signs of infection.
Surgical Modalities		
Portal-systemic shunting	Reduces portal hypertension by diverting blood flow away from obstructed portal system	Observe for development of portal-systemic encephalopathy (altered mental status, neurologic dysfunction), hepatic failure, and rebleeding.

Hepatic Encephalopathy and Coma

- Is a life-threatening complication of liver disease, occurs with profound liver failure and may result from the accumulation of ammonia and other toxic metabolites in the blood.
- Represents the most advanced stage of hepatic encephalopathy.

Pathophysiology

- Ammonia accumulates because damaged liver cells fail to detoxify and convert the ammonia that is constantly entering the bloodstream to urea.
- Ammonia enters the bloodstream as a result of its absorption from the GI tract and its liberation from kidney and muscle cells.
- The increased ammonia concentration in the blood causes brain dysfunction and damage, resulting in hepatic encephalopathy.
- The largest source of ammonia is the enzymatic and bacterial digestion of dietary and blood proteins in the GI tract. Ammonia from these sources is increased as a result of GI bleeding (ie, bleeding esophageal varices or chronic GI bleeding), a high-protein diet, bacterial infections, and uremia. The ingestion of ammonium salts also increases the blood ammonia level.
- Conversely, serum ammonia is decreased by elimination of protein from the diet and by the administration of antibiotic agents, such as neomycin sulfate, that reduce the number of intestinal bacteria capable of converting urea to ammonia

Stages of Hepatic Encephalopathy

TABLE 39-3 Stages of Hepatic Encephalopathy and Possible Nursing Diagnoses*

Stage	Clinical Symptoms	Clinical Signs and EEG Changes	Selected Potential Nursing Diagnoses
1	Normal level of consciousness with periods of lethargy and euphoria; reversal of day–night sleep patterns	Asterixis; impaired writing and ability to draw line figures. Normal EEG.	Activity intolerance Self-care deficit Disturbed sleep pattern Impaired social interaction Ineffective role performance Risk for injury Imbalanced nutrition Impaired mobility Impaired verbal communication Risk for aspiration Impaired gas exchange Impaired tissue integrity Disturbed sensory perception
2	Increased drowsiness; disorientation; inappropriate behavior; mood swings; agitation	Asterixis; fetor hepaticus. Abnormal EEG with generalized slowing.	
3	Stuporous; difficult to rouse; sleeps most of time; marked confusion; incoherent speech	Asterixis; increased deep tendon reflexes; rigidity of extremities. EEG markedly abnormal.	
4	Comatose; may not respond to painful stimuli	Absence of asterixis; absence of deep tendon reflexes; flaccidity of extremities. EEG markedly abnormal.	

*Nursing diagnoses are likely to progress, so that most nursing diagnoses present at earlier stages will occur during later stages as well.

Clinical Manifestations

- The earliest symptoms of hepatic encephalopathy include minor mental changes and motor disturbances. The patient appears slightly confused, has alterations in mood, becomes unkempt, and has altered sleep patterns. The patient tends to sleep during the day and have restlessness and insomnia at night. As hepatic encephalopathy progresses, the patient may be difficult to awaken.

- Asterixis (flapping tremor of the hands) may occur

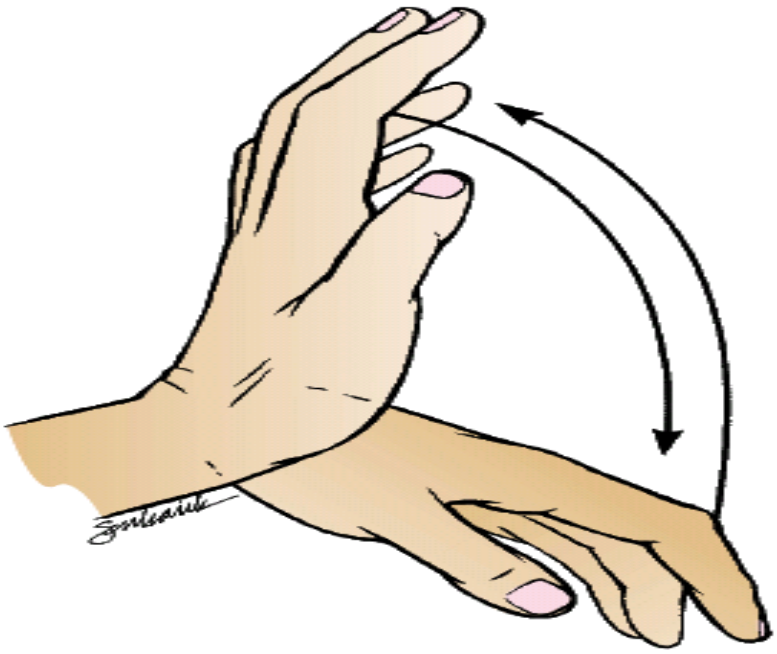


FIGURE 39-12 Asterixis or "liver flap" may occur in hepatic encephalopathy. The patient is asked to hold the arm out with the hand held upward (dorsiflexed). Within a few seconds, the hand falls forward involuntarily and then quickly returns to the dorsiflexed position.

- Simple tasks, such as handwriting, become difficult. A handwriting or drawing sample (eg, star figure), taken daily, may provide graphic evidence of progression or reversal of hepatic encephalopathy. Inability to reproduce a simple figure. is referred to as constructional apraxia.

- In the early stages of hepatic encephalopathy, the deep tendon reflexes are hyperactive; with worsening of hepatic encephalopathy, these reflexes disappear and the extremities may become flaccid.

Assessment and Diagnostic Findings

- (EEG) shows generalized slowing, an increase in the amplitude of brain waves.

- Fetor hepaticus, a sweet, slightly fecal odor to the breath presumed to be of intestinal origin may be noticed. The odor has also been described as similar to that of freshly mowed grass, acetone, or old wine.

- With further progression of the disorder, the patient lapses into frank coma and may have seizures. Approximately 35% of all patients with cirrhosis of the liver die in hepatic coma.

Medical Management

- Lactulose (Cephulac) is administered to reduce serum ammonia levels. It acts by several mechanisms that promote the excretion of ammonia in the stool:

  (1) ammonia is kept in the ionized state, resulting in a fall in colon pH, reversing the normal passage of ammonia from the colon to the blood;

  (2) evacuation of the bowel takes place, which decreases the ammonia to which decreases the ammonia absorbed from the colon.

  (3) the fecal flora are changed to organisms that do not produce ammonia from urea.

    - Monitor patient closely for the development of watery diarrheal stools, because they indicate a medication overdose.

- Intravenous administration of glucose to minimize protein breakdown, administration of vitamins to correct deficiencies, and correction of electrolyte imbalances (especially potassium). Additional principles of management of hepatic encephalopathy include the following:

  1. Therapy is directed toward treating or removing the cause.
  2. Neurologic status is assessed frequently. A daily record is kept of handwriting and performance in arithmetic to monitor mental status.
  3. Fluid intake and output and body weight are recorded each day.
  4. Vital signs are measured and recorded every 4 hours.
  5. Potential sites of infection (peritoneum, lungs) are assessed frequently, and abnormal findings are reported promptly.
  6. Serum ammonia level is monitored daily.
  7. Protein intake is restricted in patients who are comatose or who have encephalopathy that is refractory to lactulose and antibiotic therapy
  8. Reduction in the absorption of ammonia from the GI tract is accomplished by the use of gastric suction, enemas, or oral antibiotics.
  9. Electrolyte status is monitored and corrected if abnormal.
  10. Sedatives, tranquilizers, and analgesic medications are discontinued.

11. Benzodiazepine antagonists (flumazenil [Romazicon]) may be administered to improve encephalopathy whether or not the patient has previously taken benzodiazepines.

- Prevent the formation and absorption of toxins, principally ammonia, from the intestine.
- Keep daily protein intake between 1.0 and 1.5 g/kg, depending on the degree of decompensation.
- Avoid protein restriction if possible, even in those with encephalopathy. If necessary, implement temporary restriction of 0.5 g/kg.
- For patients who are truly protein-intolerant, provide additional nitrogen in the form of an amino acid supplement. Use of branched-chain amino acids is still controversial.
- Provide small, frequent meals and an evening snack of complex carbohydrates to avoid protein loading.
- Substitute vegetable protein for animal protein in as high a percentage as possible.

Nursing Management

- Maintaining a safe environment to prevent injury, bleeding, and infection. The nurse administers the prescribed treatments and monitors the patient for the many potential complications.

- • If the patient recovers from hepatic encephalopathy and coma, rehabilitation is likely to be prolonged.

Teaching Patients Self-Care

- If the patient has recovered from hepatic encephalopathy and is to be discharged home, the nurse instructs the family to watch for subtle signs of recurrent encephalopathy.

- In the acute phase of hepatic encephalopathy, dietary protein may be reduced to 0.8 to 1.0 g/kg per day. Instruct the patient in maintenance of a low-protein, high-calorie diet. Vegetable protein intake may result in improved nitrogen balance without precipitating or advancing hepatic encephalopathy

Other Manifestations of Liver Dysfunction

A. Edema and Bleeding

- Many patients with liver dysfunction develop generalized edema from hypoalbuminemia that results from decreased hepatic production of albumin.
- The production of blood clotting factors by the liver is also reduced, leading to an increased incidence of bruising, epistaxis, bleeding from wounds, and, as described above, GI bleeding.

B. Vitamin Deficiency

- Decreased production of several clotting factors may be due, in part, to deficient absorption of vitamin K from the GI tract. This probably is caused by the inability of liver cells to use vitamin K to make prothrombin.
- Absorption of the other fat-soluble vitamins (vitamins A, D, and E) as well as dietary fats may also be impaired because of decreased secretion of bile salts into the intestine.
- The threat of these avitaminoses provides the rationale for supplementing the diet of every patient with chronic liver disease (especially if alcohol-related) with ample quantities of vitamins A, B complex, C, and K and folic acid

C. Metabolic Abnormalities

- Abnormalities of glucose metabolism also occur; the blood glucose level may be abnormally high shortly after a meal , but hypoglycemia may occur during fasting because of decreased hepatic glycogen reserves and decreased gluconeogenesis.
- Because the ability to metabolize medications is decreased, medications must be used cautiously and usual medication dosages must be reduced for the patient with liver failure.
- Many endocrine abnormalities also occur with liver dysfunction because the liver cannot metabolize hormones normally, including androgens or sex hormones.
- Gynecomastia, amenorrhea, testicular atrophy, loss of pubic hair in the male, and menstrual irregularities in females may occur.

D. Pruritus and Other Skin Changes

- Patients with liver dysfunction resulting from biliary obstruction commonly develop severe itching (pruritus) due to retention of bile salts. Patients may

develop vascular (or arterial) spider angiomas on the skin, generally above the waistline.

Management of Patients With Viral Hepatic Disorders

- Viral hepatitis is a systemic, viral infection in which necrosis and inflammation of liver cells produce a characteristic cluster of clinical, biochemical, and cellular changes. To date, five definitive types of viral hepatitis have been identified: hepatitis A, B, C, D, and E .
- Hepatitis A and E are similar in mode of transmission (fecal– oral route), whereas hepatitis B, C, and D share many characteristics .

TABLE 39-4 Comparison of Major Forms of Viral Hepatitis

	Hepatitis A	Hepatitis B	Hepatitis C	Hepatitis D	Hepatitis E
Previous names	Infectious hepatitis	Serum hepatitis	Non-A, non-B hepatitis		
Epidemiology					
Cause	Hepatitis A virus (HAV)	Hepatitis B virus (HBV)	Hepatitis C virus (HCV)	Hepatitis D virus (HDV)	Hepatitis E virus (HEV)
Mode of transmission	Fecal–oral route; poor sanitation. Person-to-person contact. Waterborne; foodborne. Transmission possible with oral–anal contact during sex.	Parenterally; by intimate contact with carriers or those with acute disease; sexual and oral–oral contact. Perinatal transmission from mothers to infants. An important occupational hazard for health care personnel.	Transfusion of blood and blood products; exposure to contaminated blood through equipment or drug paraphernalia. Transmission possible with sex with infected partner; risk increased with STD.	Same as HBV. HBV surface antigen necessary for replication; pattern similar to that of hepatitis B.	Fecal–oral route; person to person contact may be possible, although risk appears low
Incubation (days)	15–50 days Average: 30 days	28–160 days Average: 70–80 days	15–160 days Average: 50 days	21–140 days Average: 35 days	15–65 days Average: 42 days
Immunity	Homologous	Homologous	Second attack may indicate weak immunity or infection with another agent.	Homologous	Unknown

Nature of Illness					
Signs andsymptoms	May occur with or without symptoms; flulike illness *Preicteric phase:* Headache, malaise, fatigue, anorexia, fever *Icteric phase:* Dark urine, jaundice of sclera and skin, tender liver	May occur without symptoms May develop arthralgias, rash	Similar to HBV; less severe and anicteric	Similar to HBV	Similar to HAV. Very severe in pregnant women.
Outcome	Usually mild with recovery. Fatality rate: <1%. No carrier state or increased risk of chronic hepatitis, cirrhosis, or hepatic cancer.	May be severe. Fatality rate: 1–10%. Carrier state possible. Increased risk of chronic hepatitis, cirrhosis, and hepatic cancer.	Frequent occurrence of chronic carrier state and chronic liver disease. Increased risk of hepatic cancer.	Similar to HBV but greater likelihood of carrier state, chronic active hepatitis, and cirrhosis	Similar to HAV except very severe in pregnant women

A. HEPATITIS A VIRUS (HAV)

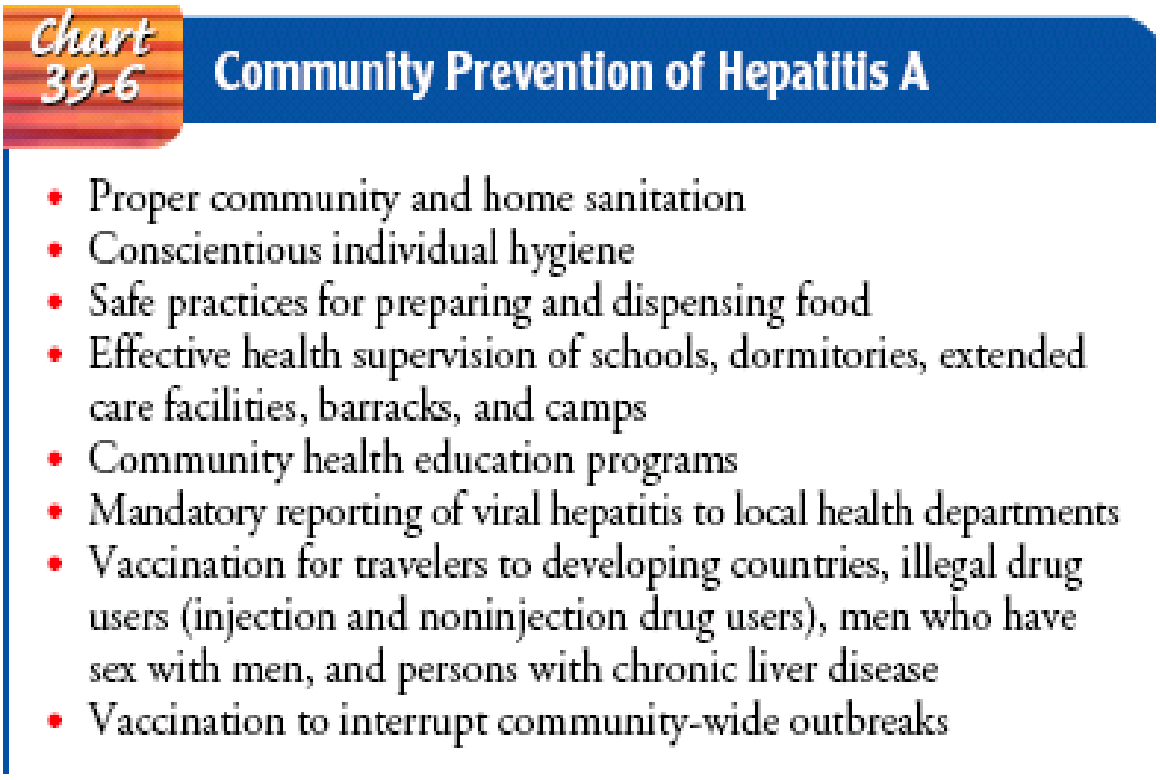
- HAV accounts for 20% to 25% of cases of clinical hepatitis in the developed world .
- Hepatitis A, formerly called infectious hepatitis, is caused by an RNA virus of the Enterovirus family .
- The mode of transmission of this disease is the fecal–oral route, primarily through the ingestion of food or liquids infected by the virus. The virus has been found in the stool of infected patients before the onset of symptoms and during the first few days of illness .
- The incubation period is estimated to be 15 to 50 days, with an average of 30 days

Clinical Manifestations

- Many patients are anicteric (without jaundice) and symptomless .
- If symptoms appear, they are of a mild, flu-like upper respiratory tract infection, with low-grade fever .

- Anorexia, an early symptom, is often severe. It is thought to result from release of a toxin by the damaged liver or by failure of the damaged liver cells to detoxify an abnormal product .
- Later, jaundice and dark urine may become apparent .
- Indigestion is present in varying degrees, marked by vague epigastric distress, nausea, heartburn, & flatulence .
- The liver and spleen are often moderately enlarged for a few days after onset; otherwise, apart from jaundice, there are few physical signs .

Prevention



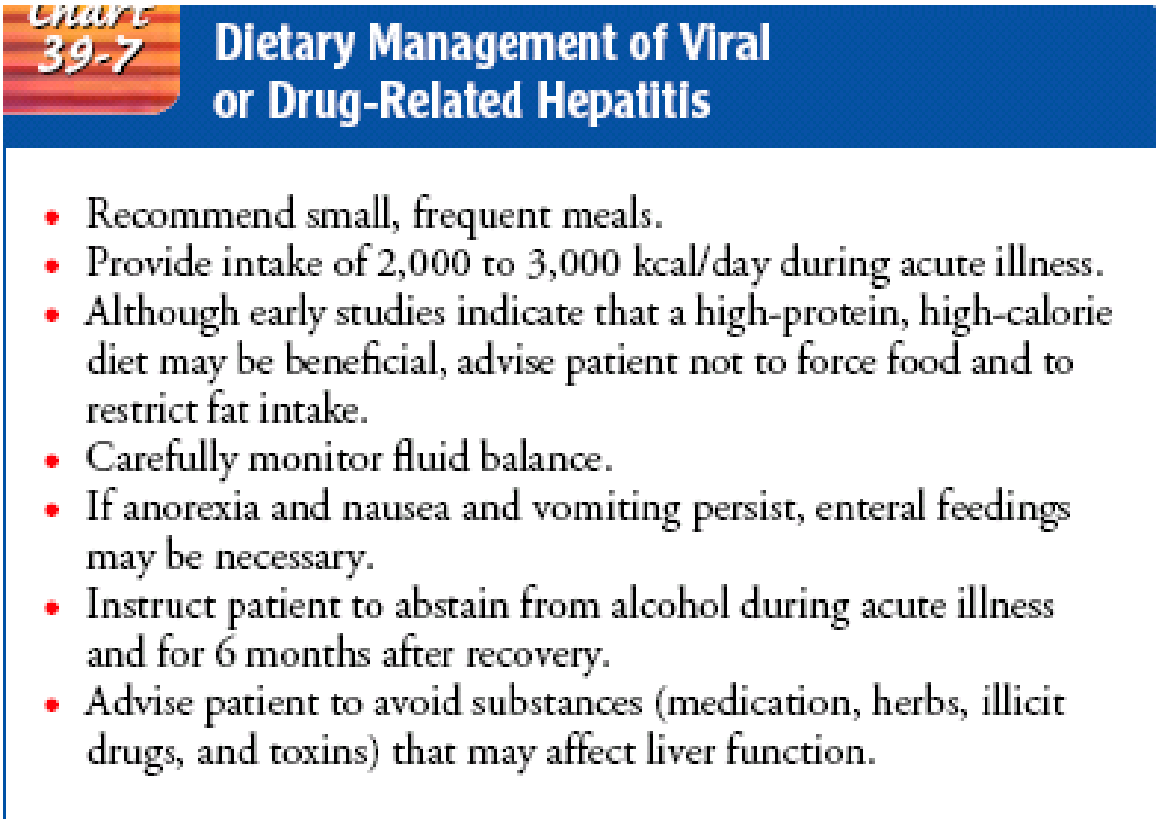
Medical Management

- Bed rest during the acute stage and a diet that is both acceptable to the patient and nutritious are part of the treatment and nursing care .
- During the period of anorexia, the patient should receive frequent small feedings, supplemented, if necessary, by IV fluids with glucose .

- Because this patient often has an aversion to food, gentle persistence and creativity may be required to stimulate the appetite .
- Optimal food and fluid levels are necessary to counteract weight loss and slow recovery .

Nursing Management

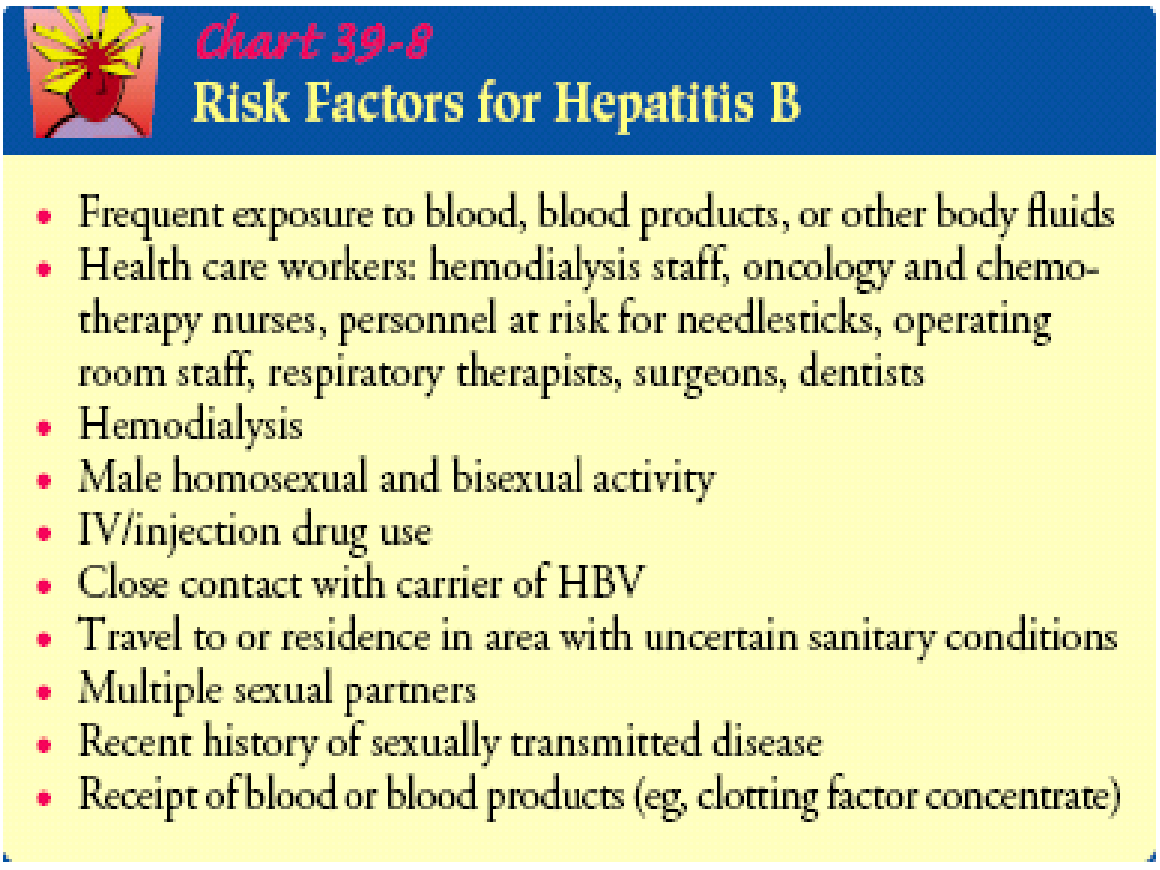
- The patient is usually managed at home unless symptoms are severe. Therefore, the nurse assists the patient and family in coping with the temporary disability and fatigue that are common in hepatitis and instructs them to seek additional health care if the symptoms persist or worsen .



B. HEPATITIS B VIRUS (HBV)

- Transmitted primarily through blood (percutaneous and permucosal routes). HBV has been found in blood, saliva, semen, and vaginal secretions and can be transmitted through mucous membranes and breaks in the skin .

- HBV is also transferred from carrier mothers to their babies, especially in areas with a high incidence (ie, Southeast Asia). The infection is usually not via the umbilical vein, but from the mother at the time of birth and during close contact afterward .
- HBV has a long incubation period. It replicates in the liver and remains in the serum for relatively long periods, allowing transmission of the virus .
- Those at risk for developing hepatitis B include surgeons, clinical laboratory workers, dentists, nurses, and respiratory therapists. Staff and patients in hemodialysis and oncology units and sexually active homosexual
- Most people (>90%) who contract hepatitis B infections will develop antibodies and recover spontaneously in 6 months. The mortality rate from hepatitis B has been reported to be as high as 10%. Another 10% of patients who have hepatitis B progress to a carrier state or develop chronic hepatitis with persistent HBV infection and hepatocellular injury and inflammation .



Clinical Manifestations

- Clinically, the disease closely resembles hepatitis A, but the incubation period is much longer (1 to 6 months). Signs and symptoms of hepatitis B may be insidious and variable. Fever and respiratory symptoms are rare; some patients have arthralgias and rashes .
- The patient may have loss of appetite, dyspepsia, abdominal pain, generalized aching, malaise, and weakness. Jaundice may or may not be evident. light-colored stools and dark urine .
- The liver may be tender and enlarged. The spleen is enlarged and palpable in a few patients; the posterior cervical lymph nodes may also be enlarged .
- Assessment and Diagnostic Findings
- HBV is a DNA virus composed of the following antigenic particles :
  - HBcAg—hepatitis B core antigen (antigenic material in an inner core
  - HBsAg—hepatitis B surface antigen (antigenic material on surface of HBV
  - HBeAg—an independent protein circulating in the blood
  - HBxAg—gene product of X gene of HBV/DNA
- Each antigen elicits its specific antibody and is a marker for different stages of the disease process :
- Anti-HBc—antibody to core antigen or HBV; persists during the acute phase of illness; may indicate continuing HB in the liver
- Anti-HBs—antibody to surface determinants on HBV; detected during late convalescence; usually indicates recovery and development of immunity. It appears in the circulation in 80% to 90% of infected patients 1 to 10 weeks after exposure, if continues for > 6 months, pt is considered a HBsAg carrier
- Anti-HBe—antibody to hepatitis B e-antigen; usually signifies reduced infectivity
- •anti-HBxAg—antibody to the hepatitis B x-antigen; may indicate ongoing replication of HBV

Prevention

- The goals of prevention are to interrupt the chain of transmission, to protect people at high risk with active immunization through the use of hepatitis B vaccine, and to use passive immunization for unprotected people exposed to HBV .

- A. PREVENTING TRANSMISSION
    - Continued screening of blood donors for the presence of hepatitis B antigens
    - The use of disposable syringes, needles, and lancets and the introduction of needleless IV
    - Good personal hygiene is fundamental to infection control. In the clinical laboratory, work areas should be disinfected daily. Gloves are worn when handling all blood and body fluids as well as HBAg positive specimens .
    - Eating and smoking are prohibited in the laboratory and in other areas exposed to secretions, blood products .
- B. Active Immunization: Hepatitis B Vaccine
    - Active immunization is recommended for individuals at high risk for hepatitis B (eg, health care personnel and hemodialysis patients). In addition, individuals with hepatitis C and other chronic liver diseases should receive the vaccine .
    - Administered IM (in the deltoid muscle in adults) in three doses, the second and third doses 1 & 6 months after the first dose. The third dose is very important in producing prolonged immunity .
    - Antibody response may be measured by anti-HBs levels 1 to 3 months after completing the basic course of vaccine
    - Universal vaccination of all infants .
- C. PASSIVE IMMUNITY: HEPATITIS B IMMUNE GLOBULIN
    - Hepatitis B immune globulin (HBIG) provides passive immunity to hepatitis B and is indicated for people exposed to HBV who have never had hepatitis B and have never received hepatitis B vaccine. Specific indications for postexposure vaccine with HBIG include :

      (1)inadvertent exposure to HBAg-positive blood through percutaneous (needlestick) or transmucosal (splashes in contact with mucous membrane) routes ,

      (2) sexual contact with people positive for HBAg, and

      (3) perinatal exposure (babies born to HBV-infected mothers should receive HBIG within 12 hours of delivery .(

Gerontologic Considerations

- The elderly patient who contracts hepatitis B has a serious risk of severe liver cell necrosis or fulminant hepatic failure, particularly if other illnesses are present. The patient is seriously ill and the prognosis is poor, so efforts should be undertaken to eliminate other factors (eg, medications, alcohol) that may affect liver function .

Medical Management

- The goals of treatment are to **minimize** infectivity, normalize liver inflammation, and decrease symptoms .
- Alpha interferon offers the most promise. It results in remission in approximately one third of patients
- Lamivudine & adefovir are new antiviral agents .
- Adequate nutrition should be maintained; proteins are restricted when the liver's ability to metabolize protein byproducts is impaired, as demonstrated by symptoms .
- If vomiting persists, the patient may require hospitalization and fluid therapy .

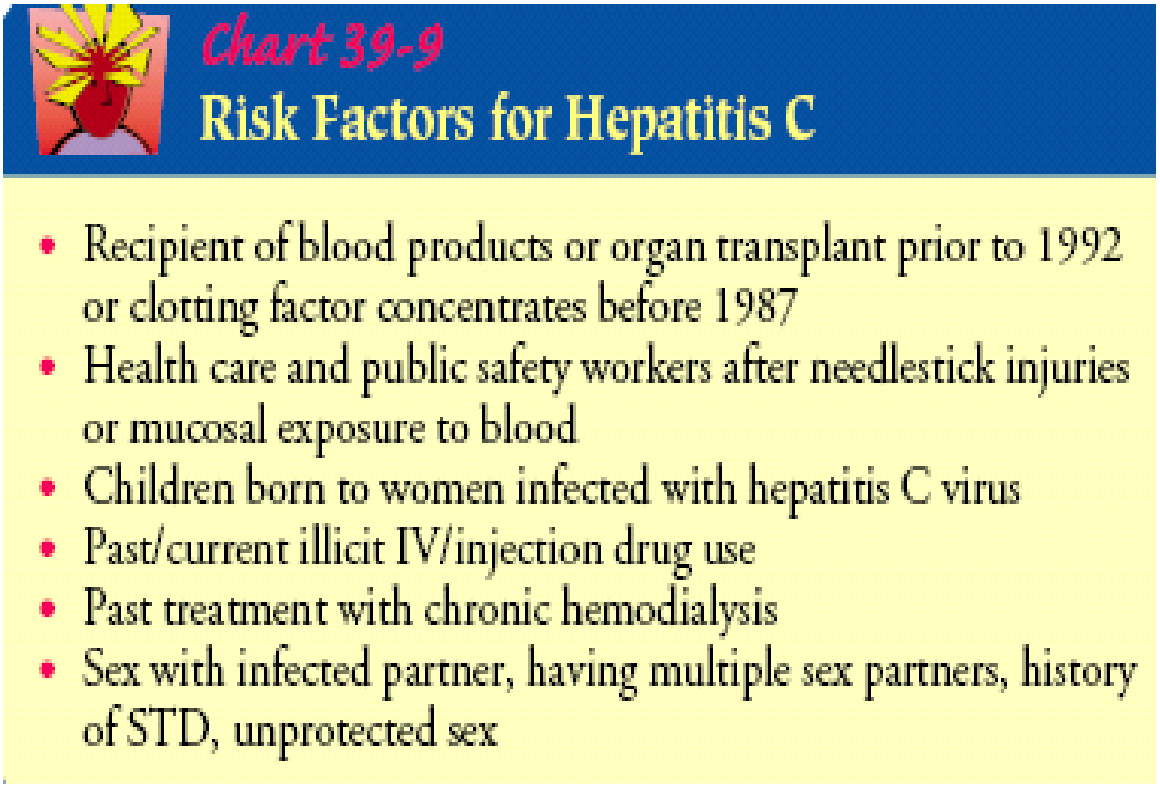
Nursing Management

- Convalescence may be prolonged, with complete symptomatic recovery sometimes requiring 3 to 4 months or longer .
- During this stage, gradual resumption of physical activity is encouraged after the jaundice has resolved .
- The nurse identifies psychosocial issues and concerns, particularly the effects of separation from family and friends if the patient is hospitalized during the acute and infective stages. Even if not hospitalized, the patient will be unable to work and must avoid sexual contact .

C. HEPATITIS C VIRUS (HCV

- Formerly referred to as non-A, non-B hepatitis .
- Blood transfusions and sexual contact accounted for most cases of hepatitis C in the United States, other parenteral means, such as sharing contaminated needles by IV/injection drug users and unintentional needle-sticks and other injuries in health care workers, now account for a significant number of cases .

- There is no benefit from rest, diet, or vitamin supplements. Recent studies have demonstrated that a combination of interferon (Intron-A) and ribavirin (Rebetol), two antiviral agents, is effective in producing improvement in patients with hepatitis C and in treating relapse.



D. HEPATITIS D VIRUS (HDV)

- Hepatitis D (delta agent) occurs in some cases of hepatitis B. Because the virus requires hepatitis B surface antigen for its replication, only individuals with hepatitis B are at risk for hepatitis D. Anti-delta antibodies in the presence of HBAg on testing confirm the diagnosis. It is also common among IV/injection drug users, hemodialysis patients, and recipients of multiple blood transfusions. Sexual contact with those with hepatitis B is considered to be an important mode of transmission of hepatitis B and D .

E. HEPATITIS E VIRUS (HEV (

- Hepatitis E is believed to be transmitted by the fecal– oral route, principally through contaminated water in areas with poor sanitation. The incubation period is variable, estimated to range between 15 and 65 days. In general, hepatitis E resembles hepatitis A. It has a self-limiting course with an abrupt onset. Jaundice is nearly always present. Chronic forms do not develop .

F. HEPATITIS G (HGV) AND GB VIRUS.C

- It has long been believed that there is another non-A, non-B, non- C agent causing hepatitis in humans. The incubation period for post-transfusion hepatitis is 14 to 145 days, too long for hepatitis B or C. In the United States, about 5% of chronic liver disease remains cryptogenic (does not appear to be autoimmune or viral in origin), and half the patients have previously received transfusions. Thus, a new form of hepatitis (hepatitis G or GBV-C) has been described. They are two different isolates of the same virus. Autoantibodies are absent. The clinical significance of this virus remains uncertain. Risk factors are similar to those for hepatitis C .

Management of Patients With Nonviral Hepatic Disorders

- Certain chemicals have toxic effects on the liver and when taken by mouth, inhaled, or injected parenterally produce acute liver cell necrosis, or toxic hepatitis .
- The chemicals most commonly implicated in this disease are carbon tetrachloride, phosphorus, chloroform, and gold compounds .
- Drug-induced hepatitis, is similar to acute viral hepatitis, but parenchymal destruction tends to be more extensive. Some medications that can lead to hepatitis are isoniazide, halothane, acetaminophen, and certain antibiotics, antimetabolites, and anesthetic agents .

TOXIC HEPATITIS

- Resembles viral hepatitis in onset. Obtaining a history of exposure to hepatotoxic chemicals, medications, or other agents assists in early treatment and removal of the offending agent .
- Anorexia, nausea, and vomiting are the usual symptoms; jaundice and hepatomegaly are noted on physical assessment .
- Recovery from acute toxic hepatitis is rapid if the hepatotoxin is identified early and removed or if exposure to the agent has been limited .

DRUG-INDUCED HEPATITIS

- Drug-induced hepatitis is responsible for 20% to 25% of cases of acute hepatic failure in the United States .

- Manifestations of sensitivity to a medication may occur on the first day of its use or not until several months later, depending on the medication .
- Usually the onset is abrupt, with chills, fever, rash, pruritus, arthralgia, anorexia, and nausea. Later, there may be jaundice and dark urine & enlarged and tender liver. When the offending medication is withdrawn, symptoms may gradually subside .

FULMINANT HEPATIC FAILURE

- Is the clinical syndrome of sudden and severely impaired liver function in a previously healthy person. According to the original and generally accepted definition, fulminant hepatic failure develops within 8 weeks of the first symptoms of jaundice .
- Three categories are frequently cited: hyperacute, acute, and subacute liver failure .

FULMINANT HEPATIC FAILURE

- Is the clinical syndrome of sudden and severely impaired liver function in a previously healthy person .
- In hyperacute liver failure, the duration of jaundice before the onset of encephalopathy is 0 to 7 days; in acute liver failure, it is 8 to 28 days; and in subacute liver failure, it is 28 to 72 days .
- The prognosis for fulminant hepatic failure is much worse than for chronic liver failure. However, in fulminant failure, the hepatic lesion is potentially reversible, with survival rates of approximately 50% to 85% (depending on etiology). Those who do not survive die of massive hepatocellular injury and necrosis

FULMINANT HEPATIC FAILURE

- Fulminant hepatic failure is often accompanied by coagulation defects, renal failure and electrolyte disturbances, infection, hypoglycemia, encephalopathy, and cerebral edema .
- Viral hepatitis is a common cause of fulminant hepatic failure; other causes: toxic medications (eg, acetaminophen) and chemicals (eg, carbon tetrachloride), metabolic disturbances (eg, Wilson's disease, a hereditary syndrome with deposition of copper in the liver), and structural changes (eg, Budd-Chiari syndrome, an obstruction to outflow in major hepatic veins .(

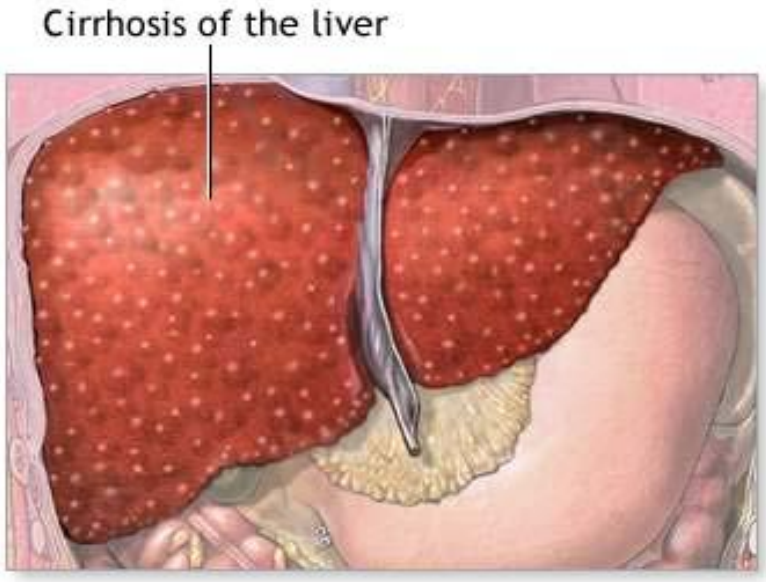
Management

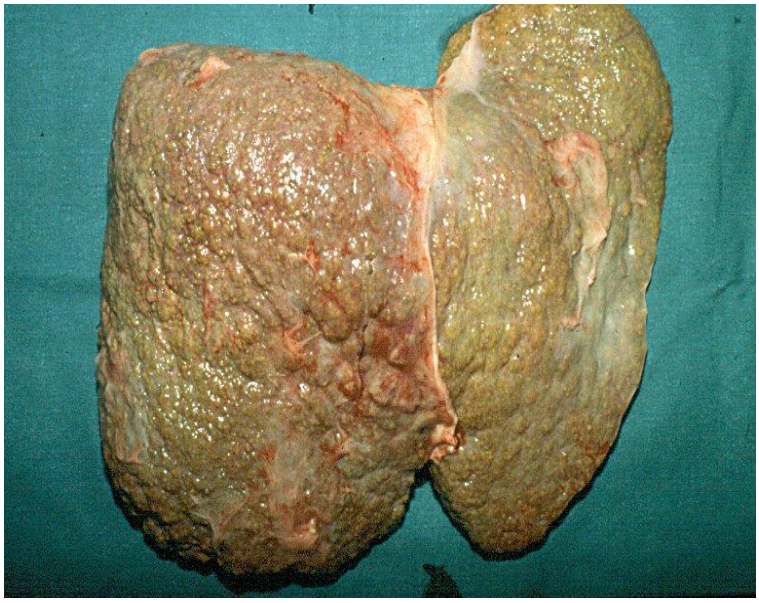
- The key to optimizing treatment is rapid recognition of acute liver failure and intensive interventions .
- The use of antidotes for certain conditions may be indicated such as N-acetylcysteine for acetaminophen toxicity and penicillin for mushroom poisoning .
- Treatment modalities may include plasma exchanges (plasmapheresis) to correct coagulopathy and to stabilize the patient awaiting liver transplantation

HEPATIC CIRRHOSIS

- Cirrhosis is a chronic disease characterized by replacement of normal liver tissue with diffuse fibrosis that disrupts the structure and function of the liver. There are three types of cirrhosis or scarring of the live:

1. Alcoholic cirrhosis, in which the scar tissue characteristically surrounds the portal areas. This is most frequently due to chronic alcoholism and is the most common type of cirrhosis .
2. Postnecrotic cirrhosis, in which there are broad bands of scar tissue as a late result of a previous infection of acute viral hepatitis .
3. Biliary cirrhosis, in which scarring occurs in the liver around the bile ducts. This type usually is the result of chronic biliary obstruction and infection (cholangitis); it is much less common than the other two types.





Pathophysiology

- Several factors have been implicated in the etiology of cirrhosis: alcohol consumption (is the major causative factor), nutritional deficiency with reduced protein intake (excessive alcohol intake is the major causative factor in fatty liver and its consequences .(
- Other factors may play a role, including exposure to certain chemicals (carbon tetrachloride, chlorinated naphthalene, arsenic, or phosphorus) or infectious schistosomiasis .
- Twice as many men as women are affected .
- Most patients are between 40 and 60 years of age .
- The destroyed liver cells are replaced gradually by scar tissue; eventually the amount of scar tissue exceeds that of the functioning liver tissue .
- Islands of residual normal tissue and regenerating liver tissue may project from the constricted areas, giving the cirrhotic liver its characteristic hobnail appearance .

Clinical Manifestations

- Signs and symptoms of cirrhosis increase in severity as the disease progresses. The severity of the manifestations helps to categorize the disorder into two main presentations

  1. Compensated cirrhosis, with its less severe, often vague symptoms, may be discovered secondarily at a routine physical examination .

2. Decompensated cirrhosis, S &S result from failure of the liver to synthesize proteins, clotting factors, and other substances and manifestations of portal hypertension .

Compensated

- Intermittent mild fever
- Vascular spiders
- Palmar erythema (reddened palms)
- Unexplained epistaxis
- Ankle edema
- Vague morning indigestion
- Flatulent dyspepsia
- Abdominal pain
- Firm, enlarged liver
- Splenomegaly

Decompensated

- Ascites
- Jaundice
- Weakness
- Muscle wasting
- Weight loss
- Continuous mild fever
- Clubbing of fingers
- Purpura (due to decreased platelet count)
- Spontaneous bruising
- Epistaxis
- Hypotension
- Sparse body hair
- White nails
- Gonadal atrophy

Clinical Manifestations

- Liver enlargement
- portal obstruction and ascites
- infection and peritonitis
- Gastrointestinal varices
- Edema
- Vitamin deficiency and anemia
- Mental deterioration

Assessment and Diagnostic Findings

- The extent of liver disease and the type of treatment are determined after reviewing the laboratory findings. Because the functions of the liver are complex, there are many diagnostic tests that may provide information about liver function .
- In severe parenchymal liver dysfunction, the serum albumin level decreases. Enzyme tests indicate liver cell damage: serum alkaline phosphatase, AST, ALT levels increase, and the serum cholinesterase level may decrease
- Bilirubin tests are performed to measure bile excretion or bile retention; elevated levels can occur with cirrhosis and other liver disorders .
- Prothrombin time is prolonged .
- Ultrasound scanning is used to measure the difference in density of parenchymal cells and scar tissue .
- CT, MRI, and radioisotope liver scans give information about liver size and hepatic blood flow and obstruction .
- Diagnosis is confirmed by liver biopsy .

Medical Management

- The management of the patient with cirrhosis is usually based on the presenting symptoms. For example, antacids are prescribed to decrease gastric distress and minimize the possibility of GI bleeding .
- Vitamins and nutritional supplements promote healing of damaged liver cells and improve the general nutritional status. Potassium-sparing diuretics (spironolactone [Aldactone], triamterene [Dyrenium]) may be indicated to decrease ascites, if present ;
- Preliminary studies indicate that colchicine, an antiinflammatory agent used to treat the symptoms of gout, may increase the length of survival in patients with mild to moderate cirrhosis. Colchicine is believed to reverse the fibrotic processes in cirrhosis, and this has improved survival

NURSING PROCESS:

THE PATIENT WITH HEPATIC CIRRHOSIS

Nursing diagnoses and goals

1. Activity intolerance related to fatigue, lethargy, and malaise

   Goal: Patient reports decrease in fatigue and reports increased ability to participate in activities

2. Imbalanced nutrition: less than body requirements, related to abdominal distention and discomfort and anorexia

   Goal: Positive nitrogen balance, no further loss of muscle mass; meets nutritional requirements

3. Impaired skin integrity related to pruritus from jaundice and edema.

   Goal: Decrease potential for pressure ulcer development; breaks in skin integrity

4. High risk for injury related to altered clotting mechanisms and altered level of consciousness

   Goal: Reduced risk of injury

5. Disturbed body image related to changes in appearance, sexual dysfunction, and role function

   Goal: Patient verbalizes feelings consistent with improvement of body image and self-esteem

6. Chronic pain and discomfort related to enlarged tender liver and ascites

   Goal: Increased level of comfort

7. Fluid volume excess related to ascites and edema formation

   Goal: Restoration of normal fluid volume

8. Disturbed thought processes related to deterioration of liver function and increased serum ammonia level

   Goal: Improved mental status; safety maintained

9. Risk for imbalanced body temperature: hyperthermia related to inflammatory process of cirrhosis or hepatitis

Goal: Maintenance of normal body temperature, free from infection

10. Ineffective breathing pattern related to ascites and restriction of thoracic excursion secondary to ascites, abdominal distention, and fluid in the thoracic cavity

    Goal: Improved respiratory status

Collaborative Problem

1. Gastrointestinal bleeding and hemorrhage

   Goal: Absence of episodes of gastrointestinal bleeding and hemorrhage

2. Hepatic encephalopathy

   Goal: Absence of changes in cognitive status and of injury

Cancer of The Liver

- Hepatic tumors may be malignant or benign. Benign liver occur with the use of oral contraceptives in women in their reproductive years .
- Malignant tumors could be primary or metastasized from other sites .

Primary Liver Tumors

- Few cancers originate in the liver .

- Usually associated with chronic liver disease, hepatitis B and C infections, and cirrhosis .
- Hepatocellular carcinoma (HCC) is the most common type of primary liver cancer. HCC is usually nonresectable because of rapid growth and metastasis .
- Other types of primary liver cancer include cholangiocellular carcinoma and combined hepatocellular and cholangiocellular carcinoma. If found early, resection may be possible, but early detection is unlikely .

Liver Metastases

- Metastases from other primary sites are found in the liver in about half of all advanced cancer cases .
- Malignant tumors are likely to reach the liver eventually, by way of the portal system or lymphatic channels, or by direct extension from an abdominal tumor .
- Moreover, the liver apparently is an ideal place for these malignant cells to thrive .

Clinical Manifestations

- The early manifestations of malignancy of the liver include pain, a continuous dull ache in the right upper quadrant, epigastrium, or back .
- Weight loss, loss of strength, anorexia, and anemia may also occur .
- The liver may be enlarged and irregular on palpation .
- Jaundice is present only if the larger bile ducts are occluded by the pressure of tumor on bile ducts .
- Ascites develops if tumor obstructs the portal veins or if tumor tissue is seeded in the peritoneal cavity .

Assessment and Diagnostic Findings

- Diagnosis is based on clinical signs and symptoms, the history and physical examination, and the results of laboratory and x-ray studies .
- Increased serum levels of bilirubin, alkaline phosphatase, AST, GGT, and lactic dehydrogenase may occur .
- Leukocytosis, erythrocytosis, hypercalcemia, hypoglycemia, and hypocholesterolemia

- The serum level of alpha-fetoprotein (AFP), which serves as a tumor marker, is elevated in 30% to 40% of patients with primary liver cancer .
- Levels of carcinoembryonic antigen (CEA), a marker of advanced cancer of the digestive tract, may be elevated .
- These two markers together are useful to distinguish between metastatic liver disease and primary liver cancer .
- Assessment and Diagnostic Findings
- X-rays, liver scans, CT scans, ultrasound studies, MRI, arteriography, and laparoscopy may be part of the diagnostic workup and may be performed to determine the extent of the cancer .
- Confirmation of a tumor's histology can be made by biopsy under imaging guidance (CT scan or ultrasound .(

Medical Management

- Surgical resection of the tumor is possible in some patients, but cirrhosis (prevalent in liver cancer), increases the risks associated with surgery .
- Radiation therapy and chemotherapy showed varying degrees of success .
- An implantable pump has been used to deliver a high concentration of chemotherapy to the liver through the hepatic artery. This method provides a reliable, controlled, and continuous infusion of medication that can be carried out in the patient's home .

Percutaneous Biliary Drainage

- Percutaneous biliary or transhepatic drainage is used to bypass biliary ducts obstructed by liver, pancreatic, or bile duct tumors in patients with inoperable tumors or in those considered poor surgical risks .
- A catheter is inserted through the abdominal wall and past the obstruction into the duodenum. Such procedures are used to reestablish biliary drainage, relieve pressure and pain from the buildup of bile behind the obstruction, and decrease pruritus and jaundice .

Surgical Management

- Surgical resection is the treatment of choice when HCC is confined to one lobe of the liver and the function of the remaining liver is considered adequate for postoperative recovery .

- Capitalizing on the regenerative capacity of the liver cells, some surgeons have successfully removed 90% of the liver .
- However, the presence of cirrhosis limits the ability of the liver to regenerate .
- Lobectomy
- Liver Transplantation

Liver Transplantation

- Liver disease for which no other form of treatment is available .
- The transplantation procedure involves total removal of the diseased liver and its replacement with a healthy liver in the same anatomic location .
- The success of liver transplantation depends on successful immunosuppression (i.e. cyclosporine corticosteroids).

Complications

- The postoperative complication rate is high, primarily because of technical complications or infection .
- Immediate postoperative complication include bleeding, infection, and rejection. Disruption, infection, or obstruction of the biliary anastomosis and impaired biliary drainage may occur. Vascular thrombosis and stenosis are other potential complications .

Nursing Management

1. Preoperative Nursing Interventions

- Provide the patient and family with full explanations about the procedure, the chances of success, and the risks, including the side effects of long-term immunosuppression. The need for close follow-up and lifelong compliance with the therapeutic regimen .
- Malnutrition, massive ascites, and fluid and electrolyte disturbances are treated before surgery to increase the chance of a successful outcome .

2. Post operative ;

- The patient is maintained in an environment as free from bacteria, viruses, and fungi as possible to prevent infection .
- Cardiovascular, pulmonary, renal, neurologic, & metabolic functions are monitored continuously .

- Cardiac output, CVP, pulmonary capillary wedge pressure, ABG, O 2 saturation, urine output, V/S are used to evaluate the patient's hemodynamic status and intravascular fluid volume .
- Liver functions tests and coagulation profiel .
- I & O including drainage from T tube .

LIVER ABSCESSES

- Two categories of liver abscess have been identified: amebic and pyogenic .

1. Amebic liver abscesses are most commonly caused by Entamoeba histolytica. Most amebic liver abscesses occur in the developing countries of the tropics and subtropics because of poor sanitation and hygiene .
2. Pyogenic liver abscesses are much less common .

Pathophysiology

- Whenever an infection develops anywhere along the biliary or GI tract, infecting organisms may reach the liver through the biliary system, portal venous system, or hepatic arterial or lymphatic system .
- Most bacteria are destroyed promptly, but occasionally some gain a foothold .
- The bacterial toxins destroy the neighboring liver cells, and the resulting necrotic tissue serves as a protective wall for the organisms .
- Meanwhile, leukocytes migrate into the infected area .
- The result is an abscess cavity full of a liquid containing living and dead leukocytes, liquefied liver cells, and bacteria .
- Pyogenic abscesses of this type may be either single or multiple and small .
- Examples of causes of pyogenic liver abscess include cholangitis and abdominal trauma .

Clinical Manifestations

- The clinical picture is one of sepsis with few or no localizing signs. Fever with chills and diaphoresis, malaise, anorexia, nausea, vomiting, and weight loss may occur .

- The patient may complain of dull abdominal pain and tenderness in the right upper quadrant of the abdomen .
- Hepatomegaly, jaundice, anemia, and pleural effusion may develop .
- Sepsis and shock may be severe and life-threatening .

Assessment and Diagnostic Findings

- Blood cultures are obtained but may not identify the organism .
- Aspiration of the liver abscess may be done to assist in diagnosis and to obtain cultures of the organism .
- Percutaneous drainage of pyogenic abscesses is carried out to evacuate the abscess material and promote healing .
- A catheter may be left in place for continuous drainage; the patient must be instructed about its management .

Medical Management

- Treatment includes IV antibiotic therapy; the specific antibiotic used in treatment depends on the organism identified .
- Continuous supportive care is indicated because of the serious condition of the patient .
- Open surgical drainage may be required if antibiotic therapy and percutaneous drainage are ineffective .

Nursing Management

- Depends on the patient's physical status and the medical management that is indicated .
- For patients who undergo evacuation and drainage of the abscess, monitoring of the drainage and skin care are imperative .
- Strategies must be implemented to contain the drainage and to protect the patient from other sources of infection .
- Vital signs are monitored to detect changes in the patient's physical status .
- Deterioration in vital signs or the onset of new symptoms such as increasing pain, which may indicate rupture or extension of the abscess, is reported promptly .

- The nurse administers IV antibiotic therapy as prescribed .
- The white blood cell count and other laboratory test results are monitored closely for changes consistent with worsening infection.

NURSING PROCESS FOR PATIENTS WITH HEPATIC DYSFUNCTIONS

Nursing Diagnosis: Activity intolerance related to fatigue, lethargy, and malaise **Goal:** Patient reports decrease in fatigue and reports increased ability to participate in activities		
Nursing Interventions	**Rationale**	**Expected Outcomes**
1. Assess level of activity tolerance and degree of fatigue, lethargy, and malaise when performing routine ADLs. 2. Assist with activities and hygiene when fatigued. 3. Encourage rest when fatigued or when abdominal pain or discomfort occurs. 4. Assist with selection and pacing of desired activities and exercise. 5. Provide diet high in carbohydrates with protein intake consistent with liver function. 6. Administer supplemental vitamins (A, B complex, C, and K).	1. Provides baseline for further assessment and criteria for assessment of effectiveness of interventions 2. Promotes exercise and hygiene within patient's level of tolerance 3. Conserves energy and protects the liver 4. Stimulates patient's interest in selected activities 5. Provides calories for energy and protein for healing 6. Provides additional nutrients	• Exhibits increased interest in activities and events • Participates in activities and gradually increases exercise within physical limits • Reports increased strength and well-being • Reports absence of abdominal pain and discomfort • Plans activities to allow ample periods of rest • Takes vitamins as prescribed
Nursing Diagnosis: Imbalanced nutrition: less than body requirements, related to abdominal distention and discomfort and anorexia **Goal:** Positive nitrogen balance, no further loss of muscle mass; meets nutritional requirements		
1. Assess dietary intake and nutritional status through diet history and diary, daily weight measurements and laboratory data. 2. Provide diet high in carbohydrates with protein intake consistent with liver	1. Identifies deficits in nutritional intake and adequacy of nutritional state 2. Provides calories for energy, sparing protein for healing 3. Reduces edema and ascites formation	• Exhibits improved nutritional status by increased weight (without fluid retention) and improved laboratory data. • States rationale for dietary modifications • Identifies foods high in carbohydrates and within

function. 3. Assist patient in identifying low-sodium foods. 4. Elevate the head of the bed during meals. 5. Provide oral hygiene before meals and pleasant environment for meals at meal time. 6. Offer smaller, more frequent meals (6 per day). 7. Encourage patient to eat meals and supplementary feedings. 8. Provide attractive meals and an aesthetically pleasing setting at meal time. 9. Eliminate alcohol. 10. Apply an ice collar for nausea. 11. Administer medications prescribed for nausea, vomiting, diarrhea, or constipation. 12. Encourage increased fluid intake and exercise if the patient reports constipation.	4. Reduces discomfort from abdominal distention and decreases sense of fullness produced by pressure of abdominal contents and ascites on the stomach 5. Promotes positive environment and increased appetite; reduces unpleasant taste 6. Decreases feeling of fullness, bloating 7. Encouragement is essential for the patient with anorexia and gastrointestinal discomfort. 8. Promotes appetite and sense of well-being 9. Eliminates 'empty calories' and further damage from alcohol 10. May reduce incidence of nausea 11. Reduces gastrointestinal symptoms and discomforts that decrease the appetite and interest in food 12. Promotes normal bowel pattern and reduces abdominal discomfort and distention	protein requirements (moderate to high protein in cirrhosis and hepatitis, low protein in hepatic failure) • Reports improved appetite • Participates in oral hygiene measures • Reports increased appetite; identifies rationale for smaller, frequent meals • Demonstrates intake of high-calorie diet; adheres to protein restriction • Identifies foods and fluids that are nutritious and permitted on diet • Gains weight without increased edema or ascites formation • Reports increased appetite and well-being • Excludes alcohol from diet • Takes medications for gastrointestinal disorders as prescribed • Reports normal gastrointestinal function with regular bowel function
7. Nursing Diagnosis: Impaired skin integrity related to pruritus from jaundice and edema Goal:Decrease potential for pressure ulcer development; breaks in skin integrity.		
8. Nursing Interventions	**Rationale**	**Expected Outcomes**
9. Assess degree of discomfort related to pruritus and edema. 10. Note and record degree of	1. Assists in determining appropriate interventions 2. Provides baseline for detecting	• Exhibits intact skin without redness, excoriation, or breakdown

jaundice and extent of edema. 11. Keep patient's fingernails short and smooth. 12. Provide frequent skin care; avoid use of soaps and alcohol-based lotions. 13. Massage every 2 h with emollients; turn every 2 h 14. Initiate use of alternating-pressure mattress or low air loss bed. 15. Recommend avoiding use of harsh detergents. 16. Assess skin integrity every 4–8 h. Instruct patient and family in this activity. 17. Restrict sodium as prescribed. 18. Perform range of motion exercises every 4 h; elevate edematous extremities whenever possible.	changes and evaluating effectiveness of interventions 3. Prevents skin excoriation and infection from scratching 4. Removes waste products from skin while preventing dryness of skin 5. Promotes mobilization of edema 6. Minimizes prolonged pressure on bony prominences susceptible to breakdown 7. May decrease skin irritation and need for scratching 8. Edematous skin and tissue have compromised nutrient supply and are vulnerable to pressure and trauma 9. Minimizes edema formation 10. Promotes mobilization of edema	• Reports relief from pruritus • Exhibits no skin excoriation from scratching • Uses nondrying soaps and lotions. States rationale for use of nondrying soaps and lotions. • Turns self periodically. Exhibits reduced edema of dependent parts of the body. • Exhibits no areas of skin breakdown • Exhibits decreased edema; normal skin turgor
Nursing Diagnosis: High risk for injury related to altered clotting mechanisms and altered level of consciousness **Goal:**Reduced risk of injury		
1. Assess level of consciousness and cognitive level. 2. Provide safe environment (pad side rails, remove obstacles in room, prevent falls). 3. Provide frequent surveillance to orient patient and avoid use of restraints. 4. Replace sharp objects	1. Assists in determining patient's ability to protect self and comply with required self-protective actions; may detect deterioration of hepatic function 2. Minimizes falls and injury if falls occur 3. Protects patient from harm while stimulating and orienting patient; use of restraints may	• Is oriented to time, place, and person • Exhibits no hallucinations, and demonstrates no efforts to get up unassisted or to leave hospital • Exhibits no ecchymoses (bruises), cuts, or hematoma • Uses electric razor rather than sharp-edged razor

(razors) with safer items. 5. Observe each stool for color, consistency, and amount. 6. Be alert for symptoms of anxiety, epigastric fullness, weakness, and restlessness. 7. Test each stool and emesis for occult blood. 8. Observe for hemorrhagic manifestations: ecchymosis, epistaxis, petechiae, and bleeding gums. 9. Record vital signs at frequent intervals, depending on patient acuity (every 1–4 h). 10. Keep patient quiet and limit activity. 11. Assist physician in passage of tube for esophageal balloon tamponade, if its insertion is indicated. 12. Observe during blood transfusions. 13. Measure and record nature, time, and amount of vomitus. 14. Maintain patient in fasting state, if indicated. 15. Administer vitamin K as prescribed. 16. Remain with patient during episodes of bleeding. 17. Offer cold liquids by mouth when bleeding stops (if prescribed). 18. Institute measures to prevent	disturb patient further 4. Avoids cuts and bleeding 5. Permits detection of bleeding in gastrointestinal tract 6. May indicate early signs of bleeding and shock 7. Detects early evidence of bleeding 8. Indicates altered clotting mechanisms 9. Provides baseline and evidence of hypovolemia, and hemorrhagic shock 10. Minimizes risk of bleeding and straining 11. Promotes nontraumatic insertion of tube in anxious and combative patient for immediate treatment of bleeding 12. Permits detection of transfusion reactions (risk is increased with multiple blood transfusions needed for active bleeding from esophageal varices) 13. Assists in evaluating extent of bleeding and blood loss 14. Reduces risk of aspiration of gastric contents and minimizes risk of further trauma to esophagus and stomach by preventing vomiting 15. Promotes clotting by providing fat-soluble vitamin necessary	• Exhibits absence of frank bleeding from gastrointestinal tract • Exhibits absence of restlessness, epigastric fullness, and other indicators of hemorrhage and shock • Exhibits negative results of test for occult gastrointestinal bleeding • Is free of ecchymotic areas or hematoma formation • Exhibits normal vital signs • Maintains rest and remains quiet if active bleeding occurs • Identifies rationale for blood transfusions and measures to treat bleeding • Uses measures to prevent trauma (eg, uses soft toothbrush, blows nose gently, avoids bumps and falls, avoids straining during defecation) • Experiences no side effects of medications • Takes all medications as prescribed • Identifies rationale for precautions with use of all medications • Cooperates with treatment.

trauma: a. Maintain safe environment. b. Encourage *gentle* blowing of nose. c. Provide soft toothbrush and avoid use of toothpicks. d. Encourage intake of foods with high content of vitamin C. e. Apply cold compresses where indicated. f. Record location of bleeding sites. g. Use small-gauge needles for injections. 19. Administer medications carefully; monitor for side effects.	for clotting. 16. Reassures anxious patient and permits monitoring and detection of further needs of the patient 17. Minimizes risk of further bleeding by promoting vasoconstriction of esophageal and gastric blood vessels 18. Promotes safety of patient a. Minimizes risk of trauma and bleeding by avoiding falls and cuts, etc. b. Reduces risk of nosebleed (epistaxis) secondary to trauma and decreased clotting c. Prevents trauma to oral mucosa while promoting good oral hygiene d. Promotes healing e. Minimizes bleeding into tissues by promoting local vasoconstriction f. Permits detection of new bleeding sites and monitoring of previous sites of bleeding g. Minimizes oozing and blood loss from repeated injections 19. Reduces risk of side effects secondary to damaged liver's inability to detoxify (metabolize) medications normally	
Nursing Diagnosis: Disturbed body image related to changes in appearance, sexual dysfunction, and role function		

Goal: Patient verbalizes feelings consistent with improvement of body image and self-esteem		
1. Assess changes in appearance and the meaning these changes have for patient and family. 2. Encourage patient to verbalize reactions and feelings about these changes. 3. Assess patient's and family's previous coping strategies. 4. Assist and encourage patient to maximize appearance and explore alternatives to previous sexual and role functions. 5. Assist patient in identifying short-term goals. 6. Encourage and assist patient in decision making about care. 7. Identify with patient resources to provide additional support (counselor, spiritual advisor). 8. Assist patient in identifying previous practices that may have been harmful to self (alcohol and drug abuse).	1. Provides information for assessing impact of changes in appearance, sexual function, and role on the patient and family 2. Enables patient to identify and express concerns; encourages patient and significant others to share these concerns 3. Permits encouragement of those coping strategies that are familiar to patient and have been effective in the past 4. Encourages patient to continue safe roles and functions while encouraging exploration of alternatives 5. Accomplishing these goals serves as positive reinforcement and increases self-esteem. 6. Promotes patient's control of life and improves sense of well-being and self-esteem 7. Assists patient in identifying resources and accepting assistance from others when indicated 8. Recognition and acknowledgment of the harmful effects of these practices are necessary for identifying a healthier lifestyle.	• Verbalizes concerns related to changes in appearance, life, and lifestyle • Shares concerns with significant others • Identifies past coping strategies that have been effective • Uses past effective coping strategies to deal with changes in appearance, life, and lifestyle • Maintains good grooming and hygiene • Identifies short-term goals and strategies to achieve them • Takes an active role in decision making about self and care • Identifies resources that are not harmful • Verbalizes that some of previous lifestyle practices have been harmful • Uses healthy expressions of frustration, anger, anxiety
Nursing Diagnosis: Chronic pain and discomfort related to enlarged tender liver and ascites **Goal:** Increased level of comfort		
Nursing Interventions	**Rationale**	**Expected Outcomes**

1. Maintain bed rest when patient experiences abdominal discomfort. 2. Administer antispasmodic and analgesic agents as prescribed. 3. Observe, record, and report presence and character of pain and discomfort. 4. Reduce sodium and fluid intake if prescribed. 5. Prepare patient and assist with paracentesis.	1. Reduces metabolic demands and protects the liver 2. Reduces irritability of the gastrointestinal tract and decreases abdominal pain and discomfort 3. Provides baseline to detect further deterioration of status and to evaluate interventions 4. Minimizes further formation of ascites 5. Removal of ascites fluid may decrease abdominal discomfort	• Reports pain and discomfort if present • Maintains bed rest and decreases activity in presence of pain • Takes antispasmodic and analgesics as indicated and as prescribed • Reports decreased pain and abdominal discomfort • Reduces sodium and fluid intake to prescribed levels if indicated to treat ascites • Exhibits decreased abdominal girth and appropriate weight changes • Reports decreased discomfort after paracentesis
Nursing Diagnosis: Fluid volume excess related to ascites and edema formation **Goal:** Restoration of normal fluid volume		
1. Restrict sodium and fluid intake if prescribed. 2. Administer diuretics, potassium, and protein supplements as prescribed. 3. Record intake and output every 1 to 8 h depending on response to interventions and on patient acuity. 4. Measure and record abdominal girth and weight daily. 5. Explain rationale for sodium and fluid restriction.	1. Minimizes formation of ascites and edema 2. Promotes excretion of fluid through the kidneys and maintenance of normal fluid and electrolyte balance 3. Indicates effectiveness of treatment and adequacy of fluid intake 4. Monitors changes in ascites formation and fluid accumulation 5. Promotes patient's understanding of restriction	• Consumes diet low in sodium and within prescribed fluid restriction • Takes diuretics, potassium, and protein supplements as indicated without experiencing side effects • Exhibits increased urine output • Exhibits decreasing abdominal girth • Exhibits no rapid increase in weight • Identifies rationale for

6. Prepare patient and assist with paracentesis.	and cooperation with it 6. Paracentesis will temporarily decrease amount of ascites present.	sodium and fluid restriction • Shows a decrease in ascites with decreased weight •
Nursing Diagnosis: Disturbed thought processes related to deterioration of liver function and increased serum ammonia level **Goal:** Improved mental status; safety maintained		
1. Restrict dietary protein as prescribed. 2. Give frequent, small feedings of carbohydrates. 3. Protect from infection. 4. Keep environment warm and draft-free. 5. Pad the side rails of the bed. 6. Limit visitors. 7. Provide careful nursing surveillance to ensure patient's safety. 8. Avoid opioids and barbiturates. 9. Awaken at intervals (every 2–4 h) to assess cognitive status.	1. Reduces source of ammonia (protein foods) 2. Promotes consumption of adequate carbohydrates for energy requirements and spares protein from breakdown for energy 3. Minimizes risk for further increase in metabolic requirements 4. Minimizes shivering, which would increase metabolic requirements 5. Provides protection for the patient should hepatic coma and seizure activity occur 6. Minimizes patient's activity and metabolic requirements 7. Provides close monitoring of new symptoms and minimizes trauma to the confused patient 8. Prevents masking of symptoms of hepatic coma and prevents drug overdose secondary to reduced ability of the damaged liver to metabolize opioids and barbiturates	• Adheres to protein restriction • Demonstrates an interest in events and activities in environment • Demonstrates normal attention span • Follows and participates in conversation appropriately • Is oriented to person, place, and time • Remains in bed when indicated • Reports no urinary or fecal incontinence • Experiences no seizures

	9. Provides stimulation to the patient and opportunity for observing the patient's level of consciousness	
Nursing Diagnosis: Risk for imbalanced body temperature: hyperthermia related to inflammatory process of cirrhosis or hepatitis **Goal:** Maintenance of normal body temperature, free from infection		
1. Record temperature regularly (every 4 h). 2. Encourage fluid intake. 3. Apply cool sponges or icebag for elevated temperature. 4. Administer antibiotics as prescribed. 5. Avoid exposure to infections. 6. Keep patient at rest while temperature is elevated. 7. Assess for abdominal pain, tenderness.	1. Provides baseline to detect fever and to evaluate interventions 2. Corrects fluid loss from perspiration and fever and increases patient's level of comfort 3. Promotes reduction of fever and increases patient's comfort 4. Ensures appropriate serum concentration of antibiotics to treat infection 5. Minimizes risk of further infection and further increases in body temperature and metabolic rate 6. Reduces metabolic rate 7. May occur with bacterial peritonitis	• Exhibits normal temperature and reports absence of chills or sweating • Demonstrates adequate intake of fluids • Exhibits no evidence of local or systemic infection
Nursing Diagnosis: Ineffective breathing pattern related to ascites and restriction of thoracic excursion secondary to ascites, abdominal distention, and fluid in the thoracic cavity **Goal:** Improved respiratory status		
1. Elevate head of bed to at least 30 degrees. 2. Conserve patient's strength	1. Reduces abdominal pressure on the diaphragm and permits fuller thoracic excursion and lung	• Experiences improved respiratory status • Reports decreased

by providing rest periods and assisting with activities. 3. Change position every 2 h. 4. Assist with paracentesis or thoracentesis. a. Explain procedure and its purpose to patient. b. Have patient void before paracentesis. c. Support and maintain position during procedure. d. Record both the amount and the character of fluid aspirated. e. Observe for evidence of coughing, increasing dyspnea, or pulse rate.	expansion 2. Reduces metabolic and oxygen requirements 3. Promotes expansion and oxygenation of all areas of the lungs 4. Paracentesis and thoracentesis (performed to remove fluid from the abdominal and thoracic cavities, respectively) may be frightening to the patient. a. Helps obtain patient's cooperation with procedures b. Prevents inadvertent bladder injury c. Prevents inadvertent organ or tissue injury d. Provides record of fluid removed and indication of severity of limitation of lung expansion by fluid e. Indicates irritation of the pleural space and evidence of pneumothorax or hemothorax.	shortness of breath • Reports increased strength and sense of well-being • Exhibits normal respiratory rate (12–18/min) with no adventitious sounds • Exhibits full thoracic excursion without shallow respirations • Exhibits normal arterial blood gases • Exhibits adequate oxygen saturation by pulse oximetry • Experiences absence of confusion or cyanosis
Collaborative Problem: Gastrointestinal bleeding and hemorrhage **Goal:** Absence of episodes of gastrointestinal bleeding and hemorrhage		
1. Assess patient for evidence of gastrointestinal bleeding or hemorrhage. If bleeding does occur: a. Monitor vital signs	1. Allows early detection of signs and symptoms of bleeding and hemorrhage 2. Minimizes increases in intra-abdominal pressure that	10. Assess patient for evidence of gastrointestinal bleeding or hemorrhage. If bleeding does occur:

(blood pressure, pulse, respiratory rate) every 4 h or more frequently, depending on acuity. b. Assess skin temperature, level of consciousness every 4 hours or more frequently, depending on acuity. c. Monitor gastrointestinal secretions and output (emesis, stool for occult or obvious bleeding). Test emesis for blood once per shift and with any color change. Hematest each stool. d. Monitor hematocrit and hemoglobin for trends and changes. 2. Avoid activities that increase intra-abdominal pressure (straining, turning). a. Avoid coughing/sneezing. b. Assist patient to turn. c. Keep all needed items within easy reach. d. Use measures to prevent constipation such as adequate fluid intake; stool	could lead to rupture and bleeding of esophageal or gastric varices 3. Equipment, medications, and supplies will be readily available if patient experiences bleeding from ruptured esophageal or gastric varices. 4. Gastrointestinal bleeding and hemorrhage require emergency measures (eg, insertion of Blakemore tube, administration of fluids and medications). 5. The patient is at high risk for respiratory complications, including asphyxiation if gastric balloon of tamponade tube ruptures or migrates upward. 6. The patient who experiences hemorrhage is very anxious and fearful; minimizing anxiety assists in control of hemorrhage. 7. Risk of rebleeding is high with all treatment modalities used to halt gastrointestinal bleeding. 8. Family members are likely to be anxious about the patient's status; providing information will reduce their anxiety level and promote more effective coping. 9. Risk of rebleeding is high. Subtle signs may be more	a. Monitor vital signs (blood pressure, pulse, respiratory rate) every 4 h or more frequently, depending on acuity. b. Assess skin temperature, level of consciousness every 4 hours or more frequently, depending on acuity. c. Monitor gastrointestinal secretions and output (emesis, stool for occult or obvious bleeding). Test emesis for blood once per shift and with any color change. Hematest each stool. d. Monitor hematocrit and hemoglobin for trends and changes. 11. Avoid activities that increase intra-abdominal pressure (straining, turning). a. Avoid coughing/sneezing. b. Assist patient to turn.

softeners. e. Ensure small meals. 3. Have equipment (Blakemore tube, medications, IV fluids) available if indicated. 4. Assist with procedures and therapy needed to treat gastrointestinal bleeding and hemorrhage. 5. Monitor respiratory status every hour and minimize risk of respiratory complications if balloon tamponade is needed. 6. Prepare patient physically and psychologically for other treatment modalities if needed. 7. Monitor patient for recurrence of bleeding and hemorrhage. 8. Keep family informed of patient's status. 9. Once recovered from bleeding episode, provide patient and family with information regarding signs and symptoms of gastrointestinal bleeding.	quickly identified	c. Keep all needed items within easy reach. d. Use measures to prevent constipation such as adequate fluid intake; stool softeners. e. Ensure small meals. 12. Have equipment (Blakemore tube, medications, IV fluids) available if indicated. 13. Assist with procedures and therapy needed to treat gastrointestinal bleeding and hemorrhage. 14. Monitor respiratory status every hour and minimize risk of respiratory complications if balloon tamponade is needed. 15. Prepare patient physically and psychologically for other treatment modalities if needed. 16. Monitor patient for recurrence of bleeding and hemorrhage. 17. Keep family informed of patient's status. 18. Once recovered from bleeding episode, provide patient and family with information regarding signs and symptoms of

		gastrointestinal bleeding.
Collaborative Problem: Hepatic encephalopathy **Goal:** Absence of changes in cognitive status and of injury		
1. Assess cognitive status every 4–8 h: a. Assess patient's orientation to person, place, and time. b. Monitor patient's level of activity, restlessness, and agitation. Assess for presence of flapping hand tremors (asterixis). c. Obtain and record daily sample of patient's handwriting or ability to construct a simple figure (eg, star). d. Assess neurologic signs (deep tendon reflexes, ability to follow instructions). 2. Monitor medications to prevent administration of those that may precipitate hepatic encephalopathy (sedatives, hypnotics, analgesics). 3. Monitor laboratory data, especially serum ammonia level. 4. Notify physician of even subtle changes in patient's neurologic status and	1. Data will provide baseline of patient's cognitive status and enable detection of changes. 2. Medications are a common precipitating factor in development of hepatic encephalopathy in patients at risk. 3. Increases in serum ammonia level are associated with hepatic encephalopathy and coma. 4. Allows early initiation of treatment of hepatic encephalopathy and prevention of hepatic coma 5. Reduces breakdown and conversion of protein to ammonia 6. Reduces serum ammonia level 7. The patient who develops hepatic coma is at risk for respiratory complications (ie, pneumonia, atelectasis, infection). 8. The patient in coma is at risk for skin breakdown and pressure ulcer formation.	• Remains awake, alert, and aware of surroundings • Is oriented to time, place, and person • Exhibits no restlessness or agitation • Record of handwriting demonstrates no deterioration in cognitive function • States rationale for treatment used to prevent or treat hepatic encephalopathy • Demonstrates stable serum ammonia level within acceptable limits • Consumes adequate caloric intake and adheres to protein restriction • Takes medications as prescribed • Breath sounds are normal without adventitious sounds • Skin and tissue intact without evidence of pressure or breaks in integrity

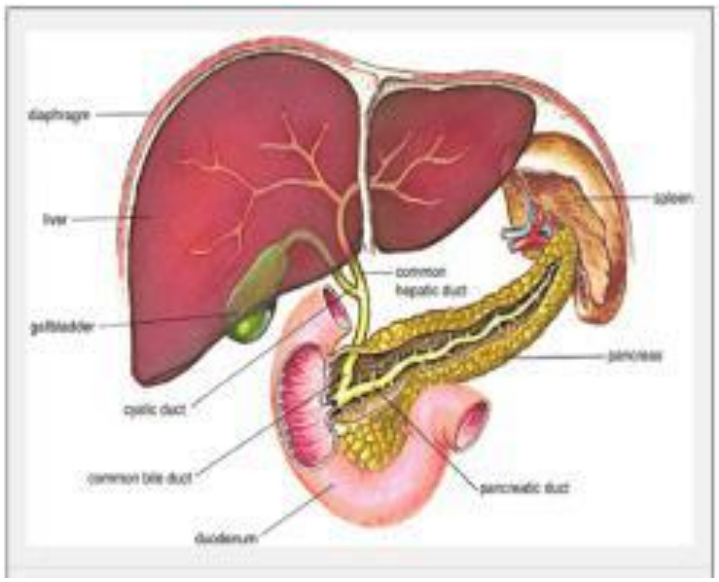
cognitive function. 5. Limit sources of protein from diet if indicated. 6. Administer medications prescribed to reduce serum ammonia level (eg, lactulose, antibiotics, glucose, benzodiazepine antagonist [Flumazenil] if indicated). 7. Assess respiratory status and initiate measures to prevent complications. 8. Protect patient's skin and tissue from pressure and breakdown.		

Chapter 40

Assessment and Management of Patients with Biliary Disorders

Anatomic and Physiologic Overview

- A pear-shaped, hollow, saclike organ, 7.5 to 10 cm long, lies in a shallow depression on the inferior surface of the liver, to which it is attached by loose connective tissue.
- The capacity of the gallbladder is 30 to 50 mL of bile.
- The gallbladder is connected to the common bile duct by the cystic duct



Function of gallbladder

- Functions as a storage depot for bile.
- During storage, a large portion of the water in bile is absorbed, so that gallbladder bile is five to ten times more concentrated.
- When food enters the duodenum, the gallbladder contracts and the sphincter of Oddirelaxes and allows the bile to enter the intestine.
- This response is mediated by secretion of the hormone cholecystokinin-pancreozymin(CCK-PZ) from the intestinal wall.
- The bile salts assist in emulsification of fats in the distal ileum.

The pancreas

- The pancreas, located in the upper abdomen, has **endocrine** as well as **exocrine** functions The secretion of pancreatic enzymes into the gastrointestinal tract through the pancreatic duct represents its exocrine function. The secretion of insulin, glucagon, and somatostatin directly into the bloodstream represents its endocrine function.

Exocrine Pancreas

- The secretions of the exocrine portion of the pancreas are collected in the pancreatic duct, which joins the common bile duct and enters the duodenum at the ampulla of Vater. Surrounding the ampulla is the sphincter of Oddi, which partially controls the rate at which secretions from the pancreas and the gallbladder enter the duodenum.

Exocrine Pancreas

- The secretions of the exocrine pancreas are digestive enzymes high in protein content and an electrolyte-rich fluid. The secretions are very alkaline because of their high concentration of sodium bicarbonate and are capable of neutralizing the highly acid gastric juice that enters the duodenum.

- The enzyme secretions include **amylase**, which aids in the digestion of carbohydrates; **trypsin**, which aids in the digestion of proteins; and **lipase**, which aids in the digestion of fats.

Endocrine Pancreas

- The islets of Langerhans, the endocrine part of the pancreas, are collections of cells embedded in the pancreatic tissue.

- They are composed of alpha, beta, and delta cells. The hormone produced by the beta cells is called insulin; the alpha cells secrete glucagon and the delta cells secrete somatostatin.

1. Insulin

- A major action of insulin is to lower blood glucose by permitting entry of the glucose into the cells of the liver, muscle, and other tissues, where it is either stored as glycogen or used for energy. Insulin also promotes the storage of fat in adipose tissue and the synthesis of proteins in various body tissues. In the absence of insulin, glucose cannot enter the cells and is excreted in the urine.

2. Glucagon

- The effect of glucagon (opposite to that of insulin) is chiefly to raise the blood glucose by converting glycogen to glucose in the liver. Glucagon is secreted by the pancreas in response to a decrease in the level of blood glucose.

3. Somatostatin

- Somatostatin exerts a hypoglycemic effect by interfering with release of growth hormone from the pituitary and glucagon from the pancreas, both of which tend to raise blood glucose levels.

Endocrine Control of Carbohydrate Metabolism

- Glucose for body energy needs is derived by metabolism of ingested carbohydrates and also from proteins by the process of gluconeogenesis. Glucose can be stored temporarily in the liver, muscles, and other tissues in the form of glycogen. The endocrine system controls the level of blood glucose by regulating the rate at which glucose is synthesized, stored, and moved to and from the bloodstream. Through the action of hormones, blood glucose is normally maintained at about 100 mg/dL (5.5 mmol/L).

- Insulin is the primary hormone that lowers the blood glucose level. Hormones that raise the blood glucose level are glucagon, epinephrine, adrenocorticosteroids, growth hormone, and thyroid hormone.

- The major exocrine function is to facilitate digestion through secretion of enzymes into the proximal duodenum. Secretin and CCK-PZ are hormones from the gastrointestinal tract that aid in the digestion of food substances by controlling the secretions of the pancreas. Neural factors also influence pancreatic enzyme secretion. Considerable dysfunction of the pancreas must occur before enzyme secretion decreases and protein and fat digestion becomes impaired. Pancreatic enzyme secretion is normally 1,500 to 2,500 mL/day.

Definition of Biliary Terms

- **Cholecystitis:** inflammation of the gallbladder
- **Cholelithiasis:** the presence of calculi in the gallbladder
- **Cholecystectomy:** removal of the gallbladder
- **Cholecystostomy:** opening and drainage of the gallbladder
- **Choledochotomy:** opening into the common duct

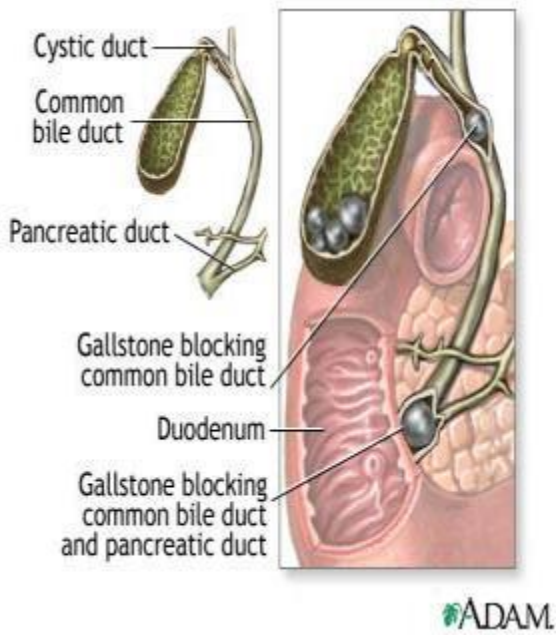
- **Choledocholithiasis:** stones in the common duct
- **Choledocholithotomy:** incision of common bile duct for removal of stones

Cholecystitis

- Acute inflammation (cholecystitis) of the gallbladder causes pain, tenderness, and rigidity of the upper right abdomen that may radiate to the midsternalarea or right shoulder
- Associated with nausea, vomiting, and the usual signs of an acute inflammation.
- An empyemaof the gallbladder develops if the gallbladder becomes filled with purulent fluid (pus).
- Calculouscholecystitisis the cause of more than 90% of cases of acute cholecystitis.
- Gallbladder stone obstructs bile outflow. Bile remaining in the gallbladder initiates a chemical reaction; autolysis and edema occur; and the blood vessels in the gallbladder are compressed, compromising its vascular supply.
- Gangrene of the gallbladder with perforation may result.
- Bacteria play a minor role in acute cholecystitis.
- Acalculouscholecystitisoccurs after major surgical procedures, severe trauma, or burns.

Cholelithiasis

- Gallstones usually form in the gallbladder from the solid constituents of bile
- Vary greatly in size, shape, and composition.
- Common after 40 years of age, especially in women.



Risk Factors for Cholelithiasis

- Obesity, Women, especially those who have had multiple pregnancies
- Frequent changes in weight
- Rapid weight loss (leads to rapid development of gallstones and high risk of symptomatic disease)
- Treatment with high-dose estrogen (ie, in prostate cancer)
- Low-dose estrogen therapy—a small increase in the risk of gallstones
- Ilealresection or disease
- Cystic fibrosis
- Diabetes mellitus

Pathophysiology

- There are two major types of gallstones:
    1. Composed of pigment.
        - Probably form when unconjugatedpigments in the bile precipitate to form stones.
        - The risk is increased in patients with cirrhosis, hemolysis, and infections of the biliarytract.

- Pigment stones cannot be dissolved and must be removed surgically.

2. Composed of cholesterol.

   - Four times more women than men develop cholesterol stones and gallbladder disease; the women are usually older than 40, multiparous, and obese.

   - The incidence rises with oral contraceptives, estrogens.

Clinical Manifestations

- Gallstones may be silent with only mild GI symptoms. Such stones may be detected incidentally.

- Symptoms are due to the disease of the gallbladder itself or to obstruction of the bile passages by a gallstone.

- The symptoms may be acute or chronic.

- Epigastricdistress, such as fullness, abdominal distention, and vague pain in the right upper quadrant of the abdomen, may occur. This distress may follow a meal rich in fried or fatty foods.

A. Pain and Biliary Colic

- If a gallstone obstructs the cystic duct, the gallbladder becomes distended, inflamed, and eventually infected (acute cholecystitis).

- The patient develops fever and may have a palpable abdominal mass.

- The patient may have biliarycolic with excruciating upper right abdominal pain that radiates to the back or right shoulder,

- It is usually associated with nausea and vomiting, and is noticeable several hours after a heavy meal.

B. Jaundice

- Jaundice occurs in a few patients with gallbladder disease and usually occurs with obstruction of the common bile duct.

C. Changes in Urine and Stool Color

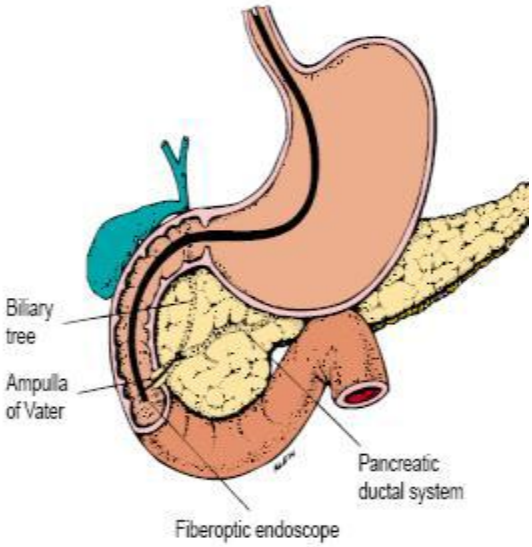
- The excretion of the bile pigments by the kidneys gives the urine a very dark color. The feces, no longer colored with bile pigments, are grayish, clay-colored.

D. Obstruction of bile flow: also interferes with absorption of the fat-soluble vitamins. The patient may exhibit deficiencies (eg, bleeding caused by vitamin K deficiency) of these vitamins if biliaryobstruction has been prolonged.

Assessment and Diagnostic Findings

- **Abdominal X-ray**
    - Ultrasonography
    - Cholecystography
    - Endoscopic retrograde cholangiopancreatography(ERCP)
    - Percutaneoustranshepaticcholangiography
    - Endoscopic retrograde cholangiopancreatography(ERCP). A fiberopticduodenoscope, with side-viewing apparatus, is inserted into the duodenum. The ampullaof Vateris catheterized and the biliarytree injected with contrast agent. The pancreatic ductalsystem is also assessed, if indicated.

      This procedure is of special value in visualizing neoplasmsof the ampullaarea and extracting a biopsy specimen.



Studies Used in the Diagnosis of Biliary Tract & Pancreatic Disease

Studies	Diagnostic Uses
Cholecystogram, cholangiogram	To visualize gallbladder and bile duct
Celiac axis arteriography	To visualize liver and pancreas
Laparoscopy	To visualize anterior surface of liver, gallbladder, and mesentery through a trocar
Ultrasonography	To show size of abdominal organs and presence of masses
Magnetic resonance imaging (MRI) andcomputed tomography (CT scans)	To detect neoplasms; diagnose cysts, pseudocysts, abscess, and hematomas
Endoscopic retrograde cholangiopancreato-graphy (ERCP)	To visualize biliary structures and pancreas via endoscopy
Serum alkaline phosphatase	In absence of bone disease, to measure biliary tract obstruction
Gamma-glutamyl (GGT), gamma-glutamyl trans-peptidase (GGTP), lactate dehydrogenase (LDH)	Markers for biliary stasis; also elevated in alcohol abuse
Cholesterol levels	Elevated in biliary obstruction; decreased in parenchymal liver disease

Medical Management

- The major objectives of medical therapy are to reduce the incidence of acute episodes of gallbladder pain and cholecystitisby supportive and dietary management and, if possible, to remove the cause of cholecystitisby pharmacologic therapy, endoscopic procedures, or surgical intervention.
- Removal of the gallbladder (**cholecystectomy**)
- Traditional surgical approaches
- **Laparoscopic cholecystectomy**(removal of the gallbladder through a small incision through the umbilicus) reducers surgical risks, length of hospital stay and recovery period.

Nutritional and Supportive Therapy

- Approximately 80% of the patients with acute gallbladder inflammation achieve remission with rest, intravenous fluids, nasogastricsuction, analgesia, and antibiotic agents. Unless the patient's condition deteriorates, surgical intervention is delayed until the acute symptoms subside.

- Ursodeoxycholicacid given to dissolve the stone.

- Stone Removal by Instrumentation

  1. A catheter and instrument with a basket.

  2. The use of the ERCP endoscope.

  3. Lithotripsy

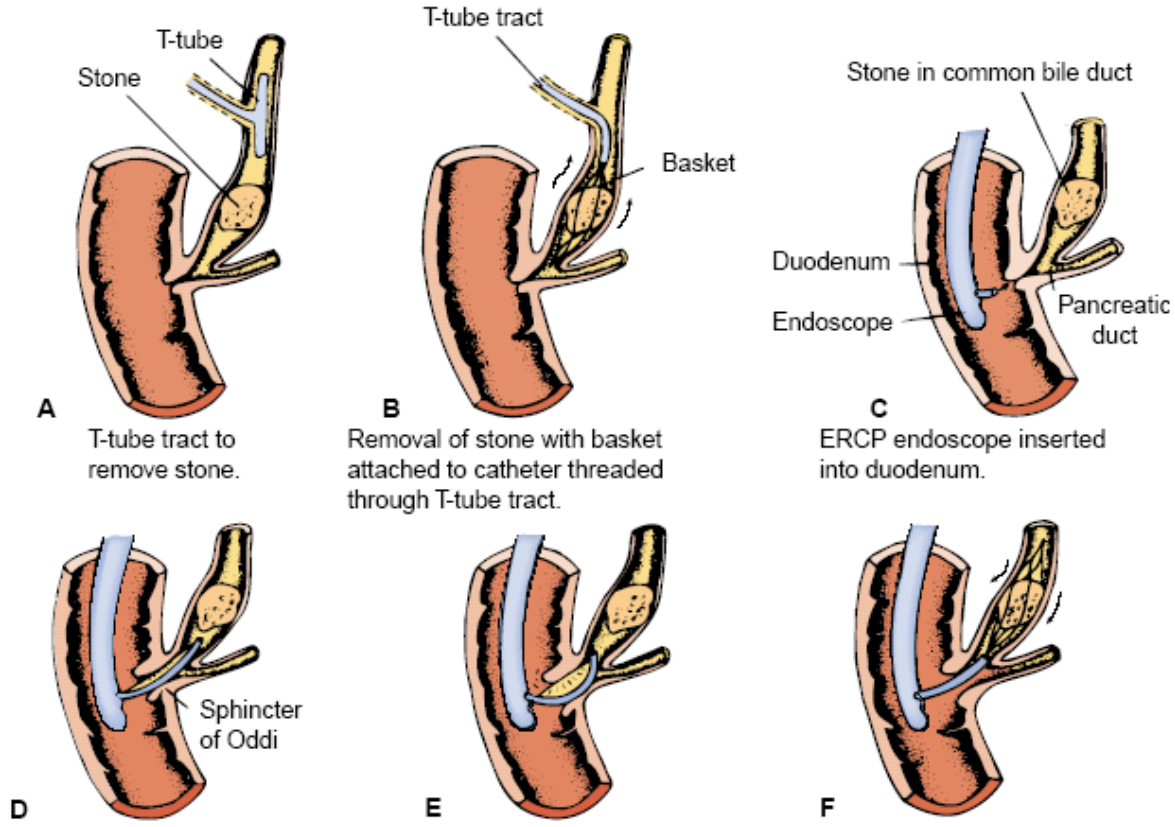


FIGURE 40-4 Nonsurgical techniques for removing gallstones.

Surgical Management

A chest x-ray, electrocardiogram, and liver function tests may be performed in addition to x-ray studies of the gallbladder. Vitamin K may be administered if the

prothrombinlevel is low. Blood component therapy may be administered before surgery. Nutritional requirements are considered; if the nutritional status is suboptimal, it may be necessary to provide intravenous glucose with protein hydrolysatesupplements to aid wound healing and help prevent liver damage. Preparation for gallbladder surgery is similar to that for any upper abdominal laparotomyor laparoscopy.

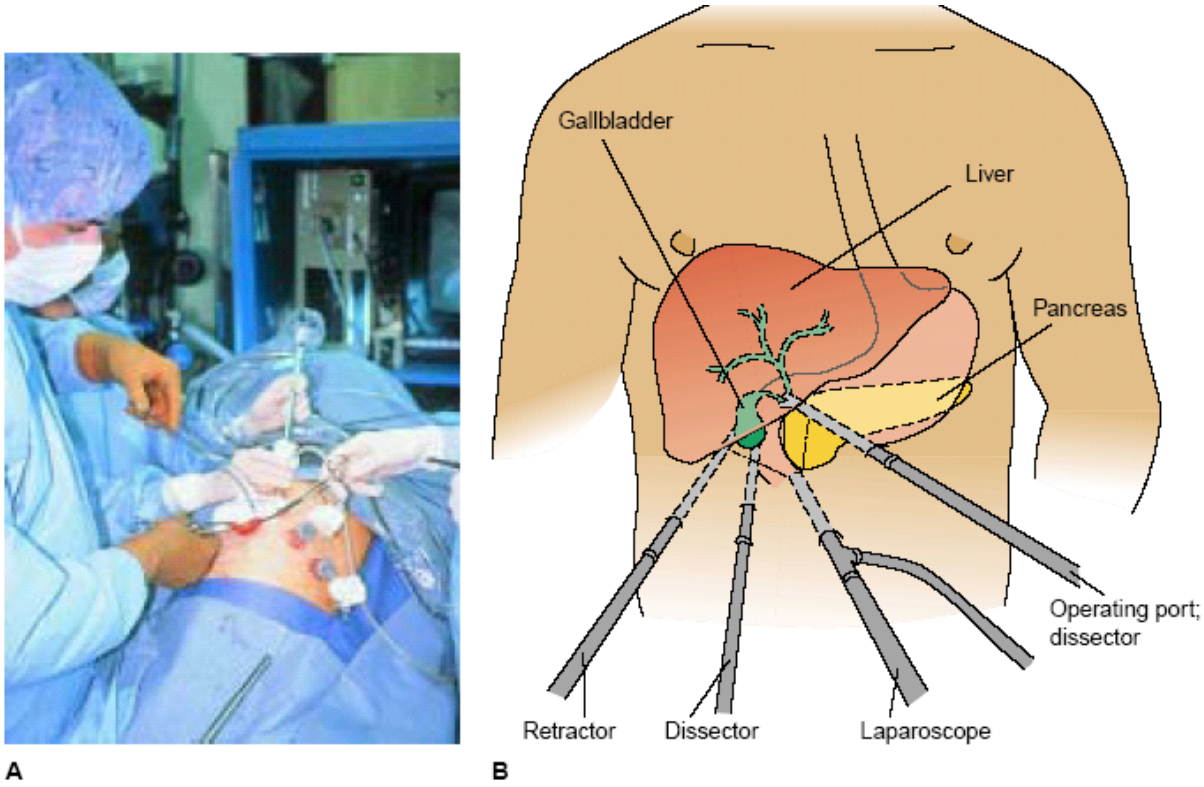


FIGURE 40-5 In (A) laparoscopic cholecystectomy, (B) the surgeon makes four small incisions (less than ½ inch each) in the abdomen and inserts a laparoscope with a miniature camera through the umbilical incision. The camera apparatus displays the gallbladder and adjacent tissues on a screen, allowing the surgeon to visualize the sections of the organ for removal.

Cholecystectomy

- In this procedure, the gallbladder is removed through an abdominal incision (usually right subcostal) after the cystic duct and artery are ligated. The procedure is performed for acute and chronic cholecystitis. In some patients a drain may be placed close to the gallbladder bed and brought out through a puncture wound if there is a bile leak. The drain type is chosen based on the physician's preference. A small leak should close spontaneously in a few days with the drain preventing accumulation of bile.

- Involves an incision into the common duct, usually for removal of stones. After the stones have been evacuated, a tube usually is inserted into the duct for drainage of bile until edema subsides.
- This tube is connected to gravity drainage tubing.

- The gallbladder also contains stones, and as a rule a cholecystectomyis performed at the same time.

Percutaneous cholecystostomy

- has been used in the treatment and diagnosis of acute cholecystitisin patients who are poor risks for any surgical procedure or for general anesthesia. These may include patients with sepsis or severe cardiac, renal, pulmonary, or liver failure.

- Under local anesthesia, a fine needle is inserted through the abdominal wall and liver edge into the gallbladder under the guidance of ultrasound or computed tomography. Bile is aspirated to ensure adequate placement of the needle, and a catheter is inserted into the gallbladder to decompress the biliarytract.

Disorders of the Pancreas

- **Pancreatitis** (inflammation of the pancreas) is a serious disorder. It can be acute or chronic.

- Acute pancreatitis can be a medical emergency associated with a high risk for life-threatening complications and mortality.

- It does not usually lead to chronic pancreatitis. However, chronic pancreatitis can be characterized by acute episodes. Typically, patients are men 40 to 45 years of age with a history of alcoholism or women 50 to 55 years of age with a history of biliarydisease.

- Etiology is unknown, but it could be related to obstruction that causes pack up of pancreatic enzymes, along with bile, they cause autodigestion

Acute Pancreatitis

- Ranges from a mild, self-limiting to severe.

- Mild acute pancreatitis is characterized by edema and inflammation of the pancreas. Minimal organ dysfunction is present, and return to normal usually occurs within 6 months.

- patient is acutely ill and at risk for hypovolemicshock, fluid and electrolyte disturbances, and sepsis. The tissue becomes necrotic with possible abscess formation.

- Systemic complications, such as acute respiratory distress syndrome, shock, DIC , & pleural effusion, can increase the mortality rate to 50% or higher

Pathophysiology

- Self-digestion of the pancreas by its own proteolyticenzymes, principally trypsin, causes acute pancreatitis.

- 80% of patients with acute pancreatitis have biliarytract disease; but only 5% of patients with gallstones develop pancreatitis. Gallstones enter the common bile duct and lodge at the ampullaof Vater, obstructing the flow of pancreatic juice or causing a reflux of bile from the common bile duct into the pancreatic duct, thus activating the powerful enzymes within the pancreas which leads to vasodilation, increased vascular permeability, necrosis, erosion, and hemorrhage.

- Other less common causes of pancreatitis include bacterial or viral infection i.e. mumps virus.

- Spasm and edema of the ampullaof Vater, resulting from duodenitis.

- Blunt abdominal trauma, peptic ulcer disease, ischemic vascular disease, hyperlipidemia, hypercalcemia, and the use of corticosteroids, thiazidediuretics, and oral contraceptives .

Clinical Manifestations

- Severe abdominal pain is the major symptom that causes the patient to seek medical care. Typically, the pain occurs in the midepigastrium.

- Pain is frequently acute in onset, occurring 24 to 48 hours after a very heavy meal or alcohol ingestion, and it may be diffuse and difficult to localize. It is generally more severe after meals and is unrelieved by antacids.

- The patient appears acutely ill. Abdominal guarding is present. A rigid or board-like abdomen may develop and is generally an ominous sign; the abdomen may remain soft in the absence of peritonitis.

- Ecchymosis(bruising) in the flank or around the umbilicus may indicate severe pancreatitis.

- Nausea and vomiting are common. The emesis is usually gastric in origin but may also be bile-stained.

- Fever, jaundice, mental confusion, and agitation also may occur.

- Respiratory distress & hypoxia are common, the patient may develop dyspnea, tachypnea, and abnormal blood gas values.

- Myocardial depression, hypocalcemia, hyperglycemia, and disseminated intravascular coagulopathy(DIC) may also occur.

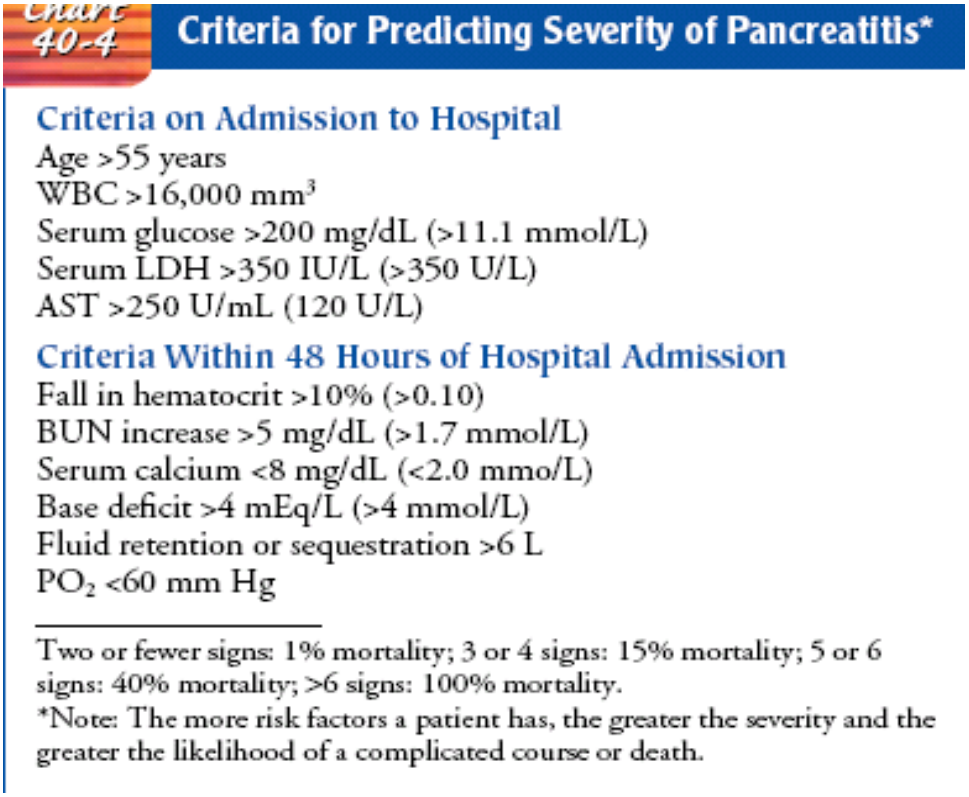


Chart 40-4 Criteria for Predicting Severity of Pancreatitis*

Criteria on Admission to Hospital

Age >55 years
WBC >16,000 mm^3
Serum glucose >200 mg/dL (>11.1 mmol/L)
Serum LDH >350 IU/L (>350 U/L)
AST >250 U/mL (120 U/L)

Criteria Within 48 Hours of Hospital Admission

Fall in hematocrit >10% (>0.10)
BUN increase >5 mg/dL (>1.7 mmol/L)
Serum calcium <8 mg/dL (<2.0 mmo/L)
Base deficit >4 mEq/L (>4 mmol/L)
Fluid retention or sequestration >6 L
PO_2 <60 mm Hg

Two or fewer signs: 1% mortality; 3 or 4 signs: 15% mortality; 5 or 6 signs: 40% mortality; >6 signs: 100% mortality.
*Note: The more risk factors a patient has, the greater the severity and the greater the likelihood of a complicated course or death.

Assessment and Diagnostic Findings

- History of abdominal pain, the presence of known risk factors,
- In 90% of the cases, serum amylase and lipase levels usually rise in excess of three times their normal upper limit within 24 hours
- Serum amylase usually returns to normal within 48 to 72 hours. Serum lipase levels may remain elevated for 7 to 14 days
- Urinary amylase levels elevated and remain elevated longer than serum amylase levels.
- WBC is usually elevated.
- Hypocalcemiais present in many patients and correlates well with the severity of pancreatitis.
- Transient hyperglycemia and glucosuriaand elevated serum bilirubinlevels occur in some patients with acute pancreatitis.
- X-ray.

- Ultrasound and CT scans.
- Hematocritand hemoglobin levels to monitor for bleeding.
- Peritoneal fluid may contain increased levels of pancreatic enzymes.
- The stools are often bulky, pale, and foul-smelling. Fat content of stools varies between 50% and 90% in pancreatic disease; normally, the fat content is 20%.

Medical Management

- Management of the patient with acute pancreatitis is directed toward relieving symptoms and preventing or treating complications. All oral intake is withheld to inhibit pancreatic stimulation and secretion of pancreatic enzymes.
- Parenteral nutrition is usually an important part of therapy, Nasogastric suction may be used to relieve nausea and vomiting, to decrease painful abdominal distention and paralytic ileus, and to remove hydrochloric acid so that it does not enter the duodenum and stimulate the pancreas.
- Histamine-2 (H2) antagonists to decrease pancreatic activity by inhibiting HCl secretion.

Pain Management

- Adequate pain medication is essential during the course of acute pancreatitis to provide sufficient pain relief and minimize restlessness, which may stimulate pancreatic secretion further. Morphine and morphine derivatives are often avoided because it has been thought that they cause spasm of the sphincter of Oddi; meperidine (Demerol) is often prescribed because it is less likely to cause spasm of the sphincter

Intensive care

- Correction of fluid and blood loss and low albumin levels is necessary to maintain fluid volume and prevent renal failure. The patient is usually acutely ill and is monitored in the intensive care unit, where hemodynamic monitoring and arterial blood gas monitoring are initiated. Antibiotic agents may be prescribed if infection is present; insulin may be required if significant hyperglycemia occurs.

Respiratory Care

- Aggressive respiratory care is indicated because of the high risk for elevation of the diaphragm, pulmonary infiltrates and effusion, and atelectasis. Hypoxemia occurs in a significant number of patients with acute pancreatitis

even with normal x-ray findings. Respiratory care may range from close monitoring of arterial blood gases to use of humidified oxygen to intubation and mechanical ventilation

Biliary drainage

- Placement of biliary drains (for external drainage) and stents (indwelling tubes) in the pancreatic duct through endoscopy has been performed to reestablish drainage of the pancreas. This has resulted in decreased pain and increased weight gain.

Surgical Intervention

- Although often risky because the acutely ill patient is a poor surgical risk, surgery may be performed to assist in the diagnosis of pancreatitis (diagnostic laparotomy), to establish pancreatic drainage, or to resect or débride a necrotic pancreas. The patient who undergoes pancreatic surgery may have multiple drains in place postoperatively as well as a surgical incision that is left open for irrigation and repacking every 2 to 3 days to remove necrotic debris

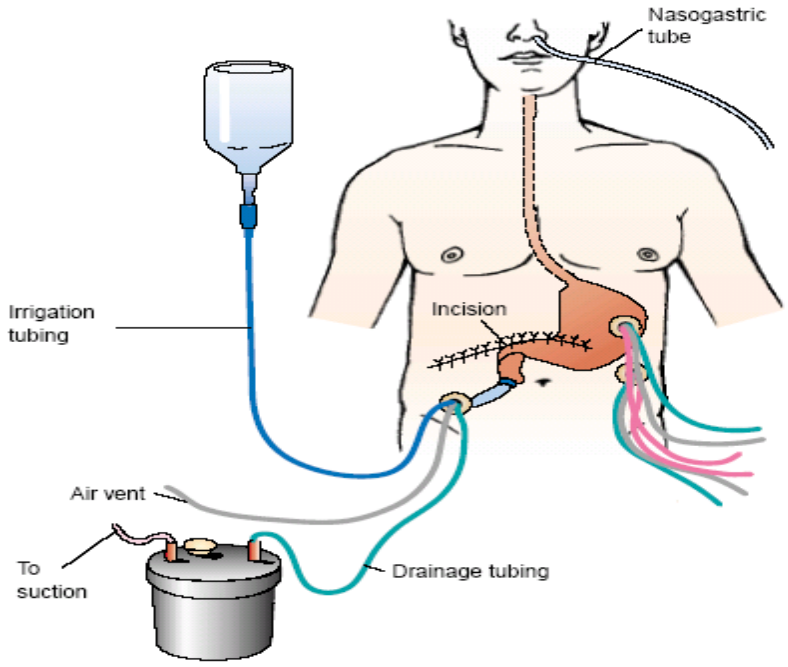


FIGURE 40-6 Multiple sump tubes are used after pancreatic surgery. Triple-lumen tubes consist of ports that provide tubing for irrigation, air venting, and drainage.

Post Acute Management

- Antacids may be used when acute pancreatitis begins to resolve. Oral feedings low in fat and protein are initiated gradually. Caffeine and alcohol are eliminated from the diet. If the episode of pancreatitis occurred during

treatment with thiazide diuretics, corticosteroids, or oral contraceptives, these medications are discontinued.

- Follow-up of the patient may include ultrasound, x-ray studies, or ERCP to determine whether the pancreatitis is resolving and to assess for abscesses and pseudocysts.

Chronic Pancreatitis

- is an inflammatory disorder characterized by progressive anatomic and functional destruction of the pancreas.

- As cells are replaced by fibrous tissue with repeated attacks of pancreatitis, pressure within the pancreas increases. The end result is mechanical obstruction of the pancreatic and common bile ducts and the duodenum. Additionally, there is atrophy of the epitheliumof the ducts, inflammation, and destruction of the secreting cells of the pancreas.

- Alcohol consumption in Western societies and malnutrition worldwide are the major causes of chronic pancreatitis. Excessive and prolonged consumption of alcohol accounts for approximately 70% of the cases

- The incidence of pancreatitis is 50 times greater in alcoholics than in the nondrinking population. Long-term alcohol consumption causes hypersecretion of protein in pancreatic secretions, resulting in protein plugs and calculi within the pancreatic ducts. Alcohol also has a direct toxic effect on the cells of the pancreas. Damage to these cells is more likely to occur and to be more severe in patients whose diets are poor in protein content and either very high or very low in fat.

Clinical Manifestations

- Characterized by recurring attacks of severe upper abdominal and back pain, accompanied by vomiting. Attacks are often so painful that opioids, even in large doses, do not provide relief. As the disease progresses, recurring attacks of pain are more severe, more frequent, and of longer duration.

- Weight loss is a major problem in chronic pancreatitis: more than 75% of patients experience significant weight loss, usually caused by decreased dietary intake secondary to anorexia or fear that eating will precipitate another attack. Malabsorption occurs late in the disease, when as little as 10% of pancreatic function remains. As a result, digestion, especially of proteins and fats, is impaired. The stools become frequent, frothy, and foul-smelling because of impaired fat digestion,

Assessment and Diagnostic Findings

- ERCP is the most useful study in the diagnosis of chronic pancreatitis. It provides detail about the anatomy of the pancreas and the pancreatic and biliary ducts. It is also helpful in obtaining tissue for analysis and differentiating pancreatitis from other conditions, such as carcinoma.

- Magnetic resonance imaging, computed tomography, and ultrasound, have been useful in the diagnostic evaluation of patients with suspected pancreatic disorders.

- A glucose tolerance test evaluates pancreatic islet cell function, information necessary for making decisions about surgical resection of the pancreas. An abnormal glucose tolerance test indicative of diabetes may be present.

Medical Management

- The management of chronic pancreatitis depends on its probable cause in each patient. Treatment is directed toward preventing and managing acute attacks, relieving pain and discomfort, and managing exocrine and endocrine insufficiency of pancreatitis.

Nonsurgical Management

- Nonsurgical approaches may be indicated for the patient who refuses surgery, who is a poor surgical risk, or whose disease and symptoms do not warrant surgical intervention. Endoscopy to remove pancreatic duct stones and stent strictures may be effective in selected patients to manage pain and relieve obstruction.

- Focus is usually on the use of nonopioid methods to manage pain. Diabetes mellitus resulting from dysfunction of the pancreatic islet cells is treated with diet, insulin, or oral antidiabetic agents.

Surgical Management

- Surgery is generally carried out to relieve abdominal pain and discomfort, restore drainage of pancreatic secretions, and reduce the frequency of acute attacks of pancreatitis. The surgery performed depends on the anatomic and functional abnormalities of the pancreas, including the location of disease within the pancreas, diabetes, exocrine insufficiency, biliary stenosis, and pseudocysts of the pancreas.

- Pancreaticojejunostomy (also referred to as Roux-en-Y) with a side-to-side anastomosis or joining of the pancreatic duct to the jejunum allows drainage of the pancreatic secretions into the jejunum.

- Other surgical procedures may be performed for different degrees and types of disease, ranging from revision of the sphincter of the ampulla of Vater, to internal drainage of a pancreatic cyst into the stomach, to insertion of a stent, to wide resection or removal of the pancreas. A Whipple resection (pancreaticoduodenectomy) has been carried out to relieve the pain of chronic pancreatitis.

- Autotransplantation or implantation of the patient's pancreatic islet cells has been attempted to preserve the endocrine function of the pancreas in patients who have undergone total pancreatectomy.

Pancreatic Cysts

- As a result of the local necrosis that occurs at the time of acute pancreatitis, collections of fluid may form in the vicinity of the pancreas. These become walled off by fibrous tissue and are calledpancreatic pseudocysts. They are the most common type of pancreatic cysts. Less common cysts occur as a result of congenital anomalies or are secondary to chronic pancreatitis or trauma to the pancreas.

- Diagnosis of pancreatic cysts and pseudocysts is made by ultrasound, computed tomography, and ERCP. ERCP may be used to define the anatomy of the pancreas and evaluate the patency of pancreatic drainage. Pancreatic pseudocysts may be of considerable size. Because of their location behind the posterior peritoneum, when they enlarge they impinge on and displace the stomach or the colon, which are adjacent. Eventually, through pressure or secondary infection, they produce symptoms and require drainage

Cancer of the Pancreas

- The incidence of pancreatic cancer has decreased slightly over the past 25 years in non-Caucasian men. It is the fifth leading cause of cancer deaths in the United States and occurs most frequently in the fifth to seventh decades of life . Cigarette smoking, exposure to industrial chemicals or toxins in the environment, and a diet high in fat, meat, or both are associated with pancreatic cancer, although their role is not completely clear. The risk for pancreatic cancer increases as the extent of cigarette smoking increases. Diabetes mellitus, chronic pancreatitis, and hereditary pancreatitis are also associated

- Cancer may arise in any portion of the pancreas (in the head, the body, or the tail); clinical manifestations vary depending on the location of the lesion and whether functioning, insulinsecreting pancreatic islet cells are involved. Approximately 75% of pancreatic cancers originate in the head of the pancreas and give rise to a distinctive clinical picture. Functioning islet cell tumors,

whether benign (adenoma) or malignant (carcinoma), are responsible for the syndrome of hyperinsulinism.

Clinical Manifestations

- Pain, jaundice, or both are present in more than 90% of patients and, along with weight loss, are considered classic signs of pancreatic carcinoma. However, they often do not appear until the disease is far advanced. Other signs include rapid, profound, andprogressive weight loss as well as vague upper or midabdominal pain or discomfort that is unrelated to any gastrointestinal function and is often difficult to describe.

- An important sign, when present, is the onset of symptoms of insulin deficiency: glucosuria, hyperglycemia, and abnormal glucose tolerance. Thus, diabetes may be an early sign of carcinoma of the pancreas. Meals often aggravate epigastric pain, which usually occurs before the appearance of jaundice and pruritus.

Assessment and Diagnostic Findings

- Magnetic resonance imaging and computed tomography are used to identify the presence of pancreatic tumors. ERCP is also used in the diagnosis of pancreatic carcinoma. Cells obtained during ERCP are sent to the laboratory for examination. Gastrointestinal x-ray findings may demonstrate deformities in adjacent viscera caused by the impinging pancreatic mass. Percutaneous fine-needle aspiration biopsy of the pancreas is used to diagnose pancreatic tumors and confirm the diagnosis

- Percutaneous transhepatic cholangiography is another procedure that may be performed to identify obstructions of the biliary tract by a pancreatic tumor. Several tumor markers (eg, CA 19-9, CEA, DU-PAN-2) may be used Angiography, computed tomography, and laparoscopy may be performed to determine whether the tumor can be removed surgically. Intraoperative ultrasonography has been used to determine if there is metastatic disease to other organs.

Medical Management

- If the tumor is resectable and localized (typically tumors in the head of the pancreas), the surgical procedure to remove it is usually extensiveHowever, definitive surgical treatment (ie, total excision of the lesion) is often not possible because of the extensive growth when the tumor is finally diagnosed and because of the probable widespread metastases (especially to the liver, lungs, and bones). More often, treatment is limited to palliative measures.

- The patient may be treated with radiation and chemotherapy (fluorouracil and gemcitabine). If the patient undergoes surgery, intraoperative radiation therapy (IORT) may be used to deliver a high dose of radiation to the tumor with minimal injury to other tissues.

Nursing Management

- Pain management and attention to nutritional requirements are important nursing measures to improve the level of comfort. Skin care and nursing measures are directed toward relief of pain and discomfort associated with jaundice, anorexia, and profound weight loss. Specialty mattresses are beneficial and protect bony prominences from pressure. Pain associated with pancreatic cancer may be severe and may require liberal use of opioids;

- **Promoting Home and Community-Based Care**

- specific patient and family teaching indicated varies with the stage of disease and the treatment choices made by the patient. If the patient elects to receive chemotherapy, the nurse focuses teaching on prevention of side effects and complications of the agents used. If surgery is performed to relieve obstruction and establish biliary drainage, teaching addresses management of the drainage system and monitoring for complications.

Continuing Care

- A referral for home care is indicated to help the patient and family deal with the physical problems and discomforts associated with pancreatic cancer and the psychological impact of the disease. The home care nurse assesses the patient's physical status, fluid and nutritional status, and skin integrity and the adequacy of pain management.

Tumors Of The Headof The Pancreas

- Sixty to eighty percent of pancreatic tumors occur in the head of the pancreas. Tumors in this region of the pancreas obstruct the common bile duct where the duct passes through the head of the pancreas to join the pancreatic duct and empty at the ampulla of Vater into the duodenum. The tumors producing the obstruction may arise from the pancreas, the common bile duct, or the ampulla of Vater.

Clinical Manifestations

- The obstructed flow of bile produces jaundice, clay-colored stools, and dark urine. Malabsorption of nutrients and fat-soluble vitamins may result from obstruction by the tumor to entry of bile in the gastrointestinal tract.

Abdominal discomfort or pain and pruritus may be noted, along with anorexia, weight loss, and malaise.

Assessment and Diagnostic Findings

- Diagnostic studies may include duodenography, angiography by hepatic or celiac artery catheterization, pancreatic scanning, percutaneous transhepatic cholangiography, ERCP, and percutaneous needle biopsy of the pancreas. Results of a biopsy of the pancreas may aid in the diagnosis.

Medical Management

- Before extensive surgery can be performed, a fairly long period of preparation is often necessary because the patient's nutritional and physical condition is often quite compromised. Various liver and pancreatic function studies are performed. A diet high in protein along with pancreatic enzymes is often prescribed. Preoperative preparation includes adequate hydration, correction of prothrombin deficiency with vitamin K, and treatment of anemia to minimize postoperative complications.

- A biliary-enteric shunt may be performed to relieve the jaundice and, perhaps, to provide time for a thorough diagnostic evaluation. Total pancreatectomy (removal of the pancreas) may be performed if there is no evidence of direct extension of the tumor to adjacent tissues or regional lymph nodes.

A pancreaticoduodenectomy

- (Whipple's procedure or resection) is used for potentially resectable cancer of the head of the pancreas79

- This procedure involves removal of the gallbladder, distal portion of the stomach, duodenum, head of the pancreas, and common bile duct and anastomosis of the remaining pancreas and stomach to the jejunum

- The result is removal of the tumor, allowing flow of bile into the jejunum. When the tumor cannot be excised, the jaundice may be relieved by diverting the bile flow into the jejunum by anastomosing the jejunum to the gallbladder, a procedure known as cholecystojejunostomy.

- The postoperative management of patients who have undergone a pancreatectomy or a pancreaticoduodenectomy is similar to the management of patients after extensive gastrointestinal and biliary surgery.

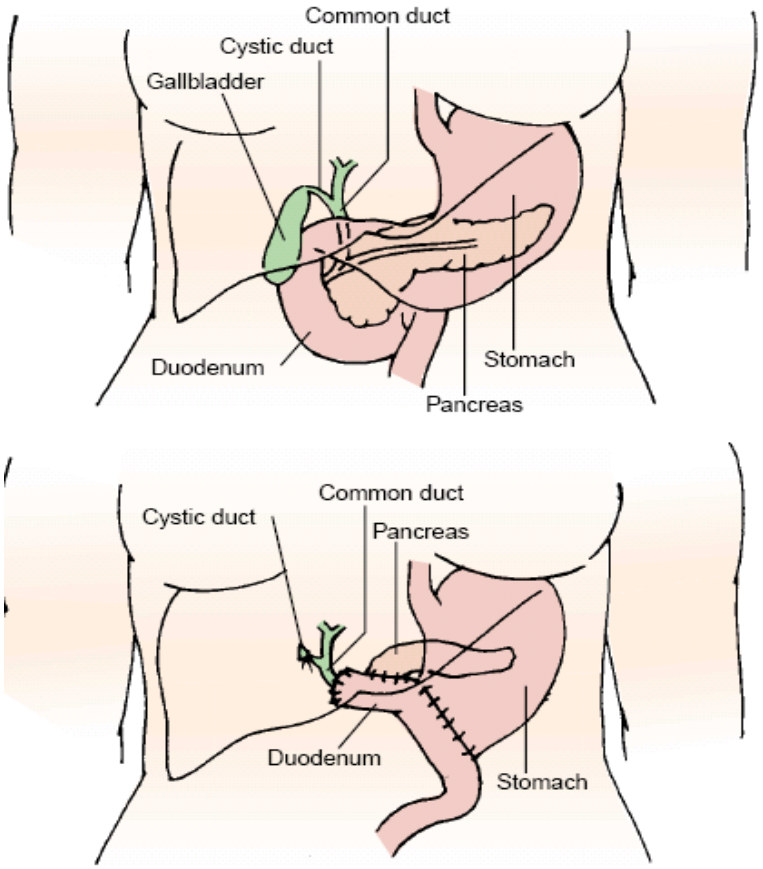


FIGURE 40-7 Pancreatoduodenectomy (Whipple's procedure or resection). End result of the resection of the carcinoma of the head of the pancreas or the ampulla of Vater. The common duct is sutured to the end of the jejunum, and the remaining portion of the pancreas and the end of the stomach are sutured to the side of the jejunum.

Nursing Management

- Preoperatively and postoperatively, nursing care is directed toward promoting patient comfort, preventing complications, and assisting the patient to return to and maintain as normal and comfortable a life as possible.

- The nurse closely monitors the patient in the intensive care unit after surgery; the patient will have multiple intravenous and arterial lines in place for fluid and blood replacement as well as for monitoring arterial pressures, and is on a mechanical ventilator in the immediate postoperative period. It is important to give careful attention to changes in vital signs, arterial blood gases and pressures, pulse oximetry, laboratory values,and urine output. The nurse must also consider the patient's compromised nutritional status and risk for bleeding.

Promoting Home and Community-Based Care,

- Teaching Patients Self-Care.

- Continuing Care.

Nursing Process for the Patient Undergoing Surgery for Gallbladder Disease

Assessment

The patient who is to undergo surgical treatment of gallbladder disease is often admitted to the hospital or same-day surgery unit on the morning of surgery. Preadmission testing is often completed a week or longer before admission. At that time, the nurse instructs the patient about the need to avoid smoking, to enhance pulmonary recovery postoperatively and to avoid respiratory complications. It also is important to instruct the patient to avoid the use of aspirin and other agents (over-the-counter medications and herbal remedies) that can alter coagulation and other biochemical processes.

Assessment should focus on the patient's respiratory status. If a traditional surgical approach is planned, the high abdominal incision required during surgery may interfere with full respiratory excursion. The nurse notes a history of smoking, previous respiratory problems, shallow respirations, a persistent or ineffective cough, and the presence of adventitious breath sounds. Nutritional status is evaluated through a dietary history and a general examination performed at the time of preadmission testing. The nurse also reviews previously obtained laboratory results to obtain information about the patient's nutritional status.

Diagnosis

Nursing Diagnoses

Based on all the assessment data, the major postoperative nursing diagnoses for the patient undergoing surgery for gallbladder disease may include the following:

- Acute pain and discomfort related to surgical incision
- Impaired gas exchange related to the high abdominal surgical incision (if traditional surgical cholecystectomy was performed)
- Impaired skin integrity related to altered biliary drainage after surgical intervention (if a T-tube was inserted because of retained stones in the common bile duct or another drainage device was employed)
- Imbalanced nutrition, less than body requirements, related to inadequate bile secretion
- Deficient knowledge about self-care activities related to incision care, dietary modifications (if needed), medications, and reportable signs or symptoms (eg, fever, bleeding, vomiting)

Collaborative Problems/Potential Complications

Based on assessment data, potential complications may include the following:

- Bleeding
- Gastrointestinal symptoms (may be related to biliary leak or injury to the bowel)

Planning and Goals

The goals for the patient include relief of pain, adequate ventilation, intact skin and improved biliary drainage, optimal nutritional intake, absence of complications, and

understanding of self-care routines.

Postoperative Nursing Interventions

After recovery from anesthesia, the patient is placed in the low Fowler's position. Fluids may be administered intravenously, and nasogastric suction (a nasogastric tube was probably inserted immediately before surgery for a nonlaparoscopic procedure) may be instituted to relieve abdominal distention. Water and other fluids are administered within hours after laparoscopic procedures. A soft diet is started after bowel sounds return, which is usually the next day if the laparoscopic approach is used.

Relieving Pain

The location of the subcostal incision in nonlaparoscopic gallbladder surgery often causes the patient to avoid turning and moving, to splint the affected site, and to take shallow breaths to prevent pain. Because full expansion of the lungs and gradually increased activity are necessary to prevent postoperative complications, the nurse administers analgesic agents as prescribed to relieve the pain and to promote well-being in addition to helping the patient turn, cough, breathe deeply, and ambulate as indicated. Use of a pillow or binder over the incision may reduce pain during these maneuvers.

Improving Respiratory Status

Patients undergoing biliary tract surgery are especially prone to pulmonary complications, as are all patients with upper abdominal incisions. Therefore, the nurse reminds the patient to take deep breaths and cough every hour, to expand the lungs fully and prevent atelectasis. The early and consistent use of incentive spirometry also helps improve respiratory function. Early ambulation prevents pulmonary complications as well as other complications, such as thrombophlebitis. Pulmonary complications are more likely to occur in elderly patients, obese patients, and those with preexisting pulmonary disease.

Promoting Skin Care and Biliary Drainage

In patients who have undergone a cholecystostomy or choledochostomy, the drainage tube must be connected immediately to a drainage receptacle. The nurse should fasten tubing to the dressings or to the patient's gown, with enough leeway for the patient to move without dislodging or kinking it. Because a drainage system remains attached when the patient is ambulating, the drainage bag may be placed in a bathrobe pocket or fastened so that it is below the waist or common duct level. If a Penrose drain is used, the nurse changes the dressings as required.

After these surgical procedures, the patient is observed for indications of infection, leakage of bile into the peritoneal cavity, and obstruction of bile drainage. If bile is not draining properly, an obstruction is probably causing bile to be forced back into the liver and bloodstream. Because jaundice may result, the nurse should be particularly observant of the color of the sclerae. The nurse should also note and report right upper quadrant abdominal pain, nausea and vomiting, bile drainage around any drainage tube, clay-colored stools, and a change in vital signs.

Bile may continue to drain from the drainage tract in considerable quantities for some time, necessitating frequent changes of the outer dressings and protection of the skin from irritation (bile is corrosive to the skin).

To prevent total loss of bile, the physician may want the drainage tube or collection receptacle elevated above the level of the abdomen so that the bile drains externally only if pressure develops in the duct system. Every 24 hours, the nurse measures the bile collected and records the amount, color, and character of the drainage. After several days of drainage, the tube may be clamped for 1 hour before and after each

meal to deliver bile to the duodenum to aid in digestion. Within 7 to 14 days, the drainage tube is removed. The patient who goes home with a drainage tube in place requires instruction and reassurance about the function and care of the tube.
In all patients with biliary drainage, the nurse (or the patient, if at home) observes the stools daily and notes their color. Specimens of both urine and stool may be sent to the laboratory for examination for bile pigments. In this way, it is possible to determine whether the bile pigment is disappearing from the blood and is draining again into the duodenum. Maintaining a careful record of fluid intake and output is important.

Improving Nutritional Status

The nurse encourages the patient to eat a diet that is low in fats and high in carbohydrates and proteins immediately after surgery. At the time of hospital discharge, there are usually no special dietary instructions other than to maintain a nutritious diet and avoid excessive fats. Fat restriction usually is lifted in 4 to 6 weeks, when the biliary ducts dilate to accommodate the volume of bile once held by the gallbladder and when the ampulla of Vater again functions effectively. After this time, when the patient eats fat, adequate bile will be released into the digestive tract to emulsify the fats and allow their digestion. This is in contrast to the condition before surgery, when fats may not be digested completely or adequately, and flatulence may occur. However, one purpose of gallbladder surgery is to allow a normal diet.

Monitoring and Managing Potential Complications

Bleeding may occur as a result of inadvertent puncture or nicking of a major blood vessel. Postoperatively, the nurse closely monitors vital signs and inspects the surgical incisions and drains, if any are in place, for evidence of bleeding. The nurse also periodically assesses the patient for increased tenderness and rigidity of the abdomen. If these signs and symptoms occur, they are reported to the surgeon. The nurse instructs the patient and family to report to the surgeon any change in the color of stools, because this may indicate complications. Gastrointestinal symptoms, although not common, may occur with manipulation of the intestines during surgery.
After laparoscopic cholecystectomy, the nurse assesses the patient for loss of appetite, vomiting, pain, distention of the abdomen, and temperature elevation. These may indicate infection or disruption of the gastrointestinal tract and should be reported to the surgeon promptly. Because the patient is discharged soon after laparoscopic surgery, the patient and family are instructed verbally and in writing about the importance of reporting these symptoms promptly.

Promoting Home and Community-Based Care

Teaching Patients Self-Care

The nurse instructs the patient about the medications that are prescribed (vitamins, anticholinergics, and antispasmodics) and their actions. It also is important to inform the patient and family about symptoms that should be reported to the physician, including jaundice, dark urine, pale-colored stools, pruritus, and signs of inflammation and infection, such as pain or fever.
Some patients report one to three bowel movements a day. This is the result of a continual trickle of bile through the choledochoduodenal junction after cholecystectomy. Usually, such frequency diminishes over a period of a few weeks to several months.
If a patient is discharged from the hospital with a drainage tube still in place, the patient and family need instructions about its management. The nurse instructs them in proper care of the drainage tube and the importance of reporting to the surgeon

promptly any changes in the amount or characteristics of drainage. Assistance in securing the appropriate dressings reduces the patient's anxiety about going home with the drain or tube still in place. (See Chart 40-3 for more details.)

Patient Education

Managing Self-Care After Laparoscopic Cholecystectomy
Resuming Activity

- Begin light exercise (walking) immediately.
- Take a shower or bath after 1 or 2 days.
- Drive a car after 3 or 4 days.
- Avoid lifting objects exceeding 5 pounds after surgery, usually for 1 week.
- Resume sexual activity when desired.

Caring for the Wound

- Check puncture site daily for signs of infection.
- Wash puncture site with mild soap and water.
- Allow special adhesive strips on the puncture site to fall off. Do not pull them off.

Resuming Eating

- Resume your normal diet.
- If you had fat intolerance before surgery, gradually add fat back into your diet in small increments.

Managing Pain

- You may experience pain or discomfort in your right shoulder from the gas used to inflate your abdominal area during surgery. Sitting upright in bed or a chair, walking, or use of a heating pad may ease the discomfort.
- Take analgesics as needed and as prescribed. Report to surgeon if pain is unrelieved even with analgesic use.

Managing Follow-Up Care

- Make an appointment with your surgeon for 7 to 10 days after discharge.
- Call your surgeon if you experience any signs or symptoms of infection at or around the puncture site: redness, tenderness, swelling, heat, or drainage.
- Call your surgeon if you experience a fever of 37.7°C (100°F) or more for 2 consecutive days.
- Call your surgeon if you develop nausea, vomiting, or abdominal pain.

Chapter 41

Assessment and Management of Patients with Diabetes Mellitus

Diabetes Mellitus Definition

• Is a group of metabolic diseases characterized by increased levels of glucose in the blood (hyperglycemia) resulting from defects in insulin secretion, insulin action, or both

• related to:

–An endocrine disorder causes Abnormal insulin production

–Impaired insulin utilization

–Both abnormal production and impaired utilization

• Leading cause of heart disease, stroke, adult blindness, and nontraumatic lower limb amputations

Diabetes Mellitus Etiology and Pathophysiology

–Produced by the b cells in the islets of Langherans of the pancreas

–Facilitates normal glucose range of 70 to 120 mg/dl

Functions of insulin

• Transports and metabolizes glucose for energy

• Stimulates storage of glucose in the liver and muscle (in the form of glycogen)

• Signals the liver to stop the release of glucose

• Enhances storage of dietary fat in adipose tissue

• Accelerates transport of amino acids (derived from dietary protein) into cells

• Inhibits breakdown of stored glucose, protein, and fat.

Type 1 Diabetes Mellitus

• Formerly known as “juvenile onset” or “insulin dependent” diabetes

• Most often occurs in people under 30 years of age

• Peak onset between ages 11 and 13

Etiology and Pathophysiology

• Progressive destruction of pancreatic b cells

• Autoantibodies cause a reduction of 80% to 90% of normal b cell function before manifestations occur

• **Causes:**

–Genetic predisposition

• Related to human leukocyte antigens (HLAs)

–Exposure to a virus

- Combined genetic, immunologic, and possibly environmental (eg, toxins, viral) factors are thought to contribute to beta cell destruction.
- There is also evidence of an autoimmune response in type 1 diabetes. This is an abnormal response in which antibodies are directed against normal tissues of the body, responding to these tissues as if they were foreign.

Onset of Disease

• Manifestations develop when the pancreas can no longer produce insulin

–Rapid onset of symptoms

–Present at ER with ketoacidosis

Type 1 Diabetes Mellitus Onset of Disease

• Weight loss

• Polydipsia

• Polyuria

• Polyphagia

• Diabetic ketoacidosis (DKA)

–Occurs in the absence of exogenous insulin

–Life-threatening condition

–Results in metabolic acidosis

- The destruction of the beta cells results in decreased insulin production, unchecked glucose production by the liver, and fasting hyperglycemia.
- In addition, glucose cannot be stored in the liver but instead remains in the bloodstream and contributes to postprandial (after meals) hyperglycemia.

- If the concentration of glucose in the blood exceeds the renal threshold for glucose, usually 180 to 200 mg/dL, the kidneys may not reabsorb all of the filtered glucose; the glucose then appears in the urine (glycosuria). When excess glucose is excreted in the urine, it is accompanied by excessive loss of fluids and electrolytes. This is called osmotic diuresis.
- Because insulin normally inhibits glycogenolysis (breakdown of stored glucose) and gluconeogenesis (production of new glucose from amino acids and other substrates), these processes occur in an unrestrained fashion in people with insulin deficiency and contribute further to hyperglycemia. In addition, fat breakdown occurs, resulting in an increased production of ketone bodies, which are the byproducts of fat breakdown.

Type 2 Diabetes Mellitus

• Accounts for 90% of patients with diabetes

• Usually occurs in people over 40 years of age

• 80-90% of patients are overweight

Etiology and Pathophysiology

• Pancreas continues to produce some endogenous insulin

• Insulin produced is either insufficient or poorly utilized by the tissues

• Insulin resistance

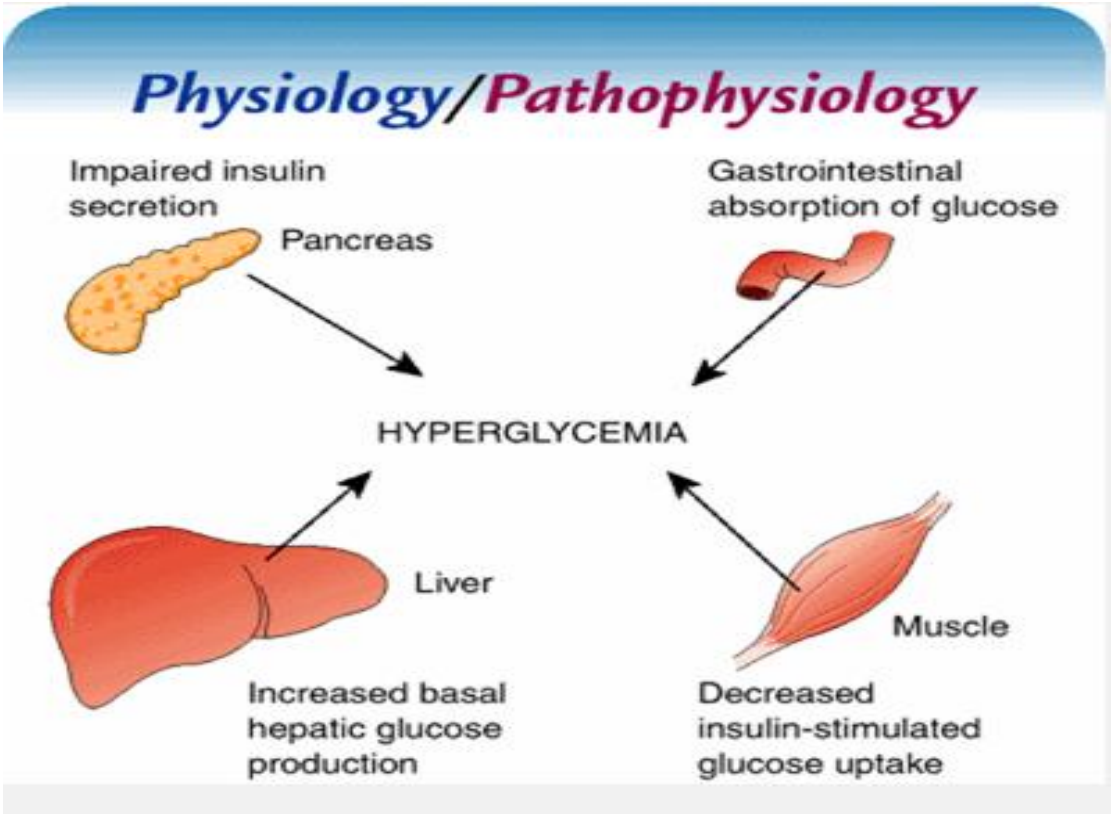
–Body tissues do not respond to insulin

–Results in hyperglycemia

• Inappropriate glucose production by the liver

–Not considered a primary factor in the development of type 2 diabetes

- Normally, insulin binds to special receptors on cell surfaces and initiates a series of reactions involved in glucose metabolism. In type 2 diabetes, these intracellular reactions are diminished, making insulin less effective at stimulating glucose uptake by the tissues and at regulating glucose release by the liver.
- The exact mechanisms that lead to insulin resistance and impaired insulin secretion in type 2 diabetes are unknown, although genetic factors are thought to play a role.
- To overcome insulin resistance and to prevent the buildup of glucose in the blood, increased amounts of insulin must be secreted to maintain the glucose level at a normal or slightly elevated level. However, if the beta cells cannot keep up with the increased demand for insulin, the glucose level rises, and type 2 diabetes develops.



Type 2 Diabetes Mellitus Onset of Disease

• Gradual onset

• Person may go many years with undetected hyperglycemia

• 75% of type 2 diabetes is detected incidentally

- For most patients (approximately 75%), type 2 diabetes is detected incidentally (eg, when routine laboratory tests or ophthalmoscopic examinations are performed). One consequence of undetected diabetes is that long-term diabetes complications (eg, eye disease, peripheral neuropathy, peripheral vascular disease) may have developed before the actual diagnosis of diabetes is made

- **Etiology**

(not well know)

–Genetic factors

–Increased weight.

- Recent studies have demonstrated that type 2 diabetes can be prevented or delayed in people at high risk for the disease through weight reduction and increased participation in moderate exercise

Gestational Diabetes

• Develops during pregnancy

• Detected at 24 to 28 weeks of gestation

• Risk for cesarean delivery, perinatal death, and neonatal complications

- Hyperglycemia develops during pregnancy because of the secretion of placental hormones, which causes insulin resistance.
- Gestational diabetes occurs in as many as 14% of pregnant women and increases their risk for hypertensive disorders during pregnancy
- Women who are considered to be at high risk for GDM and who should be screened by blood glucose testing at their first prenatal visit are those with marked obesity, a personal history of GDM, glycosuria, or a strong family history of diabetes.
- Initial management includes dietary modification and blood glucose monitoring. If hyperglycemia persists, insulin is prescribed.
- Many women who have had GDM develop type 2 diabetes later in life.

Secondary Diabetes

• Results from another medical condition or due to the treatment of a medical condition that causes abnormal blood glucose levels

–Cushing syndrome

–Hyperthyroidism

–Parenteral nutrition

Clinical Manifestations Diabetes Mellitus

• Polyuria

• Polydipsia (excessive thirst)

• Polyphagia

• In Type I

–Weight loss

–Ketoacidosis

- Polyphagia (increased appetite) resulting from the catabolic state induced by insulin deficiency and the breakdown of proteins and fats
- Other symptoms include fatigue and weakness, sudden vision changes, tingling or numbness in hands or feet, dry skin, skin lesions or wounds that are slow to heal, and recurrent infections.

- The onset of type 1 diabetes may also be associated with sudden weight loss or nausea, vomiting, or abdominal pains, if DKA has developed.

Clinical Manifestations Non-specific symptoms

–Fatigue and weakness

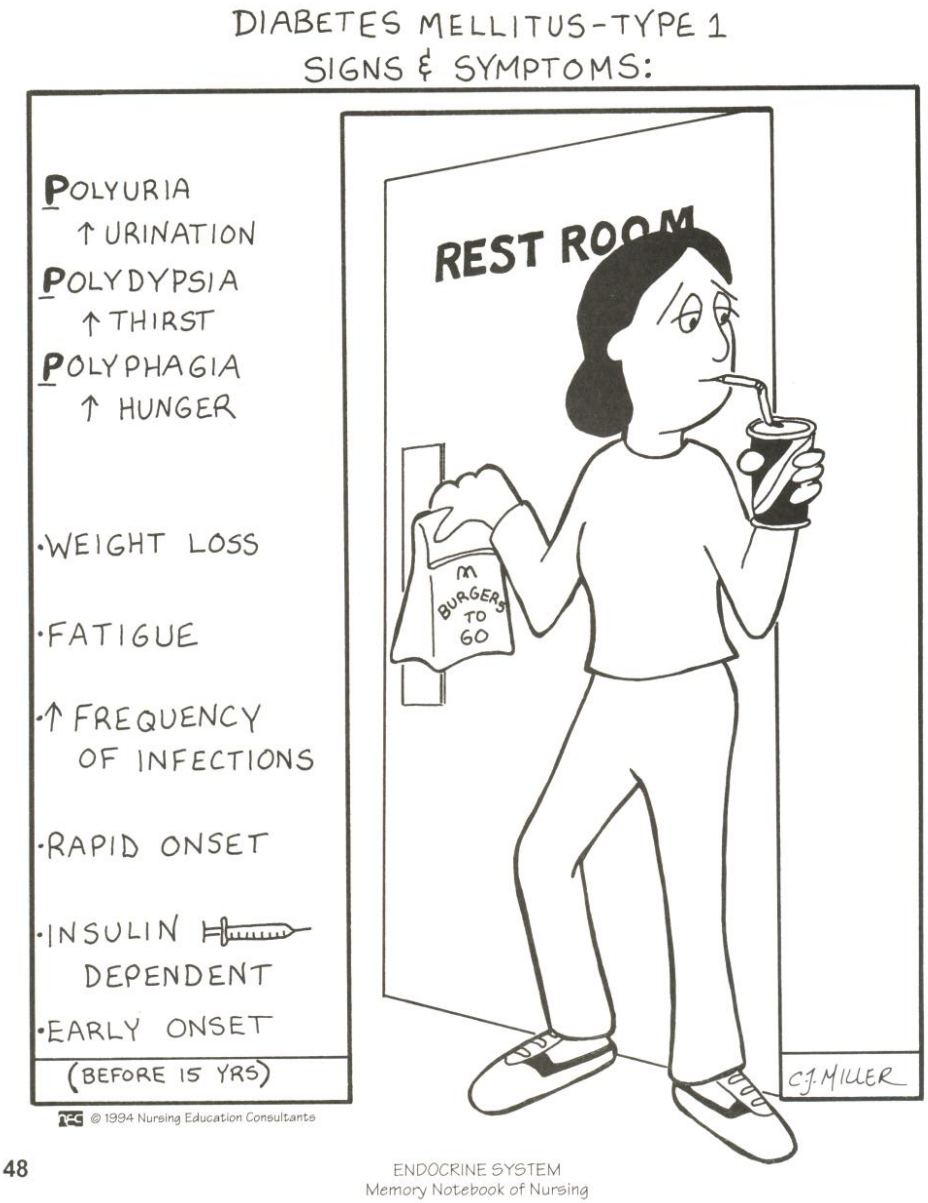
–Sudden vision changes

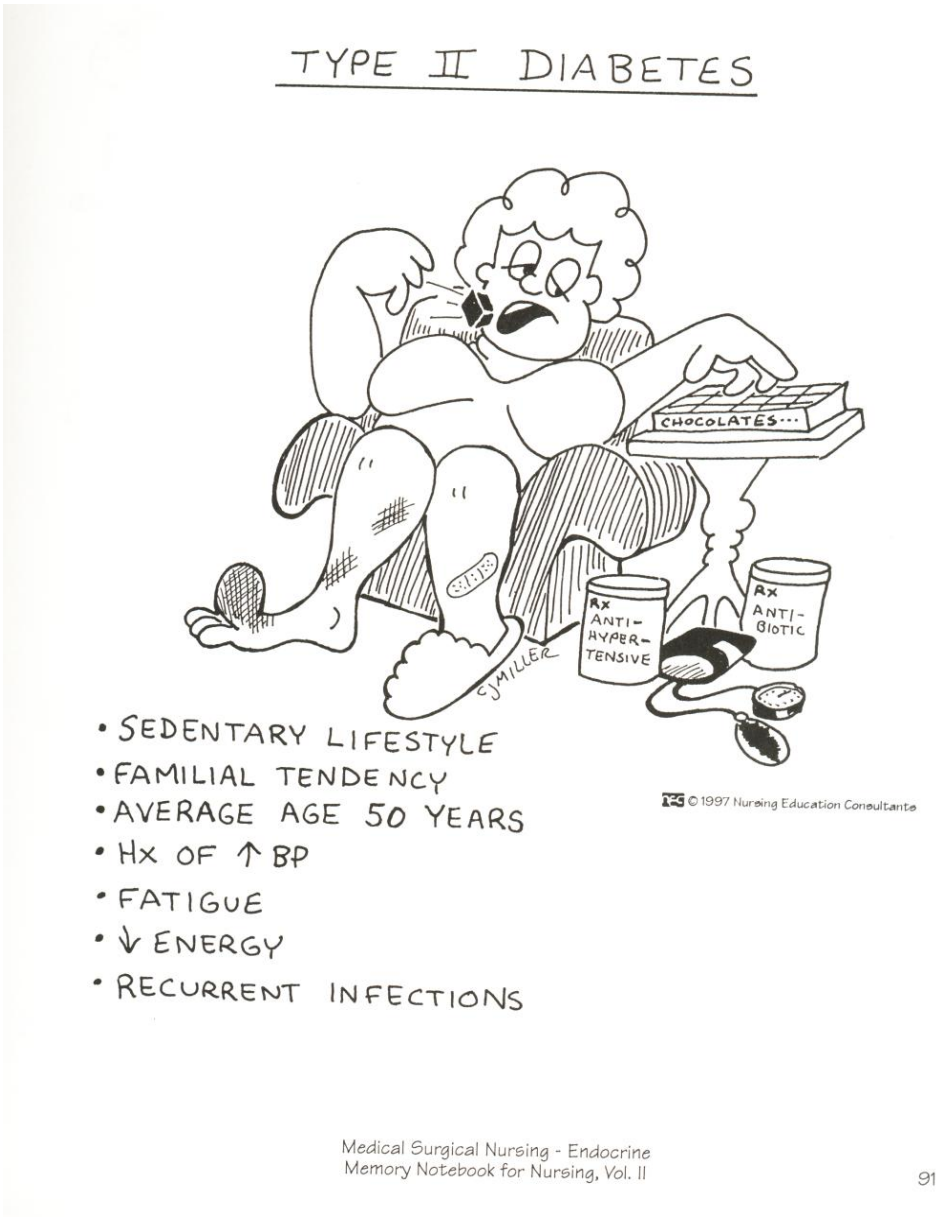
–Tingling or numbness in hands or feet

–Skin lesions or recurrent infections

–Prolonged wound healing

–Visual changes





Diagnostic Studies

• Fasting plasma glucose level >126 mg/dl

• Random plasma glucose measurement

>200 mg/dl plus symptoms

• Two-hour OGTT level >200 mg/dl using a glucose load of 75 g

- Fasting blood glucose and Random blood glucose should be higher than normal on more than one occasion to diagnose with DM.
- Fasting is defined as no caloric intake for at least 8 hours.
- Because laboratory methods measure plasma glucose, most blood glucose monitors used at home and some test strips calibrate blood glucose readings to plasma values. Plasma glucose values are 10% to 15% higher than whole blood glucose

values, and it is crucial for patients with diabetes to know whether their monitor and strips provide whole blood or plasma results

Assessing the Patient with Diabetes

• History:

Symptoms related to the diagnosis of diabetes:
Symptoms of hyperglycemia
Symptoms of hypoglycemia
Frequency, timing, severity, and resolution

Results of blood glucose monitoring

Status, symptoms, and management of chronic complications of diabetes:
Eye; kidney; nerve; genitourinary and sexual, bladder, and gastrointestinal
Cardiac; peripheral vascular; foot complications associated with diabetes

Adherence to/ability to follow prescribed dietary management plan

Adherence to prescribed exercise regimen

Adherence to/ability to follow prescribed pharmacologic treatment (insulin or oral antidiabetic agents)

Use of tobacco, alcohol, and prescribed and over-the-counter medications/drugs

Lifestyle, cultural, psychosocial, and economic factors that may affect diabetes treatment

Effects of diabetes or its complications on functional status (eg, mobility, vision)

Physical examination

Blood pressure (sitting and standing to detect orthostatic changes)

Body mass index (height and weight)

Fundoscopic examination and visual acuity

Foot examination (lesions, signs of infection, pulses)

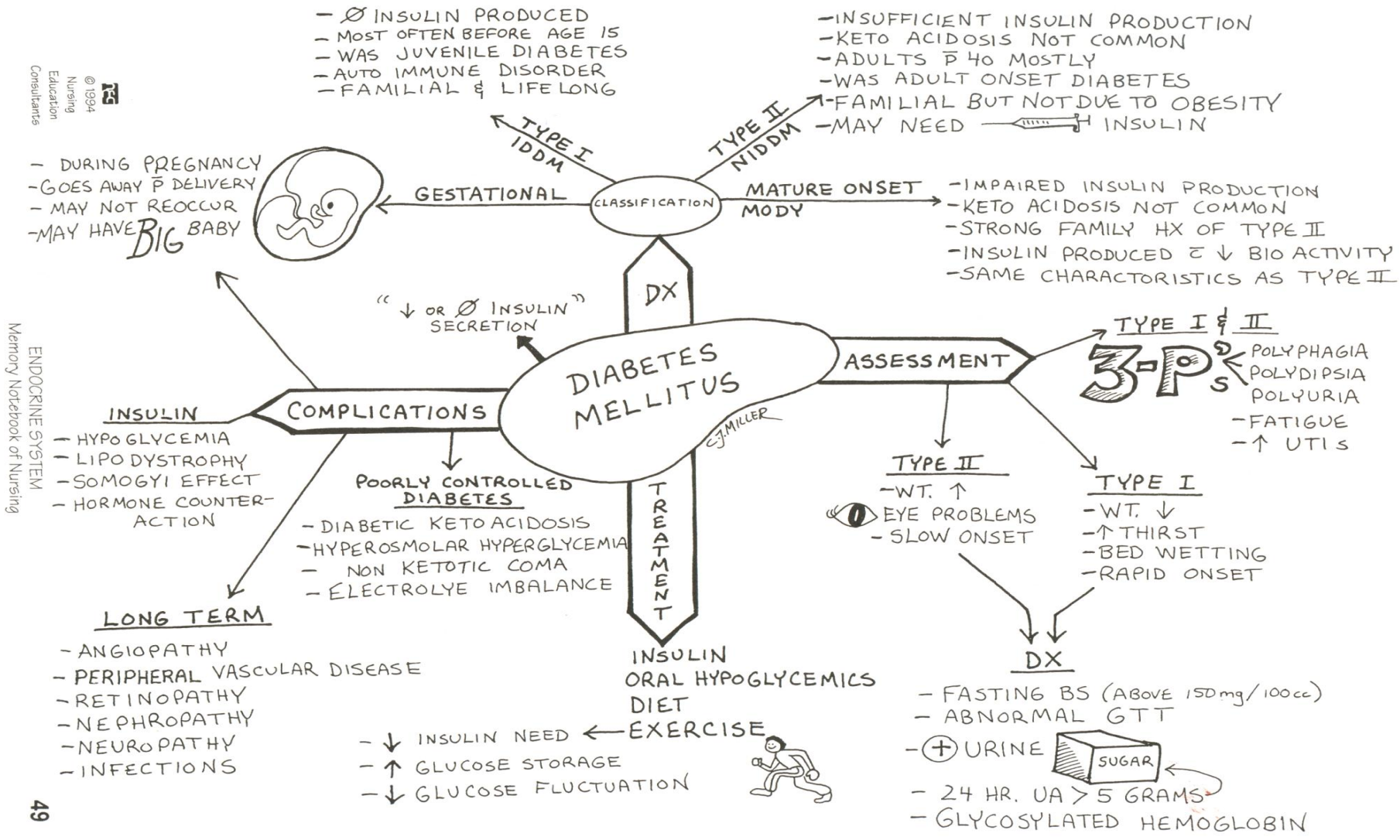
Skin examination (lesions and insulin-injection sites)

Neurologic examination
Vibratory and sensory examination using monofilament
Deep tendon reflexes

Oral examination

• Laboratory Examination

• Need for Referrals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ENDOCRINE SYSTEM
Memory Notebook of Nursing
49
DIABETES MELLITUS
C.J. MILLER
CLASSIFICATION
TYPE I IDDM
- ∅ INSULIN PRODUCED
- MOST OFTEN BEFORE AGE 15
- WAS JUVENILE DIABETES
- AUTO IMMUNE DISORDER
- FAMILIAL & LIFE LONG
TYPE II NIDDM
-INSUFFICIENT INSULIN PRODUCTION
-KETO ACIDOSIS NOT COMMON
-ADULTS P 40 MOSTLY
-WAS ADULT ONSET DIABETES
-FAMILIAL BUT NOT DUE TO OBESITY
-MAY NEED INSULIN
GESTATIONAL
- DURING PREGNANCY
-GOES AWAY P DELIVERY
- MAY NOT REOCCUR
-MAY HAVE BIG BABY
MATURE ONSET MODY
-IMPAIRED INSULIN PRODUCTION
-KETO ACIDOSIS NOT COMMON
-STRONG FAMILY HX OF TYPE II
-INSULIN PRODUCED & ↓ BIO ACTIVITY
-SAME CHARACTORISTICS AS TYPE II
DX
" ↓ OR ∅ INSULIN SECRETION "
ASSESSMENT
TYPE I & II
3 Ps
POLYPHAGIA
POLYDIPSIA
POLYURIA
-FATIGUE
-↑ UTIs
TYPE II
-WT. ↑
EYE PROBLEMS
- SLOW ONSET
TYPE I
-WT. ↓
-↑ THIRST
-BED WETTING
-RAPID ONSET
DX
- FASTING BS (ABOVE 150 mg/100 cc)
- ABNORMAL GTT
-⊕ URINE
SUGAR
- 24 HR. UA > 5 GRAMS
- GLYCOSYLATED HEMOGLOBIN
COMPLICATIONS
INSULIN
- HYPOGLYCEMIA
- LIPODYSTROPHY
-SOMOGYI EFFECT
- HORMONE COUNTER-ACTION
POORLY CONTROLLED DIABETES
- DIABETIC KETOACIDOSIS
-HYPEROSMOLAR HYPERGLYCEMIA
- NON KETOTIC COMA
- ELECTROLYE IMBALANCE
LONG TERM
- ANGIOPATHY
- PERIPHERAL VASCULAR DISEASE
-RETINOPATHY
-NEPHROPATHY
-NEUROPATHY
-INFECTIONS
TREATMENT
INSULIN
ORAL HYPOGLYCEMICS
DIET
EXERCISE
- ↓ INSULIN NEED
- ↑ GLUCOSE STORAGE
- ↓ GLUCOSE FLUCTUATION

Diabetes Mellitus Collaborative Care

• Goals of diabetes management:

–Reduce symptoms

–Promote well-being

–Prevent acute complications

–Delay onset and progression of long-term complications

Figure 41-2 The five components of diabetes management.

Nutritional Therapy

–Overall objectives

• Assist people in making changes in nutrition and exercise habits that will lead to improved metabolic control

• Control of total caloric intake to attain or maintain a reasonable body weight, control of blood glucose levels, and normalization of lipids and blood pressure to prevent heart disease.

Nutrition, meal planning, and weight control are the foundation of diabetes management.

• Obesity is associated with an increased resistance to insulin.

• Some obese patients who have type 2 diabetes and who require insulin or oral agents to control blood glucose levels may be able to reduce or eliminate the need for medication through weight loss.

• A weight loss as small as 10% of total weight may significantly improve blood glucose levels

Nutritional Therapy for Type 1 DM

–Meal plan based on the individual's usual food intake and is balanced with insulin and exercise patterns

Nutritional Therapy for Type 2 DM

–Emphasis placed on achieving glucose, lipid, and blood pressure goals

–Calorie reduction

• Food composition

–Individual meal plan developed with a dietitian

–Nutritionally balanced

–Does not prohibit the consumption of any one type of food

Caloric Distribution

• Calculate daily caloric requirement.

• Carbohydrates

–50% to 60% of caloric intake.

–Majority of calories should come from grains

–Foods high in carbohydrates, such as sucrose, are not eliminated from the diet but should be eaten in moderation (up to 10% of total calories

• Fats

–20% to 30% of calories come from fat.

–Limit the amount of saturated fats to 10% of total calories

• Proteins

–10% to 20% of calories come from protein.

• Fiber

–Lower total cholesterol and LDL in the blood.

–Improve blood glucose levels

–Decrease the need for exogenous insulin.

–Increase satiety, which is helpful for weight loss

–Alcohol

• High in calories (lead to weigh gain)

• Promotes hypertriglyceridemia

• Can cause severe hypoglycemia

- Alcohol is absorbed before other nutrients and does not require insulin for absorption.
- Large amounts can be converted to fats, increasing the risk for DKA.
- A major danger of alcohol consumption by the patient with diabetes is hypoglycemia, especially for patients who take insulin. Alcohol may decrease the normal physiologic reactions in the body that produce glucose (gluconeogenesis).
- Alcohol consumption may lead to excessive weight gain (from the high caloric content of alcohol), hyperlipidemia, and elevated glucose levels (especially with mixed drinks and liqueurs).

• Diet teaching

–Dietitian initially provides instruction

–Should include the patient's family and significant others

–Read food labels

– Sweetners

TABLE 36-6 Nutrient Recommendations for Adults With Diabetes

NUTRIENT	RECOMMENDED DAILY INTAKE
Calories (kcal)	Amount needed to attain and maintain as close as possible the desired body weight.
Carbohydrates	Individualized, based on client's individual eating habits and glucose and lipid goals.
Sweeteners	Saccharin (Sweet & Low), aspartame or neotame (NutraSweet, Equal), sucralose (Splenda), or acesulfame potassium (Sunette) are safe when consumed within acceptable daily levels by FDA.
Protein	Approximately 15% to 20% of the daily caloric intake; should be from both animal and vegetable sources. Clients with nephropathy need lower protein intake.
Saturated fat and cholesterol	Less than 7% of the daily calories should be from saturated fats, with dietary cholesterol limited to 300 mg or less per day.
Fiber	20–35 g of dietary fiber each day from legumes, fruits, vegetables, whole grain products, and fiber-rich cereals (5 g or more fiber/serving).
Sodium	The same as for the general population; no more than 3,000 mg/day.
Vitamins and minerals	Sufficient to meet daily requirements.
Alcohol	Limit alcohol intake to one drink or less per day for women and two drinks or less per day for men. Ingest with a meal to decrease the risk of hypoglycemia.

Source: American Diabetes Association. (2008). Nutrition recommendations and interventions for diabetes. *Diabetes Care, 31* (Suppl. 1), S61–S74.

Exercise

–Essential part of diabetes management

–Increases insulin sensitivity

–Lowers blood glucose levels

–Decreases insulin resistance

–Decreases weight

–Reduces cardiovascular risk factors

- Resistance (strength) training, such as weight lifting, can increase lean muscle mass, thereby increasing the resting metabolic rate. These effects are useful in diabetes in relation to losing weight, easing stress, and maintaining a feeling of well-being. Exercise also alters blood lipid concentrations, increasing levels of high-density lipoproteins and decreasing total cholesterol and triglyceride levels.

Exercise/ Precautions

• Don't exercise if blood glucose > 250 mg/dL or if there is ketone bodies in the urine.

• Don't exercise when the insulin at its peak

• Use proper footwear and.

• Avoid exercise in extreme heat or cold.

• Inspect feet daily after exercise.

- Patients who have blood glucose levels exceeding 250 mg/dL and who have ketones in their urine should not begin exercising until the urine test results are negative for ketones and the blood glucose level is closer to normal.
- Exercising with elevated blood glucose levels increases the secretion of glucagon, growth hormone, and catecholamines. The liver then releases more glucose, and the result is an increase in the blood glucose level

–Several small carbohydrate snacks can be taken to prevent hypoglycemia

• Before exercising

• At the end of the exercise with strenuous exercise

• At the time with strenuous exercise

• Deduce them from total daily calories

–May need to reduce inlsulin dose

- The physiologic decrease in circulating insulin that normally occurs with exercise cannot occur in patients treated with insulin. Initially, patients who require insulin should be taught to eat a 15-g carbohydrate snack (a fruit exchange) or a snack of complex carbohydrates with a protein before engaging in moderate exercise, to prevent unexpected hypoglycemia.
- Some patients find that they do not require a pre-exercise snack if they exercise within 1 to 2 hours after a meal. Other patients may require extra food regardless of when they exercise. If extra food is required, it need not be deducted from the regular meal plan.

Diabetes Mellitus Exercise

–Best done after meals

–Exercise plans should be individualized

–Monitor blood glucose levels before, during, and after exercise

–Better to exercise at the same time daily when blood sugar at its peak

Monitoring Blood Glucose

• Self-monitoring of blood glucose (SMBG)

–Enables patient to make self-management decisions regarding diet, exercise, and medication

Diabetes Mellitus Monitoring Blood Glucose

• Self-monitoring of blood glucose (SMBG)

–Important for detecting episodic hyperglycemia and hypoglycemia

–Patient training is crucial

- For most patients who require insulin, SMBG is recommended two to four times daily (usually before meals and at bedtime).

Drug Therapy: Insulin

• Exogenous insulin:

–Required for type 1 diabetes

–Prescribed for the patient with type 2 diabetes who cannot control blood glucose by other means

• Types of insulin

–Human insulin

• Most widely used type of insulin

• Cost-effective

¯ Likelihood of allergic reaction

- Human insulin preparations have a shorter duration of action than insulin from animal sources because the presence of animal proteins triggers an immune response that results in the binding of animal insulin, which slows its availability.

• Types of insulin

–Insulins differ in regard to onset, peak action, and duration

–Different types of insulin may be used in combination therapy

–**Rapid-acting:** Lispro (onset 15', peak 60-90' and last from 2-4 hours)

–Short-acting: Regular (Onset is 30-60', peak in 2-3h and last for 4-6 hours, and Regular insulin is only kind for IV use.

–Intermediate-acting: NPH or Lente

Onset 3-4h, peak 4-12 hours and lst 16-20 hours. Names include Humulin N, Novolin N, Humulin L, Novolin L

–Long-acting: Ultralente, Lantus

Onset 6-8h, peak 12-16 h and lasts 20-30h.

TABLE 36-2 Action of Insulin Preparations

TYPE OF INSULIN	ONSET (HR)	PEAK (HR)	DURATION (HR)
Rapid-Acting			
■ Lispro (Humalog)	0.25	0.5–2.5	3–6.5
■ Aspart (NovoLog)	0.25	1-3	3-5
■ Glulisine (Apidra)	0.25	0.5–1.5	3-5
Short-Acting			
■ Regular (Novolin-R, Humulin-R)	0.5–1	2–3	4–6
Intermediate-Acting			
■ NPH (Novolin-N, Humulin-N)	1–2	6–14	16–24
■ Novolin NPH 70/ regular 30	0.5	4–8	24
Long-Acting			
■ Glargine (Lantus)	2	Peak not defined	24
■ Detemir (Levemir)	2	Peak not defined	24

• Administration of insulin

–Cannot be taken orally

–SQ injection for self-administration

–IV administration

Insulin Strengths

Insulin Strengths

–100 U per mL or 500 U per mL

–Administered in a sterile, single-use, disposable syringe

–All insulin given parenterally

–Regular insulin: either subcutaneous or intravenous

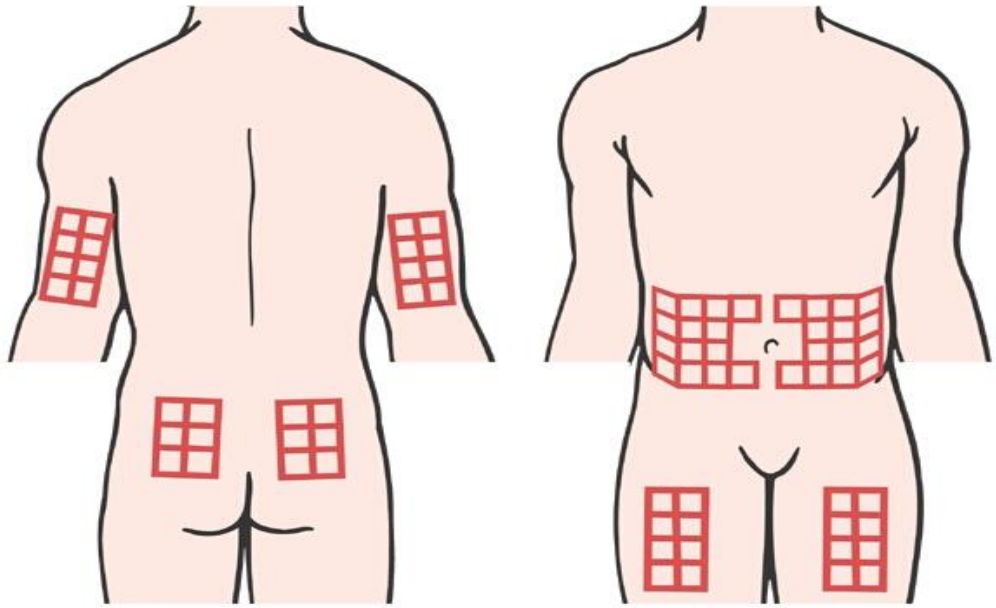
Injection Sites

• Process: pinch skin, inject needle at 90-degree angle

• Do not inject into muscle; do not massage after injecting

• Rotate injection sites

• Minimize painful injections



BOX 36-2 PROCEDURE CHECKLIST

Techniques to Minimize Painful Injections

- ☑ Inject insulin at room temperature.
- ☑ Make sure no air bubbles remain in the syringe before injection.
- ☑ Wait until alcohol on the skin dries completely before injection.
- ☑ Teach client to relax muscles in the injection area.
- ☑ Penetrate the skin with the needle quickly.
- ☑ Don't change the direction of the needle during insertion or withdrawal.
- ☑ Don't reuse needles.

Source: American Diabetes Association. (2004). Insulin administration. *Diabetes Care*, 27 (Suppl. 1), S106–S107.

Complications of insulin therapy

–Hypoglycemia

–Allergic reactions

• Lipodystrophy : is a medical condition characterized by abnormal or degenerative conditions of the body's adipose tissue

–Includes lipoatrophy or lipohypertrophy

Systemic allergic reactions are rare. When they do occur, there is an immediate local skin reaction that gradually spreads into generalized urticaria (hives).

The treatment is desensitization, with small doses of insulin administered in gradually increasing amounts.

Lipodystrophy refers to a localized reaction, in the form of either lipoatrophy or lipohypertrophy, occurring at the site of insulin injections.

Lipoatrophy is loss of subcutaneous fat; it appears as slight dimpling or more serious pitting of subcutaneous fat.

The use of human insulin has almost eliminated this disfiguring complication.

Morning hyperglycemia

• **Insulin Waning** (Progressive rise in blood glucose from bedtime to morning)

–Increase evening' NPH (predinner or bedtime) dose

• **Dawn Phenomenon** (Relatively normal blood glucose until about 3 AM, when the level begins to rise)

Dawn phenomenon is thought to result from nocturnal surges in growth hormone secretion, which create a greater need for insulin in the early morning hours in patients with type 1 diabetes.

–Change time of injection of evening NPH from dinnertime to bedtime.

Morning hyperglycemia

• **Somogyi Effect** (Normal or elevated blood glucose at bedtime, a decrease at 2–3 AM to hypoglycemic levels, and a subsequent increase caused by the production of counterregulatory hormones

–Decrease evening (predinner or bedtime) dose of intermediate-acting insulin, or increase bedtime snack.

Resistance to Injected Insulin

–Most patients have some degree of insulin resistance at one time or another.

–The most common is obesity.

Local Allergic Reactions

–Redness swelling, tenderness and induration or a 2- to 4-cm wheal

Systemic Allergic Reactions (rare)

–Immediate local skin reaction that gradually spreads into generalized urticaria (hives).

TABLE 36-3 Giving Medications Safely: Insulin and Client Teaching

NURSING IMPLICATIONS	CLIENT/FAMILY TEACHING
■ Discard vials of insulin whose expiration date has passed. ■ Discard any vial that is discolored or contains clumps, granules, or solid deposits on the sides. ■ Check client's blood glucose level 30 minutes before giving an insulin injection. ■ When drawing up insulin dose, always check type and dose with another nurse. ■ If a client's meal is delayed, hold administration of rapid-acting insulin. ■ Monitor and maintain a record of blood glucose readings before each meal and at bedtime or as ordered. ■ Monitor food intake; notify physician when client eats an inadequate diet. ■ Inspect injection sites for signs of lipodystrophy. ■ Monitor for signs and symptoms of hypoglycemia or hyperglycemia and take appropriate action.	■ Know the manifestations of diabetes mellitus. ■ Store opened insulin vials in a cool place for up to 4 weeks; avoid exposure to extreme temperatures (36° to 46°F) or sunlight. ■ Refrigerate unopened extra insulin vials; do not freeze them. ■ Refrigerated insulin should be brought to room temperature before using it. ■ Demonstrate self-administration of insulin (review procedure checklist in Box 36-3). ■ Know how to mix two types of insulin. ■ Discard outdated or discolored insulin. ■ Keep a regular insulin vial available for emergencies. ■ Check blood glucose before meals, at bedtime, and as prescribed. ■ If breakfast is delayed, also delay giving rapid-acting insulin. ■ Know the signs of hypoglycemia and hyperglycemia. ■ Keep candy or sugar source available to treat hypoglycemia. ■ Avoid alcoholic beverages to prevent hypoglycemia. ■ Observe injection site for hardness, dimpling, or sunken areas; develop a plan for rotating injection sites.

Diabetes Mellitus Drug Therapy: Oral Agents

• Used only in type II DM

• They increases the secretion of insulin by the pancreatic beta cells, may improve binding between insulin and insulin receptors or increase the number of insulin receptors

• Used along with (but not a substitute to) nutrition and exercise.

• In time, they may no longer be effective in controlling the patient's diabetes because of decline of beta cells. In such cases, the patient is treated with insulin.

• Sulfonylureas: Glipizide, Glyburide and Glimepiride, Chlorpropamide (Diabinese)

• Meglitinides: Prandin & Starlix

• Biguanides: Metformin

• a-Glucosidase inhibitors: Acarbose. Delay absorption of CHO

• Thiazolidinediones: Pioglitazone (Actos)

Other drugs affecting blood glucose levels:

– Adrenergic blockers

– Adrenaline

– Corticosteoids

Diabetes Mellitus Pancreas Transplantation

Used for patients with type 1 diabetes who have end-stage renal disease and who have had or plan to have a kidney transplant

• Eliminates the need for exogenous insulin

• Can also eliminate hypoglycemia and hyperglycemia

Diabetes Mellitus New Developments in Diabetic Therapy

• New insulin delivery systems not yet approved by the FDA:

–Inhaled insulin

–Skin patch

–Oral spray

Diabetes Mellitus Patient education

1. Simple pathophysiology

–Basic definition of diabetes (having a high blood glucose level)

–Normal blood glucose ranges

–Effect of insulin and exercise (decrease glucose)

–Effect of food and stress, including illness and infections (increase glucose)

–Basic treatment approaches

2. Treatment modalities

–Administration of medications

–Meal planning (food groups, timing of meals)

–Monitoring of blood glucose and urine ketones

3. Recognition, treatment, and prevention of acute complications

–Hypoglycemia

–Hyperglycemia

4. Pragmatic information

–Where to buy and store insulin, syringes, and glucose monitoring supplies

–When and how to contact the physician

Diabetes Mellitus Patient education

• Planning In-Depth and Continuing Education

–Foot care

–Eye care

–General hygiene (eg, skin care, oral hygiene)

–Risk factor management (eg, control of blood pressure and blood lipid levels, normalizing blood glucose levels)

Diabetes Mellitus Misconceptions Related to Insulin Treatment

1. Once insulin injections are started (for treatment of type 2 diabetes), they can never be discontinued

2. If increasing doses of insulin are needed to control the blood glucose, the diabetes must be getting "worse"

3. Insulin causes blindness (or other diabetic complications)

4. Insulin must be injected directly into the vein

5. There is extreme danger in injecting insulin if there are any air bubbles in the syringe

6. Insulin always causes people to have bad (hypoglycemic) reactions

Diabetes Mellitus Acute Complications

• Hypoglycemia

• Diabetic ketoacidosis (DKK)

• Hyperosmolar hyperglycemic nonketotic syndrome (HHNS)

Hypoglycemia

• Type 1 or type 2 diabetes

• Blood glucose < 50-60 mg/dL

• Causes

–Too much insulin

–Overdose of oral antidiabetic agents

–Too little food

–Excess physical activity

• May experience S & S of hypoglycemia if there is sudden decrease in BS

- For example, patients who usually have a blood glucose level in the hyperglycemic range (eg, 200 mg/dL or greater) may feel hypoglycemic (adrenergic) symptoms when their blood glucose falls rapidly to 120 mg/dL (6.6 mmol/L) or less. Conversely, patients who frequently have a glucose level in the low range of normal (eg, 80 to 100 mg/dL) may be asymptomatic when the blood glucose falls slowly to less than 50 mg/dL.

BOX 36-6 MANIFESTATIONS OF HYPOGLYCEMIA

CAUSED BY RESPONSES OF THE AUTONOMIC NERVOUS SYSTEM	
Hunger	Shakiness
Nausea	Irritability
Anxiety	Rapid pulse
Pale, cool skin	Hypotension
Sweating	
CAUSED BY IMPAIRED CEREBRAL FUNCTION	
Strange or unusual feelings	Blurred vision
Headache	Decreasing levels of consciousness
Difficulty in thinking	Seizures
Inability to concentrate	Coma
Change in emotional behavior	
Slurred speech	
LABORATORY FINDINGS	
Blood glucose	Less than 50 mg/dL
Blood and urine ketones	Negative
Plasma pH	Normal
Serum osmolality	Normal

• **Treatment of hypoglycemia**

– Mild

- Immediate treatment
- 15 g rapid-acting sugar

–Severe

- Hospitalized
- Intravenous glucose

–Teach patients to carry simple sugar with them

Diabetes Ketoacidosis (DKA)

• Life-threatening illness in type 1

–Hyperglycemia

–Dehydration and electrolyte loss

–Acidosis

• Causes of DKA

–Decreased or missed dose of insulin,

–Illness or infection,

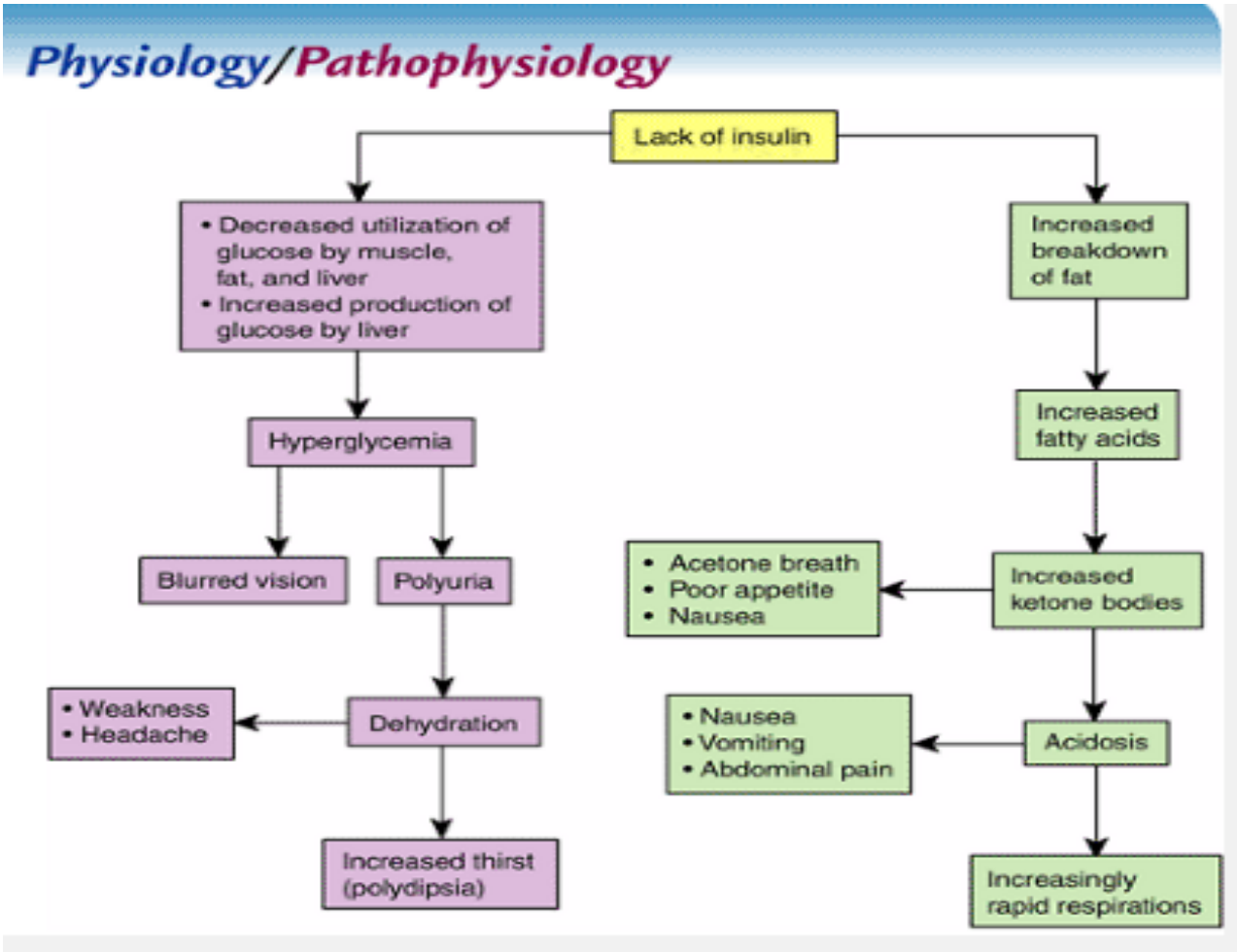
–Undiagnosed and untreated diabetes

• Without insulin, the amount of glucose entering the cells is reduced, and production and release of glucose by the liver is increased (lead to hyperglycemia).

• Excess glucose leads to polyuria (6.5 L/day) dehydration, sodium and potassium loss

• Burning of fat leads to ketosis

• Kidneys unable to excrete ketones, leads to ketoacidosis



• **Diagnosis:** Blood glucose (300 and 800 mg/dL)

• **Treatment**

–Rehydration (0.9-0.45% saline)

–Restoring Electrolytes (K+)

• loss of potassium from body stores and an intracellular-to-extracellular shift of potassium

–Reversing Acidosis (reversed with insulin)

• Regular insulin infusion (5 units/hr)

• Hourly blood glucose monitoring

- Initially, 0.9% sodium chloride (normal saline) solution is administered at a rapid rate, usually 0.5 to 1 L/hour for 2 to 3 hours.
- Half-strength normal saline (0.45%) solution (also known as hypotonic saline solution) may be used for patients with hypertension or hypernatremia and those at risk for heart failure.

- Moderate to high rates of infusion (200 to 500 mL/hour) may continue for several more hours.
- Although the initial plasma concentration of potassium may be low, normal, or even high, There is a major loss of potassium from body stores and an intracellular-to-extracellular shift of potassium.
- Furthermore, the serum level of potassium decreases as potassium reenters the cells during the course of treatment of DKA; therefore, the serum potassium level must be monitored frequently.
- IV fluid solutions with higher concentrations of glucose, such as normal saline (NS) solution (eg, D_5NS, $D_{5.}$45NS), are administered when blood glucose levels reach 250 to 300 mg/dL (13.8 to 16.6 mmol/L), to avoid too rapid a drop in the blood glucose level (ie, hypoglycemia) during treatment.

Hyperosmolar hyperglycemic nonketotic syndrome (HHNS)

• Is a serious condition most frequently seen in older persons.

• HHNS is usually brought on by something else, such as an illness or infection, dialysis, drugs that increase BS.

• Blood sugar levels rise resulting into glycosuria, polyuria, thirst.

• Severe dehydration will lead to seizures, coma and eventually death.

• HHNS may take days or even weeks to develop. Know the warning signs of HHNS.

HHNS/ clinical manifestations

Hypotension, profound dehydration (dry mucous membranes, poor skin turgor), tachycardia, and variable neurologic signs (eg, alteration of sensorium, seizures, hemiparesis).

• Blood glucose level (600 to 1200 mg/dL)

• Treatment: fluid replacement, correction of electrolyte imbalances, and insulin.

Characteristics	DKA	HHNS
Patients most commonly affected	Can occur in type 1 or type 2 diabetes; more common in type 1 diabetes	Can occur in type 1 or type 2 diabetes; more common in type 2 diabetes, especially elderly patients with type 2 diabetes
Precipitating event	Omission of insulin; physiologic stress (infection, surgery, CVA, MI)	Physiologic stress (infection, surgery, CVA, MI)
Onset	Rapid (<24 h)	Slower (over several days)
Blood glucose levels	Usually >250 mg/dL (>13.9 mmol/L)	Usually >600 mg/dL (>33.3 mmol/L)
Arterial pH level	<7.3	Normal
Serum and urine ketones	Present	Absent
Serum osmolality	300–350 mOsm/L	>350 mOsm/L
Plasma bicarbonate level	<15 mEq/L	Normal
BUN and creatinine levels	Elevated	Elevated
Mortality rate	<5%	10–40%

Diabetes Mellitus Chronic Complications

–Macrovascular (atherosclerotic plaque)

• Coronary arteries → (MI's)

• Cerebral arteries → (strokes)

• Peripheral vessels → (ulcers, amputations, infection)

–Microvascular (capillary damage)

• Retinopathy

• Neuropathy

• Nephropathy

Whether it is type 1 or type 2 if hyperglycemia remains uncontrolled, serious long term adverse effects can result both macrovascular (large Vessels) and microvascular (small vessel damage).

Large vessel damage is related to deposition of atherosclerotic plaque in the vessels

Macrovascular (atherosclerotic plaque)

Coronary arteries MI

Cerebral arteries strokes

Peripheral vessels foot ulcers, amputations

Microvascular (capillary damage)

Retinopathy partial or complete blindness

Neuropathy autonomic nerve damage: for example diabetic gastroparesis, bladder dysfunction, unawareness of hypoglycemia, (somatic nerve damage, foot ulcers, due to loss of sensations.)

Nephropathy proteinuria (microalbuminuria) chronic renal failure requires dialysis.

Macrovascular Complications

• Macrocirculation

–Blood vessel walls thicken, sclerose, and become occluded by plaque that adheres to the vessel walls. finally, blood flow is blocked.

• Complications

–Coronary artery disease

–Stroke

–Peripheral vascular disease

Although it may be tempting to attribute the increased prevalence of macrovascular diseases to the increased prevalence of certain risk factors (eg, obesity, increased triglyceride levels, hypertension) in patients with diabetes, there is a higher-than-expected rate of macrovascular diseases among patients with diabetes compared with patients without diabetes who have the same risk factors (ADA, 2004d). Therefore, diabetes itself is seen as an independent risk factor for accelerated atherosclerosis. Other potential factors that may play a role in diabetes-related atherosclerosis include platelet and clotting factor abnormalities, decreased flexibility of red blood cells, decreased oxygen release, changes in the arterial wall related to hyperglycemia, and possibly hyperinsulinemia.

Complication: CAD

• CAD account for 50% to 60% of all deaths among patients with diabetes.

• High cholesterol and high triglycerides

• MI is twice as common in men and three times in women with diabetes, compared to people without diabetes.

• Silent MI

• Higher risk for a second infarction

Complication: Stroke

• People with diabetes have twice the risk of developing cerebrovascular disease.

• There is a greater likelihood of death from cerebrovascular disease.

• Recovery is slower with high BS.

• Hypertension plays a role

Complication: Peripheral Vascular Disease

• Diabetes-induced arteriosclerosis

• 2-3 times higher than in nondiabetic people

• S & S: diminished peripheral pulses and intermittent claudication (pain in the buttock, thigh, or calf during walking)

• Can lead to leg ulcers and gangrene and amputation.

Management of Macrovascualr changes

• Prevention and treatment of risk factors for atherosclerosis.

–obesity, hypertension, and hyperlipidemia (exercise, stop smoking).

–Control of blood glucose levels may reduce triglyceride concentrations and can significantly reduce the incidence of complications.

Microvascular Complications

• Microcirculation

–Eyes

–Kidneys

–Nerves

Complication: Diabetic Retinopathy

• Leading cause of blindness in people ages 20 to 74 in US

• Almost all patients with type 1 diabetes and more than 60% of patients with type 2 diabetes have some degree of retinopathy after 20 years

Diabetic Retinopathy

• Changes in the retinal capillaries; lead to retinal ischemia.

• Changes include microaneurysms, intraretinal hemorrhage, hard exudates, and focal capillary closure

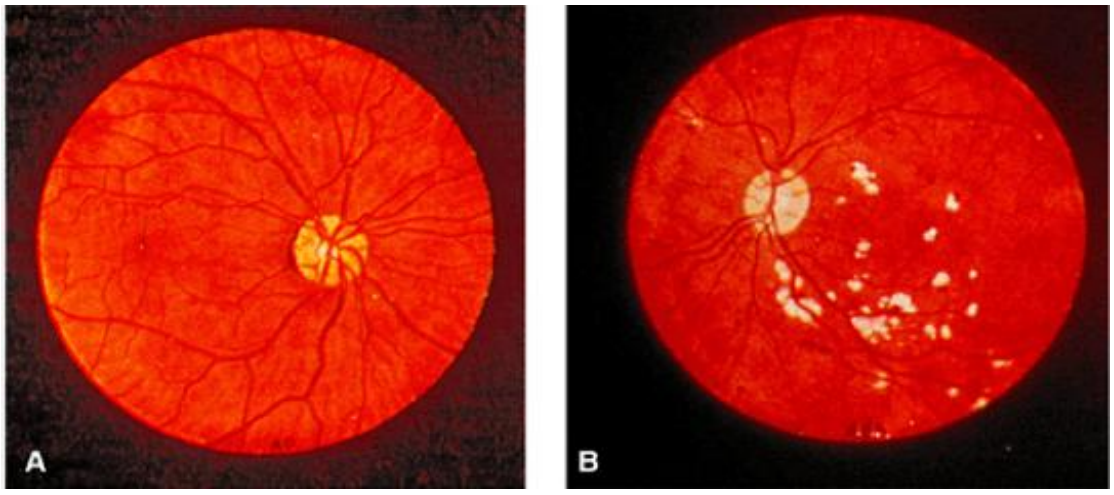
• Retinopathy stages: nonproliferative (background), preproliferative, & proliferative.

• Yearly eye exams are recommended

Diagnosis and treatment

• Dx: Direct visualization, fluorescein angiography.

• Treatment: control Blood pressure and glucose, stop smoking , and vitrectomy



A major hemorrhage into the vitreous may occur, with the vitreous fluid becoming mixed with blood, preventing light from passing through the eye; this can cause blindness. A vitrectomy is a surgical procedure in which vitreous humor filled with blood or fibrous tissue is removed with a special drill-like instrument and replaced with saline or another liquid.

Retinopathy	Deterioration of the small blood vessels that nourish the retina
Background	Early stage, asymptomatic retinopathy. Blood vessels within the retina develop microaneurysms that leak fluid, causing swelling and forming deposits (exudates). In some cases, macular edema causes distorted vision.
Preproliferative	Represents increased destruction of retinal blood vessels
Proliferative	Abnormal growth of new blood vessels on the retina. New vessels rupture, bleeding into the vitreous and blocking light. Ruptured blood vessels in the vitreous form scar tissue, which can pull on and detach the retina.
Cataracts	Opacity of the lens of the eye; cataracts occur at an earlier age in patients with diabetes.
Lens changes	The lens of the eye can swell when blood glucose levels are elevated. For some patients, visual changes related to lens swelling may be the first symptoms of diabetes. It may take up to 2 months of improved blood glucose control before hyperglycemic swelling subsides and vision stabilizes. Therefore, patients are advised not to change eyeglass prescriptions during the 2 months after discovery of hyperglycemia.
Extraocular muscle palsy	This may occur as a result of diabetic neuropathy. The involvement of various cranial nerves responsible for ocular movements may lead to double vision. This usually resolves spontaneously.
Glaucoma	Results from occlusion of the outflow channels by new blood vessels. Glaucoma may occur with slightly higher frequency in the diabetic population.

Complication: Diabetic Nephropathy

• Disease of the kidneys (50% of RF due to DM)

• Characterized by albumin in the urine, hypertension, edema, renal insufficiency

• DM is the most common cause of renal failure

• First indication: microalbuminuria

• Treatment: ACE inhibitors, control BP and BS, prevent & treat UTI, low Na & protein diet.

About 20% to 30% of people with type 1 or type 2 diabetes develop nephropathy, but fewer of those with type 2 diabetes progress to ESRD.

As renal failure progresses, the catabolism (breakdown) of both exogenous and endogenous insulin decreases, and frequent hypoglycemic episodes may result.

Complication: Diabetic Neuropathy

• Disorder of the peripheral nerves, spinal cord, and autonomic nervous system

• Results: sensory and motor impairments, postural hypotension, delayed gastric emptying, diarrhea, impaired GU function

• Result from the thickening of the capillary membrane and destruction of myelin sheath which disrupt nerve conductions.

The prevalence increases with the age of the patient and the duration of the disease and may be as high as 50% in patients who have had diabetes for 25 years.

The two most common types of diabetic neuropathy are sensorimotor polyneuropathy and autonomic neuropathy.

• Bilateral sensory disorders

–Appear first in toes, feet, and progress upward to fingers and hands

–Tingling, decrease in proprioception , and a decreased sensation of light touch

• Treatment

–Controlling BS delay the onset.

–Analgesics to control pain

Proprioception (awareness of posture and movement of the body and of position and weight of objects in relation to the body

Complication: Autonomic Neuropathy

• Involves numerous body systems such as:

–Cardiovascular (slight tachycardia, orthostatic hypotension & silent MI).

–Gastrointestinal (Delayed gastric emptying , N&V, early satiety, variation of BS absorption)

–Genitourinary (urinary symptoms of neurogenic bladder, UTI, erectile dysfunction)

–Hypoglycemic unawareness (DM diminish function of adrenal medulla)

Delayed gastric emptying may occur with the typical gastrointestinal symptoms of early satiety, bloating, nausea, and vomiting. “Diabetic” constipation or diarrhea (especially nocturnal diarrhea) may occur as a result. In addition, there may be unexplained wide swings in blood glucose levels related to inconsistent absorption of the glucose from ingested foods secondary to the inconsistent gastric emptying.

Foot and Leg Problems

• 50% -75% of lower extremity amputations are performed on people with diabetes.

• More than 50% of these amputations are thought to be preventable.

Foot and Leg Problems Contributing factors

• Neuropathy

• Peripheral vascular disease

• Immunocompromise

• Injuries could be:

• Chemical

• Thermal

• Traumatic

Neuropathy—Sensory neuropathy leads to loss of pain and pressure sensation, and autonomic neuropathy leads to increased dryness and fissuring of the skin. Motor neuropathy results in muscular atrophy, which may lead to changes in the shape of the foot.

Peripheral vascular disease—Poor circulation of the lower extremities contributes to poor wound healing and the development of gangrene.

Immunocompromise—Hyperglycemia impairs the ability of specialized leukocytes to destroy bacteria. Therefore, in poorly controlled diabetes, there is a lowered resistance to certain infections.

Foot Care

1. Take care of your diabetes.

2. Inspect your feet every day.

3. Wash your feet every day (dry between toes well).

4. Keep the skin soft and smooth.

5. Smooth corns and calluses gently.

6. Trim your toenails each week or when needed.

7. Wear shoes and socks at all times.

8. Protect your feet from hot and cold.

9. Keep the blood flowing to your feet.

10. Check with your health care provider.

Special Issues in Diabetes Care

• Patients with diabetes who are undergoing surgery

–Hyperglycemia (due to stress hormones)

–Hypoglycemia (being NPO)

• Hold morning insulin unless it is > 200 mg/dL.

–Diuresis leads to fluid and electrolytes imbalance

If hyperglycemia is not controlled during surgery, the resulting osmotic diuresis may lead to excessive loss of fluids and electrolytes. Patients with type 1 diabetes also risk developing ketoacidosis during periods of stress.

The blood glucose level is controlled during surgery with the IV infusion of regular insulin, which is balanced by an infusion of dextrose. The insulin and dextrose infusion rates are adjusted according to frequent (hourly) capillary glucose determinations.

Diabetes Mellitus Nursing Process Patient newly diagnosed with DM

• Assessment:

–Signs and Symptoms of DM

–Infections.

–Complications.

–Blood glucose

–S &S of DKA/ HHNS

Nursing Diagnoses

• Risk for fluid volume deficit related to polyuria and dehydration

• Imbalanced nutrition related to imbalance of insulin, food, and physical activity

• Deficient knowledge about diabetes self-care skills/information

Nursing Diagnoses

• Deficient knowledge about diabetes self-care skills/information

• Potential self-care deficit related to physical impairments or social factors

• Anxiety related to loss of control, fear of inability to manage diabetes, misinformation related to diabetes, fear of diabetes complications

Collaborative Problems/ Potential Complications

• Fluid overload, pulmonary edema, and heart failure

• Hypokalemia

• Hyperglycemia and ketoacidosis

• Hypoglycemia

• Cerebral edema

Diabetes Mellitus Nursing Management Planning

• Overall goals:

–Active patient participation

–No episodes of acute hyperglycemic emergencies or hypoglycemia

–Maintain normal blood glucose levels

–Prevent chronic complications

–Lifestyle adjustment with minimal stress

Nursing Interventions

• Maintaining Fluid and Electrolyte Balance

• Improving Nutritional Intake

• Reducing Anxiety

• Improving Self-Care

Monitoring and Managing Potential Complications

• Fluid Overload

• Hypokalemia

• Hyperglycemia and Ketoacidosis

• Hypoglycemia

• Cerebral Edema

Diabetes Mellitus Nursing Management Nursing Implementation

• Health Promotion

–Identify those at risk

–Routine screening for overweight adults over age 45

• Ambulatory and Home Care

–Overall goal:

• Enable the patient or caregiver to reach an optimal level of independence

• Ambulatory and Home Care

–Insulin therapy and oral agents

–Personal hygiene

–Medical identification and travel

–Patient and family teaching

Chapter 42

Assessment and Management of Patients with Endocrine Disorders

Endocrine System

• Effects almost every cell, organ, and function of the body

• The endocrine system is closely linked with the nervous system and the immune system

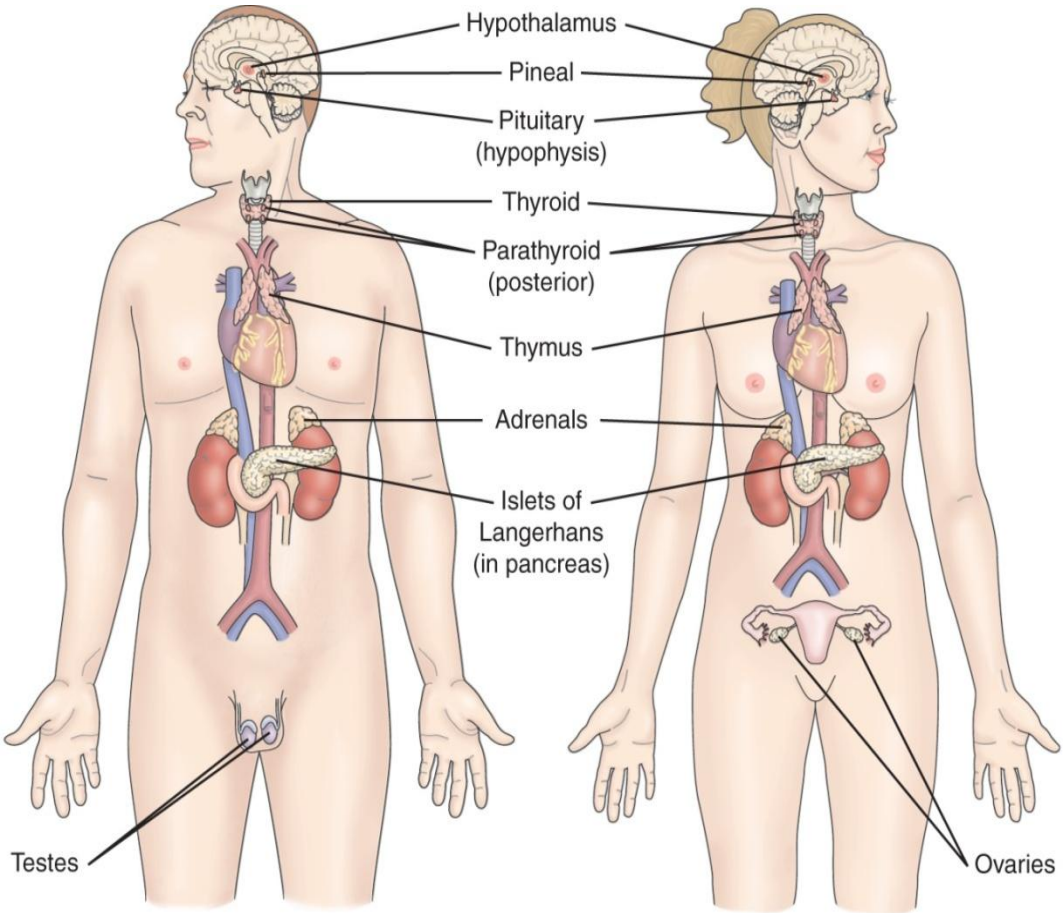
• Negative feedback mechanism

• Hormones

–Chemical messengers of the body

–Act on specific target cells

Location of the major endocrine glands.



Hypothalamus

• Sits between the cerebrum and brainstem

• Houses the pituitary gland and hypothalamus

• Regulates:

–Temperature

–Fluid volume

–Growth

–Pain and pleasure response

–Hunger and thirst

Hypothalamus Hormones

• Releasing and inhibiting hormones

• Corticotropin-releasing hormone

• Thyrotropin-releasing hormone

• Growth hormone-releasing hormone

• Gonadotropin-releasing hormone

• Somatostatin-=-inhibits GH and TSH

Pituitary Gland

• Sits beneath the hypothalamus

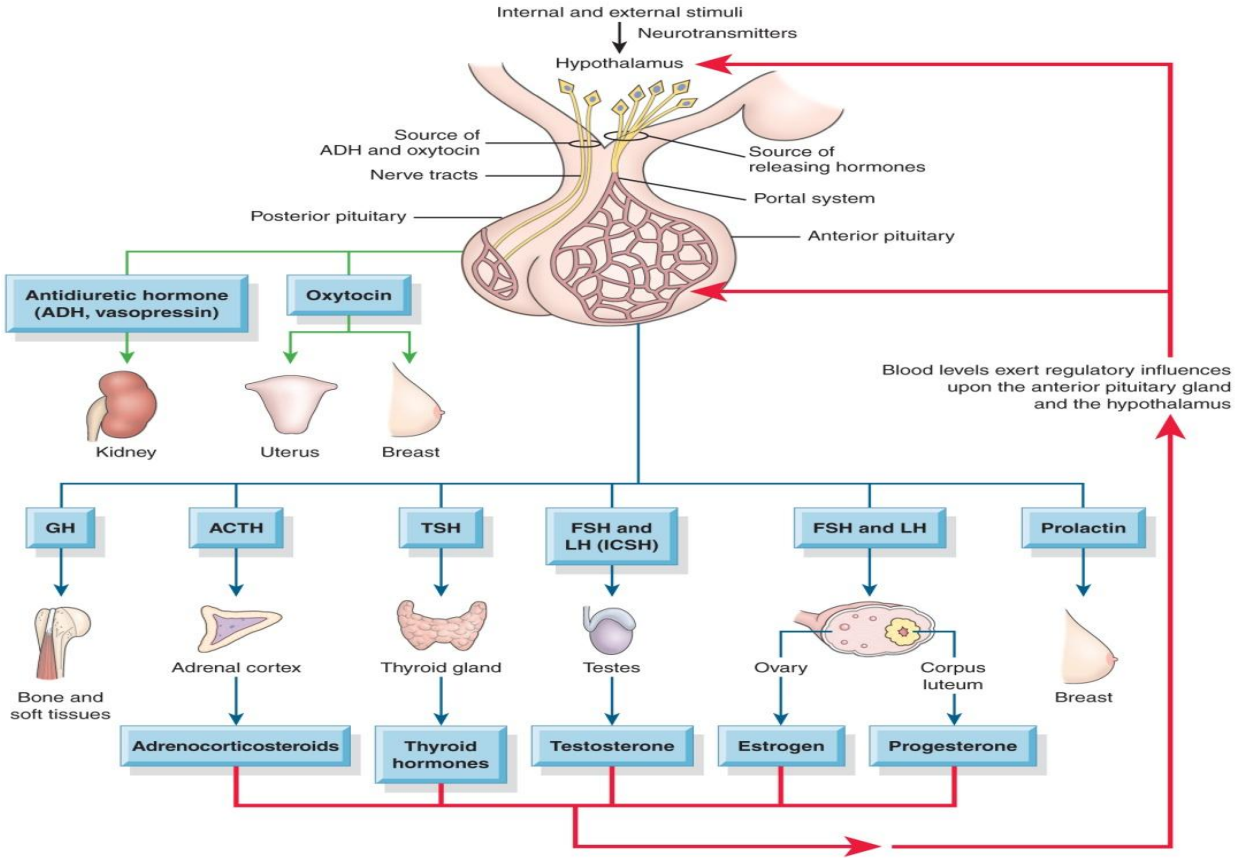
• Termed the “master gland”

• Divided into:

–Anterior Pituitary Gland

–Posterior Pituitary Gland

Actions of the major hormones of the pituitary gland.



Adrenal Glands

• Pyramid-shaped organs that sit on top of the kidneys

• Each has two parts:

–Outer Cortex

–Inner Medulla

Adrenal Cortex

• Mineralocorticoid—aldosterone. Affects sodium absorption, loss of potassium by kidney

• Glucocorticoids—cortisol. Affects metabolism, regulates blood sugar levels, affects growth, anti-inflammatory action, decreases effects of stress

• Adrenal androgens— dehydroepiandrosterone and

Adrenal Medulla

• Secretion of two hormones

–Epinephrine

–Norepinephrine

• Serve as neurotransmitters for sympathetic system

• Involved with the stress response

Thyroid Gland

• Butterfly shaped

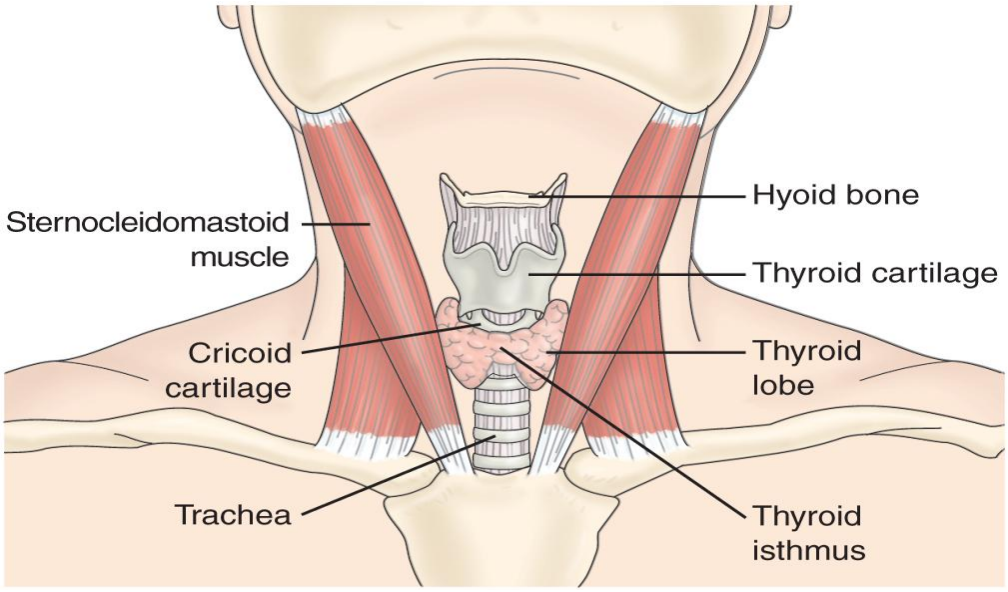
• Sits on either side of the trachea

• Has two lobes connected with an isthmus

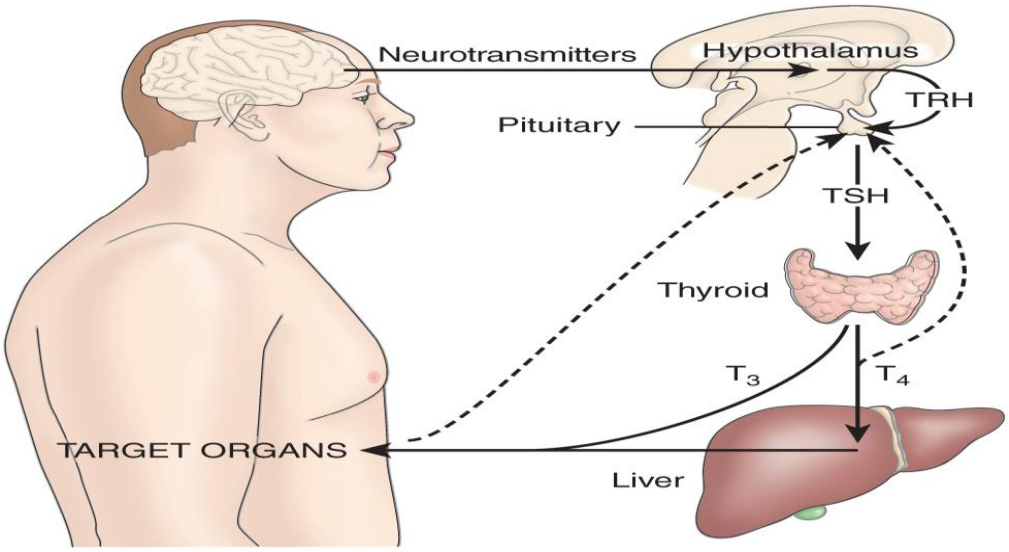
• Functions in the presence of iodine

• Stimulates the secretion of three hormones

• Involved with metabolic rate management and serum calcium levels



Hypothalamic-Pituitary-Thyroid Axis



Thyroid

• Follicular cells—excretion of triiodothyronine (T3) and thyroxine (T4)—Increase BMR, increase bone and protien turnover, increase response to catecholamines, need for infant G&D

• Thyroid C cells—calcitonin. Lowers blood calcium and phosphate levels

• BMR: Basal Metabolic Rate

Parathyroid Glands

• Embedded within the posterior lobes of the thyroid gland

• Secretion of one hormone

• Maintenance of serum calcium levels

• Parathyroid hormone—regulates serum calcium

Pancreas

• Located behind the stomach between the spleen and duodenum

• Has two major functions

–Digestive enzymes

–Releases two hormones: insulin and glucagon

Kidney

• 1, 25 dihydroxyvitamin D—stimulates calcium absorption from the intestine

• Renin—activates the Renin-Angiotensin System (RAS)

• Erythropoietin—Increases red blood cell production

Ovaries

• Estrogen

• Progesterone—important in menstrual cycle, maintains pregnancy,

Testes

• Androgens, testosterone—secondary sexual characteristics, sperm production

Thymus

• Releases thymosin and thymopoietin

• Affects maturation of T lymphocetes

Pineal

• Melatonin

• Affects sleep, fertility and aging

Assessment of Endocrine system:

Past Medical History

• Hormone replacement therapy

• Surgeries, chemotherapy, radiation

• Family history: diabetes mellitus, diabetes insipidus, goiter, obesity, Addison's disease, infertility

• Sexual history: changes, characteristics, menstruation, menopause

Physical Assessment

• General appearance

–Vital signs, height, weight

• Integumentary

–Skin color, temperature, texture, moisture

–Bruising, lesions, wound healing

–Hair and nail texture, hair growth

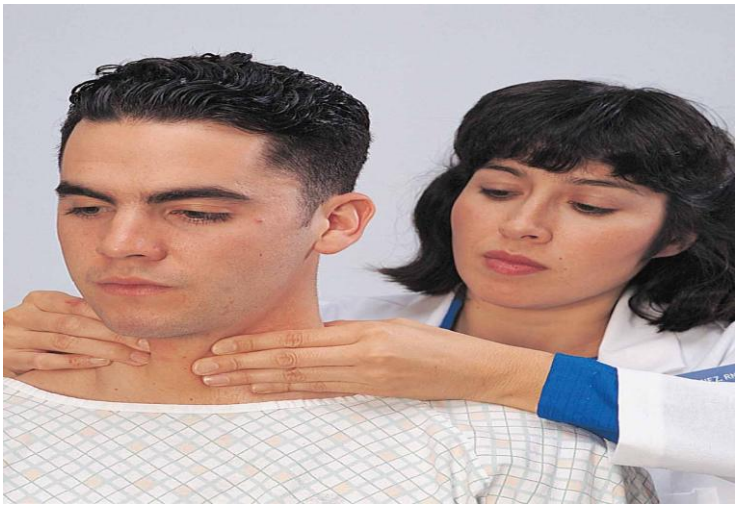
• Face

–Shape, symmetry

–Eyes, visual acuity

–Neck

Palpating the thyroid gland from behind the client.



• Extremities

–Hand and feet size

–Trunk

–Muscle strength, deep tendon reflexes

–Sensation to hot and cold, vibration

–Extremity edema

• Thorax

–Lung and heart sounds

Older Adults and Endocrine Function

• Relationship unclear

• Aging causes fibrosis of thyroid gland

• Reduces metabolic rate

• Contributes to weight gain

• Cortisol level unchanged in aging

Abnormal Findings

• Ask the client:

–Energy level

–Fatigue

–Maintenance of ADL

–Sensitivity to heat or cold

–Weight level

–Bowel habits

–Level of appetite

–Urination, thirst, salt craving

• Ask the client:

–Cardiovascular status: blood pressure, heart rate, palpitations, SOB

–Vision: changes, tearing, eye edema

–Neurologic: numbness/tingling lips or extremities, nervousness, hand tremors, mood changes, memory changes, sleep patterns

–Integumentary: hair changes, skin changes, nails, bruising, wound healing

Most Common Endocrine Disorders

• Thyroid abnormalities

• Diabetes mellitus

Diagnostic Tests

• GH: fasting, well rested, not physically stressed

• T3/T4, TSH: no specific preparation

• Serum calcium/phosphate: fasting may or may not be required

• Cortisol/aldosterone level

• 24 urine collection to measure the level of catacholamines (epinephrine, norepinephrine, dopamine).

Thyroid Disorders

• Cretinism

• Hypothyroidism

• Hyperthyroidism

• Thyroiditis

• Goiter

• Thyroid cancer

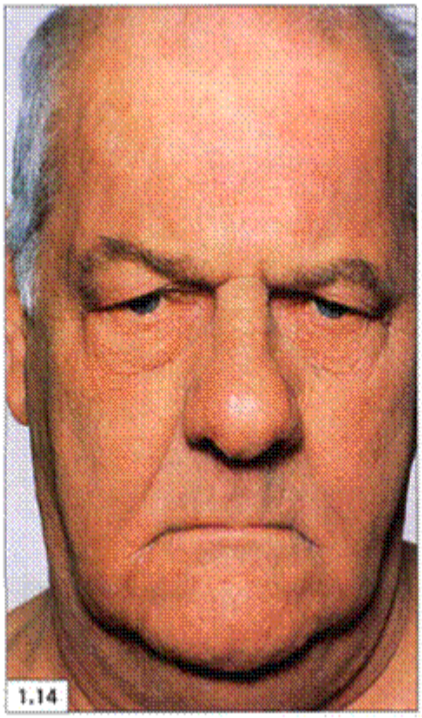
HYPOTHYRODISM

Hypothyroidism is the disease state caused by insufficient production of thyroid hormone by the thyroid gland.

INCEDENCE

• 30-60 yrs of age

• Mostly women (5 times more than men)



1.14
Hypothyroidism: large nose and facial folds. Note a noncommunicative affect

• Causes

–Autoimmune disease (Hashimoto's

thyroiditis, post–Graves' disease)

–Atrophy of thyroid gland with aging

–Therapy for hyperthyroidism

• Radioactive iodine (131I)

• Thyroidectomy

• Medications

• Radiation to head and neck

Clinical Manifestations:

1. Fatigue.

2. Constipation.

3. Apathy

4. Weight gain.

5. Memory and mental impairment and decreased concentration.

6. Masklike face.

7. Menstrual irregularities and loss of libido.

8. Coarseness or loss of hair.

9. Dry skin and cold intolerance.

10. Menstrual disturbances

11. N umbness and tingling of fingers.

12. Tongue, hands, and feet may enlarge

13. Slurred speach

14. Hyperlipidemia.

15. Reflex delay.

16. Bradycardia.

17. Hypothermia.

18. C ardiac and respiratory complications .

Laboratory Assessment

• Decreased T3

• Decreased T4

• Increased TSH

Treatment

Lifelong Thyroid Hormone Replacement

• levothyroxine sodium (Synthroid, T4, Eltroxin)

• **IMPORTANT**: start at low does, to avoid hypertension, heart failure and MI

• Teach about S&S of hyperthyroidism with replacement therapy

MYXEDEMA DEVELOPS

• Rare serious complication of untreated hypothyroidism

• Decreased metabolism causes the heart muscle to become flabby

• Leads to decreased cardiac output

• Leads to decreased perfusion to brain and other vital organs

• Leads to tissue and organ failure

• LIFE THREATENING EMERGENCY WITH HIGH MORTALITY RATE

• Edema changes client's appearance

• Nonpitting edema appears everywhere especially around the eyes, hands, feet, between shoulder blades

• Tongue thickens, edema forms in larynx, voice husky

Problems Seen With Myxedema Coma

• Coma

• Respiratory failure

• Hypotension

• Hyponatremia

• Hypothermia

• Hypoglycemia

Treatment Of Myexedema Coma

• Patent airway

• Replace fluids with IV.

• Give levothyroxine sodium IV

• Give glucose IV

• Give corticosteroids

• Check temp, BP hourly

• Monitor changes LOC hourly

• Aspiration precautions, keep warm

Hyperthyroidism

• Hyperthyroidism is the second most prevalent endocrine disorder, after diabetes mellitus.

• Graves' disease: the most common type of hyperthyroidism, results from an excessive output of thyroid hormones.

• May appear after an emotional shock, stress, or an infection

• Other causes: thyroiditis and excessive ingestion of thyroid hormone

• Affects women 8X more frequently than men (appears between second and fourth decade)

Clinical Manifestations (thyrotoxicosis):

1. Heat intolerance.

2. Palpitations, tachycardia, elevated systolic BP.

3. Increased appetite but with weight loss.

4. Menstrual irregularities and decreased libido.

5. Increased serum T4, T3.

6. Exophthalmos (bulging eyes)

7. Perspiration, skin moist and flushed ; however, elders' skin may be dry and pruritic

8. Insomnia.

9. Fatigue and muscle weakness

10. Nervousness, irritability, can't sit quietly.

11. Diarrhea.

Medical Management of Hyperthyroidism

• Radioactive 131I therapy

• Medications

–Propylthiouracil and methimazole

–Sodium or potassium iodine solutions

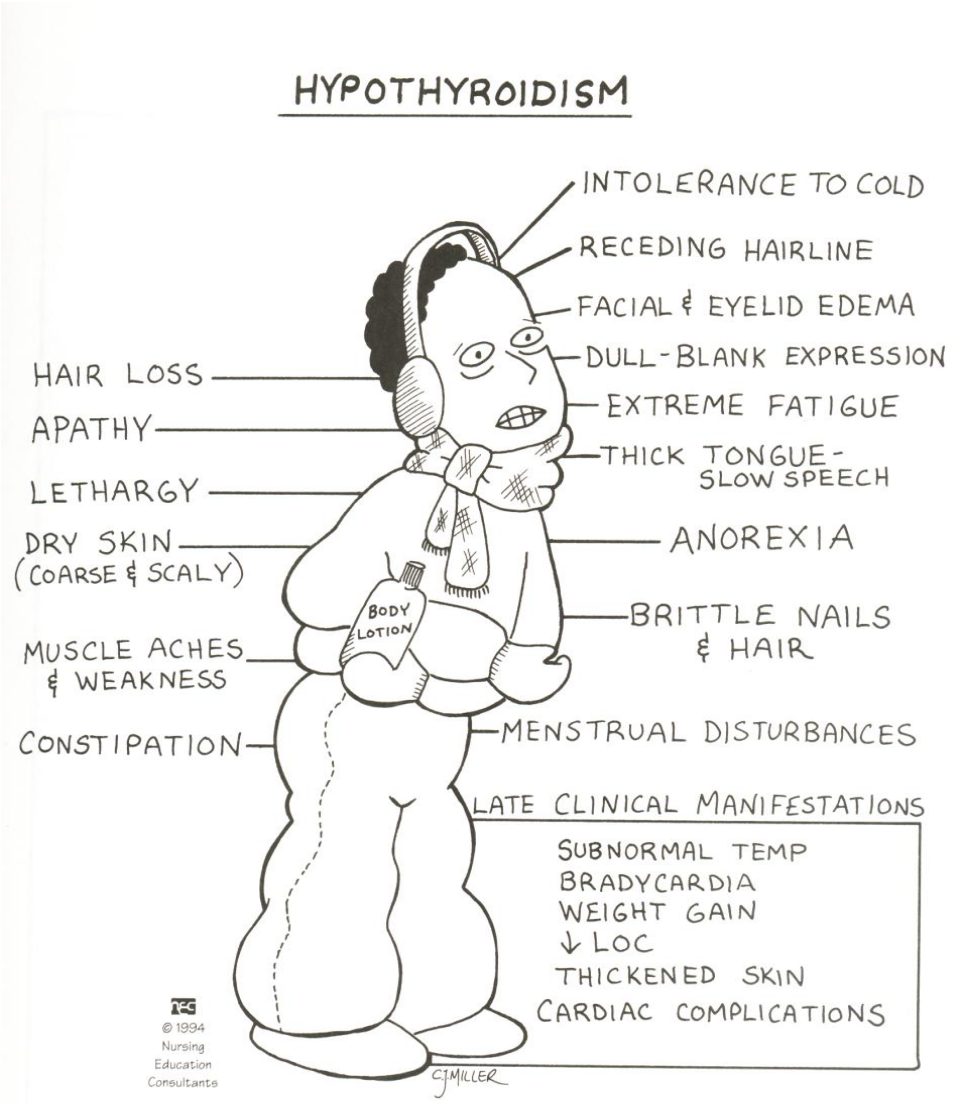
–Dexamethasone

–Beta-blockers

• Surgery; subtotal thyroidectomy

• Relapse of disorder is common

• Disease or treatment may result in hypothyroidism


HYPOTHYROIDISM
INTOLERANCE TO COLD
RECEDING HAIRLINE
FACIAL & EYELID EDEMA
DULL-BLANK EXPRESSION
EXTREME FATIGUE
THICK TONGUE-SLOW SPEECH
ANOREXIA
BRITTLE NAILS & HAIR
MENSTRUAL DISTURBANCES
LATE CLINICAL MANIFESTATIONS
SUBNORMAL TEMP
BRADYCARDIA
WEIGHT GAIN
↓ LOC
THICKENED SKIN
CARDIAC COMPLICATIONS
HAIR LOSS
APATHY
LETHARGY
DRY SKIN (COARSE & SCALY)
MUSCLE ACHES & WEAKNESS
CONSTIPATION
BODY LOTION
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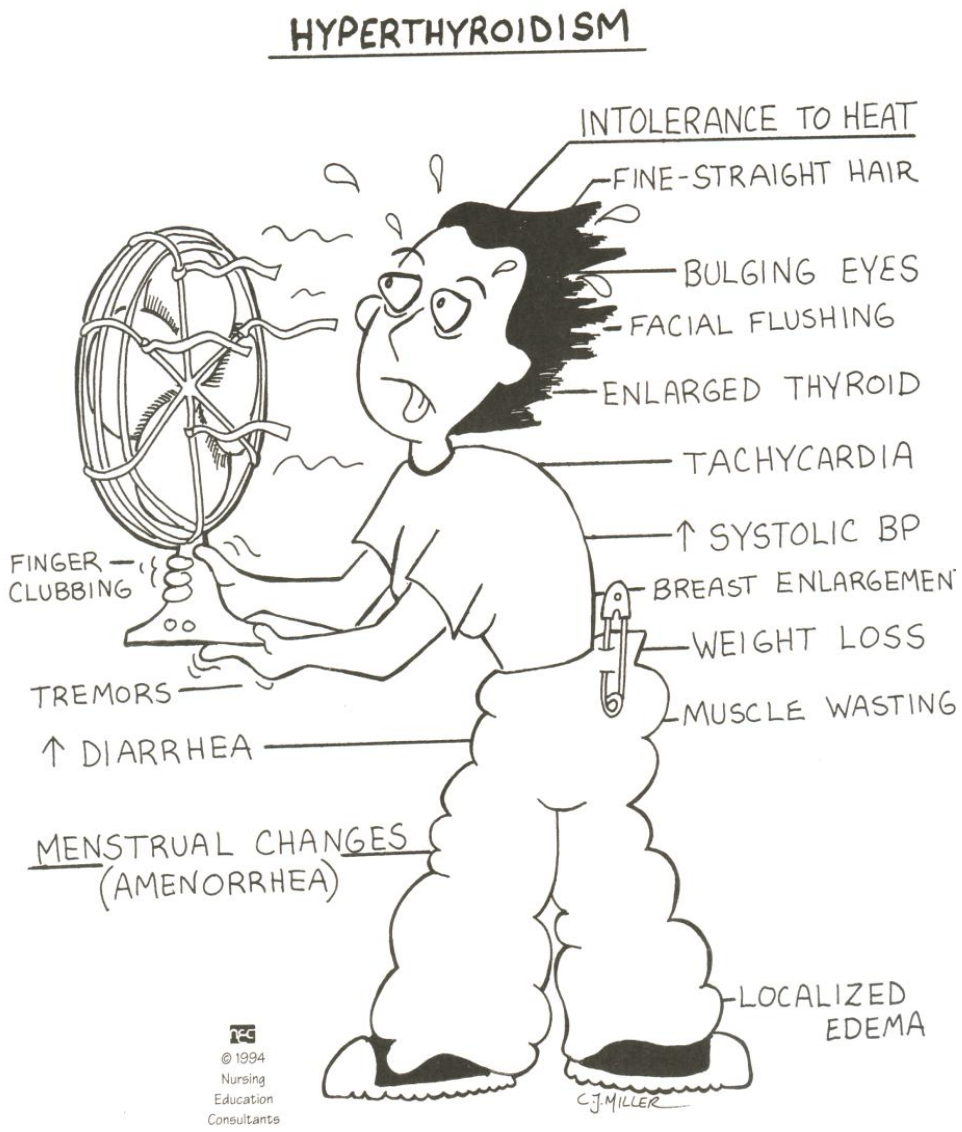


Thyroiditis

• Inflammation of the thyroid gland.

• Can be acute, subacute, or chronic (Hashimoto's Disease)

• Each type of thyroiditis is characterized by inflammation, fibrosis, or lymphocytic infiltration of the thyroid gland.

• Characterized by autoimmune damage to the thyroid.

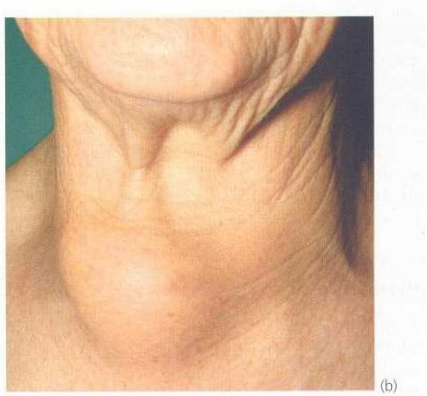
• May cause thyrotoxicosis, hypothyroidism, or both

Thyroid Tumors

• Can be being benign or malignant.

• If the enlargement is sufficient to cause a visible swelling in the neck, referred to as a goiter.

• Some goiters are accompanied by hyperthyroidism, in which case they are described as toxic; others are associated with a euthyroid state and are called nontoxic goiters.



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Thyroid Cancer

• Much less prevalent than other forms of cancer; however, it accounts for 90% of endocrine malignancies.

• Diagnosis: thyroid hormone, biobsy

• Management

–The treatment of choice surgical removal. Total or near-total thyroidectomy is performed if possible. Modified neck dissection or more extensive radical neck dissection is performed if there is lymph node involvement.

–After surgery, radioactive iodine.

Thyroidectomy

• Treatment of choice for thyroid cancer

• Preoperative goals include the reduction of stress and anxiety to avoid precipitation of thyroid storm (euothyroid)

• Iodine prep (Lugols or K iodide solution) to decrease size and vascularity of gland to minimize risk of hemorrhage, reduces risk of thyroid storm during surgery

• Preoperative teaching includes dietary guidance to meet patient metabolic needs and avoidance of caffeinated beverages and other stimulants,

Postoperative Care

• Monitor dressing for potential bleeding and hematoma formation; check posterior dressing

• Monitor respirations; potential airway impairment

• Assess pain and provide pain relief measures

• Semi-Fowler's position, support head

• Assess voice but discourage talking

• Potential hypocalcaemia related to injury or removal of parathyroid glands; monitor for hypocalcaemia

Post-Op Thyroidectomy Nursing Care

1. VS, I&O, IV

2. Semifowlers

3. Support head

4. Avoid tension on sutures

5. Pain meds, analgesic lozengers

6. Humidified oxygen, suction

7. First fluids: cold/ice, tolerated best, then soft diet

8. Limited talking , hoarseness common

9 Assess for voice changes: injury to the recurrent laryngeal nerve

Postop Thyroidectomy Nursing Care

• CHECK FOR HEMORRHAGE 1st 24 hrs:

• Look behind neck and sides of neck

• Check for c/o pressure or fullness at incision site

• Check drain

• REPORT TO MD

• CHECK FOR RESPIRATORY DISTRESS

• Laryngeal stridor (harsh hi pitched resp sounds)

• Result of edema of glottis, hematoma,or tetany

• Tracheostomy set/airway/ O2, suction

• CALL MD for extreme hoarseness (Check every 30-60 min for extreme hoarseness (S&S) of respiratory distress

Complication of operation:

Hemorrhage

Laryngeal nerve damage.

Hypoparathyrodism

Hypothyroidism

Septesis

Postoperative infection

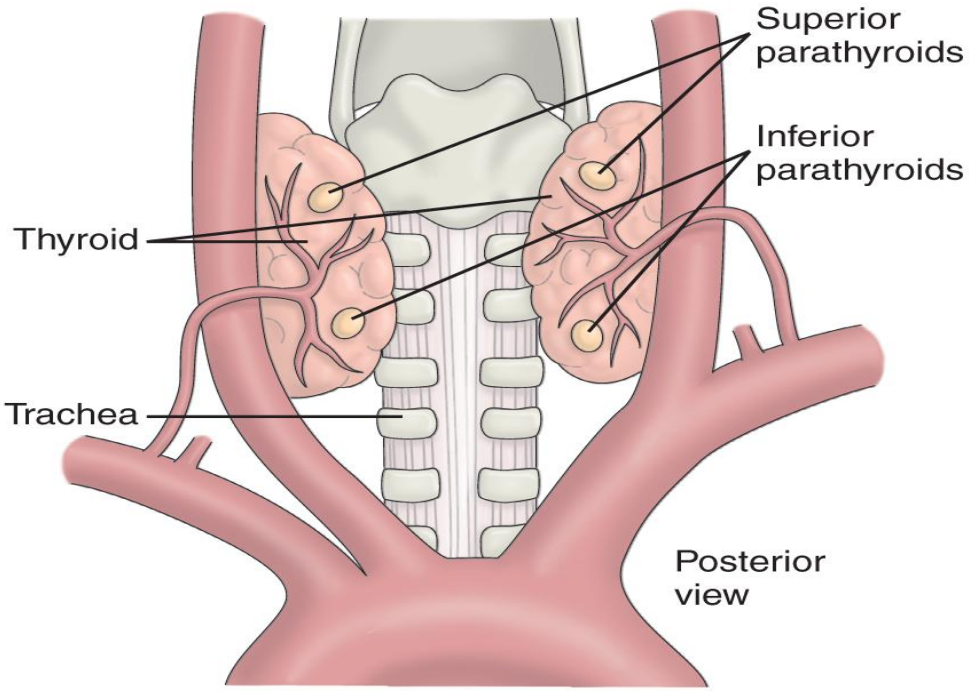
Parathyroid

• Four glands on the posterior thyroid gland

• Parathormone regulates calcium and phosphorus balance

–Increased parathormone elevates blood calcium by increasing calcium absorption from the kidney, intestine, and bone.

–Parathormone lowers phosphorus level.



Hyperparathyroidism

• Primary hyperparathyroidism is 2–4 X more frequent in women.

• Manifestations include elevated serum calcium, bone decalcification, renal calculi, apathy, fatigue, muscle weakness, nausea, vomiting, constipation, hypertension, cardiac dysrhythmias, psychological manifestations

• Treatment

–Parathyroidectomy

–Hydration therapy

–Encourage mobility reduce calcium excretion

–Diet: encourage fluid, avoid excess or restricted calcium

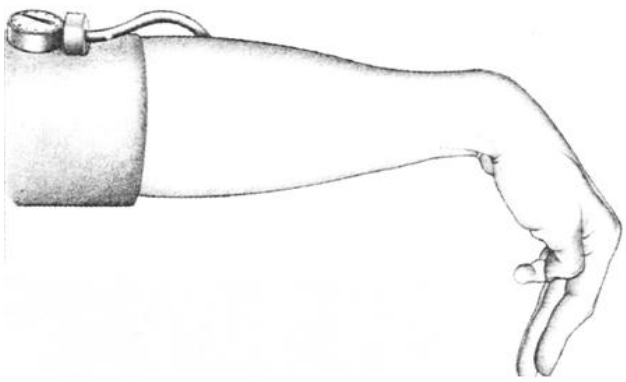
Hypoparathryoidism

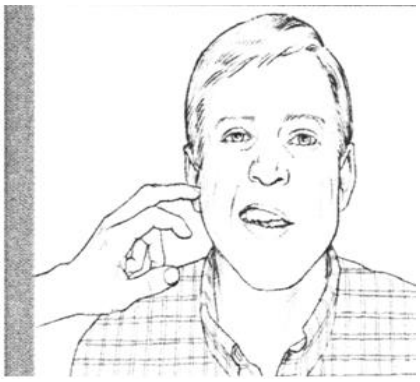
• Deficiency of parathormone usually due to surgery

• Results in hypocalcaemia and hyperphosphatemia

• Manifestations include tetany, numbness and tingling in extremities, stiffness of hands and feet, bronchospasm, laryngeal spasm, carpopedal spasm, anxiety, irritability, depression, delirium, ECG changes

–Trousseau’s sign and Chvostek’s sign





Management of Hypoparathyroidism

• Increase serum calcium level to 9—10 mg/dL

• Calcium gluconate IV

• May also use sedatives such as pentobarbital to decrease neuromuscular irritability

• Parathormone may be administered; potential allergic reactions

• Environment free of noise, drafts, bright lights, sudden movement

• Diet high in calcium and low in phosphorus

• Vitamin D

• Aluminum hydroxide is administered after meals to bind with phosphate and promote its excretion through the gastrointestinal tract.

Adrenal Glands

• Adrenal medulla

–Functions as part of the autonomic nervous system

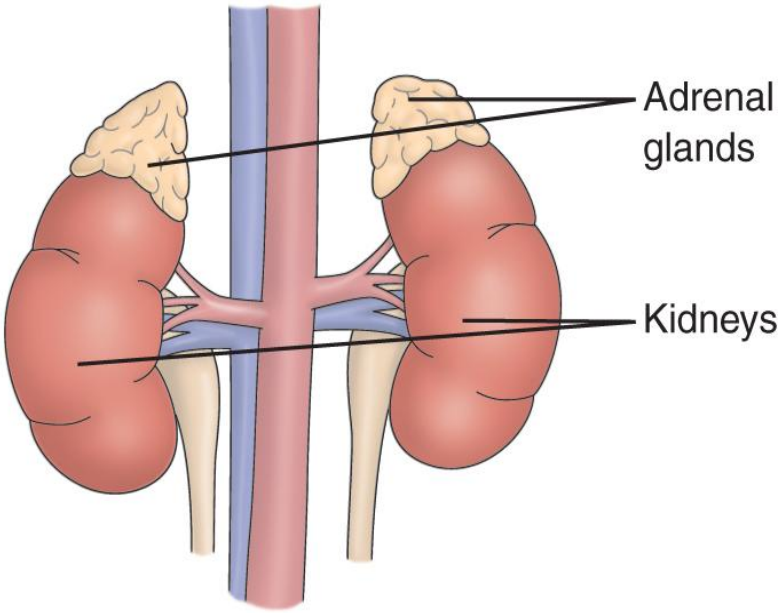
–Catecholamines; epinephrine and norepinephrine

• Adrenal cortex

–Glucocorticoids

–Mineralocorticoids

–Androgens



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Adrenal Insufficiency

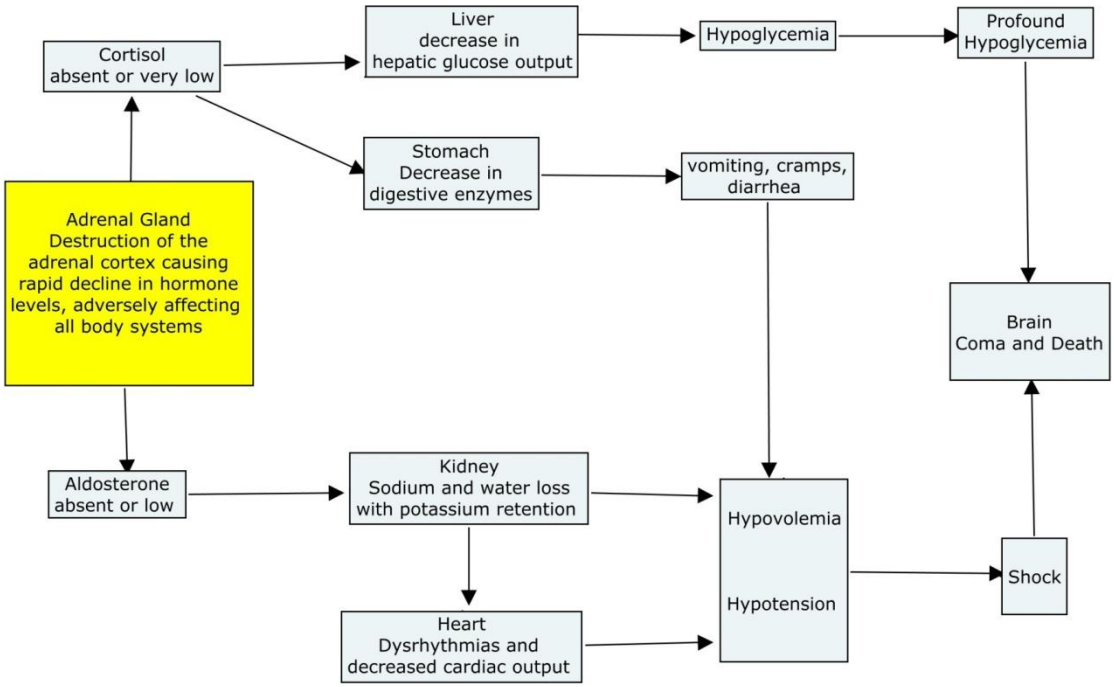
• Adrenal cortex function is inadequate to meet the needs for cortical hormones

• Primary: Addison's Disease

• Secondary

• May be the result of adrenal suppression by exogenous steroid use

Adrenal Crisis



Manifestations

• Muscle weakness, anorexia, GI symptoms, fatigue, dark pigmentation of skin and mucosa, hypotension, low blood glucose, low serum sodium, high serum potassium, mental changes, apathy, emotional lability, confusion

• Addisonian crisis: circulatory collapse

• Diagnostic tests; adrenocortical hormone levels, ACTH levels, ACTH stimulation test

Medical Management

• Immediate

–Reverse shock

–Restore blood circulation

• Antibiotics if infection

• Identify cause

• Supplement glucocorticoids during stressful procedures or significant illness

Nursing Management

• Assess fluid balance

• Monitor VS closely

• Good skin assessment

• Limit activity

• Provide quiet, non-stressful environment

Nursing Process: The Care of the Patient with Adrenocortical Insufficiency

Assessment

• Level of stress; note any illness or stressors that may precipitate problems

• Fluid and electrolyte status

• VS and postural blood pressures

• Note signs and symptoms related to adrenocortical insufficiency such as weight changes, muscle weakness, and fatigue

• Medications

• Monitor for signs and symptoms of Addisonian

Diagnoses

• Risk for fluid volume deficit

• Activity intolerance and fatigue

• Knowledge deficit

Interventions

• Risk for fluid deficit; monitor for signs and symptoms of fluid volume deficit, encourage fluids and foods, select foods high in sodium, administer hormone replacement as prescribed

• Activity intolerance; avoid stress and activity until stable, perform all activities for patient when in crisis, maintain a quiet nonstressful environment, measures to reduce anxiety

Cushing's Syndrome

• Due to excessive adrenocortical activity or corticosteroid medications

• Women between the ages of 20 and 40 years are five times more likely than men to develop Cushing's syndrome.

This woman with Cushing's syndrome has several classic signs, including facial hair, buffalo hump, and moon face. From Rubin, E. & Farber, J. L. (2005). *Pathology* (4th ed.). Philadelphia: Lippincott Williams & Wilkins.

Clinical Manifestations

• Hyperglycemia which may develop into diabetes, weight gain, central type obesity with “buffalo hump,” heavy trunk and thin extremities, fragile thin skin, ecchymosis, striae, weakness, lassitude, sleep disturbances, osteoporosis, muscle wasting, hypertension, “moon-face”, acne, increased susceptibility to infection, slow healing, virilization in women, loss of libido, mood changes, increased serum sodium, decreased serum potassium

• **Diagnosis:** Dexamethasone suppression test, ↑ Na+ ↑ glucose, ↓ K+, metabolic alkalosis

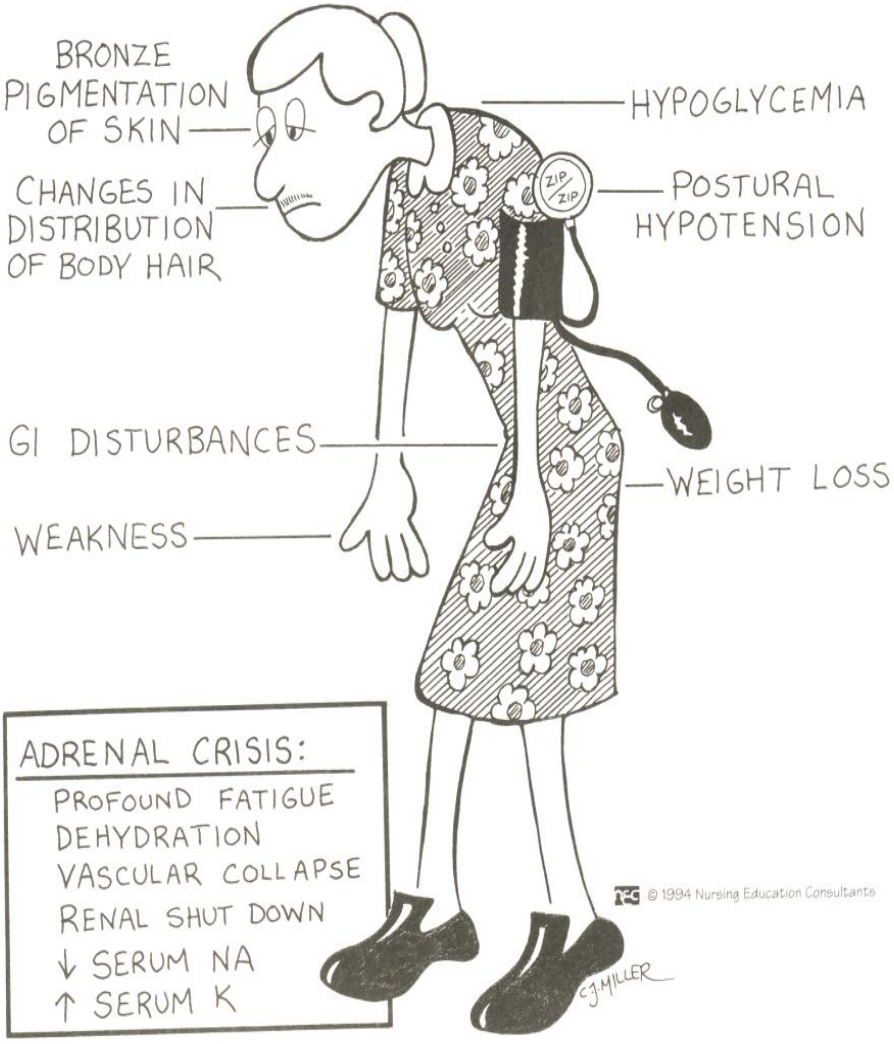
Excessive protein catabolism occurs, producing muscle wasting and osteoporosis. Kyphosis, backache, and compression fractures of the vertebrae may result. Retention of sodium and water occurs as a result of increased mineralocorticoid activity, producing hypertension and heart failure.

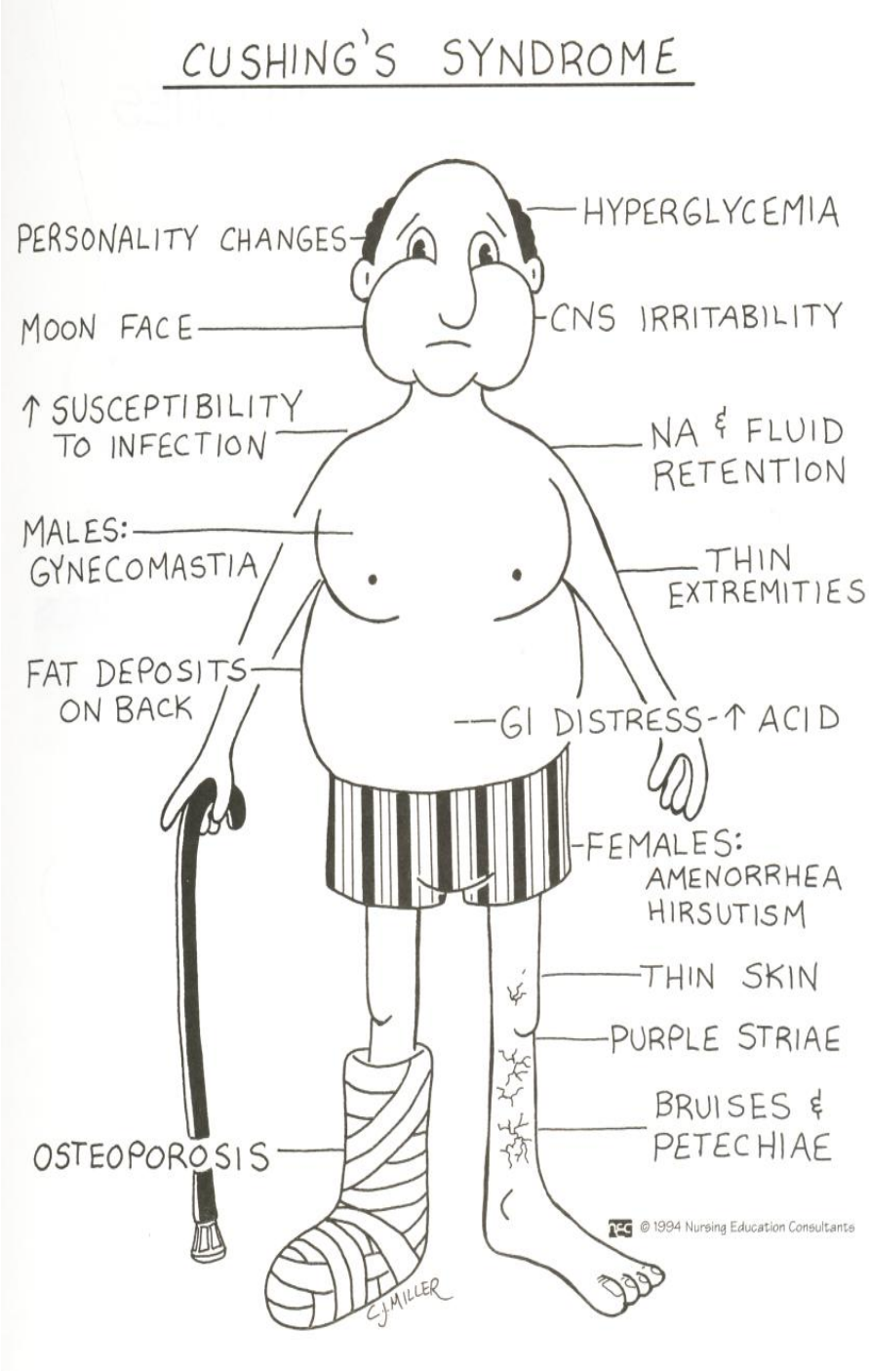
Virilization is characterized by the appearance of masculine traits and the recession of feminine traits.

There is an excessive growth of hair on the face (hirsutism), the breasts atrophy, menses cease, the clitoris enlarges, and the voice deepens.

Dexamethasone (1 mg) is administered orally at 11 PM, and a plasma cortisol level is obtained at 8 AM the next morning. Suppression of cortisol to less than 5 mg/dL indicates that the hypothalamic–pituitary–adrenal axis is functioning properly.

ADDISON'S DISEASE





Medical Management

• Pituitary tumor

–Surgical removal

–radiation

• Adrenalectomy

• Adrenal enzyme inhibitors

• Attempt to reduce or taper corticosteroid dose

Nursing Management

• Prevent injury

• Increased protein, calcium and vitamin D in diet

• Medical asepsis

• Monitor blood glucose

• Moderate activity with rest periods

• Provide restful environment

Nursing Process: The Care of the Patient with Cushing's Syndrome

Assessment

• Activity level and ability to carry out self-care

• Skin assessment

• Changes in physical appearance and patient responses to these changes

• Mental function

• Emotional status

• Medications

Diagnoses

• Risk for injury

• Risk for infection

• Self-care deficit

• Impaired skin integrity

• Disturbed body image

• Disturbed thought processes

Collaborative Problems/Potential Complications

• Addisonian crisis

• Adverse effects of adrenocortical activity

• **Planning:** Goals may include

1. Decreased risk of injury,

2. Decreased risk of infection,

3. Increased ability to carry out self-care activities,

4. Improved skin integrity,

5. Improved body image,

6. Improved mental function, and

7. Absence of complications

Interventions

• Decrease risk of injury; establish a protective environment; assist as needed; encourage diet high in protein, calcium, and vitamin D.

• Decrease risk of infection; avoid exposure to infections, assess patient carefully as corticosteroids mask signs of infection.

• Plan and space rest and activity.

• Meticulous skin care and frequent, careful skin assessment.

• Explanation to the patient and family about causes of emotional instability.

• Patient teaching.

Diabetes Insipidus

• A disorder of the posterior lobe of the pituitary gland that is characterized by a deficiency of ADH (vasopressin). Excessive thirst (polydipsia) and large volumes of dilute urine.

• It may occur secondary to head trauma, brain tumor, or surgical ablation or irradiation of the pituitary gland, infections of the central nervous system or with tumors

• Another cause of diabetes insipidus is failure of the renal tubules to respond to ADH

Medical Management

• The objectives of therapy are .

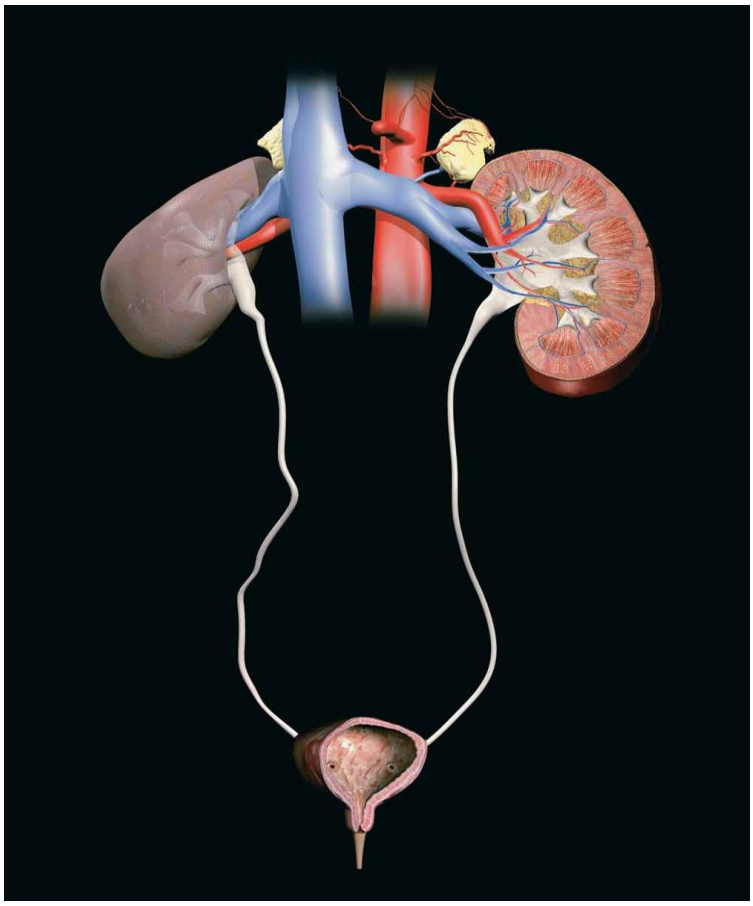
1. to replace ADH (which is usually a long-term therapeutic program),

2. to ensure adequate fluid replacement, and

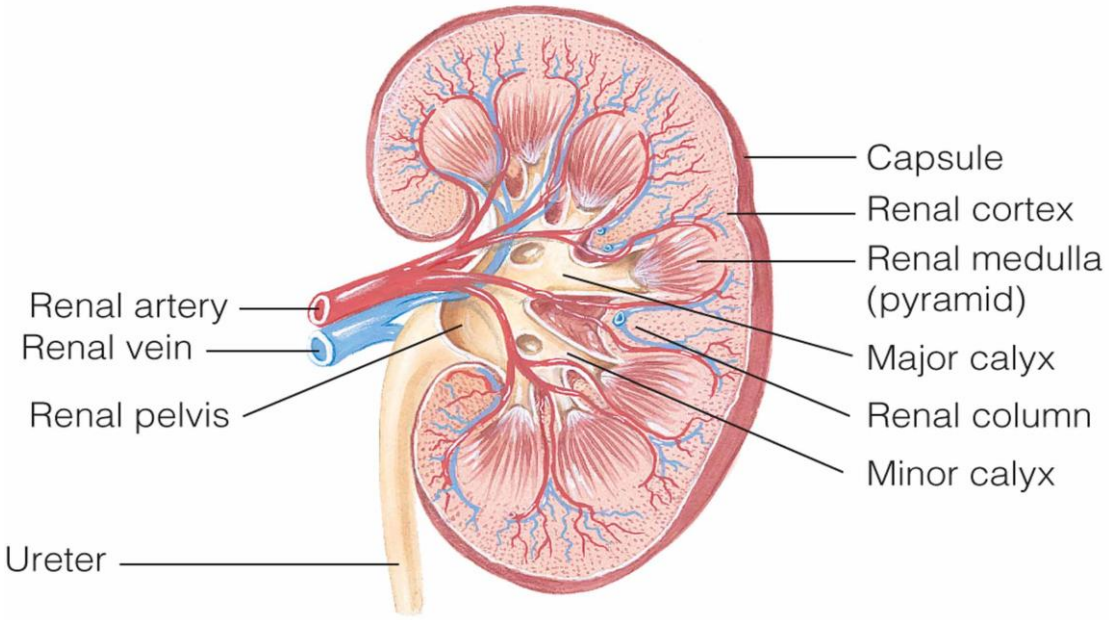
3. to identify and correct the underlying intracranial pathology.

Chapter 43

The Urinary System Assessment & Disorders

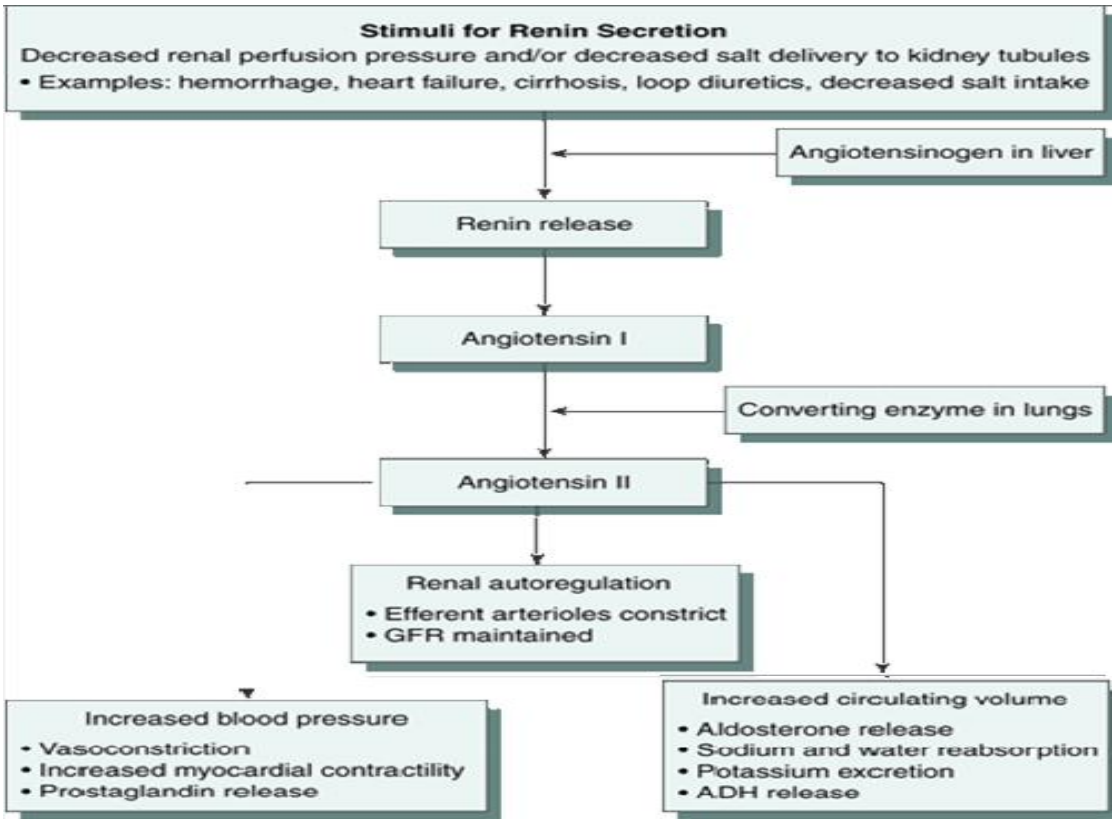


An illustration of the internal structures of the kidney.



Functions of kidney:

1. Urine formation
2. Excretion of waste products
3. Regulation of electrolytes
4. Regulation of acid–base balance
5. Control of water balance
6. Control of blood pressure
7. Renal clearance
8. Regulation of red blood cell production
9. Synthesis of vitamin D to active form
10. Secretion of prostaglandins
11. Regulates calcium and phosphorus balance
12. Activates growth hormone



Age-Related Changes

• Nephrons lost with aging

–Reduces kidney mass and GFR

• Less urine concentration

–Risk for dehydration

Assessment

• Use simple language

• Assess for incontinence (esp. muliparous)

• Family history

• Chief concern

• Location and character of pain

• Previous UTI, stones, urinary problems

• Pattern or urination

• Color, clarity, amount of urine

• Difficulty initiating urination or changes in stream

• Changes in urinary pattern

• Dysuria, nocturia, hematuria, pyuria

Obtaining a urologic health history requires excellent communication skills, because many patients are embarrassed or uncomfortable discussing genitourinary function or symptoms

• History of urinary problems

• Urinary or abdominal surgeries

• Smoking, alcohol use

• Chance of pregnancy

• History of diabetes or other endocrine disorders

• Unexplained anemia

Diagnostic Tests

• Clean-catch urine

• 24-hour urine collection

• Culture and sensitivity

• BUN, creatinine and creatinine clearance = {Vol. of urine (ML/hr) x urine creatine}/serum creatinine

BUN values are affected by protein intake, tissue breakdown, and fluid volume changes.

• IVP, Retrograde Pyelography

• Cystography, voiding cystogram

• CT scan, MRI

• Renal scan

• Ultrasound

• X-ray (KUB)

• Cystoscopy

• Renal Angiography

• Kidney biopsy (by needle or open procedure)

Glomerulonephritis

• Inflammatory condition of glomerulus

• Antigen–antibody complexes form in the blood and become trapped in the glomerular capillaries, inducing an inflammatory response.

• Damages capillary membrane

–Blood cells and proteins escape into filtrate

–Hematuria, proteinuria, azotemia (increase BUN & Creatinin)

• Acute or chronic

Acute Glomerulonephritis -Manifestations

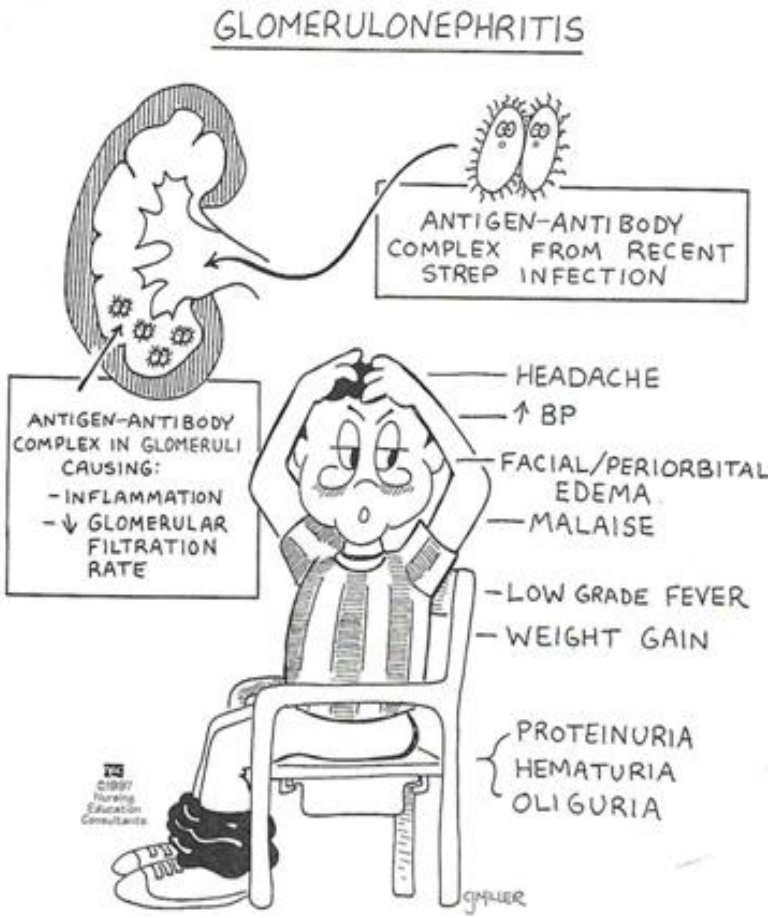
• Usually follows infection of group A beta-hemolytic Streptococcus

• Affect children > 2 years

• Manifestations develop abruptly

–Hematuria (? Microscopic, or frank, urine is cola color), proteinuria, edema, azotemia (High BUN and Creatineine) hypertension, fatigue, hypoalbuminemia, hyperlipidemia

–? headache, malaise and flank pain



Antigen (group A beta-hemolytic streptococcus)

↓

Antigen-antibody product

↓

Deposition of antigen–antibody complex in glomerulus

↓

Increased production of epithelial cells lining the glomerulus

↓

Leukocytes infiltrate the glomerulus

↓

Thickening of the glomerular filtration membrane

↓

Scarring and loss of glomerular filtration membrane

↓

Decreased glomerular filtration rate (GFR)

Glomerulonephritis –Diagnostic Tests

• ASO titer (anti streptolysine O)

• BUN

• Serum creatinine

• Serum electrolytes

• Urinalysis

• KUB x-ray

• Kidney scan or biopsy

Complications of acute glomerulonephritis

• Hypertensive encephalopathy,

• Heart failure,

• Pulmonary edema,

• Without treatment, end-stage renal disease (ESRD) develops in a matter of weeks or months.

Glomerulonephritis –Treatment

• Focus is on identifying and treating underlying disease process and preserving kidney function

• If residual streptococcal infection is suspected, penicillin.

• Corticosteroids and immunosuppressant medications may be prescribed for patients with rapidly progressive acute glomerulonephritis.

• Dietary protein is restricted when renal insufficiency (elevated BUN) develop.

• Sodium is restricted when the patient has hypertension, edema, and heart failure.

• Loop diuretic and antihypertensive medications may be prescribed to control hypertension.

• Bed rest during acute phase.

Glomerulonephritis –Nursing Care

• Decrease protein and increase CHO to prevent protein breakdown.

• Accurate I & O (consider insensible loss)

Chronic Glomerulonephritis

• Could be due to repeated episodes of acute glomerulonephritis, hypertensive nephrosclerosis, hyperlipidemia, glomerular sclerosis

• Other causes include SLE, DM

• Kidney size reduce to 1/5th of original size and many scar tissue formed leading to ESRF.

Chronic Glomerulonephritis/ S&S

• Many are asymptomatic

• ? Discovered when patient diagnosed with Hypertension.

• ? severe nosebleed, a stroke, or a seizure, swollen feet at night.

• Heneral symptoms, such as loss of weight and strength, increasing irritability, nocturia, Headaches, dizziness, and digestive disturbances.

• Finally, S&S of renal failure.

Medical Management

• Control BP: Na & water restriction, antihypertensive drug

• Monitor weight.

• Diuretics.

• Adequate CHO diet to spare protien

• Treat UTI

• ? Dialysis.

Nephrotic Syndrome

• Is a cluster of clinical findings, including:

1. Marked increase in protein (particularly albumin) in the urine (proteinuria)

2. Decrease in albumin in the blood (hypoalbuminemia)

3. Edema (periorbital, ascites, and dependent edema)

4. High serum cholesterol and low-density lipoproteins (hyperlipidemia)

Treatment

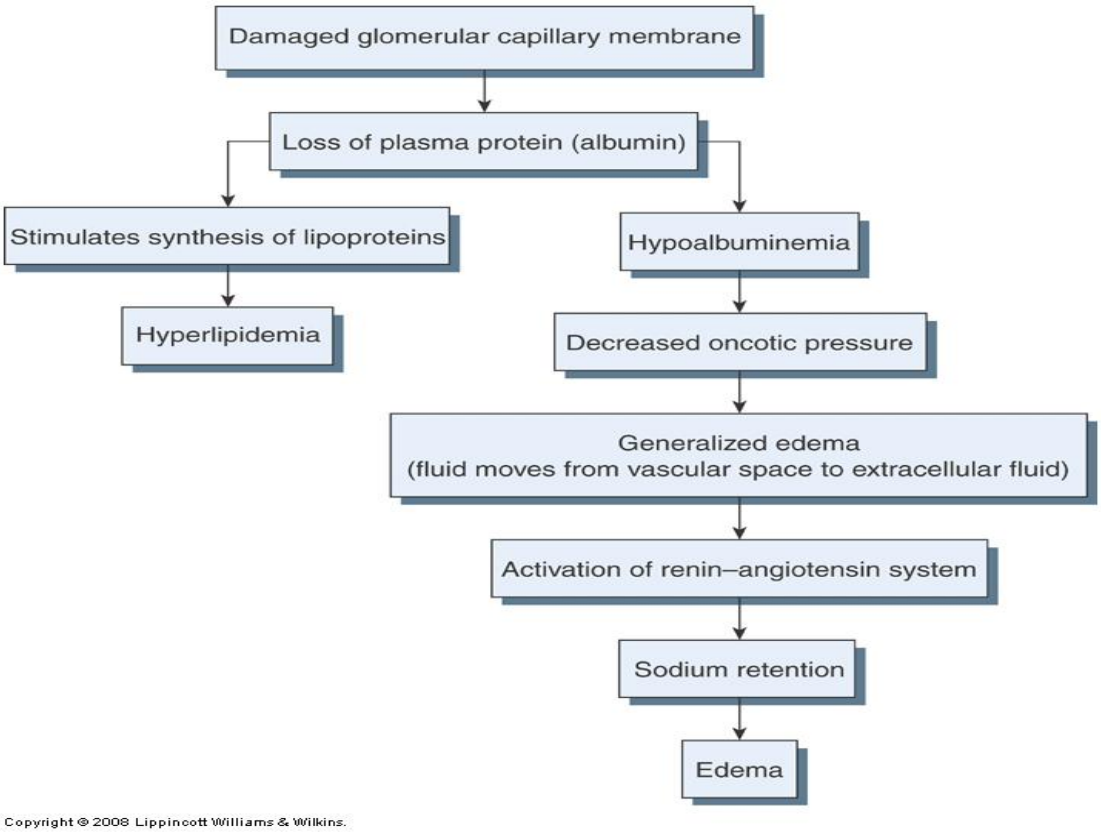
• Diuretics (be careful not to cause sever hypovolemia as it may lead to ARF)

• Loop diuretics + ACE inhibitors lead to decreasing protienuria.

–Immunosuppresive agents (i.e. cytoxan).

–Coriticosteroids.

• Restrict protein and sodium.



Acute Renal Failure (ARF)

• Is a reversible clinical syndrome where there is a sudden and almost complete loss of kidney function (decreased GFR) over a period of hours to days with failure to excrete nitrogenous waste products and to maintain fluid and electrolyte homeostasis

• May progress to end stage renal disease, uremic syndrome, and death without treatment

• Persons at Risks

–Major surgery

–Major trauma

–Receiving nephrotoxic medications

–Elderly

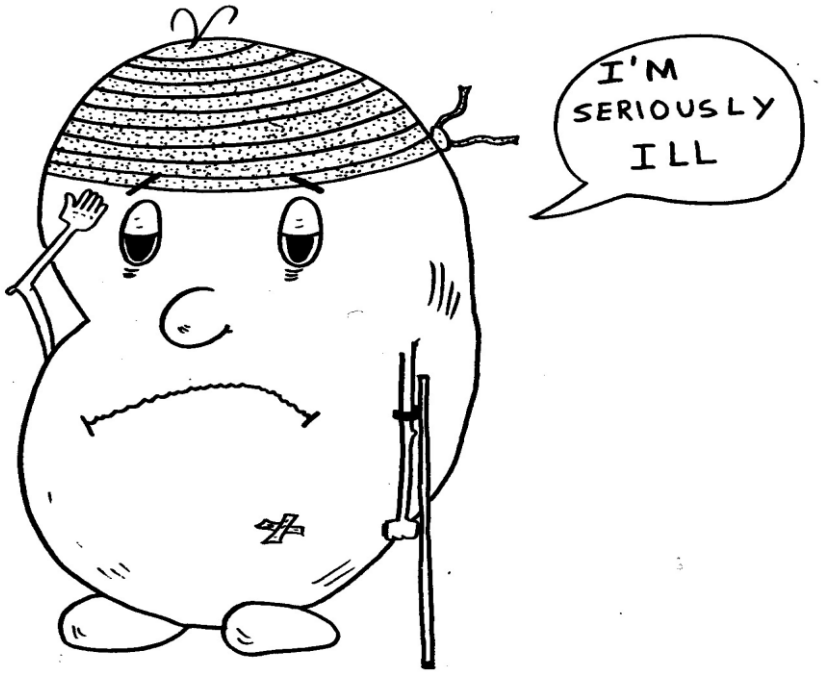
• ARF mostly occur within hospital settings

Causes of ARF

1. Prerenal Failure

2. Intrarenal Failure

3. Postrenal Failure



Prerenal Failure

• Volume depletion resulting from:

–Hemorrhage

–Renal losses (diuretics, osmotic diuresis)

–Gastrointestinal losses (vomiting, diarrhea, nasogastric suction)

• Impaired cardiac efficiency resulting from:

–Myocardial infarction

–Heart failure

–Dysrhythmias

–Cardiogenic shock

• Vasodilation resulting from:

–Sepsis

–Anaphylaxis

–Antihypertensive medications or other medications that cause vasodilation

Intrarenal Failure

• Prolonged renal ischemia resulting from:

–Pigment nephropathy (associated with the break-down of blood cells containing pigments that in turn occlude kidney structures)

–Myoglobinuria (trauma, crush injuries, burns)

–Hemoglobinuria (transfusion reaction, hemolytic anemia)

• Nephrotoxic agents such as:

–Aminoglycoside antibiotics (gentamicin, tobramycin, amicacin)

–Radiopaque contrast agents

–Heavy metals (lead, mercury)

–Solvents and chemicals (ethylene glycol, carbon tetrachloride, arsenic)

–Nonsteroidal anti-inflammatory drugs (NSAIDs)

–Angiotensin-converting enzyme inhibitors (ACE inhibitors)

• Infectious processes such as:

–Acute pyelonephritis

–Acute glomerulonephritis

Postrenal failure

• Urinary tract obstruction, including:

–Calculi (stones)

–Tumors

–Benign prostatic hyperplasia

–Strictures

–Blood clots

Phases of Acute Renal Failure

• Initiation period: begins with the initial insult and ends when oliguria develops.

• Oliguria period: UOP < 400 ml/day, increase in urea, creatinine, uric acid, K & magnesium. Some people have normal urine output (2 L/d)

Diuretic – UOP ^ to as much as 4000 mL/d but BUN & Cretinine still high, at end of this stage may begin to see improvement

Recovery – things go back to normal. It may take up to 3-12 months

The oliguria period is accompanied by an increase in the serum concentration of substances usually excreted by the kidneys (urea, creatinine, uric acid, organic acids, and the intracellular cations [potassium and magnesium]). The minimum amount of urine needed to rid the body of normal metabolic waste products is 400 mL. In this phase uremic symptoms first appear and life-threatening conditions such as hyperkalemia develop.

Some patients have decreased renal function with increasing nitrogen retention, yet actually excrete normal amounts of urine (2 L/day or more). This is the nonoliguric form of renal failure and occurs predominantly after exposure of the patient to nephrotoxic agents; it may also occur with burns, traumatic injury, and the use of halogenated anesthetic agents.

The diuresis period is marked by a gradual increase in urine output, which signals that glomerular filtration has started to recover. Laboratory values stop increasing and eventually decrease. Although the volume of urinary output may reach normal or elevated levels, renal function may still be markedly abnormal. Because uremic symptoms may still be present, the need for expert medical and nursing management continues. The patient must be observed closely for dehydration during this phase; if dehydration occurs, the uremic symptoms are likely to increase.

The recovery period signals the improvement of renal function and may take 3 to 12 months. Laboratory values return to the patient's normal level. Although a permanent 1% to 3% reduction in the GFR is common, it is not clinically significant.

Acute Renal Failure S & S

–The patient may appear critically ill and lethargic.

–The skin and mucous membranes are dry from dehydration.

–Central nervous system signs and symptoms include drowsiness, headache, muscle twitching, and seizures.

–Urine output varies (scanty to normal volume), ? hematuria & urine has a low specific gravity

• Diagnostic tests

–BUN, creatinine, potassium increase.

–pH

–Hgb and Hct

–Urine studies

–US of kidneys

–High phosphorus and low calcium.

With a decline in the GFR, the patient cannot excrete potassium normally. Patients with oliguria and anuria are at high risk for hyperkalemia. Protein catabolism results in the release of cellular potassium into the body fluids, causing severe hyperkalemia (high serum potassium levels).

Prevention of ARF

• Provide adequate hydration

• Prevent and treat shock promptly

• Hourly urine output for critical patients

• Continuosally assess renal function

• Prevent and treat infections promptly

• Monitor for effects of toxic drugs

Medical treatment of ARF

• Objectives of treatment are to restore normal chemical balance and prevent complications until repair of renal tissue and restoration of renal function can occur.

• Management includes

–maintaining fluid balance,

–avoiding fluid excesses, or

–possibly performing dialysis.

• Medical treatment

–Treat the cause

–Fluid and replacement or restrictions

–Monitor for fluid overload

–Diuretics

–Maintain E-lytes

–May need dialysis (especially with high K)

–May need to stimulate production of urine with IV fluids, Dopomine, diuretics, etc.

If caused by meds, must stop meds

If caused by obstruction, must remove obstruction

If caused by blockage of artery, must open artery

Dietary restrictions may include : low K+, adequate carbs, also may give TPN

Fluids : calculate closley I/O

Hyperkalemia is life threatening

Lower K+ with Kayexalate, glucose, insulin, NaBicarb, caalcium carbonate

–Hemodialysis

• Subclavian approach

• Femoral approach

–Peritoneal dialysis

–Nutritional Therapy

• ? Decrease Protein (according to BUN level)

• Increase CHO

• Decrease potassium and phosphrous

• **Nursing Diagnosis-**

–imbalanced fluid volume= excess

–Altered electrolyte balance

–Impaired tissue perfusion: renal

–Anxiety

–Imbalanced nutrition

–Risk for infection

–Fatigue

–Knowledge deficit

• **Plan-**

–Promote recovery of optimal kidney function.

–Maintain normal fluid and electrolyte balance.

–Decrease anxiety.

–Increase knowledge.

Nursing interventions

• Monitoring Fluid and Electrolyte Balance

• Reducing Metabolic Rate

• Promoting Pulmonary Function

• Preventing Infection

• Providing Skin Care

Chronic Renal Failure

• Chronic renal failure, or ESRD, is a progressive, irreversible deterioration in renal function in which the body's ability to maintain metabolic and fluid and electrolyte balance fails, resulting in uremia or azotemia.

• Results from gradual, progressive loss of renal function

• Occasionally results from rapid progression of acute renal failure

• Conditions that cause ESRD include systemic diseases, such as diabetes mellitus (leading cause); hypertension; chronic glomerulonephritis; pyelonephritis; obstruction of the urinary tract; hereditary lesions, as in polycystic kidney disease; vascular disorders; infections; medications; or toxic agents.

• Symptoms occur when 75% of function is lost but considered chronic if 90-95% loss of function

• Dialysis is necessary D/T accumulation of uremic toxins, which produce changes in major organs

Chronic renal failure/ S&S Cardiovascular: the most common cause of death

–Hypertension

–Pitting edema (feet, hands, sacrum)

–Periorbital edema

–Pericardial friction rub

–Acidosis (kidney can’t excrete amonia, reabsorb bicarb, high phosphate)

–Engorged neck veins

–Pericarditis

–Pericardial effusion

–Pericardial tamponade

–Hyperkalemia

–Hyperlipidemia

Chronic renal failure affects almost all body systems

Hypertension occurs due to sodium and water retention and due to the activation of renin- angiotesnin-aldosteron axis.

Decreased acid secretion results from the inability of the kidney tubules to excrete ammonia (NH_3^-) and to reabsorb sodium bicarbonate (HCO_3^-). There is also decreased excretion of phosphates and other organic acids.

Chronic renal failure/ S&S Neurologic

• Weakness and fatigue

• Confusion

• Inability to concentrate

• Disorientation

• Tremors

• Seizures

• Asterixis

• Restlessness of legs

• Burning of soles of feet

• Behavior changes

Chronic renal failure/ S&S Pulmonary Integumentary

• Crackles

• Thick, tenacious sputum

• Depressed cough reflex

• Pleuritic pain

• Shortness of breath

• Tachypnea

• Kussmaul-type respirations

• Uremic pneumonitis

Chronic renal failure/ S&S Integumentary

• Gray-bronze skin color

• Dry, flaky (مُقشّر) skin

• Pruritus

• Ecchymosis

• Purpura

• Thin, brittle nails

• Coarse, thinning hair

Chronic renal failure/ S&S Gastrointestinal

• Ammonia odor to breath (“uremic fetor”)

• Metallic taste

• Mouth ulcerations and bleeding

• Anorexia, nausea, vomiting

• Hiccups

• Constipation or diarrhea

Chronic renal failure/ S&S Hematological

• Bleeding from GI tract

• Anemia

• Thrombocytopenia

Chronic renal failure/ S&S Reproductive

• Amenorrhea

• Testicular atrophy

• Infertility

• Decreased libido

• Muscle cramps

Chronic renal failure/ S&S Musculoskeletal

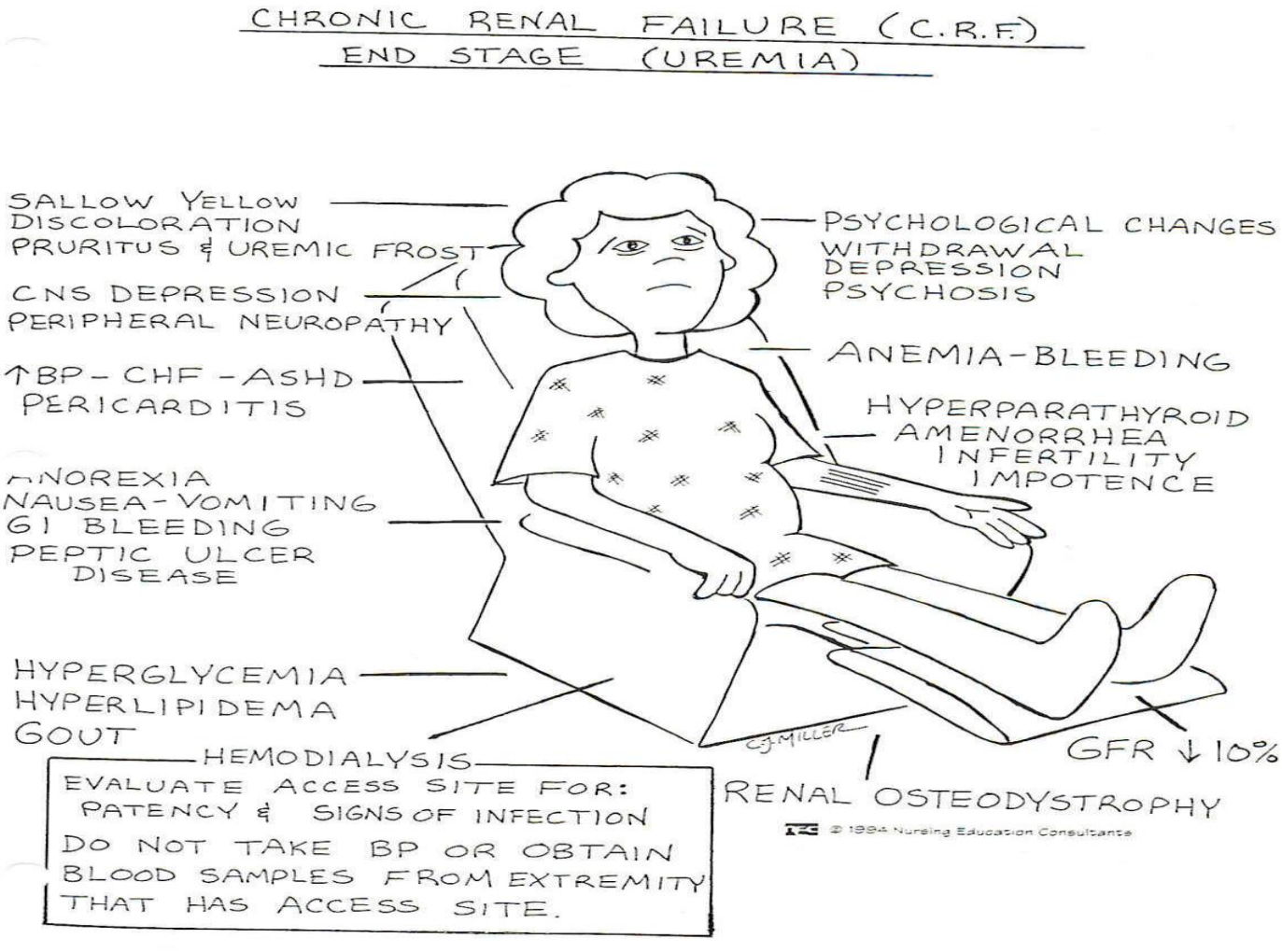
• Loss of muscle strength

• Renal osteodystrophy

• Bone pain

• Bone fractures

• Foot drop



• Lab findings

–BUN – indicator of glomerular filtration rate and is affected by the breakdown of protein.

–Serum creatinine – waste product of skeletal muscle breakdown and is a better indicator of kidney function.

–Creatinine clearance is best determent of kidney function (GFR). Must be a 24 hour urine collection.

• K+

–The kidneys are means which K+ is excreted. Normal is 3.5-5.0 ,mEq/L. maintains muscle contraction and is essential for cardiac function.

–Both elevated and decreased can cause problems with cardiac rhythm

–Hyperkalemia is treated with IV glucose and Na Bicarb which pushes K+ back into the cell

–Kayexalate (Sodium polystyrene sulfonate) is also used to promote the exchange of sodium and potassium in the body.

• Ca^{++}

–With disease in the kidney, the enzyme for utilization of Vit D is absent

–Ca absorption depends upon Vit D

–Also, phosphate level increase leading to decreasing level of Ca

–Parathyroid hormone level increase in attempt to increase calcium, but because of the high phosphorus level, there is limited response.

–Body moves Ca out of the bone to compensate.

–Renal osteodystrophy is the end result

Hypocalcemia = tetany

Parathyroid hormone level increase in attempt to increase calcium, but because of the high phosphorus level, there is limited response.

• Other abnormal findings

–Metabolic acidosis

–Fluid imbalance

–Insulin resistance

–Anemia

–Immunoligical problems

Kidneys cannot excrete wastes or change bicarb levels if needed

Retain Na and water which can elevate B/P

Insulin resistance cells cause rise in glucose which produces more lipids in the liver

Anemia = kidneys produce erythropioetin which is needed to make RBC's

Patients have less resistance to illness

Complications

• Hyperkalemia

• Pericarditis, pericardial effusion, and pericardial tamponade

• Hypertension

• Anemia

• Bone disease and metastatic and vascular calcifications

Hyperkalemia due to decreased excretion, metabolic acidosis, catabolism, and excessive intake (diet, medications, fluids)

Pericarditis, pericardial effusion, and pericardial tamponade due to retention of uremic waste products and inadequate dialysis

Hypertension due to sodium and water retention and malfunction of the renin–angiotensin–aldosterone system

Anemia due to decreased erythropoietin production, decreased RBC life span, bleeding in the GI tract from irritating toxins and ulcer formation, and blood loss during hemodialysis

Bone disease and metastatic and vascular calcifications due to retention of phosphorus, low serum calcium levels, abnormal vitamin D metabolism, and elevated aluminum levels

Medical management

• Calcium carbonate, or calcium acetate: bind to phosphours and decrease its level.

• Antihypertensive and Cardiovascular Agents

• Antiseizure Agents

• Erythropoietin

Nutritional Therapy

• Protein is restricted (allowed protein should be of high biologic value)

• Restrict fluid (500-600 ml/day more than previous day's urine output).

• Restrict K, Na, Phosphorus

• Increase CHO to meat caloric needs

• Vitamin suplements

Protein is restricted because urea, uric acid, and organic acids–the breakdown products of dietary and tissue proteins–accumulate rapidly in the blood when there is impaired renal clearance.

Treatment

• Dialysis

• Transplantation

• Nursing diagnosis

–Excess fluid volume related to decreased urine output, dietary excesses, and retention of sodium and water

–Imbalanced nutrition: less than body requirements related to anorexia, nausea and vomiting, dietary restrictions, and altered oral mucous membranes

Nursing diagnosis

–Deficient knowledge regarding condition and treatment regimen

–Activity intolerance related to fatigue, anemia, retention of waste products, and dialysis procedure

–Risk for situational low self-esteem related to dependency, role changes, changes in body image, and sexual dysfunction

Chronic Renal Failure

• Nursing care: see nursing process below

Dialysis

• Dialysis is used to remove fluid and uremic waste products from the body when the kidneys are unable to do so.

• Chronic: in ESRF when the kidney can't remove waste products.

• Acute: high level of serum K+, fluid overload, or impending pulmonary edema, acidosis, to remove certain medications or other toxins from the blood.

• ½ of patients with CRF eventually require dialysis

• Diffuse harmful waste out of body

• Control BP

• Keep safe level of chemicals in body

• 2 types

–Hemodialysis –Peritoneal dialysis

Principles for dialysis

• Diffusion: toxins and wastes in the blood are removed

• Osmosis: excess water is removed from the blood

• Ultrafiltration: helps water to move faster under high pressure to an area of lower pressure

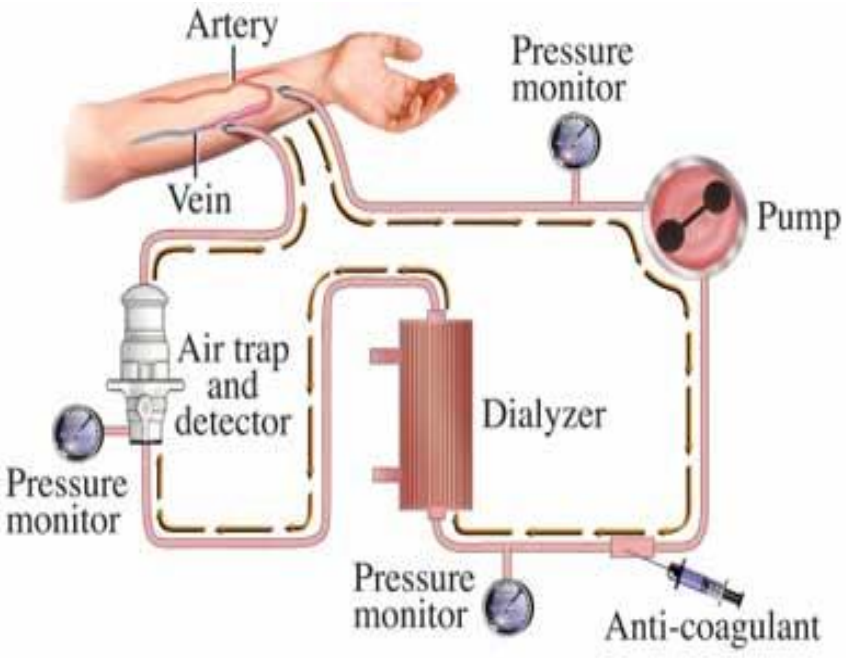
Hemodialysis

• 3-4 times a week

• Takes 2-4 hours

• Machine (dialyzer)

• filters blood and returns it to body



–Vascular access

• Temporary – subclavian or femoral

• Permanent – shunt, in arm

–Care post insertion

–Can be done rapidly

–Takes about 4 hours

–Done 3 times a week

Types of Access

• Temporary site: subclavian or femoral

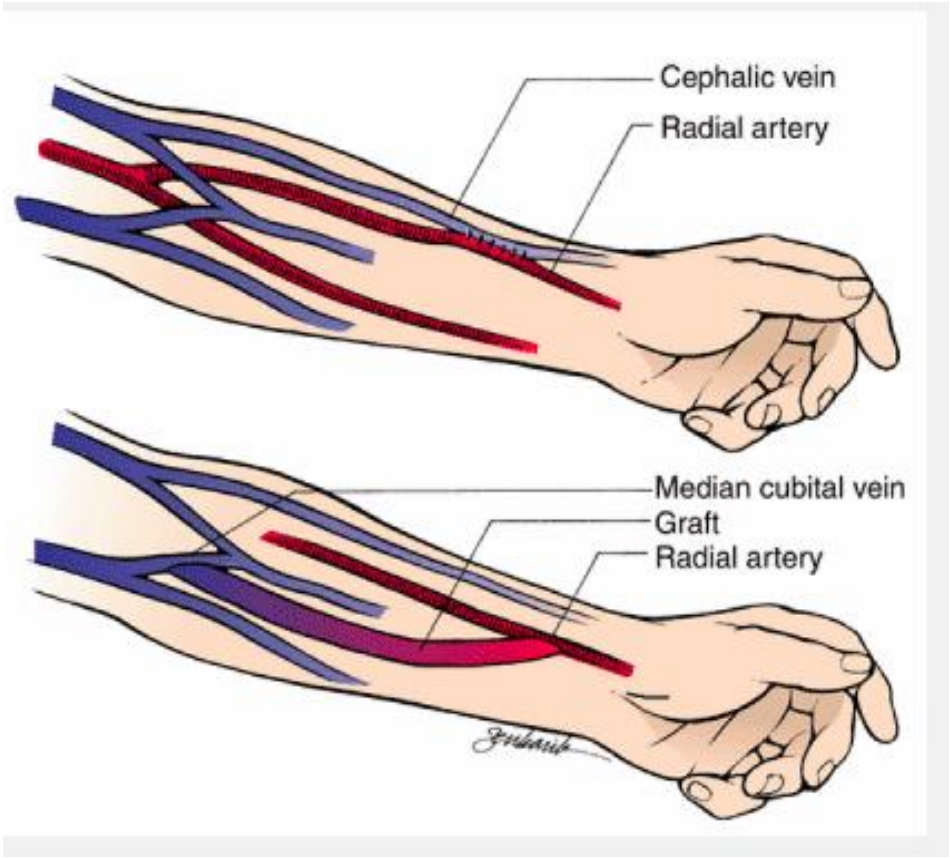
• Permanent: shunt, in arm

• AV fistula

–Surgeon constructs by combining an artery and a vein

–3 to 6 months to mature

AV graft



What This Means for You

• No BP on same arm as fistula

• Protect arm from injury

• Never inject anything into catheter

• Control obvious hemorrhage

–Bleeding will be arterial

–Maintain direct pressure

• No IV on same arm as fistula

• A thrill will be felt – this is normal

Complication of dialysis

• Hypotension

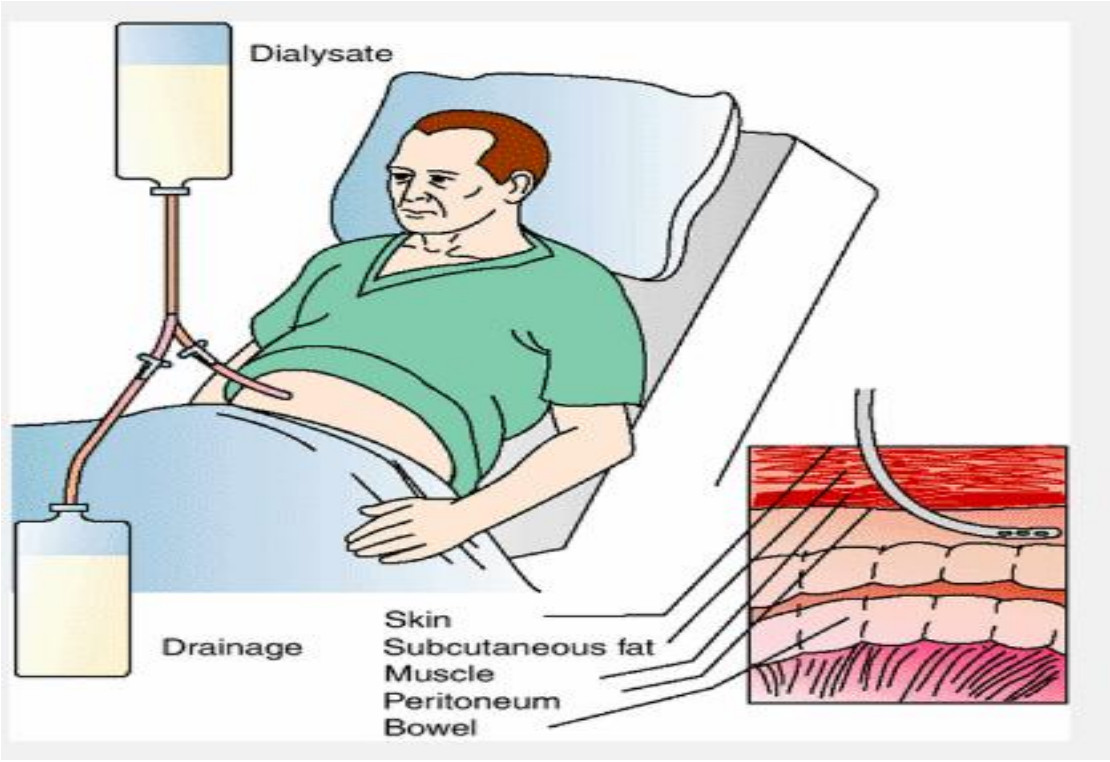
• Painful muscle cramping (due to rapid alterations in electrolyte balance)

• Dysrhythmias may result from electrolyte and pH changes

• Air embolism

• Dialysis disequilibrium results from cerebral fluid shifts.

Peritoneal Dialysis



• Abdominal lining filters blood

• 3 types

–Continuous ambulatory

–Continuous cyclical

–Intermittent

• Peritoneal dialysis

–Semipermeable membrane

–Catheter inserted through abdominal wall into peritoneal cavity

–Cost less

–Fewer restrictions

–Can be done at home

–Risk of peritonitis

–3 phases – inflow, dwell and outflow

• Automated peritoneal dialysis

–Done at home at night

–Maybe 6-7 times /week

• CAPD

–Continous ambulatory peritoneal dialysis

–Done as outpatient

–Usually 4 X/d

Renal Transplant

–Must find donor

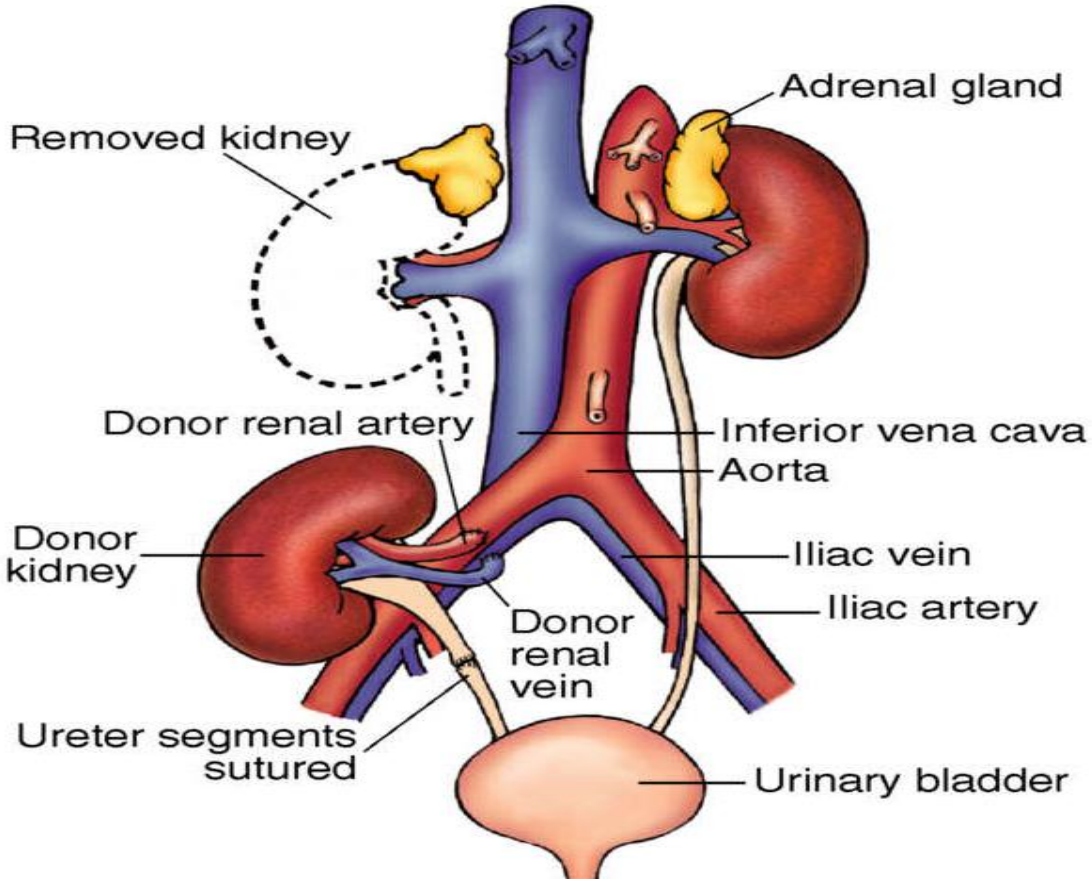
–Waiting period long

–Good survival rate – 1 year 95-97%

–Must take immunosuppressant's for life

–Rejection

• Watch for fever, elevated B/P, and pain over site of new kidney



• **Post op care**

–ICU

–I/O

–B/P

–Weight changes

–Electrolytes

–May have fluid volume deficit

–High risk for infection

Transplant Medications

• Patients have decreased resistance to infection

• Corticosteroids – anti-inflammarory

–Deltosone

–Medrol

–Solu-Medrol

• Cytotoxic – inhibit T and B lymphocytes

–Imuran

–Cytoxan

–Cellcept

• T-cell depressors - Cyclosporin

Renal Trauma

• ? due to rib fractures or fractures vertebrae.

• 80% to 90% of all renal injuries are blunt injuries

• S & S: Pain, hematouria, S & S of shock

• Rx: Bed rest, antibiotics. In sever cases, need surgical repair or ? Nephrectomy.

Plan of Nursing Care the Patient with Chronic Renal Failure

Nursing Diagnosis: Excess fluid volume related to decreased urine output, dietary excesses, and retention of sodium and water Goal: Maintenance of ideal body weight without excess fluid		
Nursing Interventions	**Rationale**	**Expected Outcomes**
1. Assess fluid status: a. Daily weight b. Intake and output balance c. Skin turgor and presence of edema d. Distention of neck veins e. Blood pressure, pulse rate, and rhythm f. Respiratory rate and effort 2. Limit fluid intake to prescribed volume. 3. Identify potential sources of fluid: a. Medications and fluids used to take or administer medications: oral and intravenous b. Foods 4. Explain to patient and family rationale for fluid restriction. 5. Assist patient to cope with the discomforts resulting from fluid restriction. 6. Provide or encourage frequent oral hygiene.	1. Assessment provides baseline and ongoing database for monitoring changes and evaluating interventions. 2. Fluid restriction will be determined on basis of weight, urine output, and response to therapy. 3. Unrecognized sources of excess fluids may be identified. 4. Understanding promotes patient and family cooperation with fluid restriction. 5. Increasing patient comfort promotes compliance with dietary restrictions. 6. Oral hygiene minimizes dryness of oral mucous membranes.	• Demonstrates no rapid weight changes • Maintains dietary and fluid restrictions • Exhibits normal skin turgor without edema • Exhibits normal vital signs • Exhibits no neck vein distention • Reports no difficulty breathing or shortness of breath • Performs oral hygiene frequently • Reports decreased thirst • Reports decreased dryness of oral mucous membranes
Nursing Diagnosis: Imbalanced nutrition; less than body requirements related to anorexia, nausea, vomiting, dietary restrictions, and altered oral mucous membranes **Goal**: Maintenance of adequate nutritional intake		
1. Assess nutritional status: a. Weight changes b. Laboratory values (serum electrolyte, BUN, creatinine, protein, transferrin, and iron levels) 2. Assess patient's nutritional dietary patterns: a. Diet history b. Food preferences c. Calorie counts 3. Assess for factors contributing to altered nutritional intake: a. Anorexia, nausea, or	1. Baseline data allow for monitoring of changes and evaluating effectiveness of interventions. 2. Past and present dietary patterns are considered in planning meals. 3. Information about other factors that may be altered or eliminated to promote adequate dietary intake is provided. 4. Increased dietary intake	• Consumes protein of high biologic value • Chooses foods within dietary restrictions that are appealing • Consumes high-calorie foods within dietary restrictions • Explains in own words rationale for dietary restrictions and relationship to

vomiting b. Diet unpalatable to patient c. Depression d. Lack of understanding of dietary restrictions e. Stomatitis 4. Provide patient's food preferences within dietary restrictions. 5. Promote intake of high biologic value protein foods: eggs, dairy products, meats. 6. Encourage high-calorie, low-protein, low-sodium, and low-potassium snacks between meals. 7. Alter schedule of medications so that they are not given immediately before meals. 8. Explain rationale for dietary restrictions and relationship to kidney disease and increased urea and creatinine levels. 9. Provide written lists of foods allowed and suggestions for improving their taste without use of sodium or potassium. 10. Provide pleasant surroundings at meal-times. 11. Weigh patient daily. 12. Assess for evidence of inadequate protein intake: a. Edema formation b. Delayed wound healing c. Decreased serum albumin levels	is encouraged. 5. Complete proteins are provided for positive nitrogen balance needed for growth and healing. 6. Reduces source of restricted foods and proteins and provides calories for energy, sparing protein for tissue growth and healing. 7. Ingestion of medications just before meals may produce anorexia and feeling of fullness. 8. Promotes patient understanding of relationships between diet and urea and creatinine levels to renal disease. 9. Lists provide a positive approach to dietary restrictions and a reference for patient and family to use when at home. 10. Unpleasant factors that contribute to patient's anorexia are eliminated. 11. Allows monitoring of fluid and nutritional status. 12. Inadequate protein intake can lead to decreased albumin and other proteins, edema formation, and delay in wound healing.	urea and creatinine levels • Takes medications on schedule that does not produce anorexia or feeling of fullness • Consults written lists of acceptable foods • Reports increased appetite at meals • Exhibits no rapid increases or decreases in weight • Demonstrates normal skin turgor without edema; wound healing and acceptable plasma albumin levels
Nursing Diagnosis: Deficient knowledge regarding condition and treatment **Goal:** Increased knowledge about condition and related treatment		
1. Assess understanding of cause of renal failure, consequences of renal failure, and its treatment: a. Cause of patient's renal failure b. Meaning of renal failure c. Understanding of renal function d. Relationship of fluid and	1. Provides baseline for further explanations and teaching. 2. Patient can learn about renal failure and treatment as he or she becomes ready to understand and accept the diagnosis and	• Verbalizes relationship of cause of renal failure to consequences • Explains fluid and dietary restrictions as they relate to failure of kidney's

dietary restrictions to renal failure e. Rationale for treatment (hemodialysis, peritoneal dialysis, transplantation) 2. Provide explanation of renal function and consequences of renal failure at patient's level of understanding and guided by patient's readiness to learn. 3. Assist patient to identify ways to incorporate changes related to illness and its treatment into lifestyle. 4. Provide oral and written information as appropriate about: a. Renal function and failure b. Fluid and dietary restrictions c. Medications d. Reportable problems, signs, and symptoms e. Follow-up schedule f. Community resources g. Treatment options	consequences. 3. Patient can see that his or her life does not have to revolve around the disease. 4. Provides patient with information that can be used for further clarification at home.	regulatory functions • States in own words relationship of renal failure and need for treatment • Asks questions about treatment options, indicating readiness to learn • Verbalizes plans to continue as normal a life as possible • Uses written information and instructions to clarify questions and seek additional information
Nursing Diagnosis: Activity intolerance related to fatigue, anemia, retention of waste products, and dialysis procedure **Goal:** Participation in activity within tolerance		
1. Assess factors contributing to activity intolerance: a. Fatigue b. Anemia c. Fluid and electrolyte imbalances d. Retention of waste products e. Depression 2. Promote independence in self-care activities as tolerated; assist if fatigued. 3. Encourage alternating activity with rest. 4. Encourage patient to rest after dialysis treatments.	1. Indicates factors contributing to severity of fatigue. 2. Promotes improved self-esteem 3. Promotes activity and exercise within limits and adequate rest. 4. Adequate rest is encouraged after dialysis treatments, which are exhausting to many patients.	• Participates in increasing levels of activity and exercise • Reports increased sense of well-being • Alternates rest and activity • Participates in selected self-care activities
Nursing Diagnosis: Risk for situational low self-esteem related to dependency, role changes, change in body image, and change in sexual function Goal: Improved self-esteem		

1. Assess patient's and family's responses and reactions to illness and treatment. 2. Assess relationship of patient and significant family members. 3. Assess usual coping patterns of patient and family members. 4. Encourage open discussion of concerns about changes produced by disease and treatment: a. Role changes b. Changes in lifestyle c. Changes in occupation d. Sexual changes e. Dependence on health care team 5. Explore alternate ways of sexual expression other than sexual intercourse. 6. Discuss role of giving and receiving love, warmth, and affection.	1. Provides data about problems encountered by patient and family in coping with changes in life. 2. Identifies strengths and supports of patient and family. 3. Coping patterns that may have been effective in past may be harmful in view of restrictions imposed by disease and treatment. 4. Encourages patient to identify concerns and steps necessary to deal with them. 5. Alternative forms of sexual expression may be acceptable. 6. Sexuality means different things to different people, depending on stage of maturity.	• Identifies previously used coping styles that have been effective and those no longer possible due to disease and treatment (alcohol or drug use; extreme physical exertion) • Patient and family identify and verbalize feelings and reactions to disease and necessary changes in their lives • Seeks professional counseling, if necessary, to cope with changes resulting from renal failure • Reports satisfaction with method of sexual expression
Collaborative Problems: Hyperkalemia; pericarditis, pericardial effusion, and pericardial tamponade; hypertension; anemia; bone disease and metastatic calcifications **Goal:** Absence of complications		
Hyperkalemia		
1. Monitor serum potassium levels. Notify physician if level greater than 5.5 mEq/L, and prepare to treat hyperkalemia. 2. Assess patient for muscle weakness, diarrhea, ECG changes (tall-tented T waves and widened QRS).	1. Hyperkalemia causes potentially life-threatening changes in the body. 2. Cardiovascular signs and symptoms are characteristic of hyperkalemia.	Patient has normal potassium level Experiences no muscle weakness or diarrhea. Exhibits normal ECG pattern Vital signs are within normal limits
Pericarditis, Pericardial Effusion, and Pericardial Tamponade		
1. Assess patient for fever, chest pain, and a pericardial friction rub (signs of pericarditis) and, if present, notify physician. 2. If patient has pericarditis, assess for the following every 4 hours: a. Paradoxical pulse > 10 mm Hg b. Extreme hypotension	1. About 30%–50% of chronic renal failure patients develop pericarditis due to uremia; fever, chest pain, and a pericardial friction rub are classic signs. 2. Pericardial effusion is a	• Has strong and equal peripheral pulses • Absence of a paradoxical pulse • Absence of pericardial effusion or tamponade on cardiac ultrasound

c. Weak or absent peripheral pulses d. Altered level of consciousness e. Bulging neck veins 3. Prepare patient for cardiac ultrasound to aid in diagnosis of pericardial effusion and cardiac tamponade. 4. If cardiac tamponade develops, prepare patient for emergency pericardiocentesis.	common fatal sequela of pericarditis. Signs of an effusion include a paradoxical pulse (> 10 mm Hg drop in blood pressure during inspiration) and signs of shock due to compression of the heart by a large effusion. Cardiac tamponade exists when the patient is severely compromised hemodynamically. 3. Cardiac ultrasound is useful in visualizing pericardial effusions and cardiac tamponade. 4. Cardiac tamponade is a life-threatening condition, with a high mortality rate. Immediate aspiration of fluid from the pericardial space is essential.	• Patient has normal heart sounds
Hypertension		
1. Monitor and record blood pressure as indicated. 2. Administer antihypertensive medications as prescribed. 3. Encourage compliance with dietary and fluid restriction therapy. 4. Teach patient to report signs of fluid overload, vision changes, headaches, edema, or seizures.	1. Provides objective data for monitoring. Elevated levels may indicate non-adherence to the treatment regimen. 2. Antihypertensive medications play a key role in treatment of hypertension associated with chronic renal failure. 3. Adherence to diet and fluid restrictions and dialysis schedule prevents excess fluid and sodium accumulation. 4. These are indications of in-adequate control of hypertension and the need to alter therapy.	• Blood pressure within normal limits • Reports no headaches, visual problems, or seizures • Edema is absent • Demonstrates compliance with dietary and fluid restrictions
Anemia		

1. Monitor RBC count, hemoglobin, and hematocrit levels as indicated. 2. Administer medications as prescribed, including iron and folic acid supplements, Epogen, and multivitamins. 3. Avoid drawing unnecessary blood specimens. 4. Teach patient to prevent bleeding: avoid vigorous nose blowing and contact sports, and use a soft toothbrush. 5. Administer blood component therapy as indicated.	1. Provides assessment of degree of anemia. 2. RBCs need iron, folic acid, and vitamins to be produced. Epogen stimulates the bone marrow to produce RBC. 3. Anemia is worsened by drawing numerous specimens. 4. Bleeding from anywhere in the body worsens anemia. 5. Blood component therapy may be needed if the patient has symptoms.	• Patient has a normal skin color without pallor • Exhibits hematology values within acceptable limits • Experiences no bleeding from any site
Bone Disease and Metastatic Calcifications		
1. Administer the following medications as prescribed: phosphate binders, calcium supplements, vitamin D supplements. 2. Monitor serum lab values as indicated (calcium, phosphorus, aluminum levels) and report abnormal findings to physician. 3. Assist patient with an exercise program.	1. Chronic renal failure causes numerous physiologic changes affecting calcium, phosphorus, and vitamin D metabolism. 2. Hyperphosphatemia, hypocalcemia, and excess aluminum accumulation are common in chronic renal failure. 3. Bone demineralization increases with immobility.	• Exhibits serum calcium, phosphorus, and aluminum levels within acceptable ranges • Exhibits no symptoms of hypocalcemia • Has no bone demineralization on bone scan • Discusses importance of maintaining activity level and exercise program

Chapter 45

Management of Patients with Urinary Disorders

Lower Urinary Tract Infections

• **Cystitis** (inflammation of the urinary bladder),

• **Prostatitis** (inflammation of the prostate gland), and

• **Urethritis** (inflammation of the urethra).

• **Upper UTI**; Pylonephritis (inflammation of the renal pelvis), interstitial nephritis (inflammation of the kidney), and renal abscesses

Lower Urinary Tract Infections

• Mechanisms maintain the sterility of the bladder:

–the physical barrier of the urethra,

–urine flow,

–ureterovesical junction competence,

–various antibacterial enzymes and antibodies, and antiadherent effects mediated by the mucosal cells of the bladder.

Risk Factors for UTI

• Inability or failure to empty the bladder completely

• Obstructed urinary flow

• Decreased natural host defenses or immunosuppression

• Instrumentation of the urinary tract (eg, catheterization, cystoscopic procedures)

• Inflammation or abrasion of the urethral mucosa

–Contributing conditions: DM, Pregnancy, neurogenic disorders, Gout, and altered states caused by incomplete emptying of the bladder and urinary stasis

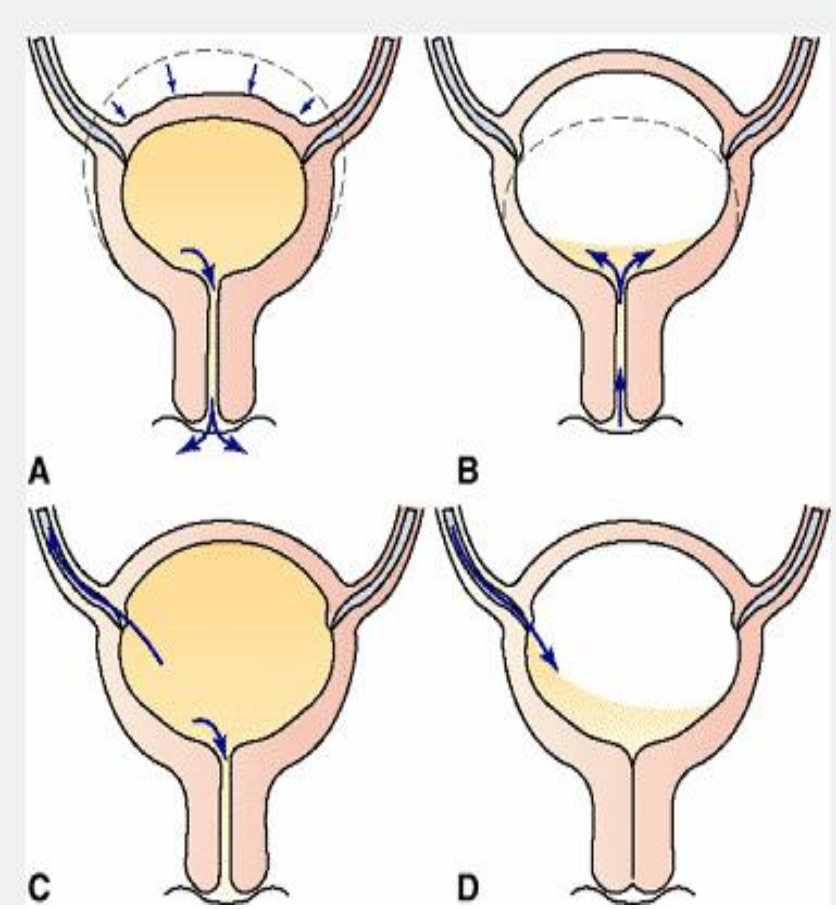
Pathophysiology

• Bacteria gain access to the bladder, attach to and colonize the epithelium of the urinary tract to avoid being washed out with voiding, evade host defense mechanisms, and initiate inflammation.

• Many UTIs result from fecal organisms that ascend from the perineum to the urethra and the bladder and then adhere to the mucosal surfaces.

• Escherichia coli is the most common agent

• Urethrovesical reflux: With coughing and straining, bladder pressure rises, which may force urine from the bladder into the urethra. (A) When bladder pressure returns to normal, the urine flows back to the bladder (B), which introduces bacteria from the urethra to the bladder. Ureterovesical reflux: With failure of the ureterovesical valve, urine moves up the ureters during voiding (C) and flows into the bladder when voiding stops (D). This prevents complete emptying of the bladder. It also leads to urinary stasis and contamination of the ureters with bacteria-laden urine.



Routes of Infection

• Transurethral route (ascending infection),

• Through the bloodstream (hematogenous spread), or

• By means of a fistula from the intestine (direct extension)

Clinical Manifestations

• About half of all patients with bacteriuria have no symptoms.

• dysuria (painful or difficult urination), burning on urination, frequency (voiding more than every 3 hours), urgency, nocturia, incontinence, and suprapubic or pelvic pain. Hematuria and back pain may also be present

Gerontologic Considerations

• High incidence of chronic illness

• Frequent use of antimicrobial agents

• Presence of infected pressure ulcers

• Immunocompromise

• Cognitive impairment

• Immobility and incomplete emptying of bladder

• Use of a bedpan rather than a commode or toilet

Diagnosis

• UA: puss cells > 4, ? hematouria

• C&S.

• WBCs

Medical Management

• Pharmacological agents according to C&S

• Patient should be instructed to complete the antibiotic course

UTIs – Nursing Care

• Assessment

• Impaired Urinary Elimination

• Readiness for Enhanced Self Health Management

• Teaching

Acute Pyelonephritis

• Clinical Manifestations

–Chills, fever, leukocytosis, bacteriuria and pyuria.

–Low back pain, flank pain, nausea and vomiting, headache, malaise, and painful urination are common findings.

–Pain and tenderness in the area of the costovertebral angle

–Symptoms of lower UTI

Medical managmenet

• On outpatient basis: AB for 2 weeks

• Good oral hydration

• If there is a relapse, AB for 6 weeks

• If there is N&V > admission, IV Fluids and IV AB

Chronic Pyelonephritis

• Clinical Manifestations

• Usually asymptomatic unless an acute exacerbation occurs.

• Noticeable S&S may include fatigue, headache, poor appetite, polyuria, excessive thirst, and weight loss.

• Persistent and recurring infection may produce progressive scarring of the kidney resulting in renal failure

Urinary Incontinence

• Involuntary urination

• Causes of Transient Incontinence: DIAPPERS

–Delirium

–Infection of urinary tract

–Atrophic vaginitis, urethritis

–Pharmacologic agents (anticholinergics, sedatives, analgesics, diuretics, muscle relaxants, adrenergic

–Psychological factors (depression, regression)

–Excessive urine production (increased intake, diabetes insipidus, diabetic ketoacidosis)

–Restricted activity

–Stool impaction

Urinary Incontinence

• Types

1. **Stress incontinence** is the involuntary loss of urine through an intact urethra as a result of sneezing, coughing, or changing position

2. **Urge incontinence** is the involuntary loss of urine associated with a strong urge to void that cannot be suppressed. The patient is aware of the need to void but is unable to reach a toilet in time

3. **Reflex incontinence** is the involuntary loss of urine due to hyperreflexia in the absence of normal sensations usually associated with voiding. This commonly occurs in patients with spinal cord injury because they have neither neurologically mediated motor control of the detrusor nor sensory awareness of the need to void

4. **Overflow incontinence** is the involuntary loss of urine associated with overdistention of the bladder. Such overdistention results from the bladder's inability to empty normally, despite frequent urine loss. Both neurologic abnormalities (eg, spinal cord lesions) and factors that obstruct the outflow of urine (eg, tumors, strictures, and prostatic hyperplasia) can cause overflow incontinence

5. **Functional incontinence** refers to those instances in which lower urinary tract function is intact but other factors, such as severe cognitive impairment (eg, Alzheimer's dementia), make it difficult for the patient to identify the need to void or physical impairments make it difficult or impossible

6. **Iatrogenic incontinence** refers to the involuntary loss of urine due to extrinsic medical factors, predominantly medications. One such example is the use of alpha-adrenergic agents to decrease blood pressure.

7. **Mixed**

Urinary Incontinence - Treatment

• Medications

–Anticholinergic agents

–alpha-adrenergic

–Estrogen therapy

• Surgery

–Bladder neck suspension

–Prostatectomy

• Behavioral modification

–Kegal exercise

–Fluid management

–Timed voiding (? Every 2 hours)

Urinary Retention

• Occurs when bladder cannot empty

• May be caused by obstructive or functional problem

–Benign prostatic hypertrophy

–Surgery

–Drugs

–Neurologic diseases

–Trauma

Urinary retention may result from diabetes, prostatic enlargement, urethral pathology (infection, tumor, calculus), trauma (pelvic injuries), pregnancy, or neurologic disorders such as stroke, spinal cord injury, multiple sclerosis, or Parkinson's disease.

Urinary Retention -Manifestations

–Overflow voiding (dribbling, frequency)

–Incontinence

–S & S of UTI

• hematuria, urgency, frequency, nocturia, and dysuria

–Firm, distended bladder

• May be displaced

Urinary Retention/ Complications

–Hydronephrosis

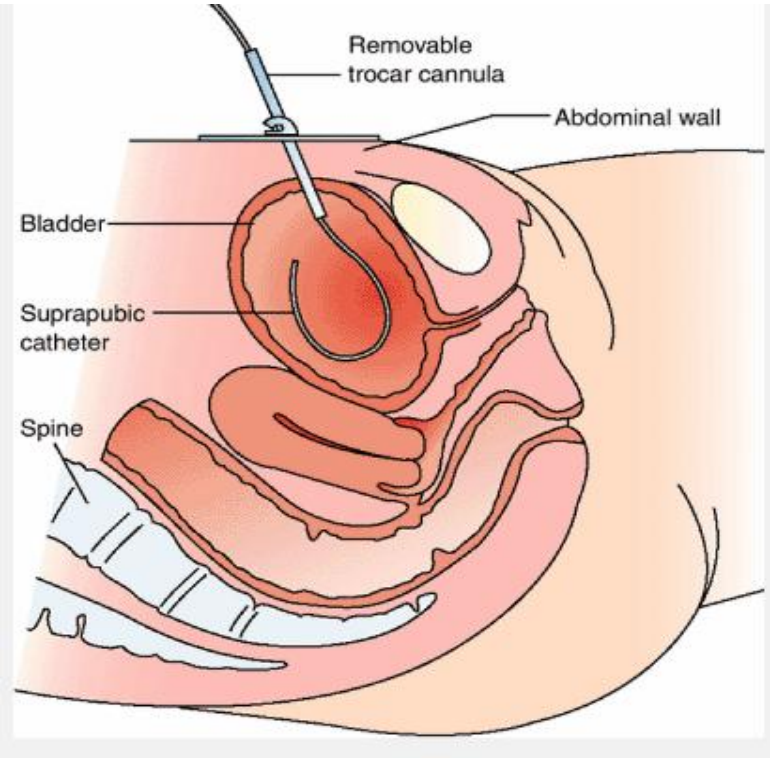
–Acute renal failure

–Urinary tract infection which may lead to urolithiasis or nephrolithiasis

Suprapubic Catheters

• Is a temporary measure to divert the flow of urine from the urethra when the urethral route is impassable

• Inserting a catheter into the bladder through a suprapubic incision or puncture.



Hydronephrosis, Hydroureter, and Urethral Stricture

• Outflow obstruction

–Urethral stricture

• Causes bladder distention and progresses to the ureters and the kidneys

–Hydronephrosis –

• Kidney enlarges as urine collects in the pelvis and kidney tissue due to obstruction in the outflow tract

• Over a few hours this enlargement can damage the blood vessels and the tubules

–Hydroureter

• Effects are similar, but occurs lower in the ureter

Causes of Obstruction

• Tumor

• Stones

• Congenital structural defects

• Fibrosis

• Treatment with radiation in pelvis

Complication of Obstruction

• If untreated, permanent damage can occur within 48 hours

• Renal failure

–Retention of

• Nitrogenous wastes (urea, creatinine, uric acid)

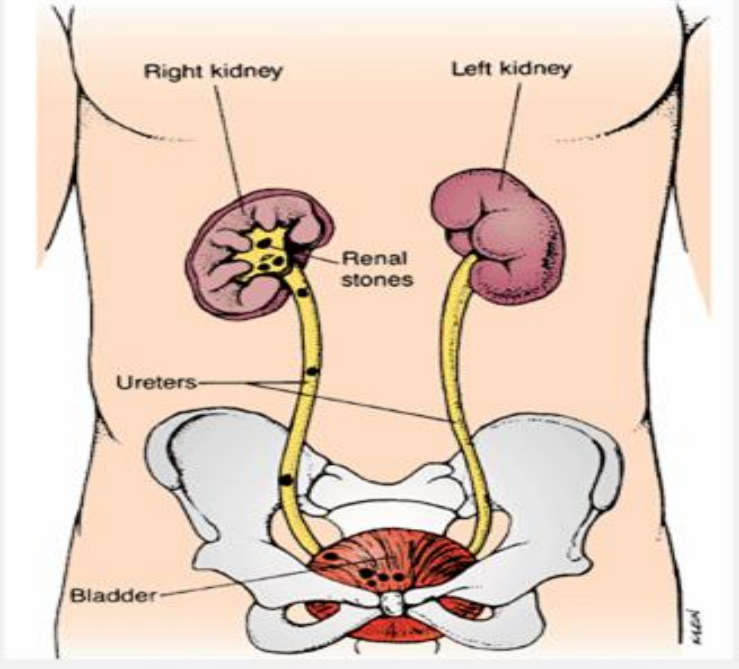
• Electrolytes (K, Na, Cl, and Phosphorus)

• Acid base balance impaired

Renal Calculi

• Called nephrolithiasis or urolithiasis

• Most commonly develop in the renal pelvis but can be anywhere in the urinary tract



• Vary in size –from very large to tiny

• Can be 1 stone or many stones

• May stay in kidney or travel into the ureter

• Can damage the urinary tract

• May cause hydronephrosis

• More common in white males 30-50 years of age

• Predisposing factors

–Dehydration

–Prolonged immobilization

–Infection

–Obstruction

–Anything which causes the urine to be alkaline

–Metabolic factors

- Excessive intake of calcium, calcium based antacids or Vit D
- Hyperthyroidism
- Elevated uric acid

Dehydration and immobilization causes urinary concentration and pooling of calculus forming substances

Urine should be acidic

Alkaline urine- bacteria (proteus, klebsiella, and pseudmonas

• Subjective symptoms

–Sever pain in the flank area, suprapubic area, pelvis or external genitalia

–May radiate anteriorly and downward toward the bladder in females and toward the testis in males.

–If in ureter, may have spasms called “renal colic”

–Urgency, frequency of urination

–N/V

–Chills

• Objective symptoms

–Increased temperature

–Pallor

–Hematuria

–Abdominal distention

–Pyuria

–Anuria

–May have UTI on urinalysis

Renal Calculi- Manifestations

• Kidney/Pelvis

–May be asymptomatic

–Dull, aching flank pain

• Ureter

–Acute severe flank pain, may radiate

–Nausea/vomiting

–Pallor

–Hematuria

• Bladder

–May be asymptomatic

–Dull suprapubic pain

–Hematuria

• Diagnostic procedures

–Urinalysis with C & S

–KUB

–IVP

–Renal CT

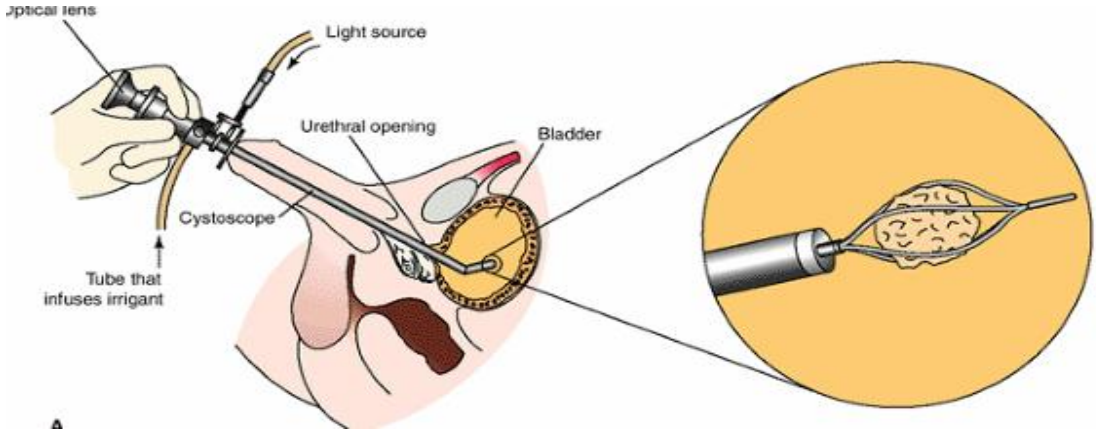
–Kidney ultrasound

–Cystoscopy with retrograde pyleogram

• **Treatment**

–Most (> 1 cm) are passed without intervention

–May need cystospy-- with basket retrieval



Lithotripsy : Extracorporeal shock wave lithotripsy (ESWL) is the non-invasive treatment of urinary calculosis and biliary calculi to fragment the stone

Lithotripsy – patient placed in bath of water and stone located by ultrasound and a series of shock waves disintegrates the stone

usually given anesthesia due to pain from shock waves

stone is passed through the urine (may take 1-4 weeks)

may need stents inserted prior to procedure to allow for passage of stones

urine will be bright red then back to normal

usually antibiotics will be given for prevention

–Lasertripsy: stone and is destroyed by the laser

• Lithotomy: surgical removal of stone

–Pylelolithotomy – removal from renal pelvis

–Urolithotomy – removal from the ureter

–Nephrolithotomy – removal from kidney

Nutritional Therapy

• Calcium Stones

–? Restrict Ca, protein, and Na. liberal amount of water.

• Uric Acid Stones

–low-purine diet to reduce urinary excretion of uric acid (shellfish, mushrooms, and organ meats), limit protein, Allopurinol.

• Avoid food contain oxylate: spinach, strawberries, chocolate, tea, peanuts, and wheat bran

Historically, patients with calcium-based renal stones were advised to restrict calcium in their diet. However, recent evidence has questioned the advisability of this practice, except for patients with type II absorptive hypercalciuria (half of all patients with calcium stones), in whom stones are clearly due to excess dietary calcium.

It is thought that a high-protein diet is associated with increased urinary excretion of calcium and uric acid, thereby causing a supersaturation of these substances in the urine. Similarly, a high sodium intake has been shown in some studies to increase the amount of calcium in the urine.

Foods high in purine (shellfish, anchovies, asparagus, mushrooms, and organ meats) are avoided

Renal Calculi/ Assessment

–History and physical exam

–Location, severity, and nature of pain

–I/O

–Vital signs, looking for fever

–Palpation of flank area, and abdomen

–? N/V

• Nursing interventions

–Primary is to treat pain – usually with opioids

–Ambulate

–Force fluids, may have IV

• Watch for fluid overload

–Strain urine – send stone to lab if passed

–Accurate I/O

–Medicate N/V

Renal Calculi/Surgical removal

–Routine pre and post op care

–May return with catheter, drains, nephrostomy tube and ureteral stent – must maintain patency and may need to irrigate as ordered

–Measure drainage from all tubes – need at least 30 cc/hr

–Watch site for bleeding

–May need frequent dressing changes due to fluid leakage, or may have collection bag

• **Discharge and prevention**

–Continue to force fluids post discharge

–May need special diet

• Stones are analyzed for calcium or other minerals

• May need to watch products with calcium

Cancer of the Urinary Tract

• Bladder cancer

• Kidney tumors

Bladder Cancer

• Bladder cancer is 4th leading cause of cancer deaths.

• More common in men than women

• Cancers arising from the prostate, colon, and rectum in males and from the lower gynecologic tract in females may metastasize to the bladder

Risk factor for bladder cancer

• Cigarette smoking: risk increase with number of years and packs smoked

• Exposure to environmental carcinogens: dyes, rubber, leather, ink, or paint

• Recurrent or chronic bacterial infection of the urinary tract

• Bladder stones

• High urinary pH

• High cholesterol intake

• Pelvic radiation therapy

Bladder Cancer -Manifestations

- Painless hematuria
- Frequency
- Urgency
- Dysuria

Diagnostic tests

–Bladder ultrasound
–Urinalysis
–Urine cytology
–Cystoscopy
–Biopsy

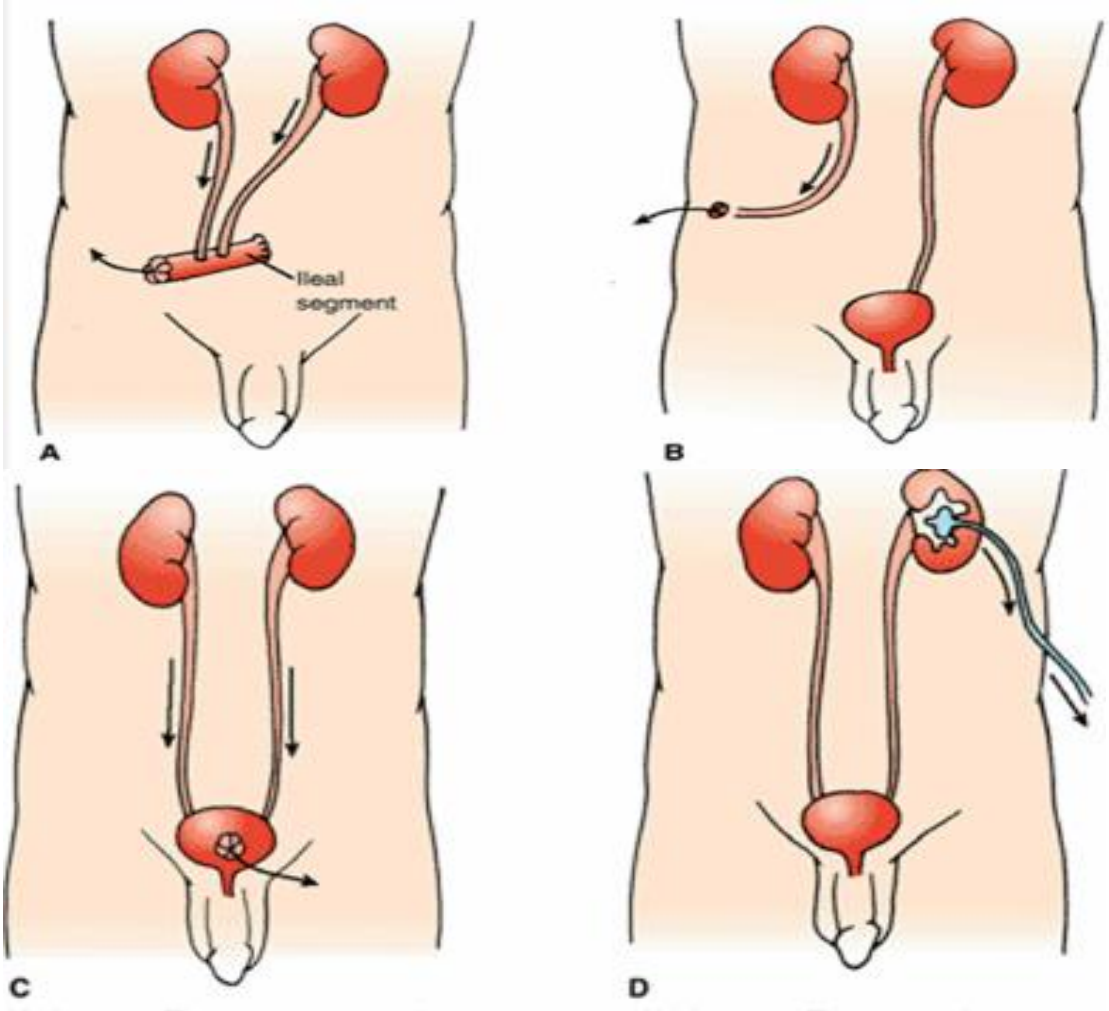
Treatment

–Medications

–Surgery: remove tumor or bladder, Urinary Diversions

Cutaneous Urinary Diversions

A. conventional ileal conduit, B. cutaneous ureterostomy
C. vesicostomy D. nephrostomy

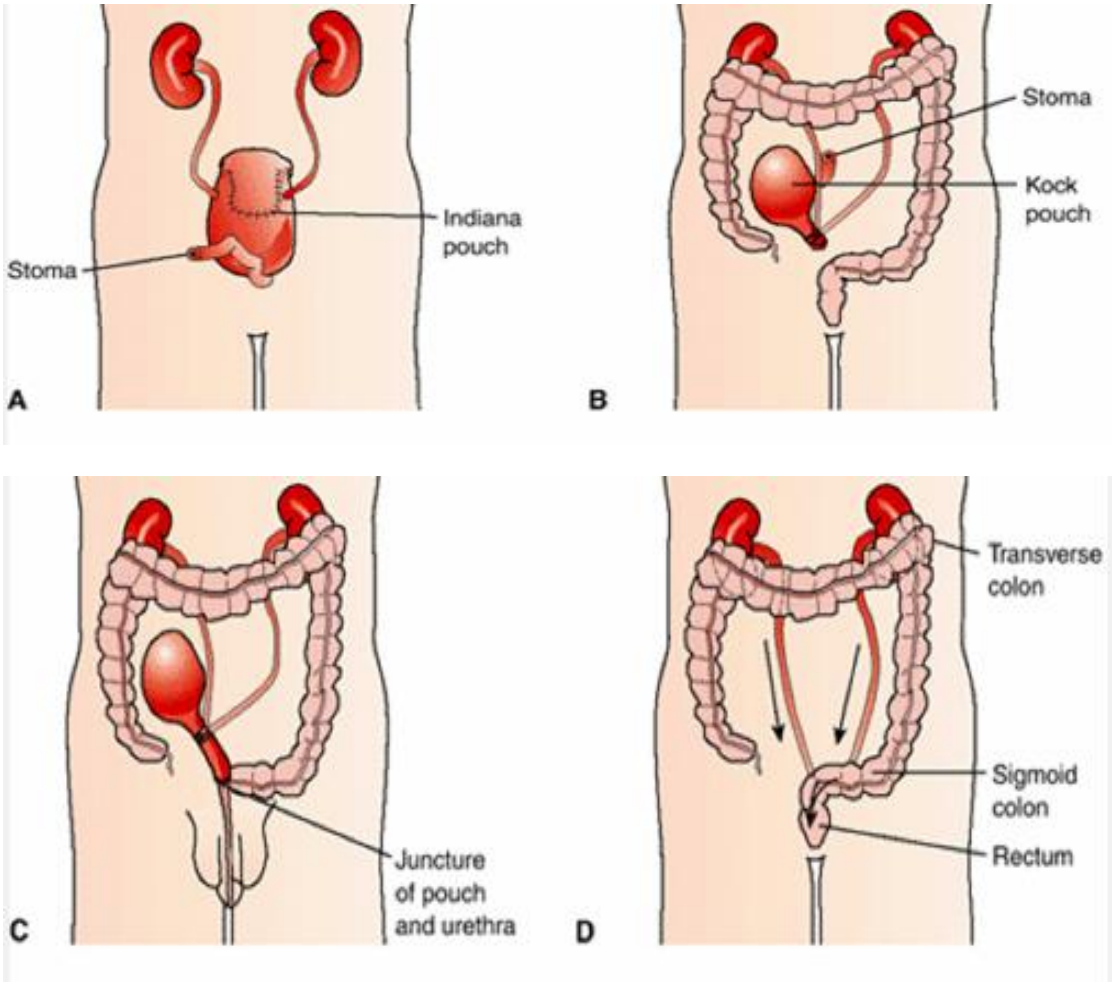


Continent urinary diversions

A. Indiana pouch

B & C the Kock pouch, also called a continent ileal diversion

D. Ureterosigmoido-stomy.



Kidney Tumors

• Uncommon

• Renal cell carcinoma most common primary tumor

• Can occur anywhere, Often metastasize

• Risk factors

–Smoking

–Obesity

–Renal calculi

Kidney Tumors -Manifestations

• May be silent

• Flank pain

• Palpable mass

• Fever, fatigue

• Weight loss, anemia, polycythemia

• Hypercalcemia, hypertension, or hyperglycemia

Kidney Tumors –Interdisciplinary Care

• Diagnostic tests

–Renal ultrasound

–CT scan

–Kidney biopsy

• Treatment: Radical nephrectomy

Bladder and Kidney Cancer – Nursing Care

• Assessment

• Diagnosing, Planning, and Implementing

–Impaired Urinary Elimination

–Risk for Impaired Skin Integrity

–Disturbed Body Image

• Diagnosing, Planning, and Implementing

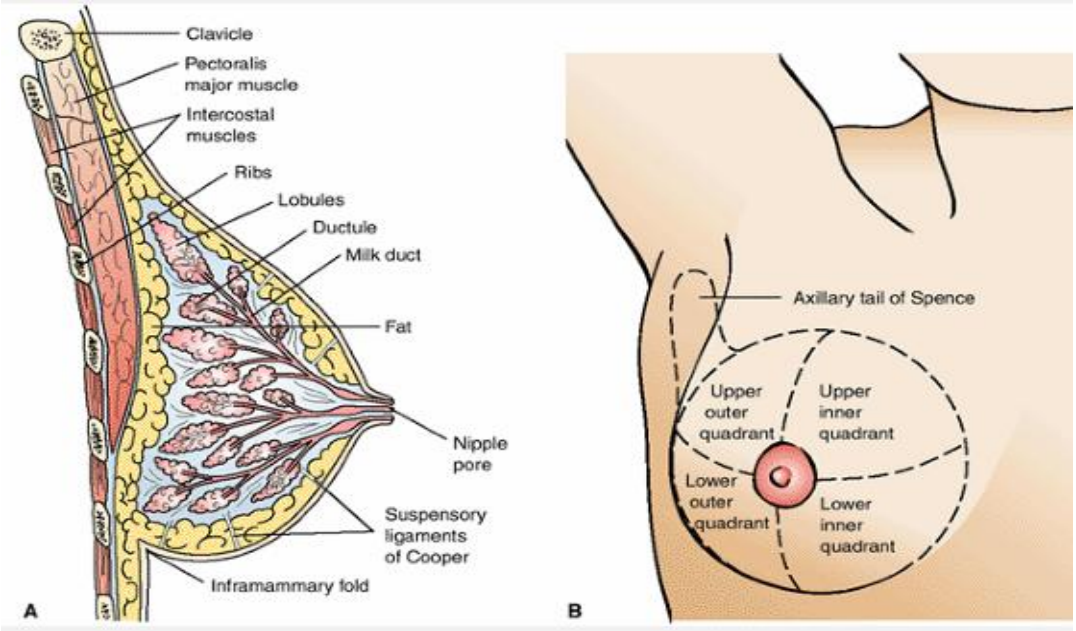
–Acute Pain

–Ineffective Breathing Pattern

–Disturbed Body Image

Chapter 48

Assessment and Management of Patients with Breast Disorders

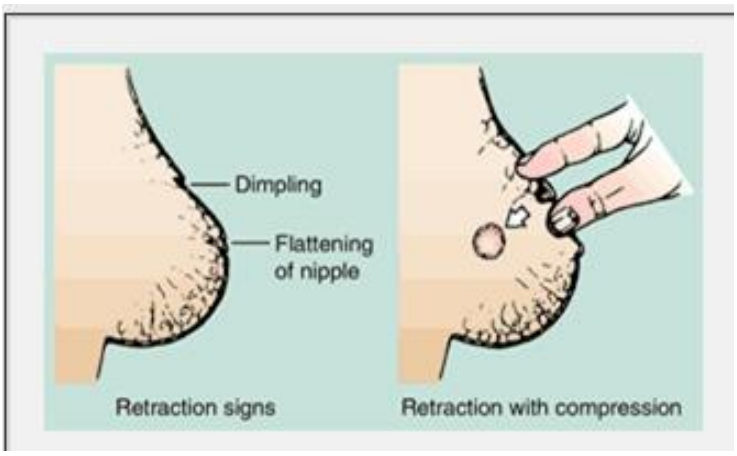


Assessment

- Health History

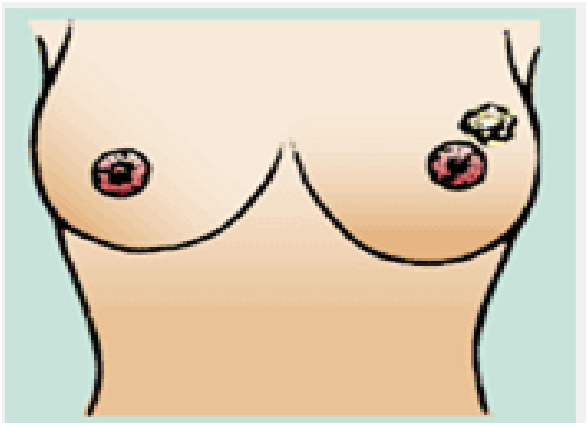
Physical Assessment/ Inspection

- Retraction Signs
- Signs include skin dimpling, creasing, or changes in the contour of the breast or nipple
- Secondary to fibrosis or scar tissue formation in the breast
- Retraction signs may appear only with position changes or with breast palpation.



Breast Cancer Mass (Malignant Tumor)

- Usually occurs as a single mass (lump) in one breast
- Firm, hard, embedded in surrounding tissue
- Referral and biopsy indicated for definitive diagnosis
- Usually nontender
- Irregular shape



Breast Cyst (Benign Mass)

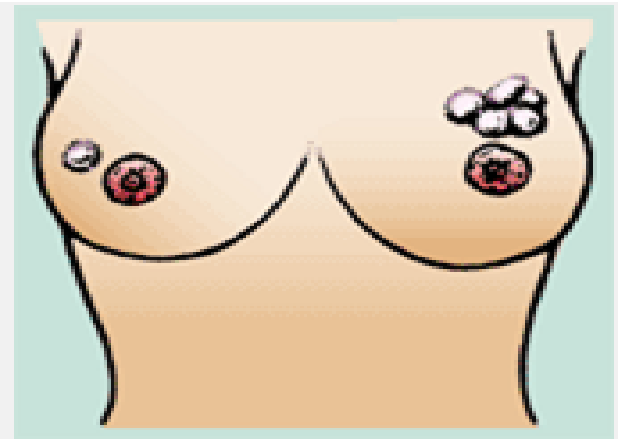
Occur as single or multiple lumps in one or both breasts

Usually tender (omitting caffeine reduces tenderness); tenderness increases during premenstrual period

Round shape

Soft or firm, mobile

Referral and biopsy indicated for definitive diagnosis, especially for first mass.



Fibroadenoma (Benign Breast Lump)

Usually occurs as a single mass in women aged 15–35 years

Usually nontender

May be round or lobular

Firm, mobile, and not fixed to breast tissue or chest wall

No premenstrual changes

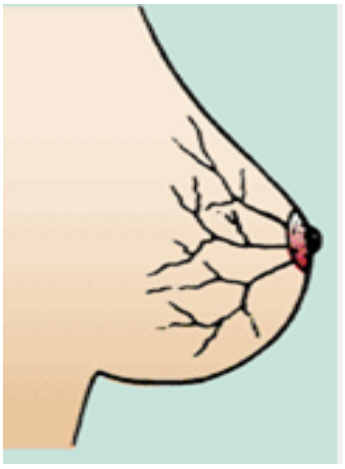
Referral and biopsy indicated for definitive diagnosis

- ***Increased Venous Prominence***

Associated with breast cancer if unilateral

Unilateral localized increase in venous pattern associated with malignant tumors

Normal with breast enlargement associated with pregnancy and lactation if bilateral and bilateral symmetry



- ***Peau d'Orange (Edema)***

Associated with breast cancer

Caused by interference with lymphatic drainage

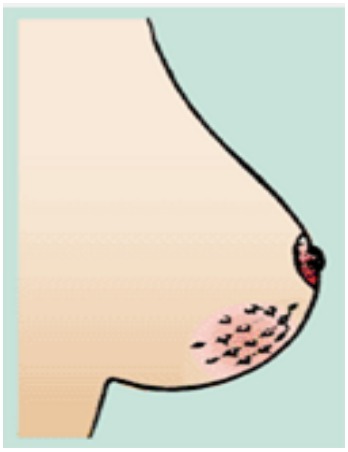
Breast skin has orange peel appearance

Skin pores enlarge

May be noted on the areola

Skin becomes thick, hard, immobile

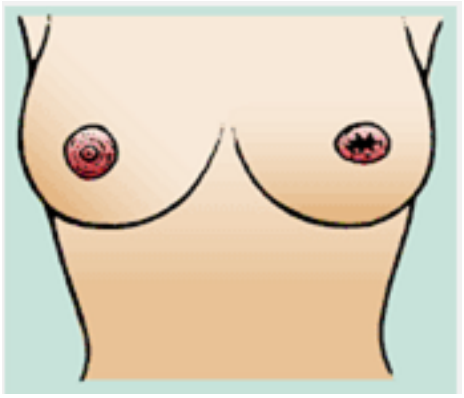
Skin discoloration may occur



- ***Nipple Inversion***

  Considered normal if long-standing

  Associated with fibrosis and malignancy if recent development



- ***Acute Mastitis (Inflammation of the Breasts)***

  Associated with lactation but may occur at any age

  Nipple cracks or abrasions noted

  Breast skin reddened and warm to touch

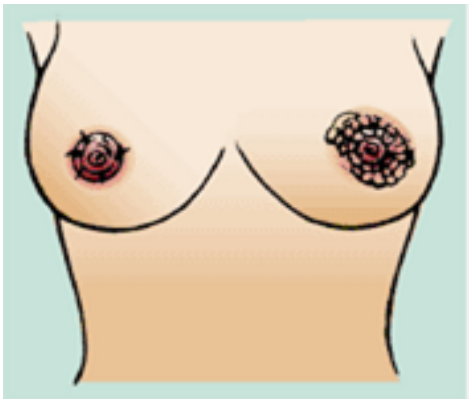
  Tenderness

  Systemic signs include fever and increased pulse

- ***Paget Disease (Malignancy of Mammary Ducts)***

  Early signs: erythema of nipple and areola

  Late signs: thickening, scaling, and erosion of the nipple and areola



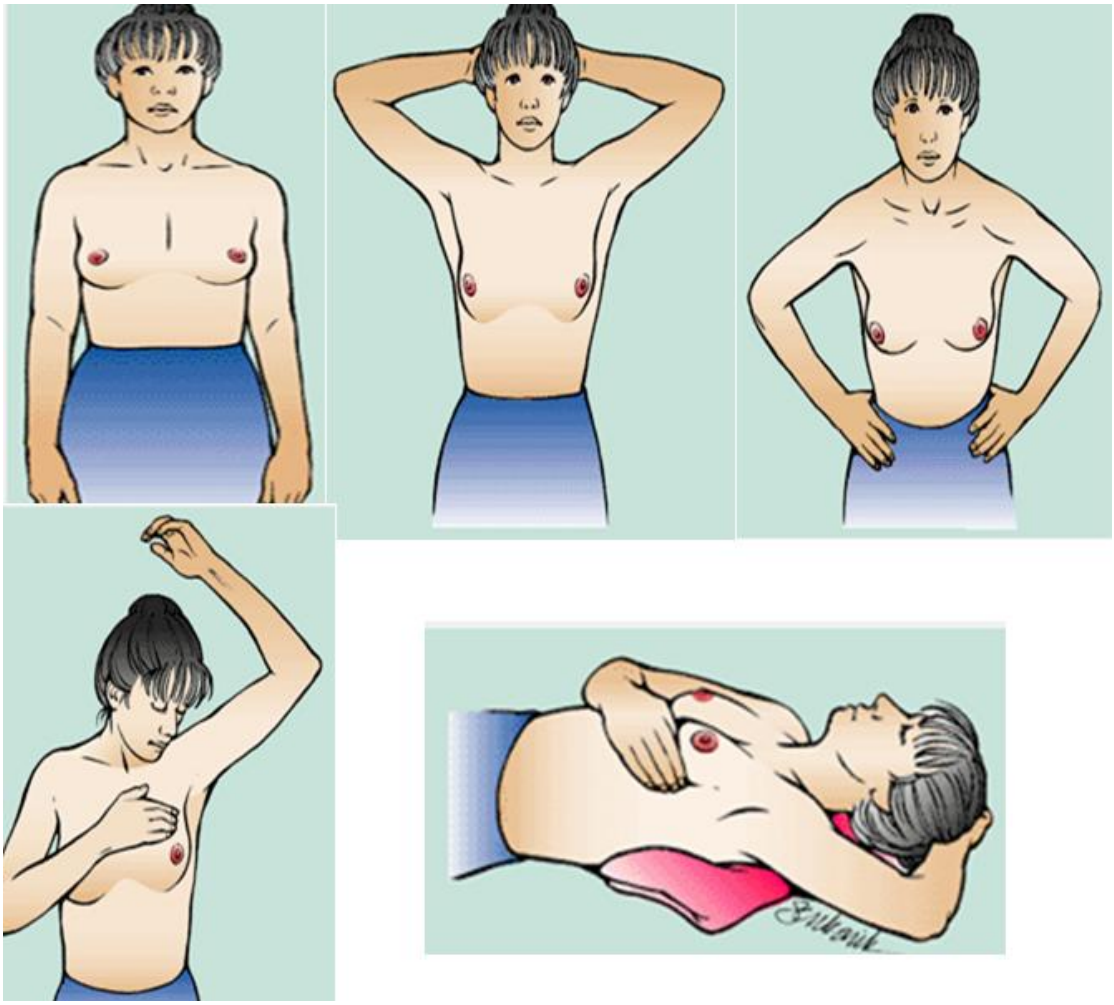
Diagnostic Evaluation

Breast Self-Examination (BSE)

Done on day 5-7 of menstrual cycle (some changes in breast occur due to hormones around menstruation)

Breast examination with the woman in a supine position. The entire surface of the breast is palpated from the outer edge of the breast to the nipple. Alternative palpation patterns are circular or clockwise, wedge, and vertical strip.

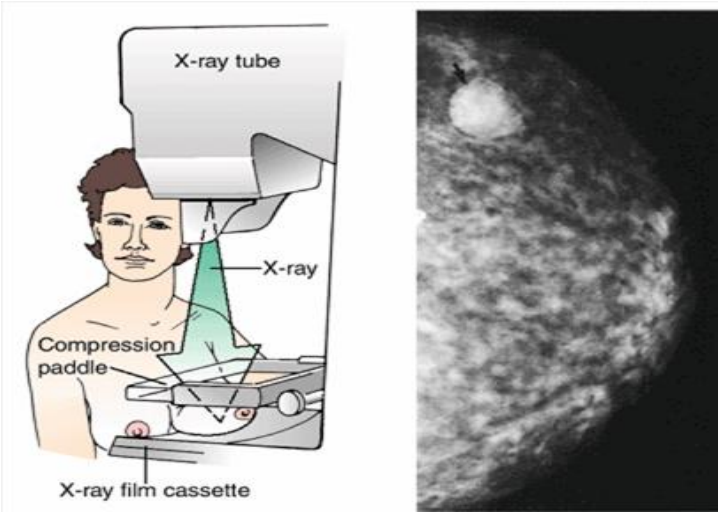
Breast-Self Examination



Diagnostic Evaluation Mammography

Detect nonpalpable lesions (< 1 cm) and assist in diagnosing palpable masses

Recommended to be done every year beginning at 40 years of age (women with family history, start at younger age)



Diagnostic Evaluation

Magnetic Resonance Imaging

Procedures for Tissue Analysis

Percutaneous Biopsy

Fine-Needle Aspiration

Surgical Biopsy

- Excisional Biopsy
- Incisional Biopsy

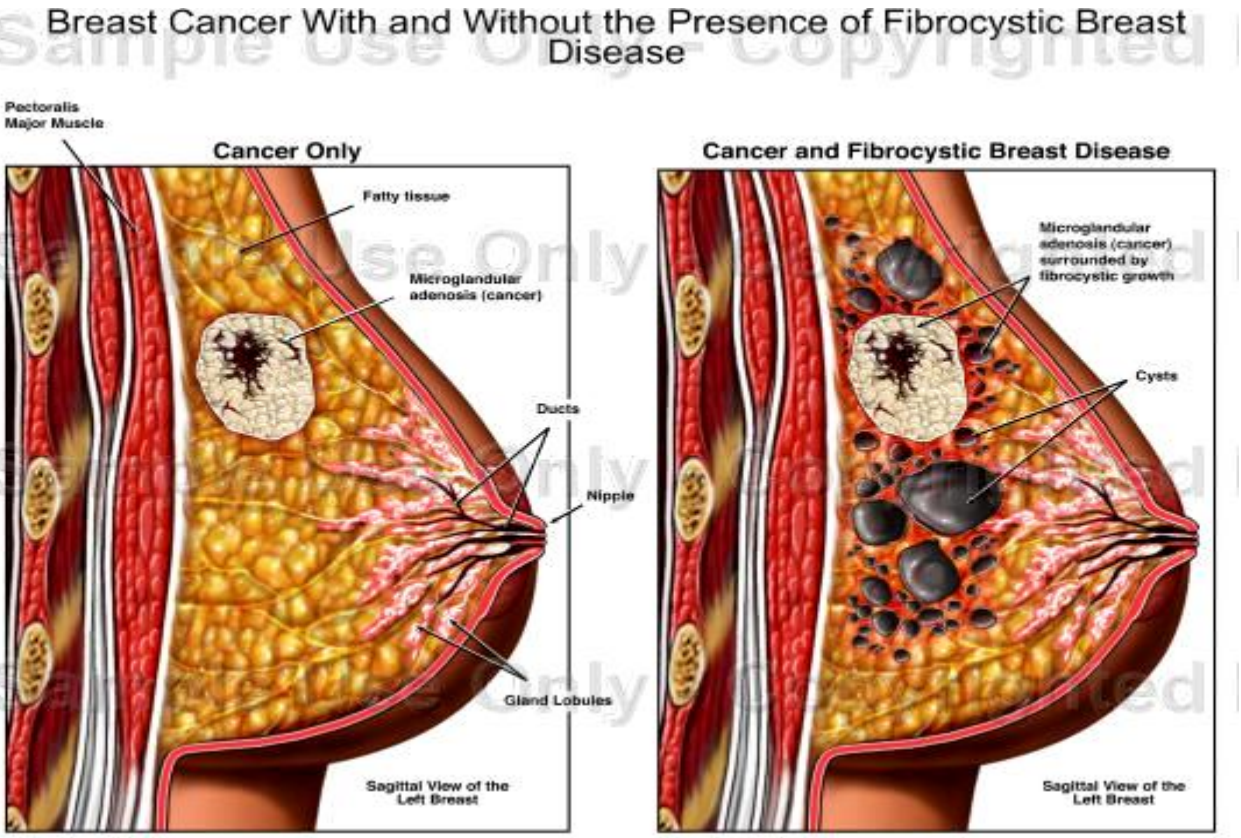
Comparison of Various Breast Masses

The most common breast masses are due to cysts, fibroadenomas, or malignancy. Biopsy is usually needed for confirmation, but the following characteristics are diagnostic clues:

Characteristics	Cysts	Fibroadenomas	Malignancy
			
Age	30–55 years, regress after menopause except with use of estrogen therapy	Puberty to menopause	30–90 years; most common, 40–80 years
Number	Single or multiple	Usually single	Usually single
Shape	Round	Round, disk, or lobular	Irregular or stellate
Consistency	Soft to firm, usually elastic	Usually firm	Firm or hard
Mobility	Mobile	Mobile	May be fixed to skin or underlying tissues
Tenderness	Usually tender	Usually nontender	Usually nontender
Retraction signs	Absent	Absent	May be present

Benign Neoplasms: Fibrocystic Breast Disease (FBD)

Also called chronic mastitis or lumpy breast syndrome, it is the most common breast lesion in females and usually occurs between ages 35 and 50. Many cases will subside after menopause.



Benign Neoplasms: Fibrocystic Breast Disease (FBD)

Incidence of developing breast cancer is increased 3 to 4 times with FBD.

Pathology

Cause is unknown; possible hormonal imbalance

Condition occurs during reproductive years and disappears with menopause

A benign condition affecting 25% of women over 30 years of age

Signs and symptoms

Subjective: breast tenderness and pain

Objective: small, round, smooth nodules

Diagnostic tests and methods

Mammography, thermomastography, xerography

Treatment: conservative

Aspiration

Biopsy examination to rule out malignancy

Nursing intervention

Explain importance of monthly breast self-examination

Encourage patient to seek medical evaluation if nodule forms, because cystic disease may interfere with early diagnosis of breast malignancy

Malignant Neoplasms: Breast Cancer

Second major cause of cancer death among women. Statistics indicate that 1 in 10 will develop cancer sometime during her life.

The key to cure is early detection by physical examination, mammography, and breast self-examination.

Risk factors for Breast Cancer

Female gender

Increasing age

Personal history of breast cancer

Family history of breast cancer

Genetic mutations (BRCA-1 and BRCA-2 mutations are responsible for majority of inherited breast cancer cases)

Late menopause

Nulliparity

Hormonal factors: Early menarche, First child after 30 years of age, Hormone therapy (HT)

Exposure to ionizing radiation during adolescence and early adulthood

History of benign proliferative breast disease

Obesity

High-fat diet (controversial)

Alcohol intake

Protective Factors

Regular exercise (after age of 35, strenuous excursive ∨ chance for BC by 14%.

Breastfeeding

Having completed a full-term pregnancy before 30 years of age

Types of Breast Cancer

1. Ductal Carcinoma in Situ

Characterized by the proliferation of malignant cells inside the milk ducts without invasion into the surrounding tissue.

It is a noninvasive form of cancer (also called intraductal carcinoma).

If not treated, ? become invasive cancer

2. Infiltrating Ductal Carcinoma

Is the most common histologic type of breast cancer.

Accounts for 75% of all cases.

The tumors arise from the duct system and invade the surrounding tissues.

They often form a solid irregular mass in the breast.

Other types of breast cancer

3. Infiltrating Lobular Carcinoma (5-10%)

Infiltrating lobular carcinoma accounts for 5% to 10% of breast cancers. The tumors arise from the lobular epithelium and typically occur as an area of ill-defined thickening in the breast. They are often multicentric and can be bilateral.

4. Medullary Carcinoma (5%)

Medullary carcinoma accounts for about 5% of breast cancers, and it tends to be diagnosed more often in women younger than 50 years. The tumors grow in a capsule inside a duct. They can become large and may be mistaken for a fibroadenoma. The prognosis is often favorable.

5. ***Mucinous Carcinoma (3%)***

   Mucinous carcinoma accounts for about 3% of breast cancers and often presents in postmenopausal women 75 years and older. A mucin producer, the tumor is also slow-growing and thus the prognosis is more favorable than in many other types.

6. ***Tubular Ductal Carcinoma (2%)***

   Tubular ductal carcinoma accounts for about 2% of breast cancers. Because axillary metastases are uncommon with this histology, prognosis is usually excellent.

7. ***Inflammatory Carcinoma (2%)***

   Inflammatory carcinoma is a rare (1% to 2%) and aggressive type of breast cancer that has unique symptoms. The cancer is characterized by diffuse edema and brawny erythema of the skin, often referred to as peau d'orange (resembling an orange peel). This is due to malignant cells blocking the lymph channels in the skin. An associated mass may or may not be present; if there is, it is often a large area of indiscrete thickening. Inflammatory carcinoma can be confused with an infection because of its presentation. The disease can spread to other parts of the body rapidly. Chemotherapy often plays an initial role in controlling disease progression, but radiation and surgery may also be useful.

8. ***Paget Disease (1%)***

   Paget disease of the breast accounts for 1% of diagnosed breast cancer cases. Symptoms typically include a scaly, erythematous, pruritic lesion of the nipple. Paget disease often represents ductal carcinoma in situ of the nipple but may have an invasive component. Mammography should be performed followed by a biopsy of the involved skin area.

Signs and symptoms

Subjective: nontender nodule

Objective:

- Enlarged axillary nodes
- Nipple retraction or elevation
- Skin dimpling
- Nipple discharge
- Usually appeal in the upper outer quadrant

Diagnostic tests and methods: Mammography, breast biopsy examination

Treatment

1. ***Lumpectomy:*** removal of the lump and partial breast tissue; indicated for early detection
2. ***Mastectomy***

   • **Simple mastectomy**: removal of breast

   • **Modified radical mastectomy**: removal of breast, pectoralis minor muscle, and some of an adjacent lymph nodes

   • **Radical mastectomy:** removal of the breast, pectoral muscles, pectoral fascia, and axillary lymph node dissection

3. ***Other Surgical procedures***

   • Oophorectomy, adrenalectomy, hypophysectomy to remove source of estrogen and the hormones that stimulate the breast tissue

4. ***Radiation therapy*** to destroy malignant residual malegnant cells
5. ***Chemotherapeutic agents*** to shrink, retard, and destroy cancer growth
6. ***Corticosteroids, antigens, and anti-estrogens*** to alter cancer that is dependent on hormonal environment

Collaborative Problems/Potential Complications

Based on the assessment data, potential complications may include the following:

Lymphedema

Hematoma/seroma formation

Infection

Preoperative Nursing Diagnosis

Deficient knowledge about the planned surgical treatments

Anxiety related to the diagnosis of cancer

Fear related to specific treatments and body image changes

Risk for ineffective coping (individual or family) related to the diagnosis of breast cancer and related treatment options

Decisional conflict related to treatment options

Preoperative Nursing Interventions

Providing Education and Preparation About Surgical Treatments

Reducing Fear and Anxiety and Improving Coping Ability

Promoting Decision-Making Ability

Breast Cancer/ Postoperative Nursing Diagnosis

Pain and discomfort related to surgical procedure

Disturbed sensory perception related to nerve irritation in affected arm, breast, or chest wall

Disturbed body image related to loss or alteration of breast

Risk for impaired adjustment related to the diagnosis of cancer and surgical treatment

Self-care deficit related to partial immobility of arm

Risk for sexual dysfunction related to loss of body part, change in self-image, and fear of partner's responses

Deficient knowledge: drain management after breast surgery

Deficient knowledge: arm exercises to regain mobility of affected extremity

Deficient knowledge: hand and arm care after an axillary lymph node dissection (ALND)

Postoperative Nursing Interventions

Relieving Pain and Discomfort

Managing Postoperative Sensations

Promoting Positive Body Image

Promoting Positive Adjustment and Coping

Monitoring and Managing Potential Complications

Lymphedema

Occurs in about 10% to 30% of patients who undergo ALND and in about 0% to 7% of patients who have SLNB

lymphatic channels become inadequate to ensure a return flow of lymph fluid to the general circulation.

Risk factors: age, obesity, extensive axillary disease, radiation treatment, and injury or infection to the extremity

Edema resolved after development of collateral circulation.

Postoperative transient edema develops until collateral circulation has completely taken over this function, which generally occurs within a month. Performing prescribed exercises, elevating the arm above the heart several times a day, and gentle muscle pumping (making a fist and releasing) can help reduce the transient edema. The patient needs reassurance that this transient swelling is not lymphedema

Hand and Arm Care After Axillary Lymph Node Dissection

Avoid BP, injections, and blood draws in affected arm.

Use sunscreen for extended exposure to sun.

Apply insect repellent to avoid insect bites.

Wear gloves for gardening.

Use cooking mitt for removing objects from oven.

Avoid cutting cuticles; push them back during manicures.

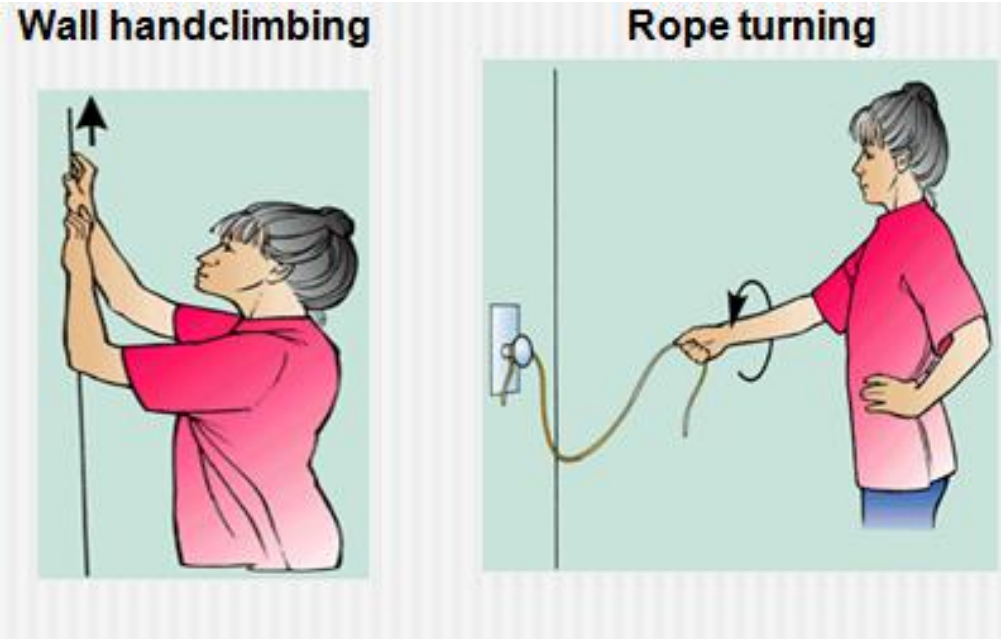
Use electric razor for shaving armpit.

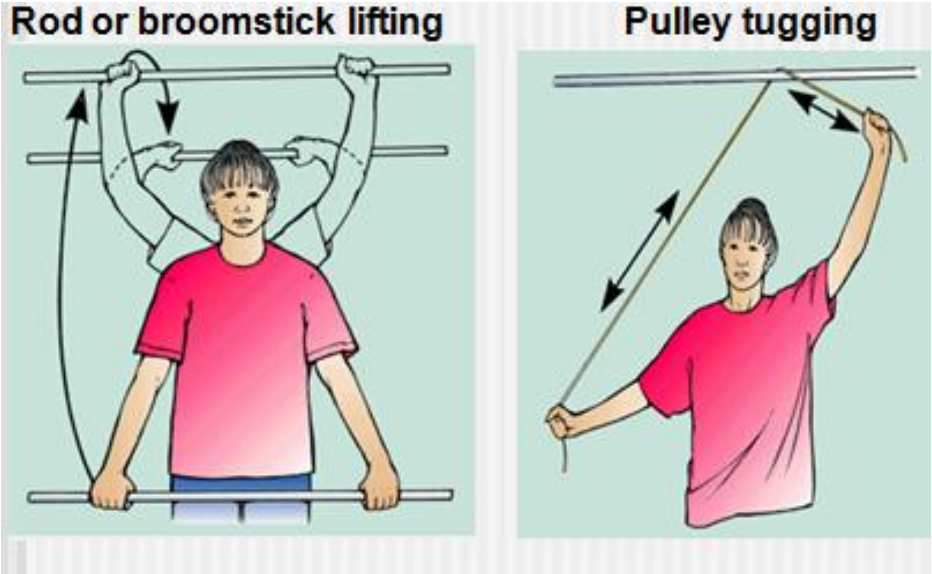
Avoid lifting objects greater than 2-4 kg.

If a trauma or break in the skin occurs, wash the area with soap and water, and apply an antibacterial ointment.

Observe the area and extremity for 24 hours; if redness, swelling, or a fever occurs, call the surgeon or nurse.

Post-op arm exercise





Nursing intervention

Provide atmosphere of acceptance, frequent patient contact, and encouragement in illness adjustment

Encourage grooming activities

Arrange attractive environment

If the patient is receiving radiation or chemotherapy, explain and assist with potential side effects

If the patient has undergone surgical intervention, follow post operative nursing actions

• Elevate affected arm above level of right atrium to prevent edema

• Drawing blood or administering parenteral fluids or taking blood pressure on affected arm is contraindicated

• Monitor dressing for hemorrhage, observed back for pooling of blood

• Empty Hemovac and measure drainage every 8 hours

• Assess circulatory status of affected limb

• Measure upper arm and forearm, twice daily, to monitor edema

• Encourage exercises of the affected arm when approved by a physician; avoid abduction

Patient teaching on discharge

- Exercise to tolerance
- Sleep with arm elevated
- Elevated arm several times daily
- Avoid injections, vaccinations, IV, and taking blood pressure, in affected arm

Malignant Neoplasms: Breast Cancer

Five year survival rate is 97% for localized cancer, 76% for cancer that has spread regionally, and 21% for cancers having distant metastases.

Metastatic breast cancer to the back

Male Breast Cancer

Accounts for less than 1% of all cases of breast cancer

Average age at diagnosis is 67 years

Risk factors:

A history of mumps orchitis,

Radiation exposure,

Decreased testosterone levels

Liver disease (compromises estrogen metabolism).

Nursing Process
The Patient Undergoing Surgery for Breast Cancer

Assessment

The health history is a valuable tool to assess the patient's reaction to the diagnosis and her ability to cope with it. Pertinent questions include the following:

- How is the patient responding to the diagnosis?
- What coping mechanisms does she find most helpful?
- What psychological or emotional supports does she have and use?
- Is there a partner, family member, or friend available to assist her in making treatment choices?
- What are her educational needs?
- Is she experiencing any discomfort?

Diagnosis

Preoperative Nursing Diagnoses

Based on the health history and other assessment data, major preoperative nursing diagnoses may include the following:

- Deficient knowledge about the planned surgical treatments
- Anxiety related to the diagnosis of cancer
- Fear related to specific treatments and body image changes
- Risk for ineffective coping (individual or family) related to the diagnosis of breast cancer and related treatment options
- Decisional conflict related to treatment options

Postoperative Nursing Diagnoses

Based on the health history and other assessment data, major postoperative nursing diagnoses may include the following:

- Pain and discomfort related to surgical procedure
- Disturbed sensory perception related to nerve irritation in affected arm, breast, or chest wall
- Disturbed body image related to loss or alteration of the breast
- Risk for impaired adjustment related to the diagnosis of cancer and surgical treatment
- Self-care deficit related to partial immobility of upper extremity on operative side
- Risk for sexual dysfunction related to loss of body part, change in self-image, and fear of partner's responses
- Deficient knowledge: drain management after breast surgery
- Deficient knowledge: arm exercises to regain mobility of affected extremity
- Deficient knowledge: hand and arm care after an axillary lymph node dissection (ALND)

Collaborative Problems/Potential Complications

Based on the assessment data, potential complications may include the following:

- Lymphedema
- Hematoma/seroma formation
- Infection

Planning and Goals

The major goals may include increased knowledge about the disease and its treatment; reduction of preoperative and postoperative fear, anxiety, and emotional stress; improvement of decision-making ability; pain management; improvement in coping abilities; improvement in sexual function; and the absence of complications.

Preoperative Nursing Interventions

Providing Education and Preparation About Surgical Treatments

Patients with newly diagnosed breast cancer are expected to absorb an abundance of new information during a very emotionally difficult time. The nurse plays a key role in reviewing treatment options by reinforcing information provided to the patient and answering any questions. The nurse fully prepares the patient for what to expect before, during, and after surgery. Patients undergoing breast conservation with ALND, or a total or modified radical mastectomy, generally remain in the hospital overnight (or longer if they have immediate reconstruction). Surgical drains will be inserted in the mastectomy incision and in the axilla if the patient undergoes an ALND. A surgical drain is generally not needed after a SLNB. The patient should be informed that she will go home with the drain(s) and that complete instructions about drain care will be provided prior to discharge. In addition, the patient should be informed that she will often have decreased arm and shoulder mobility after an ALND and that she will be shown range-of-motion exercises prior to discharge. The patient should also be reassured that appropriate analgesia and comfort measures will be provided to alleviate any postoperative discomfort.

Reducing Fear and Anxiety and Improving Coping Ability

The nurse must help the patient cope with the physical as well as the emotional effects of surgery. Many fears may emerge during the preoperative phase. These can include fear of pain, mutilation (after mastectomy), and loss of sexual attractiveness; concern about inability to care for oneself and one's family; concern about taking time off from work; and coping with an uncertain future. Providing the patient with realistic expectations about the healing process and expected recovery can help alleviate fears. Maintaining open communication and assuring the patient that she can contact the nurse at any time with questions or concerns can be a source of comfort. The patient should also be made aware of available resources at the treatment facility as well as in the breast cancer community such as social workers, psychiatrists, and support groups. Some women find it helpful and reassuring to talk to a breast cancer survivor who has undergone similar treatments.

Promoting Decision-Making Ability

The patient may be eligible for more than one therapeutic approach; she may be presented with treatment options and then asked to make a choice. This can be very frightening for some patients, and they may prefer to have someone else make the decision for them (e.g., surgeon, family member). The nurse can be instrumental in ensuring that the patient and family members truly understand their options. The nurse can then help the patient weigh the risks and benefits of each option. The patient may be presented with the option of having breast conservation treatment followed by radiation or a mastectomy. The nurse can explore the issues with the individual patient by asking questions such as the following:

- How would you feel about losing your breast?
- Are you considering breast reconstruction?
- If you choose to retain your breast, would you consider undergoing radiation treatments 5 days a week for 5 to 6 weeks?

Questions such as these can help the patient focus. Once the patient's decision is made, it is very important to support it.

Postoperative Nursing Interventions

Relieving Pain and Discomfort

Many patients tolerate the breast surgery quite well and have minimal pain during the postoperative period. This is particularly true of the less invasive procedures such as breast conservation treatment with SLNB. However, all patients must be carefully assessed, because individual patients can have varying degrees of pain. Patients who have had more invasive procedures such as a modified radical mastectomy with immediate reconstruction may have considerably more pain. All patients are discharged home with analgesic medication (e.g., oxycodone and acetaminophen [Percocet] or propoxyphene and acetaminophen [Darvocet]) and are encouraged to take it if needed. An over-the-counter analgesic such as acetaminophen may provide sufficient relief. Sometimes patients complain of a slight increase in pain after the first few days of surgery; this may occur as patients regain sensation around the surgical site and become more active. However, patients who report excruciating pain must be evaluated to rule out any potential complications such as infection or a hematoma. Alternative methods of pain management such as taking warm showers and using distraction methods (eg, guided imagery) may also be helpful.

Managing Postoperative Sensations

Because nerves in the skin and axilla are often cut or injured during breast surgery, patients experience a variety of sensations. Common sensations include tenderness, soreness, numbness, tightness, pulling, and twinges. These sensations may occur along the chest wall, in the axilla, and along the inside aspect of the upper arm. After mastectomy, some patients experience phantom sensations and report a feeling that the breast and/or nipple are still present. Overall, patients do not find these sensations severe or distressing (Baron et al., 2004). Sensations usually persist for several months and then begin to diminish, although some may persist for as long as 2 years and possibly longer. Patients should be reassured that this is a normal part of healing and that these sensations are not indicative of a problem.

Promoting Positive Body Image

Patients who have undergone mastectomy often find it very difficult to view the surgical site for the first time. No matter how prepared the patient may think she is, the appearance of an absent breast can be very emotionally distressing. Some patients who have undergone breast conservation treatment may find it difficult to view their surgical incisions, although this is rare. Ideally, the patient sees the incision for the first time when she is with the nurse or another health care provider who is available for support.

The nurse first assesses the patient's readiness and provides gentle encouragement. It is important to maintain a patient's privacy while assisting her as she views the incision; this allows her to express feelings safely to the nurse. Asking the patient what she perceives, acknowledging her feelings, and allowing her to express her emotions are important nursing actions. Reassuring the patient that her feelings are a normal response to breast cancer surgery may be comforting. If the patient has not had immediate reconstruction, providing her with a temporary breast form to place in her bra on discharge can help alleviate feelings of embarrassment or self-consciousness.

Promoting Positive Adjustment and Coping

Providing ongoing assessment of how the patient is coping with her diagnosis of breast cancer and her surgical treatment is important in determining her overall adjustment. Assisting the patient in identifying and mobilizing her support systems can be beneficial to her well-being. The patient's spouse or partner may need guidance,

support, and education as well. The patient and partner may benefit from a wide network of available community resources, including the Reach to Recovery program of the ACS, advocacy groups, or a spiritual advisor. Encouraging the patient to discuss issues and concerns with other patients who have had breast cancer may help her to understand that her feelings are normal and that other women who have had breast cancer can provide invaluable support and understanding.

The patient may also have considerable anxiety about the treatments that will follow surgery (i.e., chemotherapy and radiation) and their implications. Providing her with information about the plan of care and referring her to the appropriate members of the health care team also promote coping during recovery. Some women require additional support to adjust to their diagnosis and the changes that it brings. If a woman displays ineffective coping, consultation with a mental health practitioner may be indicated. Table 48-5 summarizes the needs and nursing interventions for patients and their partners at various stages of the breast cancer experience. Chart 48-6 provides strategies for initiating conversations with patients and their partners during different phases of therapy.

Improving Sexual Function

Once discharged from the hospital, most patients are physically allowed to engage in sexual activity. However, any change in the patient's body image, selfesteem, or the response of her partner may increase her anxiety level and affect sexual function. Some partners may have difficulty looking at the incision, whereas others may be completely unaffected. Encouraging the patient to openly discuss how she feels about herself and about possible reasons for a decrease in libido (e.g., fatigue, anxiety, self-consciousness) may help clarify issues for her. Helpful suggestions for the patient may include varying the time of day for sexual activity (when the patient is less tired), assuming positions that are more comfortable, and expressing affection using alternative measures (e.g., hugging, kissing, manual stimulation).

Most patients and their partners adjust with minimal difficulty if they openly discuss their concerns. However, if issues cannot be resolved, a referral for counseling (e.g., psychologist, psychiatrist, psychiatric clinical nurse specialist, social worker, sex therapist) may be helpful. The ambulatory care nurse in the outpatient clinic or hospital should inquire whether the patient is having difficulty with sexuality issues, because many patients are reluctant or embarrassed to bring it up themselves.

Monitoring and Managing Potential Complications

Lymphedema

Lymphedema occurs in about 10% to 30% of patients who undergo ALND and in about 0% to 7% of patients who have SLNB (Leidenius, Leivonen, Vironen, et al., 2005; Wilke, McCall, Posther, et al., 2006). Risk factors for lymphedema include increasing age, obesity, presence of extensive axillary disease, radiation treatment, and injury or infection to the extremity (Golshan, Martin & Dowlatshahi, 2003). Lymphedema results if functioning lymphatic channels are inadequate to ensure a return flow of lymph fluid to the general circulation. After axillary lymph nodes are removed, collateral circulation must assume this function. Transient edema in the postoperative period occurs until collateral circulation has completely taken over this function, which generally occurs within a month. Performing prescribed exercises, elevating the arm above the heart several times a day, and gentle muscle pumping (making a fist and releasing) can help reduce the transient edema. The patient needs reassurance that this transient swelling is not lymphedema.

Once lymphedema develops, it tends to be chronic, so preventive strategies are vital. After ALND, the patient is taught hand and arm care to prevent injury or trauma to the affected extremity, thus decreasing the likelihood for lymphedema development (Chart

48-7). The patient is instructed to follow these guidelines for the rest of her life. She is also instructed to contact the physician or a nurse immediately if she suspects that she has lymphedema, because early intervention provides the best chance for control. If allowed to progress without treatment, the swelling can become more difficult to manage. Treatment may consist of a course of antibiotics if an infection is present. A referral to a rehabilitation specialist (e.g., occupational or physical therapist) may be necessary for a compression sleeve and/or glove, exercises, manual lymph drainage, and a discussion of ways to modify daily activities to avoid worsening lymphedema.

Hematoma or Seroma Formation

Hematoma formation (collection of blood inside the cavity) may occur after either mastectomy or breast conservation and usually develops within the first 12 hours after surgery. The nurse assesses for signs and symptoms of a hematoma at the surgical site, which may include swelling, tightness, pain, and bruising of the skin. The surgeon should be notified immediately for gross swelling or increased bloody output from the drain. Depending on the surgeon's assessment, a compression wrap may be applied to the incision for approximately 12 hours, or the patient may be returned to the operating room so that the incision may be reopened to identify the source of bleeding. Some hematomas are small, and the body absorbs the blood naturally. The patient may take warm showers or apply warm compresses to help increase the absorption. A hematoma usually resolves in 4 to 5 weeks.

A seroma, a collection of serous fluid, may accumulate under the breast incision after mastectomy or breast conservation or in the axilla. Signs and symptoms may include swelling, heaviness, discomfort, and a sloshing of fluid. Seromas may develop temporarily after the drain is removed or if the drain is in place and becomes obstructed. Seromas rarely pose a threat and may be treated by unclogging the drain or manually aspirating the fluid with a needle and syringe. Large, long-standing seromas that have not been aspirated could lead to infection. Small seromas that are not bothersome to the patient usually resolve on their own.

Hand and Arm Care After Axillary Lymph Node Dissection

- Avoid blood pressures, injections, and blood draws in affected extremity.
- Use sunscreen (higher than 15 SPF) for extended exposure to sun.
- Apply insect repellent to avoid insect bites.
- Wear gloves for gardening.
- Use cooking mitt for removing objects from oven.
- Avoid cutting cuticles; push them back during manicures.
- Use electric razor for shaving armpit.
- Avoid lifting objects greater than 5–10 pounds.
- If a trauma or break in the skin occurs, wash the area with soap and water, and apply an over-the-counter antibacterial ointment (Bacitracin or Neosporin).
- Observe the area and extremity for 24 hours; if redness, swelling, or a fever occurs, call the surgeon or nurse.

Infection

Although infection is rare, it is a risk after any surgical procedure. This risk may be higher in patients with accompanying conditions such as diabetes, immune disorders, and advanced age, as well as in those with poor hygiene. Patients are taught to monitor for signs and symptoms of infection (redness, warmth around incision, tenderness, foul-smelling drainage, temperature greater than 100.4°F, chills) and to contact the surgeon

or nurse for evaluation. Treatment consists of oral or IV antibiotics (for more severe infections) for 1 or 2 weeks. Cultures are taken of any foul-smelling discharge.

Promoting Home and Community-Based Care

Teaching Patients Self-Care

Patients who undergo breast cancer surgery receive a tremendous amount of information preoperatively and postoperatively. It is often difficult for the patient to absorb all of the information, partly because of the emotional distress that often accompanies the diagnosis and treatment. Prior to discharge, the nurse must assess the patient's readiness to assume self-care responsibilities, and any gaps in knowledge must be identified. Teaching may need to be reviewed and reinforced to ensure that the patient and family are prepared to manage the necessary home care. The nurse reiterates symptoms the patient should report, such as infection, seroma, hematoma, or arm swelling. All teaching should be reinforced during office visits and by telephone.

Most patients are discharged 1 or 2 days after ALND and/or mastectomy (possibly later if they have had immediate reconstruction) with surgical drains in place. Initially, the drainage fluid appears bloody, but it gradually changes to a serosanguineous and then a serous fluid over the next several days. The patient is given instructions about drainage management at home (Chart 48-8). If the patient lives alone and drainage management is difficult for her, a referral for a home care nurse should be made. The drains are usually removed when the output is less than 30 mL in a 24-hour period (approximately 7 to 10 days). The home care nurse also reviews pain management and incision care.

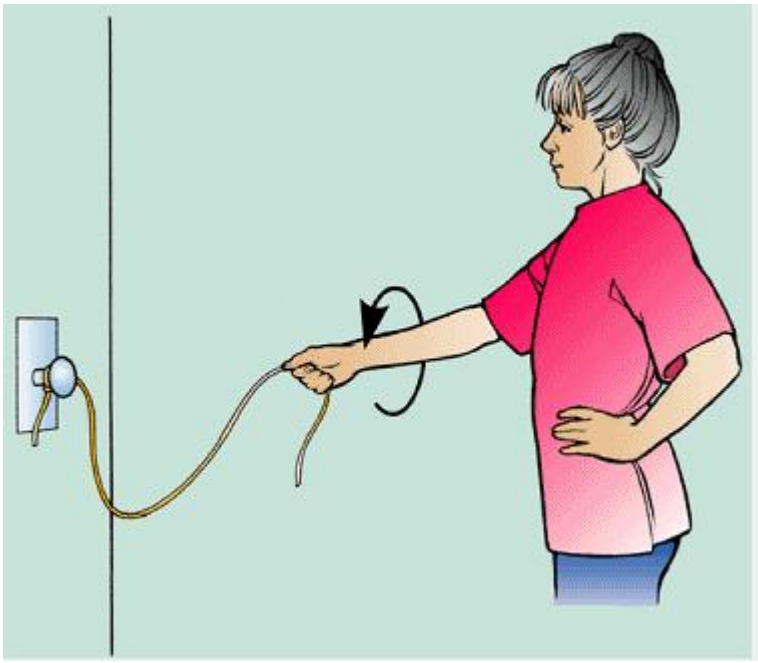
Generally, the patient may shower on the second postoperative day and wash the incision and drain site with soap and water to prevent infection. If immediate reconstruction has been performed, showering may be contraindicated until the drain is removed. A dry dressing may be applied to the incision each day for 7 days. The patient should know that sensation may be decreased in the operative area because the nerves were disrupted during surgery, and gentle care is needed to avoid injury. After the incision has completely healed (usually after 4 to 6 weeks), lotions or creams may be applied to the area to increase skin elasticity. The patient can begin to use deodorant on the affected side, although many women note that they no longer perspire as much as before the surgery.

After ALND, patients are taught arm exercises on the affected side to restore range of motion (Chart 48-9). After SLNB, patients may also benefit from these exercises, although they are less likely to have decreased range of motion than those who have undergone ALND. Range of motion exercises are initiated on the second postoperative day, although instruction often occurs on the first postoperative day. The goals of the exercise regimen are to increase circulation and muscle strength, prevent joint stiffness and contractures, and restore full range of motion. The patient is instructed to perform range of motion exercises at home 3 times a day for 20 minutes at a time until full range of motion is restored (generally 4 to 6 weeks). Most patients find that after the drain is removed, range of motion returns quickly if they have adhered to their exercise program.

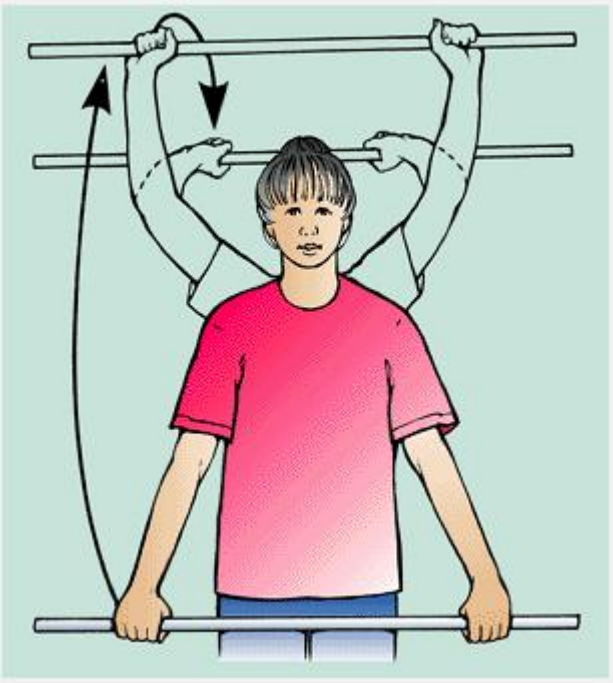
Patient Education
Exercise After Breast Surgery

- Wall handclimbing. Stand facing the wall with feet apart and toes as close to the wall as possible. With elbows slightly bent, place the palms of the hand on the wall at shoulder level. By flexing the fingers, work the hands up the wall until arms are fully extended. Then reverse the process, working the hands down to the starting point.

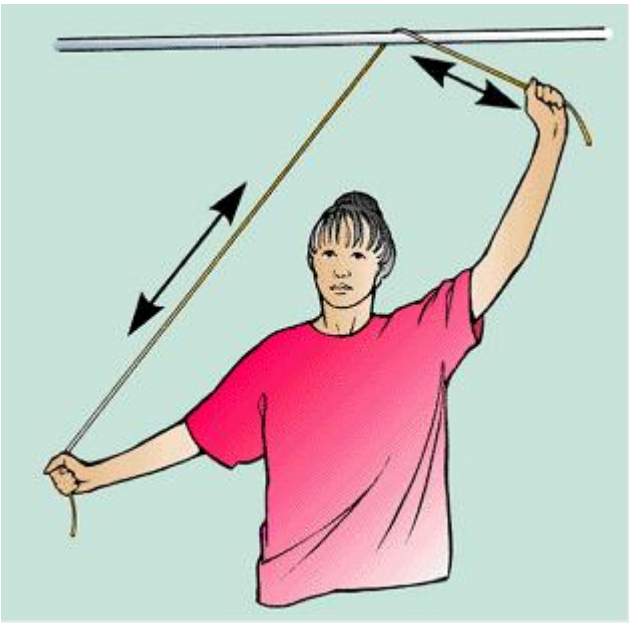
- Rope turning. Tie a light rope to a doorknob. Stand facing the door. Take the free end of the rope in the hand on the side of surgery. Place the other hand on the hip. With the rope-holding arm extended and held away from the body (nearly parallel with the floor), turn the rope, making as wide swings as possible. Begin slowly at first; speed up later.



- Rod or broomstick lifting. Grasp a rod with both hands, held about 2 feet apart. Keeping the arms straight, raise the rod over the head. Bend elbows to lower the rod behind the head. Reverse maneuver, raising the rod above the head, then return to the starting position.



- Pulley tugging. Toss a light rope over a shower curtain rod or doorway curtain rod. Stand as nearly under the rope as possible. Grasp an end in each hand. Extend the arms straight and away from the body. Pull the left arm up by tugging down with the right arm, then the right arm up and the left down in a see-sawing motion.



If the patient is having any discomfort, taking an analgesic 30 minutes before beginning the exercises can be helpful. Taking a warm shower before exercising can also loosen stiff muscles and provide comfort. When exercising, the patient is encouraged to use the muscles in both arms and to maintain proper posture. Specific exercises may need to be prescribed and introduced gradually if the patient has had skin grafts; has a tense, tight surgical incision; or has had immediate reconstruction. Self-care activities, such as brushing the teeth, washing the face, and brushing the hair, are physically and

emotionally therapeutic because they aid in restoring arm function and provide a sense of normalcy for the patient.
The patient is instructed about postoperative activity limitation. Generally, heavy lifting (more than 5 to 10 lbs) is avoided for about 4 to 6 weeks, although normal household and work-related activities are promoted to maintain muscle tone. Brisk walking, use of stationary bikes and stepping machines, and stretching exercises may begin as soon as the patient feels comfortable. Once the drain is removed, the patient may begin to drive if she has full arm range of motion and is no longer taking opioid analgesics. General guidelines for activity focus on the gradual introduction of previous activities (e.g., bowling, weight-training) once fully healed, although checking with the physician or nurse beforehand is recommended.

Continuing Care

Patients who have difficulty managing their postoperative care at home may benefit from a home health care referral. The home care nurse assesses the patient's incision and surgical drain(s), adequacy of pain management, adherence to the exercise plan, and overall physical and psychological functioning. In addition, the home care nurse reinforces previous teaching and communicates important physiologic findings and psychosocial issues to the patient's primary care provider, nurse, or surgeon.
The frequency of follow-up visits after surgery may vary but generally should occur every 3 to 6 months for the first several years. The patient may alternate visits with the surgeon, medical oncologist, or radiation oncologist, depending on the treatment regimen. The ambulatory care nurse can also be a great source of comfort and security for the patient and family and should encourage them to telephone if they have any questions or concerns. It is common for people to ignore routine health care when a major health issue arises, so women who have been treated for breast cancer should be reminded of the importance of participating in routine health screening.

Evaluation

Expected Preoperative Patient Outcomes

Expected preoperative patient outcomes may include:

- Exhibits knowledge about diagnosis and surgical treatment options
    - Asks relevant questions about diagnosis and available surgical treatments
    - States rationale for surgery
    - Describes advantages and disadvantages of treatment options
- Verbalizes willingness to deal with anxiety and fears related to the diagnosis and the effects of surgery on self-image and sexual functioning
- Demonstrates ability to cope with diagnosis and treatment
    - Verbalizes feelings appropriately and recognizes normalcy of mood lability
    - Proceeds with treatment in timely fashion
    - Discusses impact of diagnosis and treatment on family and work
- Demonstrates ability to make decisions regarding treatment options in timely fashion

Expected Postoperative Patient Outcomes

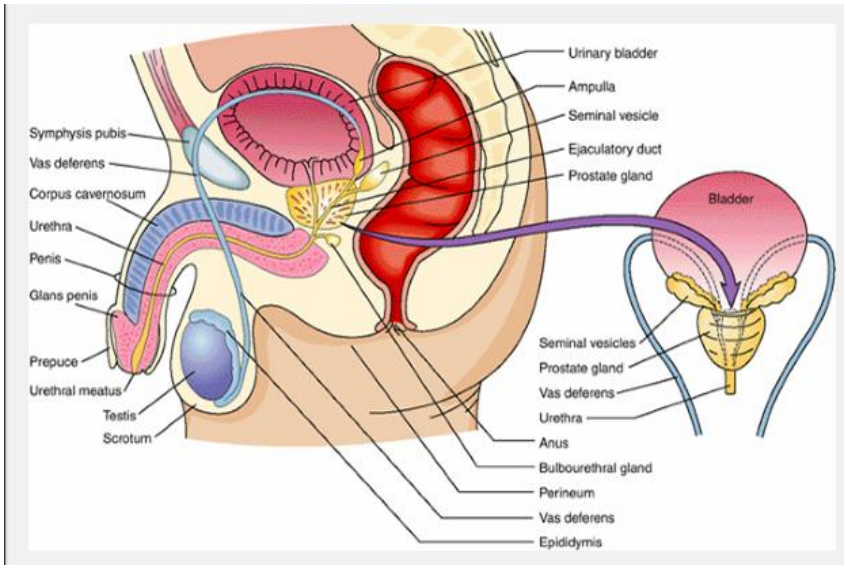
Expected postoperative patient outcomes may include:

- Reports that pain has decreased and states pain and discomfort management strategies are effective

- Identifies postoperative sensations and recognizes that they are a normal part of healing
- Exhibits clean, dry, and intact surgical incisions without signs of inflammation or infection
- Lists the signs and symptoms of infection to be reported to the nurse or surgeon
- Verbalizes feelings regarding change in body image
- Discusses meaning of the diagnosis, surgical treatment, and fears appropriately
- Participates actively in self-care activities
    - Performs exercises as prescribed
    - Participates in self-care activities as prescribed
- Discusses issues of sexuality and resumption of sexual relations
- Demonstrates knowledge of postdischarge recommendations and restrictions
    - Describes follow-up care and activities
    - Demonstrates appropriate care of incisions and drainage system
    - Demonstrates arm exercises and describes exercise regimen and activity limitations during postoperative period
    - Describes care of affected arm and hand and lists indications to contact the surgeon or nurse
- Experiences no complications
    - Identifies signs and symptoms of reportable complications (eg, redness, heat, pain, edema)
    - Explains how to contact appropriate health care providers in case of complications

Chapter 49

Assessment and Management of Problems Related to Male Reproductive Processes



Anatomy and Physiology

The scrotum (two parts; each contains a testis, an epididymis, and a portion of the spermatic cord, otherwise known as vas deferens).

The prostate (an encapsulated gland that encircles the proximal portion of the urethra).

The penis.

The testes have a dual function: spermatogenesis (production of sperm) and secretion of the male sex hormone testosterone, which induces and preserves the male sex characteristics.

The prostate gland produces a secretion that is chemically and physiologically suitable to the needs of the spermatozoa in their passage from the testes.

Assessment

Health History and Clinical Manifestations

Physical Assessment

Digital Rectal Examination

Testicular Examination

Testicular self-examination (TSE)

Diagnostic Evaluation

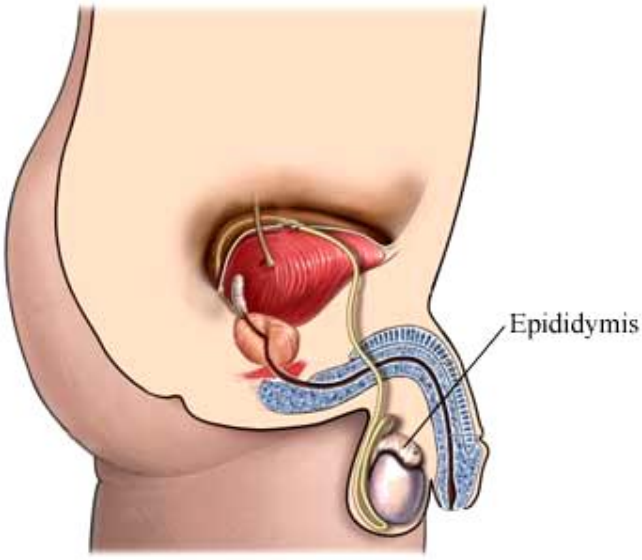
Prostate-Specific Antigen Test

Prostate Fluid or Tissue Analysis

Inflammatory Diseases: Epididymitis

An infection of the epididymis, which usually descends from an infected prostate or urinary tract.

Symptoms include unilateral pain and soreness in the inguinal canal, sudden, severe pain in the scrotum, scrotal swelling, fever, pyuria, bacteriuria, dysuria, and pyuria.



Epididymitis/ treatment

If it is caused by a chlamydial infection, the patient and his wife must be treated with antibiotics.

Observe for abscess formation

Epididymectomy (excision of the epididymis from the testis) may be performed for patients who have chronic, painful conditions

Nursing Management

Bed rest and scrotal support to prevent traction on the spermatic cord and to relieve pain.

Intermittent cold compresses to ease the pain.

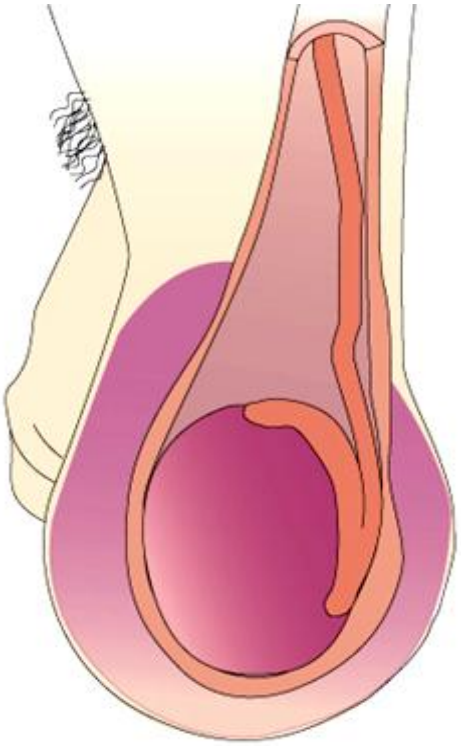
Sitz baths may help resolve the inflammation.

Analgesic for pain relief as prescribed.

Instructs patient to avoid straining, lifting, and sexual stimulation until the infection is under control.

He needs to know that it may take 4 weeks or longer for the epididymis to return to normal.

Inflammatory Diseases: Orchitis



An inflammation of the testes that most often occurs as a complication of a bloodborne infection originating in the epididymis.

Causes include gonorrhea, trauma, surgical manipulation, and tuberculosis and mumps that occur after puberty.

Symptoms include sudden scrotal pain, scrotal edema, chills, fever, nausea, and vomiting.

Inflammatory Diseases: Prostatitis

An inflammation of the prostate which is a common complication of urethritis caused by chlamydia or gonorrhea.

Symptoms include perineal pain, fever,dysuria, and urethral discharge.

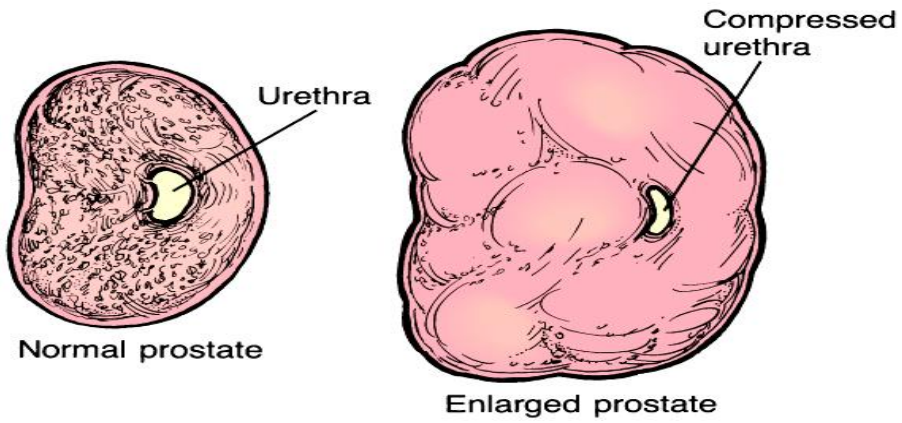


Figure 55-9 Comparison of normal prostate and enlarged prostate.

Nursing Interventions

Encourage bed rest

Monitor VS, esp. temp for fever

Monitor I & O

Assess pain

Sitz bath – provide comfort = PROSTATITIS

Provide ice pack to scrotum to decrease swelling

Elevate or provide scrotal support

Interventions

Analgesic

Antibiotic

Procaine = anesthetic

Stool softeners

Digital massage – rectally – to release infected fluid

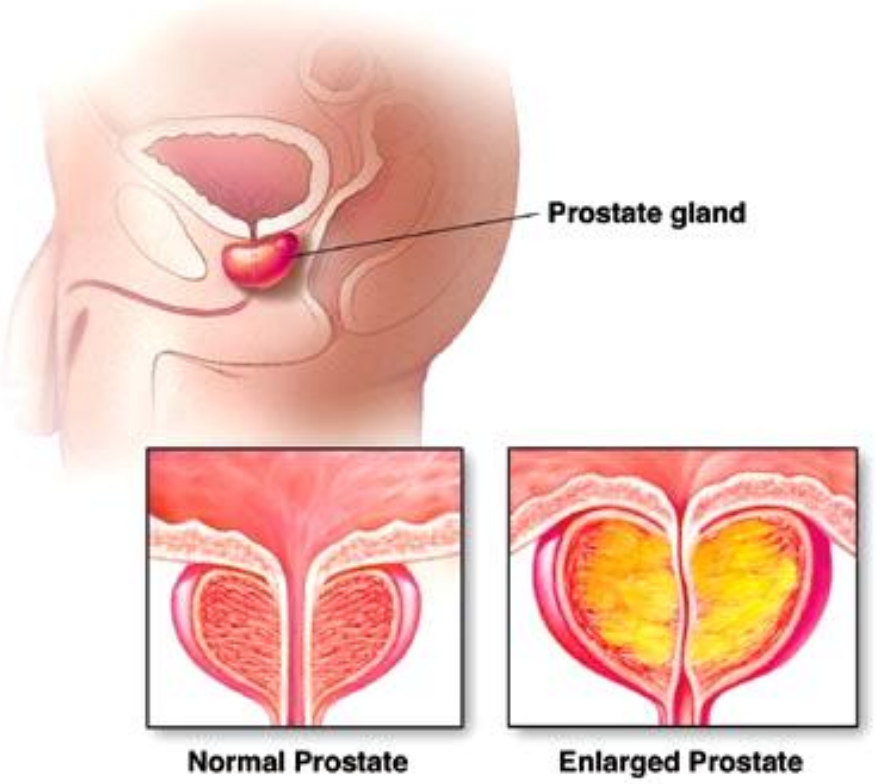
Benign Prostatic Hyperplasia

BPH is a progressive adenomatous enlargement of the prostate gland that occurs with aging.

More than 50% of men over the age of 50 and 80% of men ≥ 80 demonstrate some increase in the size of the prostate gland.

Risk factors: smoking, heavy alcohol consumption, hypertension, heart disease, and diabetes

Early symptoms include hesitancy, decreased force of stream, urinary frequency, and nocturia. Then frequent UTIs



Diagnosis:

Rectal examination – most reliable

Urine analysis

Ultrasound

Serum BUN & creatinine to evaluate kidney function

Treatment

Foley's catheter (stylet needed, inserted by urologist)

Surgical

1. ***TURP***

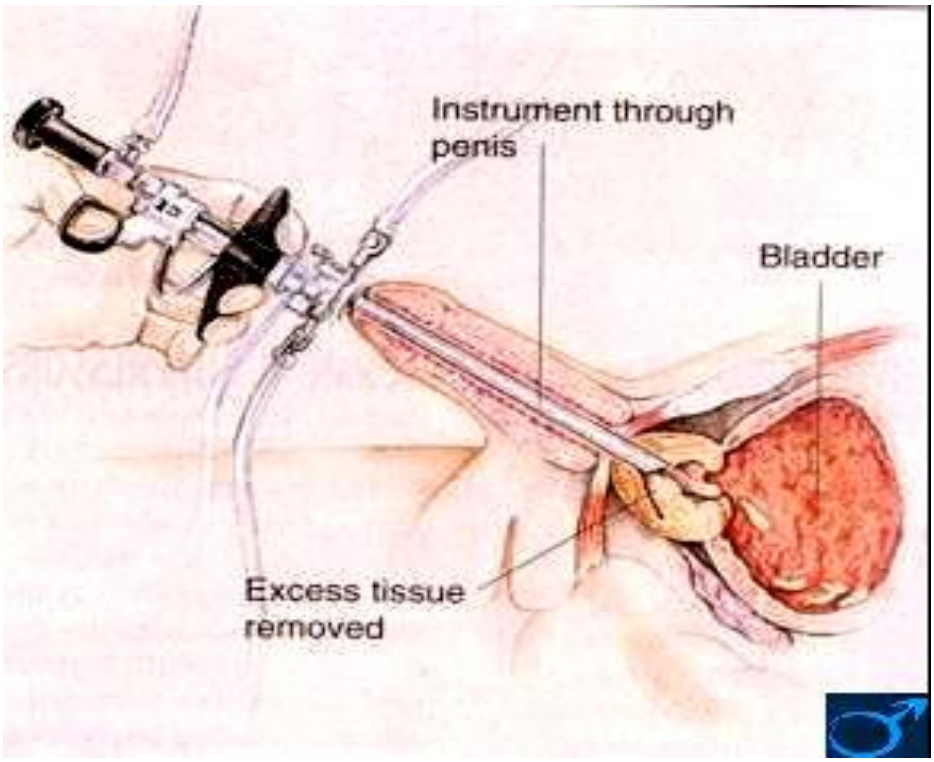
    •Transurethral Resection of the Prostate

•Continuous irrigation = reduce or prevent clot formation = clogs urethra = urinary retention = kidney damage

•Monitor I & O

•3-way f/c

•Monitor for distention -bladder



2. PROSTATECTOMY

A. Perineal prostectomy – incision through perineum
B. Suprapubic resection – lower abdomen – incision through the bladder – urethrotomy
C. Retropubic – lower abdomen – does not go through the bladder

Pharmacological Treatment

Alpha blockers – relax the smooth muscles along urinary tract

Narcotic analgesic – relieve post-op pain –Morphine, Codeine

Nursing Interventions

Increased fluids – monitor I & O

Maintain gravity drainage of F/C

Monitor blood clots and color = bright red = bleeding

Keep irrigation flowing, note clots

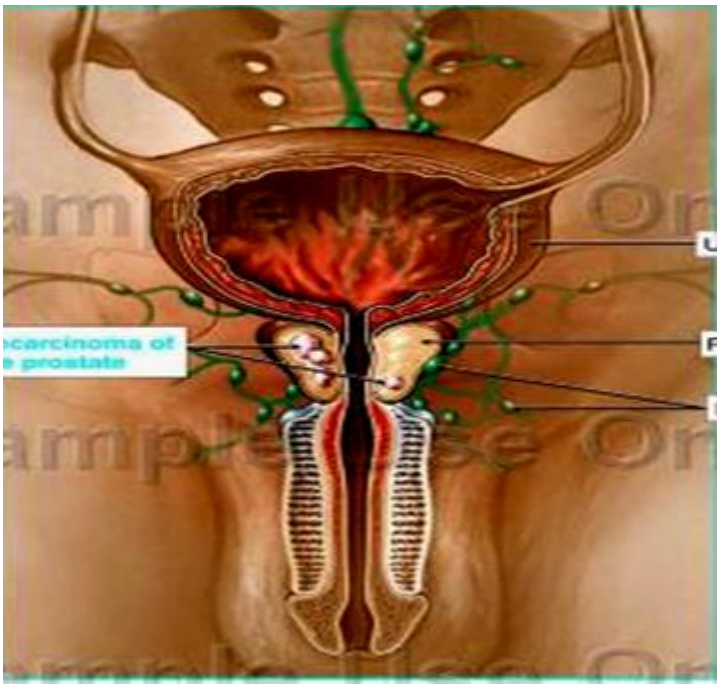
Monitor VS – pain level, temp – orally, NOT rectal

Avoid straining, provide stool softeners

Teach deep breathing, relaxation technique

Observe bladder distention & spasms = ask for antispasmodic – stops spasms = pain, increase blood clots

Malignant Neoplasms: Prostate Cancer



The second leading cause of cancer deaths in men.

Risk factors include: advancing age (over 55, more than 70% of cases diagnoses at age ≥ 65); first-degree relative with prostate cancer; African-American heritage; high level of serum testosterone.

Five-year survival rate is 98%.

Manifestations

Early tumor – no symptoms

Subjective

• Back pain, same symptoms as BPH – hesitancy, decrease pressure, frequency, dysuria, urinary retention, painful ejaculation.

Objective

• Symptoms from metastasis

• ? Blood in urine or semen.

• Lumps – inguinal

• Enlarged lymph nodes

• Blockage of urethra, and rectal dysfunction

Diagnostic Test – Prostate CA

Digital Rectal Examination

PSA- prostate specific antigen – elevated

Bone scan to detect metastasis

MRI, CT scan

Complications

Sexual dysfunction (gets worse with treatment)

Treatment – Prostate CA

Radiation, chemo, surgical removal

Complete surgical removal of the prostate, seminal vesicles, tips of the vas deferens, and often the surrounding fat, nerves, and blood vessels

Bilateral orchiectomy (removal of testes)

TURP

Estrogen therapy – inhibits serum testosterone = contradicts

Agonists of LH – estrogen

Radioactive seed implant – rectally

Nursing process

Anxiety related to concern and lack of knowledge about the diagnosis, treatment plan, and prognosis

Reduced stress and improved ability to cope

Urinary retention related to urethral obstruction secondary to prostatic enlargement or tumor and loss of bladder tone due to prolonged distention/retention

Improved pattern of urinary elimination

Deficient knowledge related to the diagnosis of: cancer, urinary difficulties, and treatment modalities

Understanding of the diagnosis and ability to care for self

Imbalanced nutrition: less than body requirements related to decreased oral intake because of anorexia, nausea, and vomiting caused by cancer or its treatment

Maintain optimal nutritional status

Sexual dysfunction related to effects of therapy: chemotherapy, hormonal therapy, radiation therapy, surgery

Ability to resume/enjoy modified sexual functioning

Pain related to progression of disease and treatment modalities

Relief of pain

Impaired physical mobility and activity intolerance related to tissue hypoxia, malnutrition, and exhaustion and to spinal cord or nerve compression from metastases

Improved physical mobility

Collaborative Problems: Hemorrhage, infection, bladder neck obstruction

Goal: Absence of complications

Nursing interventions – Prostate CA

BPH interventions

Be supportive – expect feminization, more emotional, educate

Gynecomastia – enlargement of the breast

Control pain – terminally ill = hospice, palliative care

Malignant Neoplasms: Testicular Cancer

Although it accounts for only 1% of all cancer in men, it is the most common cancer in young men between the ages of 15 and 40.
Essential for clients to learn TSE (testicular self-examination). – monthly

During shower

Five-year survival rate is 95%.

Management same as prostate cancer

Risk Factors

Undescended testicles (cryptorchidism),

A family history of testicular cancer,

Cancer of one testicle,

Ethnicity: more common in white Caucasian

Assessment

Subjective data

Heaviness in scrotum	Weight loss
Scrotal pain	Anxiety or depression

Objective data

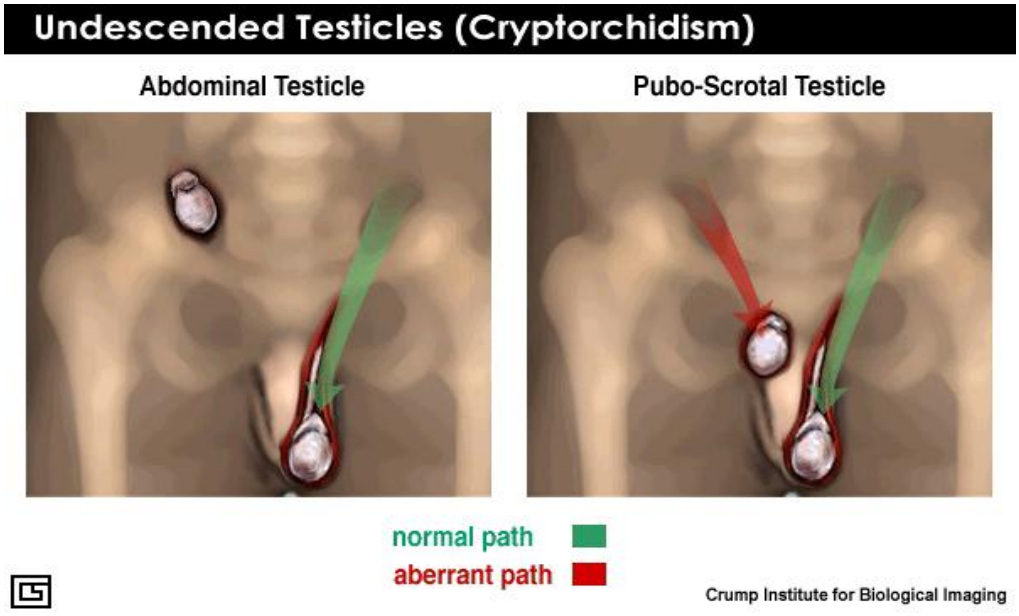
Palpation of abdomen and scrotum – enlarged

Mass or lump on the testicle and usually painless

Medical Management

The testis is removed by orchiectomy

Cryptorchidism



Hydrocele

•Collection of amber fluid within the testes, tunica vaginalis, and spermatic cord

•Painful

•Swelling

•Discomfort in sitting and walking

•Treatment: aspiration (usually in children)

•Hydrocelectomy – removal of the sac

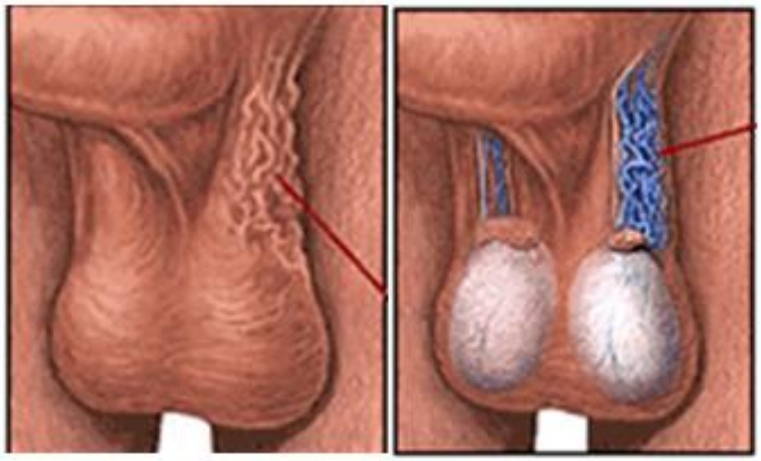
Nursing Interventions:

•Preoperative and postoperative management

•Scrotal support (elevation)

•Supportive to parents/patient

Varicocele



-Vein- dilation

-Spermatic cord = Vas deferens

-Occurs when incompetent or absent valves in the spermatic venous system permits blood to accumulate and increase hydrostatic pressure

-Hyperthermia – decrease spermatogenesis = fertility

-Bluish discoloration

-Wormlike mass

Treatment: High Ligation

Plan of Nursing Care: The Patient with Prostate Cancer

Nursing Diagnosis: Anxiety related to concern and lack of knowledge about the diagnosis, treatment plan, and prognosis
Goal: Reduced stress and improved ability to cope

Nursing Interventions	Rationale	Expected Outcomes
1. Obtain health history to determine the following: a. Patient's concerns b. His level of understanding of his health problem c. His past experience with cancer d. Whether he knows his diagnosis of malignancy and its prognosis e. His support systems and coping methods 2. Provide education about diagnosis and treatment plan: a. Explain in simple terms what diagnostic tests to expect, how long they will take, and what will be experienced during each test. b. Review treatment plan and allow patient to ask questions. 3. Assess his psychological reaction to his diagnosis/prognosis and how he has coped with past stresses. 4. Provide information about institutional and community resources for coping with prostate cancer: social services, support groups, community agencies	1. Nurse clarifies information and facilitates patient's understanding and coping. 2. Helping the patient to understand the diagnostic tests and treatment plan will help decrease his anxiety and promote cooperation. 3. This information provides clues in determining appropriate measures to facilitate coping. 4. Institutional and community resources can help the patient and family cope with the illness and treatment on an ongoing basis.	• Appears relaxed • States that anxiety has been reduced or relieved • Demonstrates understanding of illness, diagnostic tests, and treatment when questioned • Engages in open communication with others

Nursing Diagnosis: Urinary retention related to urethral obstruction secondary to prostatic enlargement or tumor and loss of bladder tone due to prolonged distention/retention
Goal: Improved pattern of urinary elimination

1. Determine patient's usual pattern of urinary function. 2. Assess for signs and symptoms of urinary retention: amount and frequency of urination, suprapubic distention, complaints of urgency and discomfort. 3. Catheterize patient to determine amount of residual urine. 4. Initiate measures to treat retention: a. Encourage assuming normal position for voiding. b. Recommend using Valsalva maneuver preoperatively, if not contraindicated. c. Administer prescribed cholinergic agent. d. Monitor effects of medication. 5. Consult with physician regarding intermittent or indwelling catheterization; assist with procedure as required. 6. Monitor catheter function; maintain sterility of closed system; irrigate as required. 7. Prepare patient for surgery if indicated.	1. Provides a baseline for comparison and goal to work toward 2. Voiding 20 to 30 mL frequently and output less than intake suggest retention. 3. Determines amount of urine remaining in bladder after voiding 4. Promotes voiding a. Usual position provides relaxed conditions conducive to voiding. b. Valsalva maneuver exerts pressure to force urine out of bladder. c. Stimulates bladder contraction d. If unsuccessful, another measure may be required. 5. Catheterization will relieve urinary retention until the specific cause is determined; it may be an obstruction that can be corrected only surgically. 6. Adequate functioning of catheter is to be ensured to empty bladder and to prevent infection. 7. Surgical removal of obstruction may be necessary.	• Voids at normal intervals • Reports absence of frequency, urgency, or bladder fullness • Displays no palpable suprapubic distention after voiding • Maintains balanced intake and output
Nursing Diagnosis: Deficient knowledge related to the diagnosis of: cancer, urinary difficulties, and treatment modalities **Goal**: Understanding of the diagnosis and ability to care for self		
1. Encourage communication with the patient. 2. Review the anatomy of the involved area. 3. Be specific in selecting information that is relevant to the patient's particular treatment plan. 4. Identify ways to reduce pressure on the operative area after prostatectomy:	1. This is designed to establish rapport and trust. 2. Orientation to one's anatomy is basic to understanding its function. 3. This is based on the treatment plan; as it varies with each patient, individualization is desirable. 4. This is to prevent bleeding; such precautions are in order	• Discusses his concerns and problems freely • Asks questions and shows interest in his disorder • Describes activities that help or hinder recovery • Identifies ways of attaining/maintainin

a. Avoid prolonged sitting (in a chair, long automobile rides), standing, walking. b. Avoid straining, such as during exercises, bowel movement, lifting, and sexual intercourse. 5. Familiarize patient with ways of attaining/maintaining bladder control. a. Encourage urination every 2 to 3 hours; discourage voiding when supine. b. Avoid drinking cola and caffeine beverages; urge a cutoff time in the evening for drinking fluids to minimize frequent voiding during the night. c. Describe perineal exercises to be performed every hour. d. Develop a schedule with patient that will fit into his routine. 6. Demonstrate catheter care; encourage his questions; stress the importance of position of urinary receptacle.	for 6 to 8 weeks postoperatively. 5. These measures will help control frequency and dribbling and aid in preventing retention. a. By sitting or standing, patient is more likely to empty his bladder. b. Spacing the kind and amount of liquid intake will help to prevent frequency. c. Exercises will assist him in starting and stopping the urinary stream. d. A schedule will assist in developing a workable pattern of normal activities. 6. By requiring a return demonstration of care, collection, and emptying of the device, he will become more independent and also can prevent backflow of urine, which can lead to infection.	g bladder control • Demonstrates satisfactory technique and understanding of catheter care • Lists signs and symptoms that must be reported should they occur
Nursing Diagnosis: Imbalanced nutrition: less than body requirements related to decreased oral intake because of anorexia, nausea, and vomiting caused by cancer or its treatment **Goal**: Maintain optimal nutritional status		
1. Assess the amount of food eaten. 2. Routinely weigh patient. 3. Elicit patient's explanation of why he is unable to eat more. 4. Cater to his individual food preferences (eg, avoiding	1. This assessment will help determine nutrient intake. 2. Weighing the patient on the same scale under similar conditions can help monitor changes in weight. 3. His explanation may present easily corrected practices.	• Responds positively to his favorite foods • Assumes responsibility for his oral hygiene • Reports absence of nausea and vomiting.

foods that are too spicy or too cold). 5. Recognize effect of medication or radiation therapy on appetite. 6. Inform patient that alterations in taste can occur. 7. Use measures to control nausea and vomiting: a. Administer prescribed antiemetics, around the clock if necessary. b. Provide oral hygiene after vomiting episodes. c. Provide rest periods after meals. 8. Provide frequent small meals and a comfortable and pleasant environment. 9. Assess patient's ability to obtain and prepare foods.	4. He will be more likely to consume larger servings if food is palatable and appealing. 5. Many chemotherapeutic agents and radiation therapy promote anorexia. 6. Aging and the disease process can reduce taste sensitivity. In addition, smell and taste can be altered as a result of the body's absorption of byproducts of cellular destruction (brought on by malignancy and its treatment). 7. Prevention of nausea and vomiting can stimulate appetite. 8. Smaller portions of food are less overwhelming to the patient. 9. Disability or lack of social support can hinder the patient's ability to obtain and prepare foods	• Notes increase in weight after improved appetite
Nursing Diagnosis: Sexual dysfunction related to effects of therapy: chemotherapy, hormonal therapy, radiation therapy, surgery **Goal**: Ability to resume/enjoy modified sexual functioning		
1. Determine from nursing history what effect patient's medical condition is having on his sexual functioning. 2. Inform patient of the effects of prostate surgery, orchiectomy (when applicable), chemotherapy, irradiation, and hormonal therapy on sexual function. 3. Include his partner in developing understanding and in discovering alternative, satisfying close relations with each other.	1. Usually decreased libido and, later, impotence may be experienced. 2. Treatment modalities may alter sexual function, but each is evaluated separately with regard to its effect on a particular patient. 3. The bonds between a couple may be strengthened with new appreciation and support that had not been evident before the current illness.	• Describes the reasons for changes in sexual functioning • Discusses with appropriate health care personnel alternative approaches and methods of sexual expression • Includes partner in discussions related to changes in sexual function
Nursing Diagnosis: Pain related to progression of disease and treatment modalities **Goal**: Relief of pain		
1. Evaluate nature of patient's pain, its location and intensity using pain rating	1. Determining nature and causes of pain and its intensity helps to select	• Reports relief of pain • Expects

scale. 2. Avoid activities that aggravate or worsen pain. 3. Because pain is usually related to bone metastasis, ensure that patient's bed has a bed board on a firm mattress. Also, protect the patient from falls/injuries. 4. Provide support for affected extremities. 5. Prepare patient for radiation therapy if prescribed. 6. Administer analgesics or opioids at regularly scheduled intervals as prescribed. 7. Initiate bowel program to prevent constipation.	proper pain-relief modality and provide baseline for later comparison. 2. Bumping the bed is an example of an action that can intensify the patient's pain. 3. This will provide added support and is more comfortable. Protecting the patient from injury protects him from additional pain. 4. More support, coupled with reduced movement of the part, helps in pain control. 5. Radiation therapy may be effective in controlling pain. 6. Analgesics alter perception of pain and provide comfort. Regularly scheduled analgesics around the clock rather than PRN provide more consistent pain relief. 7. Opioid analgesics and inactivity contribute to constipation.	exacerbations, reports their quality and intensity, and obtains relief • Uses pain relief strategies appropriately and effectively • Identifies strategies to avoid complications of analgesic use (eg, constipation)
Nursing Diagnosis: Impaired physical mobility and activity intolerance related to tissue hypoxia, malnutrition, and exhaustion and to spinal cord or nerve compression from metastases **Goal**: Improved physical mobility		
1. Assess for factors causing limited mobility (eg, pain, hypercalcemia, limited exercise tolerance). 2. Provide pain relief by administering prescribed medications. 3. Encourage use of assistive devices: cane, walker. 4. Involve significant others in helping patient with range-of-motion exercises, positioning, and walking. 5. Provide positive reinforcement for achievement of small gains. 6. Assess nutritional status.	1. This information offers clues to the cause; if possible, cause is treated. 2. Analgesics/opioids allow the patient to increase his activity more comfortably. 3. Support may offer the security needed to become mobile. 4. Assistance from partner or others encourages patient to repeat activities and achieve goals. 5. Encouragement stimulates improvement of performance. 6. See Nursing Diagnosis: Imbalanced nutrition: less than body requirements.	• Achieves improved physical mobility • Relates that short-term goals are encouraging him because they are attainable
Collaborative Problems: Hemorrhage, infection, bladder neck obstruction **Goal:** Absence of complications		

1. Alert the patient to changes that may occur (after discharge) and that need to be reported: a. Continued bloody urine; passing blood clots b. Pain; burning around the catheter c. Frequency of urination d. Diminished urinary output e. Increasing loss of bladder control	1. Certain changes signal beginning complications, which call for nursing and medical interventions. a. Hematuria with or without blood clot formation may occur postoperatively. b. Indwelling urinary catheters may be a source of infections. c. Urinary frequency may be caused by urinary tract infections or by bladder neck obstruction, resulting in incomplete voiding. d. Bladder neck obstruction decreases the amount of urine that is voided. e. Urinary incontinence may be a result of urinary retention.	• Experiences no bleeding or passage of blood clots • Reports no pain around the catheter • Experiences normal frequency or urination • Reports normal urinary output • Maintains bladder control

Nursing Process
The Patient Undergoing Prostatectomy

Assessment

The nurse assesses how the underlying disorder (BPH or prostate cancer) has affected the patient's lifestyle. Questions to ask during assessment include the following: Has the patient's activity level or activity tolerance changed? What is his presenting urinary problem (described in the patient's own words)? Has he experienced decreased force of urinary flow, decreased ability to initiate voiding, urgency, frequency, nocturia, dysuria, urinary retention, hematuria? Does the patient report associated problems, such as back pain, flank pain, and lower abdominal or suprapubic discomfort? Possible causes of such discomfort include infection, retention, and renal colic. Has the patient experienced erectile dysfunction or changes in frequency or enjoyment of sexual activity?

The nurse obtains further information about the patient's family history of cancer and heart or kidney disease, including hypertension. Has he lost weight? Does he appear pale? Can he raise himself out of bed and return to bed without assistance? Can he perform usual activities of daily living? This information helps determine how soon the patient will be able to return to normal activities after prostatectomy.

Diagnosis

Based on the assessment data, the patient's major nursing diagnoses may include the following.

Preoperative Nursing Diagnoses

- Anxiety about surgery and its outcome
- Acute pain related to bladder distention
- Deficient knowledge about factors related to the disorder and the treatment protocol

Postoperative Nursing Diagnoses

- Acute pain related to the surgical incision, catheter placement, and bladder spasms
- Deficient knowledge about postoperative care and management

Collaborative Problems/Potential Complications
Based on the assessment data, the potential complications may include the following:

- Hemorrhage and shock
- Infection
- Deep vein thrombosis
- Catheter obstruction
- Sexual dysfunction

Planning and Goals
The major preoperative goals for the patient may include reduced anxiety and learning about his prostate disorder and the perioperative experience. The major postoperative goals may include maintenance of fluid volume balance, relief of pain and discomfort, ability to perform self-care activities, and absence of complications.
Preoperative Nursing Interventions
Reducing Anxiety
The patient is frequently admitted to the hospital on the morning of surgery. Because contact with the patient may be limited before surgery, the nurse must establish communication with the patient to assess his understanding of the diagnosis and of the planned surgical procedure. The nurse clarifies the nature of the surgery and expected postoperative outcomes. In addition, the nurse familiarizes the patient with the preoperative and postoperative routines and initiates measures to reduce anxiety. Because the patient may be sensitive and embarrassed discussing problems related to the genitalia and sexuality, the nurse provides privacy and establishes a trusting and professional relationship. Guilt feelings often surface if the patient falsely assumes a cause-and-effect relationship between sexual practices and his current problems. He is encouraged to verbalize his feelings and concerns.
Relieving Discomfort
If the patient experiences discomfort before surgery, he is prescribed bed rest, analgesic agents are administered, and measures are initiated to relieve anxiety. If he is hospitalized, the nurse monitors his voiding patterns, watches for bladder distention, and assists with catheterization if indicated. An indwelling catheter is inserted if the patient has continuing urinary retention or if laboratory test results indicate azotemia (accumulation of nitrogenous waste products in the blood). The catheter can help decompress the bladder gradually over several days, especially if the patient is elderly and hypertensive and has diminished renal function or urinary retention that has existed for many weeks. For a few days after the bladder begins draining, the blood pressure may fluctuate and renal function may decline. If the patient cannot tolerate a urinary catheter, he is prepared for a cystostomy (see

Chapters 44 and 45).

Providing Instruction

Before surgery, the nurse reviews with the patient the anatomy of the affected structures and their function in relation to the urinary and reproductive systems, using diagrams and other teaching aids if indicated. This instruction often takes place during the preadmission testing visit or in the urologist's office. The nurse explains what will take place as the patient is prepared for diagnostic tests and then for surgery (depending on the type of prostatectomy planned). The nurse also describes the type of incision, which varies with the surgical approach (directly over the bladder, low on the abdomen, or in the perineal area; in the case of a transurethral procedure, no incision will be made), and informs the patient about the likely type of urinary drainage system, the type of anesthesia, and the recovery room procedure. The amount of information given is based on the patient's needs and questions. The nurse explains procedures expected to occur during the immediate perioperative period, answers questions the patient or family may have, and provides emotional support. In addition, the nurse provides the patient with information about postoperative pain management.

Preparing the Patient

If the patient is scheduled for a prostatectomy, the preoperative preparation described in Chapter 18 is provided. Elastic compression stockings are applied before surgery and are particularly important for prevention of deep vein thrombosis (DVT) if the patient is placed in a lithotomy position during surgery. An enema is usually administered at home on the evening before surgery or on the morning of surgery to prevent postoperative straining, which can induce bleeding.

Postoperative Nursing Interventions

Maintaining Fluid Balance

During the postoperative period, the patient is at risk for imbalanced fluid volume because of the irrigation of the surgical site during and after surgery. With irrigation of the urinary catheter to prevent its obstruction by blood clots, fluid may be absorbed through the open surgical site and retained, increasing the risk of excessive fluid retention, fluid imbalance, and water intoxication. The urine output and the amount of fluid used for irrigation must be closely monitored to determine whether irrigation fluid is being retained and to ensure an adequate urine output. An intake and output record, including the amount of fluid used for irrigation, must be maintained. The patient also is monitored for electrolyte imbalances (eg, hyponatremia), increasing blood pressure, confusion, and respiratory distress. These signs and symptoms are documented and reported to the surgeon. The risk of fluid and electrolyte imbalance is greater in elderly patients with preexisting cardiovascular or respiratory disease.

Relieving Pain

After a prostatectomy, the patient is assisted to sit and dangle his legs over the side of the bed on the day of surgery. The next morning, he is assisted to ambulate. If pain is present, the cause and location are determined and the severity of pain and discomfort is assessed. The pain may be related to the incision or may be the result of excoriation of the skin at the catheter site. It may be in the flank area, indicating a kidney problem, or it may be caused by bladder spasms. Bladder irritability can initiate bleeding and result in clot formation, leading to urinary retention.

Patients experiencing bladder spasms may note an urgency to void, a feeling of pressure or fullness in the bladder, and bleeding from the urethra around the catheter. Medications that relax the smooth muscles can help ease the spasms, which can be intermittent and severe; these medications include flavoxate (Urispas) and oxybutynin (Ditropan). Warm compresses to the pubis or sitz baths may also relieve the spasms.

The nurse monitors the drainage tubing and irrigates the system as prescribed to relieve any obstruction that may cause discomfort. Usually, the catheter is irrigated with 50 mL of irrigating fluid at a time. It is important to make sure that the same amount is recovered in the drainage receptacle. Securing the catheter drainage tubing to the leg or abdomen can help decrease tension on the catheter and prevent bladder irritation. Discomfort may be caused by dressings that are too snug, saturated with drainage, or improperly placed. Analgesic agents are administered as prescribed.

After the patient is ambulatory, he is encouraged to walk but not to sit for prolonged periods, because this increases intra-abdominal pressure and the possibility of discomfort and bleeding. Prune juice and stool softeners are provided to ease bowel movements and to prevent excessive straining. An enema, if prescribed, is administered with caution to avoid rectal perforation.

Monitoring and Managing Potential Complications

After prostatectomy, the patient is monitored for major complications such as hemorrhage, infection, DVT, catheter obstruction, and sexual dysfunction.

Hemorrhage

The immediate dangers after a prostatectomy are bleeding and hemorrhagic shock. This risk is increased with BPH, because a hyperplastic prostate gland is very vascular. Bleeding may occur from the prostatic bed. Bleeding may also result in the formation of clots, which then obstruct urine flow. The drainage normally begins as reddish-pink and then clears to a light pink within 24 hours after surgery. Bright red bleeding with increased viscosity and numerous clots usually indicates arterial bleeding. Venous blood appears darker and less viscous. Arterial hemorrhage usually requires surgical intervention (eg, suturing or transurethral coagulation of bleeding vessels), whereas venous bleeding may be controlled by applying prescribed traction to the catheter so that the balloon holding the catheter in place applies pressure to the prostatic fossa. The surgeon applies traction by securely taping the catheter to the patient's thigh if hemorrhage occurs.

Nursing management includes assistance in implementing strategies to stop the bleeding and to prevent or reverse hemorrhagic shock. If blood loss is extensive, fluids and blood component therapy may be administered. If hemorrhagic shock occurs, treatments described in Chapter 15 are initiated.

Nursing interventions include closely monitoring vital signs; administering medications, IV fluids, and blood component therapy as prescribed; maintaining an accurate record of intake and output; and carefully monitoring drainage to ensure adequate urine flow and patency of the drainage system. The patient who experiences hemorrhage and his family are often anxious and benefit from explanations and reassurance about the event and the procedures that are performed.

Infection

After perineal prostatectomy, the surgeon usually changes the dressing on the first postoperative day. Further dressing changes may become the responsibility of the nurse or home care nurse. Careful aseptic technique is used, because the potential for infection is great. Dressings can be held in place by a double-tailed, T-binder bandage or a padded athletic supporter. The tails cross over the incision to give double thickness, and then each tail is drawn up on either side of the scrotum to the waistline and fastened.

Rectal thermometers, rectal tubes, and enemas are avoided because of the risk of injury and bleeding in the prostatic fossa. After the perineal sutures are removed, the perineum is cleansed as indicated. A heat lamp may be directed to the perineal area to promote healing. The scrotum is protected with a towel while the heat lamp is in use. Sitz baths are also used to promote healing.

Urinary tract infections and epididymitis are possible complications after prostatectomy. The patient is assessed for their occurrence; if they occur, the nurse administers antibiotics as prescribed.

Because the risk for infection continues after discharge from the hospital, the patient and family need to be instructed to monitor for signs and symptoms of infection (fever, chills, sweating, myalgia, dysuria, urinary frequency, and urgency). The patient and family are instructed to contact the urologist if these symptoms occur.

Deep Vein Thrombosis

Because patients undergoing prostatectomy have a high incidence of DVT and pulmonary embolism, the physician may prescribe prophylactic (preventive) low-dose heparin therapy. The nurse assesses the patient frequently after surgery for manifestations of DVT and applies elastic compression stockings to reduce the risk for DVT and pulmonary embolism. Nursing and medical management of DVT and pulmonary embolism are described in Chapters 31 and 23, respectively. The patient who is receiving heparin must be closely monitored for excessive bleeding.

Obstructed Catheter

After a TUR, the catheter must drain well; an obstructed catheter produces distention of the prostatic capsule and resultant hemorrhage. Furosemide (Lasix) may be prescribed to promote urination and initiate postoperative diuresis, thereby helping to keep the catheter patent.

The nurse observes the lower abdomen to ensure that the catheter has not become blocked. An overdistended bladder manifests a distinct, rounded swelling above the pubis.

The drainage bag, dressings, and incisional site are examined for bleeding. The color of the urine is noted and documented; a change in color from pink to amber indicates reduced bleeding. Blood pressure, pulse, and respirations are monitored and compared with baseline preoperative vital signs to detect hypotension. The nurse also observes the patient for restlessness, diaphoresis, pallor, any drop in blood pressure, and an increasing pulse rate.

Drainage of the bladder may be accomplished by gravity through a closed sterile drainage system. A three-way drainage system is useful in irrigating the bladder and preventing clot formation (Fig. 49-5). Continuous irrigation may be used with TUR. Some urologists leave an indwelling catheter attached to a dependent drainage system. Gentle irrigation of the catheter may be prescribed to remove any obstructing clots. If the patient complains of pain, the tubing is examined. The drainage system is irrigated, if indicated and prescribed, to clear any obstruction. Usually, the catheter is irrigated with 50 mL of irrigating fluid at a time. The amount of fluid recovered in the drainage bag must equal the amount of fluid injected. Overdistention of the bladder is avoided, because it can induce secondary hemorrhage by stretching the coagulated blood vessels in the prostatic capsule.

To prevent traction on the bladder, the drainage tube (not the catheter) is taped to the shaved inner thigh. If a cystostomy catheter is in place, it is taped to the abdomen. The nurse explains the purpose of the catheter to the patient and assures him that the urge to void results from the presence of the catheter and from bladder spasms. He is cautioned not to pull on the catheter, because this causes bleeding and subsequent catheter blockage, which leads to urinary retention.

Complications With Catheter Removal

After the catheter is removed (usually when the urine appears clear), urine may leak around the wound for several days in the patient who has undergone perineal, suprapubic, or retropubic surgery. The cystostomy tube may be removed before or after the urethral catheter is removed. Some urinary incontinence may occur after

catheter removal, and the patient is informed that this is likely to subside over time.

Sexual Dysfunction

Depending on the type of surgery, the patient may experience sexual dysfunction related to erectile dysfunction, decreased libido, and fatigue. These issues may become a concern to the patient soon after surgery or in the weeks to months of rehabilitation. Several options to restore erectile function are discussed with the patient by the surgeon or urologist. These options may include medications, surgically placed implants, or negative-pressure devices. A decrease in libido is usually related to the impact of the surgery on the man's body. Reassurance that the usual level of libido will return after recuperation from surgery is often helpful for the patient and his partner. The patient should be aware that he may experience fatigue during rehabilitation from surgery. This fatigue may also decrease his libido and alter his enjoyment of usual activities.

Nursing interventions include assessing for the presence of sexual dysfunction after surgery. Providing a private and confidential environment to discuss issues of sexuality is important. The emotional challenges of prostate surgery and its consequences need to be carefully explored with the patient and his partner. Providing the opportunity to discuss these issues can be very beneficial to the patient. For patients who demonstrate significant problems adjusting to their sexual dysfunction, a referral to a sex therapist may be indicated.

Promoting Home and Community-Based Care

Teaching Patients Self-Care

The patient undergoing prostatectomy may be discharged within several days. The length of the hospital stay depends on the type of prostatectomy performed. Patients undergoing a perineal prostatectomy are hospitalized for 3 to 5 days. If a retropubic or suprapubic prostatectomy is performed, the hospital stay may extend to 5 to 7 days. The patient and family require instructions about how to manage the drainage system, how to assess for complications, and how to promote recovery. The nurse provides verbal and written instructions about the need to maintain the drainage system and to monitor urinary output, about wound care, and about strategies to prevent complications, such as infection, bleeding, and thrombosis. In addition, the patient and family need to know about signs and symptoms that should be reported to the physician (eg, blood in urine, decreased urine output, fever, change in wound drainage, calf tenderness).

As the patient recovers and drainage tubes are removed, he may become discouraged and depressed because he cannot regain bladder control immediately. Furthermore, urinary frequency and burning may occur after the catheter is removed. Teaching the patient the following exercises may help him regain urinary control:

- Tense the perineal muscles by pressing the buttocks together; hold this position; relax. This exercise can be performed 10 to 20 times each hour while sitting or standing.
- Try to interrupt the urinary stream after starting to void; wait a few seconds and then continue to void.

Perineal exercises should continue until the patient gains full urinary control. The patient is instructed to urinate as soon as he feels the first urge to do so. It is important that the patient know that regaining urinary control is a gradual process; he may continue to “dribble” after being discharged from the hospital, but this should gradually diminish (within 1 year). Lining underwear with absorbent pads can help minimize embarrassing stains on clothing. The urine may be cloudy for several weeks

after surgery but should clear as the prostate area heals.
While the prostatic fossa heals (6 to 8 weeks), the patient should avoid activities that produce Valsalva effects (straining, heavy lifting), because this may increase venous pressure and produce hematuria. He should avoid long motor trips and strenuous exercise, which increase the tendency to bleed. He should also know that spicy foods, alcohol, and coffee may cause bladder discomfort. The patient should be cautioned to drink enough fluids to avoid dehydration, which increases the tendency for a blood clot to form and obstruct the flow of urine. Signs of complications, such as bleeding, passage of blood clots, a decrease in the urinary stream, urinary retention, or symptoms of urinary tract infection symptoms, should be reported to the physician (Chart 49-5).

Continuing Care

Referral for home care may be indicated if the patient is elderly or has other health problems, if the patient and family cannot provide care in the home, or if the patient lives alone without available supports. The home care nurse assesses the patient's physical status (cardiovascular and respiratory status, fluid and nutritional status, patency of the urinary drainage system, wound and nutritional status) and provides catheter and wound care, if indicated. The nurse reinforces previous teaching and assesses the ability of the patient and family to manage required care. The home care nurse encourages the patient to ambulate and to carry out perineal exercises as prescribed. The patient may need to be reminded that return of bladder control may take time.

The patient is reminded about the importance of participating in routine health screening and other health promotion activities. If the prostatectomy was performed to treat prostate cancer, the patient and family are also instructed about the importance of follow-up and monitoring with the physician.

Evaluation

Expected Preoperative Patient Outcomes

Expected preoperative patient outcomes may include the following:

- Demonstrates reduced anxiety
- States that pain and discomfort are decreased
- Relates understanding of the surgical procedure and postoperative course and practices perineal muscle exercises and other techniques useful in facilitating bladder contrlo

Expected Postoperative Patient Outcomes

Expected postoperative patient outcomes may include the following:

- Reports relief of discomfort
- Exhibits fluid and electrolyte balance
    - Irrigation fluid and urinary output are within parameters determined by surgeon
    - Experiences no signs or symptoms of fluid retention
- Participates in self-care measures
    - Increases activity and ambulation daily
    - Produces urine output within normal ranges and consistent with intake
    - Performs perineal exercises and interrupts urinary stream to promote bladder control
    - Avoids straining and lifting heavy objects
- Is free of complications

- Maintains vital signs within normal limits
- Exhibits wound healing, without signs of inflammation or hemorrhage
- Maintains acceptable level of urinary elimination
- Maintains optimal drainage of catheter and other drainage tubes
- Reports understanding of changes in sexual function

Chapter 54

Assessment and Management of Patients With Rheumatic Disorders

Rheumatic Diseases

• "Arthritis"

• More than 100 different disorders

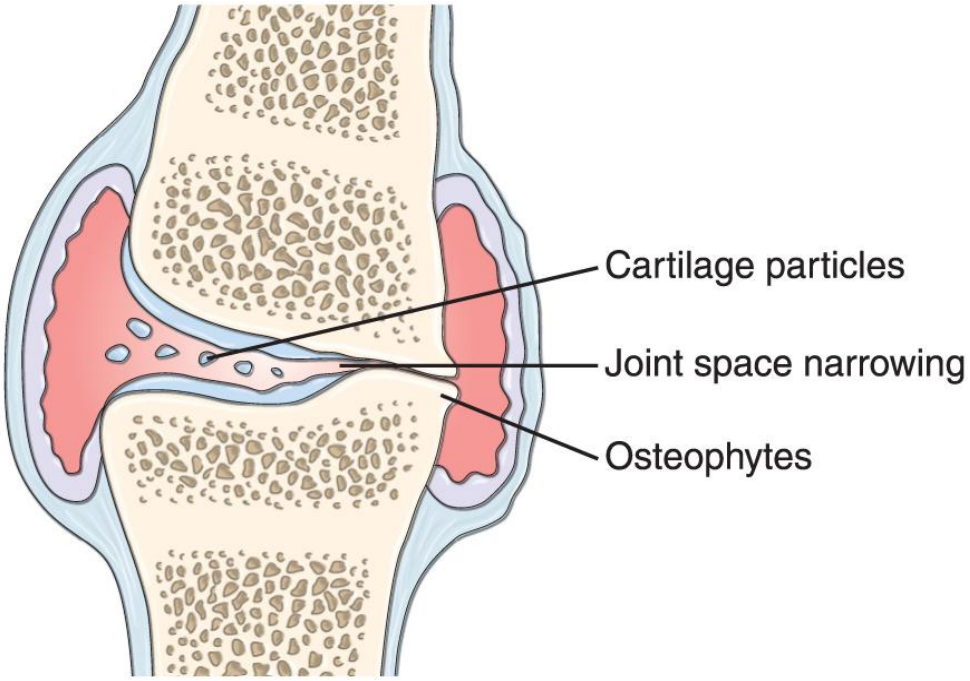
• Affect primary the joints, but also muscles, bone, ligament, tendons, cartilage

• Classification

–Monoarticular or polyarticular

–Inflammatory or noninflammatory

Characteristic Degenerative Changes— "Degradation"



Joint space narrowing and osteophytes (bone spurs) are characteristic of degenerative changes in joints.

Although the cause of degeneration of the articular cartilage is poorly understood, the process is known to be metabolically active and therefore is more accurately called "degradation."

Factors associated with degenerative joint changes

• Mechanical Stress (The articular plate (subchondral bone) thins, and its ability to absorb shock decreases)

• Altered Lubrication

• Immobility

Clinical Manifestations

• Pain

• Joint swelling

• Limited movement

• Stiffness

• Weakness

• Fatigue

• Warmth,

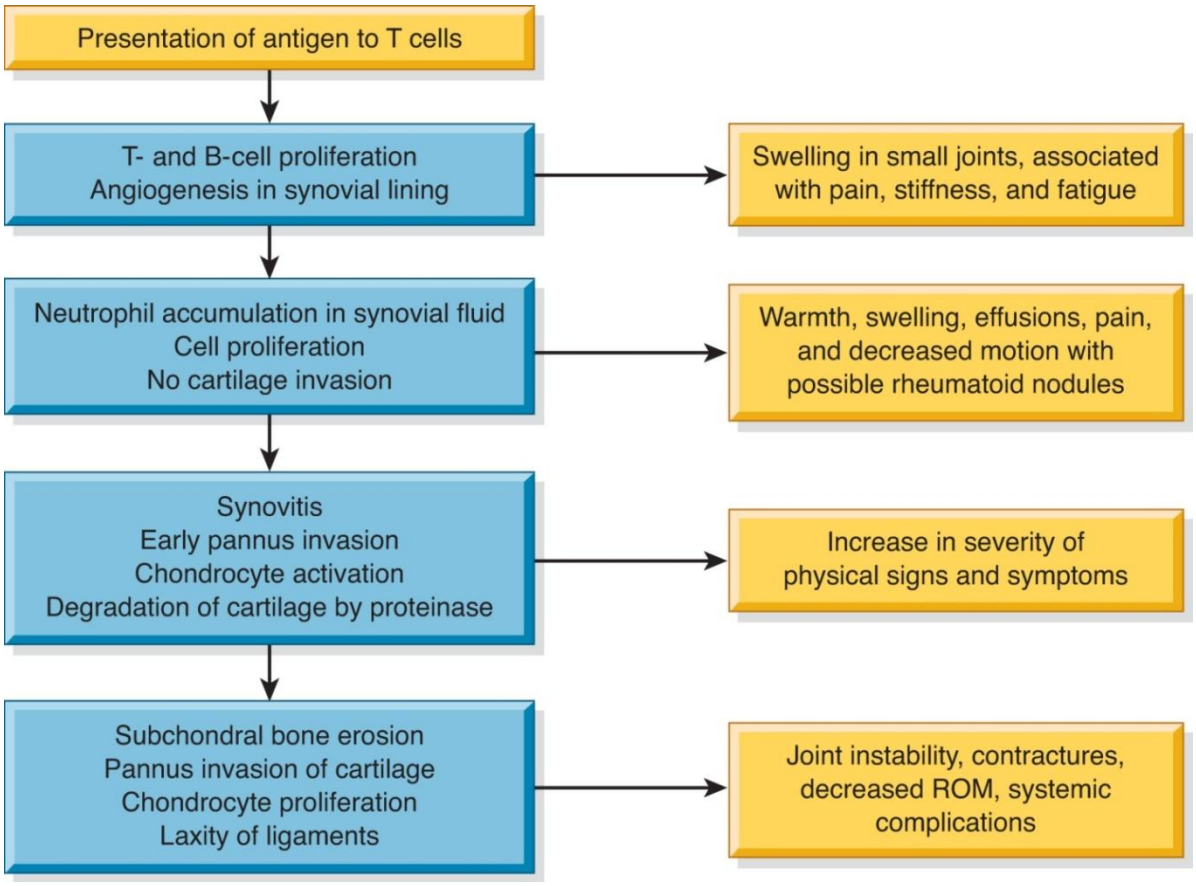
• Erythema

Rheumatoid arthritis. (**A**) Early. (**B**) Advanced.

• Joint involvement begins in the small joints of the hands, wrists, and feet. As the disease progresses, the knees, shoulders, hips, elbows, ankles, and cervical spine joints are affected.

• The onset of symptoms is usually acute. Symptoms are usually bilateral and symmetric. In addition to joint pain and swelling, another classic sign of RA is joint stiffness, especially in the morning, lasting at least 30 to 45 minutes

Pathophysiology and Associated Physical Signs of Rheumatoid Arthritis



Pannus (newly formed synovial tissue infiltrated with inflammatory cells)

Patient Assessment and Diagnostic Findings

• Health history: include onset of and evolution of symptoms, family history, past health history, and contributing factors

• Functional assessment

• Arthrocentesis (to take fluid for sampling and to relieve pain caused by pressure of increased fluid volume. After procedure, observe the patient for signs of infection and hemarthrosis)

• X-rays, bone scans, CTs, and MRIs

• Tissue biopsy

• Blood studies

Treatment

Major Goals	Management Strategy
Suppress inflammation and the autoimmune response	Optimize pharmacologic therapy (anti-inflammatory and disease-modifying agents)
Control pain	Protect joints; ease pain with splints, thermal modalities, relaxation techniques
Maintain or improve joint mobility	Implement exercise programs for joint motion and muscle strengthening and overall health
Maintain or improve functional status	Make use of adaptive devices and techniques
Increase patient's knowledge of disease process	Provide and reinforce patient teaching
Promote self-management by patient compliance with the therapeutic regimen	Emphasize compatibility of therapeutic regimen and lifestyle

Nursing Process: The Care of the Patient with a Rheumatic Disease

Assessment

• Health history and physical assessment focus on current and past symptoms, and also include the patient's psychological and mental status, social support systems, ability to participate in daily activities, comply with treatment regimen, and manage self-care

Diagnoses

• Acute and chronic pain

• Disturbed sleep pattern

• Self-care deficits

• Ineffective coping

• Fatigue

• Impaired physical mobility

• Disturbed body image

Collaborative Problems/Potential Complications

• Adverse effects of medications

Planning

• Major goals may include:

–Relief of pain and discomfort

–Relief of fatigue

–Promotion of restorative sleep

–Increased mobility

–Maintenance of self-care

–Improved body image

–Effective coping

–Absence of complications

Systemic Lupus Erythematosus

• More common in women than men

• An autoimmune disease. The immunoregulatory disturbance is brought about by some combination of genetic factors, hormonal factors (as evidenced by the usual onset during the childbearing years), environmental factors (eg, sunlight, thermal burns), and some medications (hydralazine (Apresoline), isoniazid (INH), chlorpromazine, and some antiseizure medications).

Clinical Manifestations

• The onset of SLE may be insidious or acute. For this reason, SLE may remain undiagnosed for many years.

• It can affect any body system (musculoskeletal system, with arthralgias and arthritis (synovitis), skin (butter fly rash), Oral ulcers, Pericarditis, renal involvement (increased creatinine) which leads to hypertension, CNS (subtle changes in behavior patterns or

Gout

• Is a heterogeneous group of conditions related to a genetic defect of purine metabolism that results in hyperuricemia.

• Occur as a result of uversecretion of uric acid or a renal defect to excrete uric acid, or a combination of both.

• Primary hyperuricemia may be caused by severe dieting or starvation, excessive intake of foods that are high in purines (shellfish, organ meats), or heredity.

• Secondary hyperuricemia is due to conditions

Pathophysiology

• With hyperuricemia, accumulations of sodium urate crystals, called tophi, are deposited in peripheral areas of the body, such as the great toe, the hands, and the ear.

• Renal urate lithiasis (kidney stones), with chronic renal disease secondary to urate deposition, may develop.

Clinical Manifestations

• Acute gouty arthritis (recurrent attacks of severe articular and periarticular inflammation), tophi (crystalline deposits accumulating in articular tissue, osseous tissue, soft tissue, and cartilage)

• The metatarsophalangeal joint of the big toe is the most commonly affected joint (90%). The ankle or knee may also be affected. Less commonly, the wrists, fingers, and elbows.

• Severe pain, redness, swelling, & warmth of the affected joint

Medical Management

• Pharmacology

• Diet

Nursing Process
The Patient with a Rheumatic Disease

Assessment

The depth and focus of the nursing assessment depend on several factors: the health care setting (clinic or office, home, extended care facility, or hospital), the role of the nurse (home care nurse; nurse practitioner; hospital, clinic, or office nurse), and the needs of the patient. The nurse is often the first health care team member to come in contact with the patient. This enables the nurse to assess the patient's perceptions of the disorder and situation, actions taken to relieve symptoms, plans for treatment, and expectations. The nurse's assessment may lead to identifying issues and concerns that can be addressed by nursing interventions and, through collaboration with other team members, to achieving the expected patient outcomes.

The health history and physical assessment focus on current and past symptoms, such as fatigue, weakness, pain, stiffness, fever, or anorexia, and the effects of these symptoms on the patient's lifestyle and self-image. Because the rheumatic diseases affect many body systems, the history and physical assessment include a review and examination of all systems, with particular attention given to those areas most commonly affected, including the musculoskeletal system (see Chart 54-1).

The patient's psychological and mental status and social support systems are also assessed, as well as his or her ability to participate in daily activities, comply with the treatment regimen, and manage self-care. The information obtained can give insight into the patient's understanding of the medication regimen and may reveal misuse of medications, failure to follow the treatment regimen, or use of potentially harmful unproven remedies. Additional areas assessed include the patient's understanding, motivation, knowledge, coping abilities, past experiences, preconceptions, and fears. The effects of the disease on the patient's self-concept and coping abilities are also assessed. The patient's perception of the condition and its impact influences the decisions, choices, and actions associated with treatment recommendations.

In addition, the patient's response to having a chronic disorder or a disability is assessed. Patients' and families' responses to illness are discussed in detail in Chapter 7, and chronic illness and disability are addressed in detail in Chapter 10.

Diagnosis

Nursing Diagnoses

Although many nursing diagnoses are appropriate for the patient with a rheumatic disease, the following are a few of the most common ones:

- Acute and chronic pain related to inflammation and increased disease activity, tissue damage, fatigue, or lowered tolerance level
- Fatigue related to increased disease activity, pain, inadequate sleep/rest, deconditioning, inadequate nutrition, and emotional stress/depression
- Disturbed sleep pattern related to pain, depression, and medications
- Impaired physical mobility related to decreased range of motion, muscle weakness, pain on movement, limited endurance, lack of or improper use of ambulatory devices
- Self-care deficits related to contractures, fatigue, or loss of motion
- Disturbed body image related to physical and psychological changes and dependency imposed by chronic illness
- Ineffective coping related to actual or perceived lifestyle or role changes

Collaborative Problems/Potential Complications
Based on assessment data, potential complications may include the following:

- Adverse effects of medications

Planning and Goals
The major goals for the patient may include relief of pain and discomfort, relief of fatigue, promotion of restorative sleep, increased mobility, maintenance of self-care, improved body image, effective coping, and absence of complications.

Nursing Interventions
An understanding of the underlying disease process (ie, degeneration or inflammation, including degeneration resulting from inflammation or vice versa) guides the nurse's critical thinking processes. In addition, knowledge about whether the condition is localized or more widely systemic influences the scope of the nursing activity.
Some rheumatic diseases (eg, OA) are more localized alterations in which control of symptoms such as pain or stiffness is possible. Others (eg, gout) have a known cause and specific treatment to control the symptoms. The diseases that usually present the greatest challenge are those with systemic manifestations, such as the diffuse connective tissue diseases. The plan of nursing care in Chart 54-2 details the nursing interventions to be considered for each nursing diagnosis.

Relieving Pain and Discomfort
Medications are used on a short-term basis to relieve acute pain. Because the pain may be persistent, nonopioid analgesics such as acetaminophen are often used. After administering medications, the nurse needs to reassess pain levels at intervals. With persistent pain, assessment findings should be compared with baseline measurements and evaluations. Additional measures include exploring coping skills and strategies that have worked in the past.
The patient needs to understand the importance of taking medications, such as NSAIDs and DMARDs, exactly as prescribed to achieve maximum benefits. These benefits include relief of pain and anti-inflammatory action as the disease is brought under control. Because disease control and pain relief are delayed, the patient may mistakenly believe the medication is ineffective or may think of the medication as merely “pain pills,” taking them only sporadically and failing to achieve control over the disease activity. Alternatively, the patient may not understand the need to continue the medication for its anti-inflammatory actions once pain control has been achieved.
A weight reduction program may be recommended to relieve stress on painful joints. Heat applications are also helpful in relieving pain, stiffness, and muscle spasm. Superficial heat may be applied in the form of warm tub baths or showers and warm moist compresses. Paraffin baths (dips), which offer concentrated heat, are helpful to patients with wrist and small-joint involvement. Maximum benefit is achieved within 20 minutes after application. More frequent use for shorter lengths of time is most beneficial. Therapeutic exercises can be carried out more comfortably and effectively after heat has been applied.
However, in some patients, heat may actually increase pain, muscle spasm, and synovial fluid volume. If the inflammatory process is acute, cold applications in the form of moist packs or an ice bag may be tried. Both heat and cold are analgesic to nerve pain receptors and can relax muscle spasms. Safe use of heat and cold must be evaluated and taught, particularly to patients with impaired sensation. Further study of the effectiveness of these modalities is needed.

The use of braces, splints, and assistive devices for ambulation, such as canes, crutches, and walkers, eases pain by limiting movement or stress from weight bearing on painful joints. Acutely inflamed joints can be rested by applying splints to limit motion. Splints also support the joint to relieve spasm. Canes and crutches can relieve stress from inflamed and painful weight-bearing joints while promoting safe ambulation. Cervical collars may be used to support the weight of the head and limit cervical motion. A metatarsal bar or special pads may be put into the patient's shoes if foot pain or deformity is present (Egan, Brosseau, Farmer, et al., 2006).
Other strategies for decreasing pain include muscle relaxation techniques, imagery, self-hypnosis, and distraction.

Decreasing Fatigue
Fatigue related to rheumatic disease can be both acute (brief and relieved by rest or sleep) and chronic. Chronic fatigue, related to the disease process, is persistent, cumulative, and not eliminated by rest but is influenced by biologic, psychological, social, and personal factors.

Plan of Nursing Care: Care of the Patient With a Rheumatic Disease

Nursing Diagnosis: Acute and chronic pain related to inflammation and increased disease activity, tissue damage, fatigue, or lowered tolerance level
Goal: Improvement in comfort level; incorporation of pain management techniques into daily life.

NURSING INTERVENTIONS	RATIONALE	EXPECTED OUTCOMES
1. Provide variety of comfort measures • Application of heat or cold • Massage, position changes, rest • Foam mattress, supportive pillow, splints • Relaxation techniques, diversional activities	1. Pain may respond to non-pharmacologic interventions such as joint protection, exercise, relaxation, and thermal modalities.	• Identifies factors that exacerbate or influence pain response • Identifies and uses pain management strategies • Verbalizes decrease in pain • Reports signs and symptoms of side effects in timely manner to prevent additional problems • Verbalizes that pain is characteristic of rheumatic disease • Establishes realistic pain-relief goals • Verbalizes that pain often leads to the use of nontraditional and unproven self-treatment methods • Identifies changes in quality or intensity
2. Administer anti-inflammatory, analgesic, and slow-acting antirheumatic medications as prescribed.	2. Pain of rheumatic disease responds to individual or combination medication regimens.	
3. Individualize medication schedule to meet patient's need for pain management.	3. Previous pain experiences and management strategies may be different from those needed for persistent pain.	
4. Encourage verbalization of feelings about pain and	4. Verbalization promotes coping.	

chronicity of disease.		of pain
5. Teach pathophysiology of pain and rheumatic disease, and assist patient to recognize that pain often leads to unproven treatment methods.	5. Knowledge of rheumatic pain and appropriate treatment may help patient avoid unsafe, ineffective therapies.	
6. Assist in identification of pain that leads to use of unproven methods of treatment.	6. The impact of pain on an individual's life often leads to misconceptions about pain and pain management techniques.	
7. Assess for subjective changes in pain.	7. The individual's description of pain is a more reliable indicator than objective measurements such as change in vital signs, body movement, and facial expression.	

Nursing Diagnosis: Fatigue related to increased disease activity, pain, inadequate sleep/rest, deconditioning, inadequate nutrition, and emotional stress/depression
Goal: Incorporates as part of daily activities strategies necessary to modify fatigue

NURSING INTERVENTIONS	RATIONALE	EXPECTED OUTCOMES
1. Provide instruction about fatigue • Describe relationship of disease activity to fatigue. • Describe comfort measures while providing them. • Develop and encourage a sleep routine (warm bath and relaxation techniques that promote sleep). • Explain importance of rest for relieving systematic, articular, and emotional stress. • Explain how to use energy	1. The patient's understanding of fatigue will affect his or her actions. • The amount of fatigue is directly related to the activity of the disease. • Relief of discomfort can relieve fatigue. • Effective bedtime routine promotes restorative sleep. • Different kinds of rest are needed to relieve fatigue and are based on patient need and response. • A variety of measures can be used to conserve	• Self-evaluates and monitors fatigue pattern • Verbalizes the relationship of fatigue to disease activity • Uses comfort measures as appropriate • Practices effective sleep hygiene and routine • Makes use of various assistive devices (splints, canes) and strategies (bed rest, relaxation techniques) to ease different kinds of fatigue • Incorporates time management

conservation techniques (pacing, delegating, setting priorities). • Identify physical and emotional factors that can cause fatigue.	energy. • Awareness of the various causes of fatigue provides the basis for measures to modify the fatigue.	strategies in daily activities • Uses appropriate measures to prevent physical and emotional fatigue • Has an established plan to ensure well-paced, therapeutic activity schedule • Adheres to therapeutic program • Follows a planned conditioning program • Consumes a nutritious diet consisting of appropriate food groups and recommended daily allowance of vitamins and minerals
2. Facilitate development of appropriate activity/rest schedule.	2. Alternating rest and activity conserves energy while allowing most productivity.	
3. Encourage adherence to the treatment program.	3. Overall control of disease activity can decrease the amount of fatigue.	
4. Refer to and encourage a conditioning program.	4. Deconditioning resulting from lack of mobility, understanding, and disease activity contributes to fatigue.	
5. Encourage adequate nutrition, including source of iron from food and supplements.	5. A nutritious diet can help counteract fatigue.	

Nursing Diagnosis: Impaired physical mobility related to decreased range of motion, muscle weakness, pain on movement, limited endurance, lack of or improper use of ambulatory devices

Goal: Attains and maintains optimal functional mobility

NURSING INTERVENTIONS	RATIONALE	EXPECTED OUTCOMES
1. Encourage verbalization regarding limitations in mobility.	1. Mobility is not necessarily related to deformity. Pain, stiffness, and fatigue may temporarily limit mobility. The degree of mobility is not synonymous with the degree of independence. Decreased mobility may influence a person's self-concept and lead to social isolation.	• Identifies factors that interfere with mobility • Describes and uses measures to prevent loss of motion • Identifies environmental (home, school, work, community) barriers to optimal mobility • Uses appropriate techniques and/or assistive equipment to aid mobility • Identifies community resources available
2. Assess need for occupational or physical therapy consultation: • Emphasize range of motion of affected	2. Therapeutic exercises, proper footwear, and/or assistive equipment may improve mobility. Correct posture and positioning are necessary for	

joints. • Promote use of assistive ambulatory devices. • Explain use of safe footwear. • Use individual appropriate positioning/posture.	maintaining optimal mobility.	to assist in managing decreased mobility
3. Assist to identify environmental barriers.	3. Furniture and architectural adaptations may enhance mobility.	
4. Encourage independence in mobility and assist as needed. • Allow ample time for activity • Provide rest period after activity. • Reinforce principles of joint protection and work simplification.	4. Changes in mobility may lead to a decrease in personal safety.	
5. Initiate referral to community health agency.	5. The degree of mobility may be slow to improve or may not improve with intervention.	

Nursing Diagnosis: Self-care deficits related to contractures, fatigue, or loss of motion
Goal: Achieves self-care independently or with the use of resources

NURSING INTERVENTIONS	RATIONALE	EXPECTED OUTCOMES
1. Assist patient to identify self-care deficits and factors that interfere with ability to perform self-care activities.	1. The ability to perform self-care activities is influenced by the disease activity and the accompanying pain, stiffness, fatigue, muscle weakness, loss of motion, and depression.	• Identifies factors that interfere with the ability to perform self-care activities • Identifies alternative methods for meeting self-care needs • Uses alternative methods for meeting self-care needs • Identifies and uses other health care resources for
2. Develop a plan based on the patient's perceptions and priorities on how to establish and achieve goals to meet self-care needs, incorporating joint	2. Assistive devices may enhance self-care abilities. Effective planning for changes must include the patient who must accept and adopt the plan.	

protection, energy conservation, and work simplification concepts. • Provide appropriate assistive devices. • Reinforce correct and safe use of assistive devices. • Allow patient to control timing of self-care activities. • Explore with the patient different ways to perform difficult tasks or ways to enlist the help of someone else.		meeting self-care needs
3. Consult with community health care agencies when individuals have attained a maximum level of self-care yet still have some deficits, especially regarding safety.	3. Individuals differ in ability and willingness to perform self-care activities. Changes in ability to care for self may lead to a decrease in personal safety.	

Nursing Diagnosis: Disturbed body image related to physical and psychological changes and dependency imposed by chronic illness
Goal: Adapts to physical and psychological changes imposed by the rheumatic disease

NURSING INTERVENTIONS	RATIONALE	EXPECTED OUTCOMES
1. Help patient identify elements of control over disease symptoms and treatment.	1. The individual's self-concept may be altered by the disease or its treatment.	• Verbalizes an awareness that changes taking place in self-concept are normal responses to rheumatic disease and other chronic illnesses • Identifies strategies to cope with altered self-concept
2. Encourage patient's verbalization of feelings, perceptions, and fears. • Help to assess present situation and identify problems. • Assist to identify past coping mechanisms. • Assist to identify effective coping mechanisms.	2. The individual's coping strategies reflect the strength of his or her self-concept.	

Nursing Diagnosis: Ineffective coping related to actual or perceived lifestyle or role changes
Goal: Use of effective coping behaviors for dealing with actual or perceived limitations and role changes

NURSING INTERVENTIONS	RATIONALE	EXPECTED OUTCOMES
1. Identify areas of life affected by disease. Answer questions and dispel possible myths.	1. The effects of disease may be more or less manageable once identified and explored reasonably.	• Names functions and roles affected and not affected by disease process • Describes therapeutic regimen and states actions to take to improve, change, or accept a particular situation, function, or role
2. Develop plan for managing symptoms and enlisting support of family and friends to promote daily function.	2. By taking action and involving others appropriately, patient develops or draws on coping skills and community support.	

Collaborative Problems: Complications secondary to effects of medications
Goal: Absence or resolution of complications

NURSING INTERVENTIONS	RATIONALE	EXPECTED OUTCOMES
1. Perform periodic clinical assessment and laboratory evaluation.	1. Skillful assessment helps detect early symptoms of side effects of medications.	• Complies with monitoring procedures and experiences minimal side effects • Takes medication as prescribed and lists potential side effects • Identifies strategies to reduce or manage side effects • Reports that side effects or complications have subsided
2. Instruct in correct self-administration, potential side effects, and importance of monitoring.	2. The patient needs accurate information about medications and potential side effects to avoid or manage them.	
3. Counsel regarding methods to reduce side effects and manage symptoms.	3. Appropriate identification and early intervention may minimize complications.	
4. Administer medications in modified doses as prescribed if complications occur.	4. Modifications may help minimize side effects or other complications	

Chapter 55

Assessment of Integumentary Function

The Skin

• The largest organ system of the body

• Is a barrier between the internal organs and the external environment and participates in many vital body functions.

• Protects internal body structures from harmful microorganisms and substances.

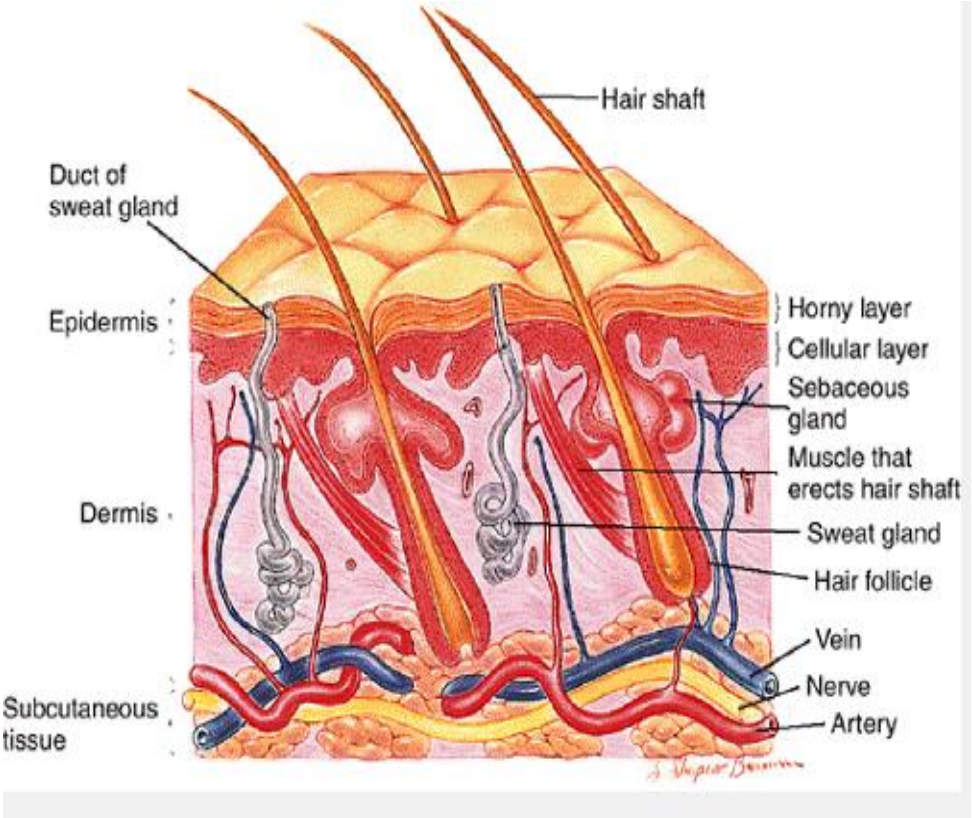
Structure of the Skin

• The skin is composed of three layers:

–The epidermis.

–The dermis.

–The subcutaneous fatty tissue.



The epidermis

• A layer of squamous epithelial cells.

• Most of these cells produce a tough, fibrous protein called keratin.

• The epidermis also produced specialized cells called melanocytes. These produce melanin (skin pigment). Aggregations of melanocytes are nevi (moles and birthmarks).

–melanin can absorb ultraviolet light in sunlight

keratin, an insoluble, fibrous protein that forms the outer barrier of the skin and has the capacity to repel pathogens and prevent excessive fluid loss from the body. Keratin is the principal hardening ingredient of the hair and nails.

Dermis

• Dense, irregular connective tissue composed of collagen and elastic fibers, blood and lymph vessels, nerves, sweat, and sebaceous glands and hair roots.

• The sebaceous glands produce sebum, an oily substance that lubricates the skin.

Subcutaneous Tissue

• Primarily connective and adipose (fatty) tissue. Here the skin is anchored to muscle and bone.

• Provides a cushion between the skin layers, muscles, and bones.

• It promotes skin mobility

Functions of the Skin

• Protection.

• Temperature regulation.

• Sensory perception.

• Fluid and electrolyte balance.

• Vitamin Production

• Immune Response Function

Hair: Structure

• Hair is composed of dead epidermal cells that begin to grow and divide in the base of the hair follicle.

• As the cells are pushed toward the skin surface, they become keratinized and die.

• Hair color is genetically determined.

Hair Growth and Replacement

• Scalp hair grows for 2 to 5 years.

• Approximately 50 hairs are lost each day.

• Sustained hair loss of more than 100 hairs each day usually indicates that something is wrong.

Hair: Function

• Protects scalp from ultraviolet rays and cushions blows.

• Eyelashes, hair in nostrils and in ears keep particles from entering organ.

Mucous Membranes

• A loose connective tissue overlaid with epithelium. Specialized cells within the mucous membrane secrete mucus.

• The cavities and tubes that open to the outside of the body are lined with mucous membranes. These include the oral and nasal cavities and the tubes of the respiratory, gastrointestinal, urinary, and reproductive systems.

Effects of Aging on the Skin

• Skin vascularity & number of sweat and sebaceous glands decrease, affecting thermoregulation.

• Thinning epidermis and prolonged wound healing make elderly more prone to injury and skin infections.

• Inflammatory response

& pain perception diminish.

• Skin cancer more common.

Assessment of Skin

• Health History and Clinical Manifestations

• Physical Assessment

–Inspection

–Palpation (? wear gloves)

• Assessing General Appearance

There are seven parameters that should be examined in performing physical assessment of the skin:

• Integrity.

• Color.

• Temperature and moisture.

• Texture.

• Turgor and mobility.

• Sensation.

• Vascularity.

Assessment of Hair, Nails, and Mucous Membranes

• Hair should be smooth, shiny, and resilient.

• Nails should be pink, smooth, and shiny, and feel firm yet flexible when palpated.

• Mucous membranes normally appear pink and moist.

Common Diagnostic Tests for Integumentary Disorders

• Biopsy.

• Patch Testing (for allergies).

• Tzanck smear (to examine cells from blistering skin conditions, i.e. herpes zoster.

• Skin scrapings.

• Culture and sensitivity.

Chapter 56

Management of Patients with Dermatologic Problems

Primary Skin Lesions

• **Macule, Patch**: Flat, nonpalpable skin color change (color may be brown, white, tan, purple, red)

–**Macule:** <1 cm, circumscribed border

–**Patch**: >1 cm, may have irregular border

• **Papule, Plaque:** Elevated, palpable, solid mass Circumscribed border

–**Papule**: <0.5 cm

–**Plaque**: >0.5 cm

• **Nodule, Tumor**: Elevated, palpable, solid mass. Extends deeper into the dermis than a papule

–**Nodule**: 0.5–2 cm; circumscribed

–**Tumor**: >1–2 cm; tumors do not always have sharp borders

• **Vesicle, Bulla**: Circumscribed, elevated, palpable mass containing serous fluid

–**Vesicle**: <0.5 cm

–**Bulla**: >0.5 cm

• **Pustule**: Pus-filled vesicle or bulla

Bacterial Skin Infections/Impetigo

• Caused by staphylococci, streptococci, or multiple bacteria.

• Face, hands, neck, and extremities are most frequently involved

• It is contagious and may spread to other parts of the patient's skin or to other members of the family who touch the patient or use towels or combs that are soiled with the exudate of the lesions.

• Starts as red macules, changed to thin-walled vesicles that rupture and become covered with a loosely adherent honey-yellow crust

• **Management**: Antibiotics

• **Complications**: Acute glomerulonephritis

• Nursing: good hygiene to prevent spread of infection to others.

Cellulitis

• Deep infection of the skin and subcutaneous tissue caused by Group A Strep or S Aureus

• Bacteria enters through a break in the skin, then Inflammation spreads horizontally

• Warm, red, swollen and painful

• Fever, malaise, chills, leukocytosis, elevated Sedimintation Rate

• Bed rest, elevation of affect part, antibiotics

• Resolves in 2 weeks with TX

Folliculitis & furuncle

• Folliculitis is an infection of bacterial or fungal origin that arises within the hair follicles.

• A furuncle (boil) is an acute inflammation arising deep in one or more hair follicles and spreading into the surrounding dermis. It is a deep form of folliculitis.

Carbuncle

• An abscess of the skin and subcutaneous tissue that represents an extension of a furuncle that has invaded several follicles and is large and deep-seated.

• Caused by a staphylococcal infection.

• Appear in areas where the skin is thick and inelastic; the back of the neck and the buttocks are common sites.

• Purulent secretions, high fever, pain, leukocytosis, and even extension of the infection to the bloodstream.

Herpes Zoster

• Caused by the varicella-zoster virus

• Usually, patients have a history of chickenpox. The virus becomes dormant and lies inside nerve cells near the brain and spinal cord

• The viruses become latent, until immunity decrease, then it will become active. They travel by way of the peripheral nerves to the skin.

• **S & S**: painful vesicular eruption (usually on face, neck & thorax). Vesicles contain serum, then become purulent.

• Treatment:

–Antiviral agents such as acyclovir (Zovirax)

–Pain is controlled with analgesics

–? Corticosteroids

Herpes Simplex

• Orolabial Herpes (fever blisters or cold sores)

–clusters of grouped vesicles on the lips.

–The onset is often accompanied by high fever, regional lymphadenopathy, and generalized malaise.

• Genital Herpes

–Minor infections may produce no symptoms

–Severe infections can cause systemic flulike illness. Lesions appear as grouped vesicles on the vagina, rectum, or penis.

Fungal (Mycotic) Infections Tinea Capitis

–Person to person transmission

–Commonly known as ringworm

–Affect the Scalp

• Scaling area with broken hair shafts, plaques, pustules

• Possible permanent hair loss

• Treatment

–Oral Griseofulvin

–Selenium Sulfide shampoos

–Topical antifungal agents

Tinea Corporis (Body)

• Appears on face, neck, trunk, and extremities.

• From infected pets

• Elevated scalilng, erythematous, very pruritic

• May spread to the hair, scalp, or nails.

• Oral Griseofulvin

• Cool compresses

• Antifungal cream applied 1 inch beyond lesion for 1-2 weeks until resolved

Tenia Cruris (Groin)

• Begins with small, red scaling patches, which spread to form circular elevated plaques, very pruritic

• Clusters of pustules may be seen around borders.

• Local application of Tolnaftate liquid

• Wet compresses or sitz baths may be soothing

Tenia Pedis (athlete's foot)

• Between toes and soles of the feet

• Maceration and fissuring between toes

• May have pinhead vesicles

• Oral Griseofulvin

• Antifungal powder

• Eliminate heat and perspiration by clean light socks, well ventilated shoes, avoidance of occlusive shoes

• Soak feet in vinegar and water solution.

Nondermatophyte Infections Candidiasis

• Yeast fungal infection

• Glistening, fiery red or moist pink, beefy red with satellite pustules, severe itching/burning

• Sites: skin folds/groin area, oral-thrush, diaper rash

• Teach prevention and management

–Disposable diapers or cloth diapers without rubber pants, Change as soon as soiled

–Exposure to open air, apply ointments (zinc oxide), avoid over washing, caution with perfumed soaps

Psoriasis

• Chronic hereditary disorder

• Light-skinned race

• Environmental factors that trigger

–Skin injury

–Infections

–Hormone changes

–Stress

–Drugs

–Alcohol

–Smoking

–obesity

• Erythematous plaque with sharp well defined borders and silvery white scales.

• Elbows, knees, scalp, lumbosacral skin, can occur anywhere

• Management

–Topical treatment

–Photo-therapy

–Teach reducing pruritus

• Avoid scratching

• Room humidifier

• Warm not hot bathing

• Avoid strong soaps

• Lubricate skin

• antihistamines

Neoplasms: Malignant

• Skin cancer is one of the most common malignant neoplasms in the United States and one of the most preventable.

• Three most common types are:

–Basal Cell Carcinoma.

–Squamous Cell Carcinoma.

–Malignant Melanoma.

Risk factors

• Fair-skinned, fair-haired, blue-eyed people.

• People who sustain sunburn

• Chronic sun exposure (i.e. farmers)

• Exposure to chemical pollutants

• Sun-damaged skin (elderly people)

• History of x-ray therapy

• Scars from severe burns

• Chronic skin irritations

• Immunosuppression

• Genetic factors

Basal Cell Carcinoma

• Most frequent type of skin cancer, arises from epidermis.

• Prolonged sun exposure, poor tanning ability, and previous therapy with x-rays for facial acne are associated

with it.

Squamous Cell Carcinoma

• Appears as a nodular lesion within the epidermis.

• Risk factors include prolonged sun exposure and exposure to gamma radiation and x-rays.

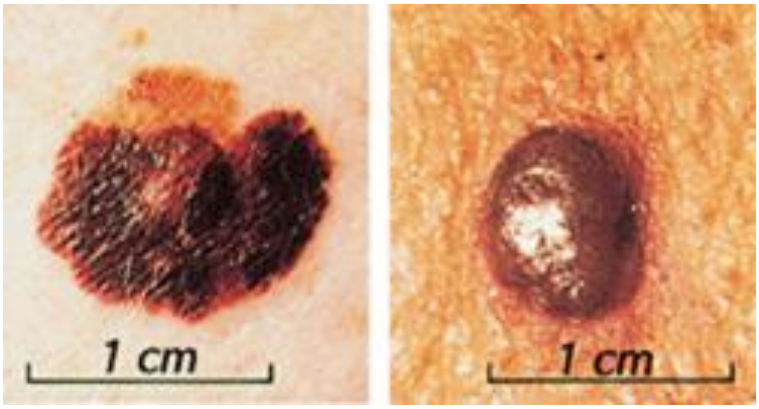
• Without treatment, it can metastasize and cause death.

Malignant Melanoma

• Moles have irregular shape and color.

• Malignant melanoma can metastasize to every organ in the body through the bloodstream and lymph system.

• Responsible for 3% of all cancer-related deaths.



Preventing Skin Cancer

• Avoid sun between 10 AM and 3 PM

• Sunscreen cream

• Reapply after swimming, strenuous exercises, or prolonged sun bathing

• Lip balm

• Protective clothing

• Inspect skin regularly

Nonmalignant skin tumor

• Benign tumor of the skin include:

–Warts

–Lipomas (benign fatty tumors).

–Keloids (abnormal growth of scar tissue).

–Sebaceous cysts.

–Nevi (moles).

–Angiomas (birthmarks).

Inflammatory Disorders of the Skin: Dermatitis/Eczema

• In current usage, eczema has almost become synonymous with dermatitis, although eczema tends to be used most often to refer to chronic forms of dermatitis.

• Eczema is an atopic dermatitis often associated with rhinitis and asthma. It is a chronic superficial inflammation that evolves into pruritic, red, weeping, crusted lesions.

Contact Dermatitis

• Skin reacts to external irritants like:

–allergens (e.g. poison ivy or cosmetics).

–harsh chemical substances (detergents, insecticides).

–metals such as nickel.

–mechanical irritations from wool or glass fibers.

–body substances like urine or feces.

Strategies for Avoiding Contact Dermatitis

• Avoid contact with causative materials.

• Avoid heat, soap, and rubbing.

• Choose bath soaps, detergents, and cosmetics that do not contain fragrance.

• Avoid topical medications, lotions, or ointments, except those specifically prescribed for your condition.

• Wash your skin thoroughly immediately after exposure to possible irritants.

Chapter 57

Management of Patients with Burn Injury

Burn Prevention

• Keep matches and lighters out of the reach of children.

• Emphasize the importance of never leaving children unattended around fire.

• Develop and practice a home exit fire drill.

• Set the water heater temperature no higher than 70°C.

• Don't smoke in bed, and caution against falling asleep while smoking.

• Caution against throwing flammable liquids onto an already burning fire.

• Caution against using flammable liquids to start fires.

• Caution against removing the radiator cap from a hot engine.

• Watch for overhead electrical wires and underground wires when working outside.

• Keep hot irons out of reach of children.

• Caution against running electric cords under carpets or rugs.

• Avoid storing flammable liquids near a fire source.

• Caution when cooking.

• Keep a working fire extinguisher in the home, and to know how to use it.

BURNS

• Results in ??? deaths annually

• Survival best at ages 15-45

• Children, elderly, and diabetics are at higher risk

• Survival best when burns cover less than 20% of TBA

Types of burns

1. Thermal

Exposure to flame or a hot object (i.e. hot water)

2. Chemical

Exposure to acid, alkali or organic substances

3. Electrical

Result from the conversion of electrical energy into heat. Extent of injury depends on the type of current, the pathway of flow, local tissue resistance, and duration of contact

4. Radiation

Result from radiant energy being transferred to the body resulting in production of cellular toxins

Burn Wound Assessment

• Classified according to depth of injury and extent of body surface area involved

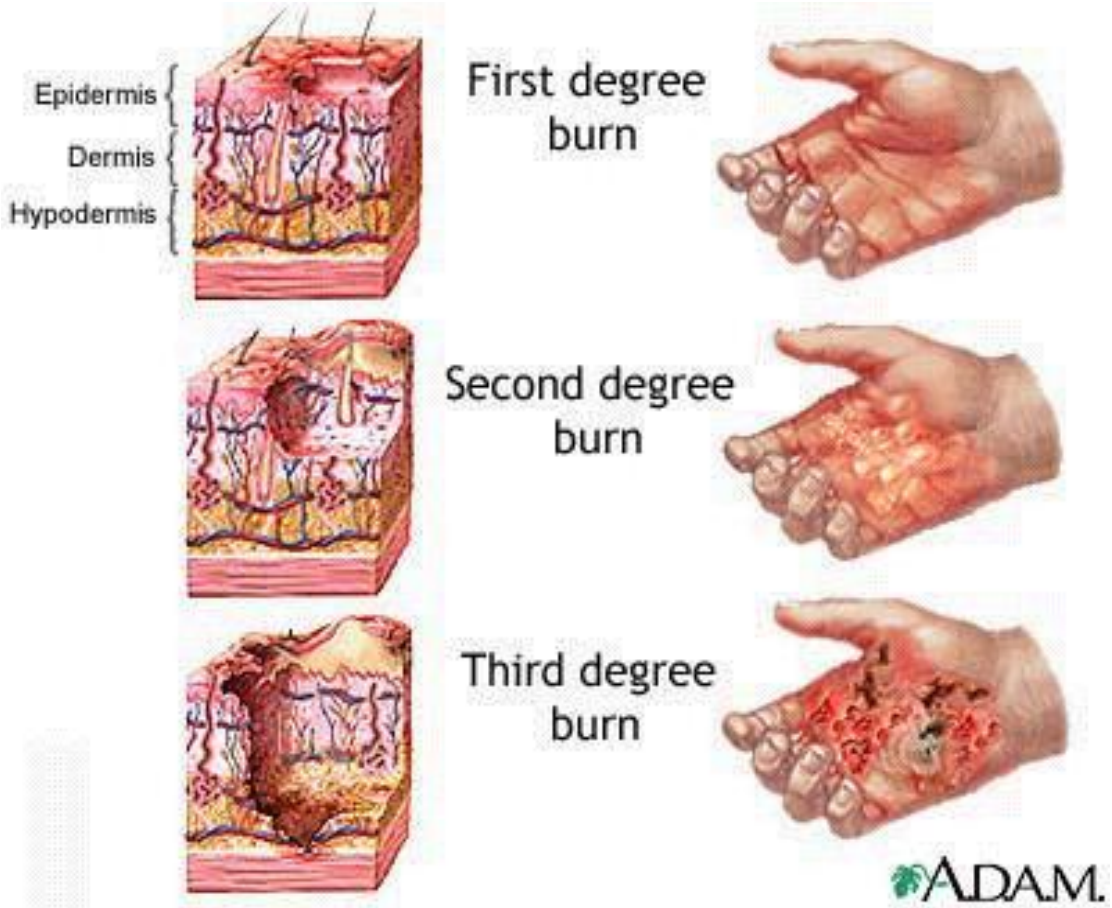
• Burn wounds differentiated depending on the level of dermis and subcutaneous tissue involved

1. Superficial (first-degree)

2. Deep (second-degree)

3. Full thickness (third and fourth degree)

The depth of the injury depends on the temperature of the burning agent and the duration of contact with the agent. For example, in the case of scald burns in adults, 1 second of contact with hot tap water at 68.9°C (156°F) may result in a burn that destroys both the epidermis and the dermis, causing a full-thickness (third-degree) injury. Fifteen seconds of exposure to hot water at 56.1°C (133°F) results in a similar full-thickness injury. Temperatures less than 111°F can be tolerated for long periods without injury.



Superficial Burns (First Degree)

• Epidermal tissue only affected

• Tingling, Hyperesthesia, pain that is soothed by cooling

• Wound: Reddened; blanches with pressure; dry, minimal or no edema, Possible blisters

• Complete recovery within a week; no scarring, peeling, i.e. sunburn

Deep (Second Degree)

• Involves the epidermis and deep layer of dermis

• Pain, hyperesthesia, sensitive to cold air.

• Blistered, mottled red base; weeping surface; edema

• Recovery in 2 to 4 weeks, some scarring and depigmentation, contractures

• Infection may convert it to full thickness

• Hospitalization required if over than 25% of body surface involved

• i.e. scald burn, flame

Full Thickness (Third/Fourth Degree)

• Destruction of all skin layers

• Requires immediate hospitalization

• Dry, waxy white (or charred), leathery, or hard skin, no pain, edema

• Exposure to flames, electricity or chemicals can cause 3rd degree burns

• Grafting necessary, scarring and loss of contour and function; contractures, loss of digits or extremity possible

Calculation of Burned Body Surface Area

Total Body Surface Area (TBSA)

• Superficial burns are not involved in the calculation

• Lund and Browder Chart is the most accurate because it adjusts for age

• Rule of nines divides the body – adequate for initial assessment for adult burns

• Palm rule

Lund-Browder Chart									
Area	0-1 Years	1-4 Years	5-9 Years	10-14 Years	15 Years	Adult	% 2nd	% 3rd	% TOTAL
Head	19	17	13	11	9	7			
Neck	2	2	2	2	2	2			
Ant. Trunk	13	13	13	13	13	13			
Post. Trunk	13	13	13	13	13	13			
R. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
L. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
Genitalia	1	1	1	1	1	1			
R.U. Arm	4	4	4	4	4	4			
L.U. Arm	4	4	4	4	4	4			
R.L. Arm	3	3	3	3	3	3			
L.L. Arm	3	3	3	3	3	3			
R. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
L. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
R. Thigh	5.5	6.5	8	8.5	9	9.5			
L. Thigh	5.5	6.5	8	8.5	9	9.5			
R.L. Leg	5	5	5.5	6	6.5	7			
L.L. Leg	5	5	5.5	6	6.5	7			
R. Foot	3.5	3.5	3.5	3.5	3.5	3.5			
L. Foot	3.5	3.5	3.5	3.5	3.5	3.5			

From the Medical University of South Carolina Children's Hospital Pediatric Burn Intake Form. (Charleston, SC)

Rule of Nines

• Head & Neck = 9%

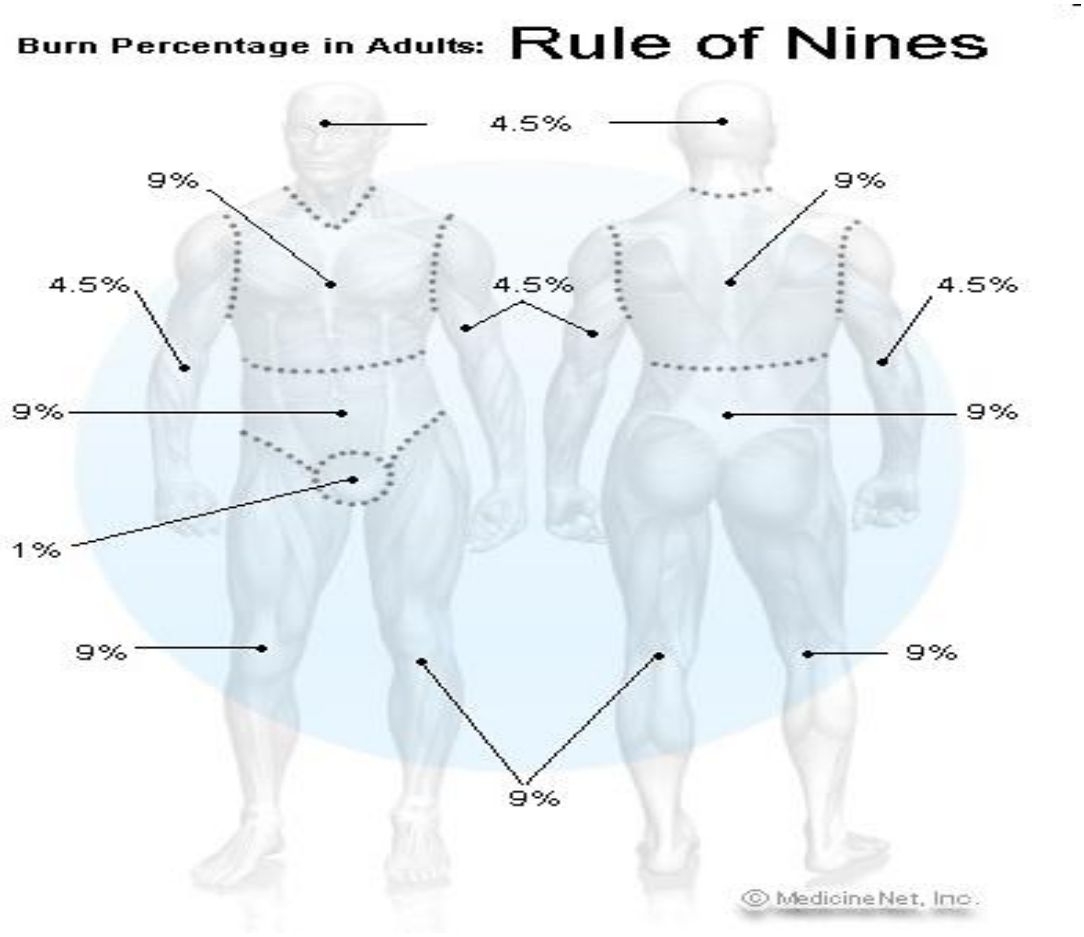
• Each upper extremity (Arms) = 9%

• Each lower extremity (Legs) = 18%

• Anterior trunk= 18%

• Posterior trunk = 18%

• Genitalia (perineum) = 1%



Pathophysiology

• Tissue destruction results from coagulation, protein denaturation, or ionization of cellular contents.

• skin and the mucosa of the upper airways are the sites of tissue destruction

• Disruption of the skin can lead to increased fluid loss, infection, hypothermia, scarring, compromised immunity, and changes in function, appearance, and body image.

• Burns that do not exceed 25% TBSA produce a primarily local response. Burns that exceed 25% TBSA may produce both a local and a

Cardiovascular Alterations

• Hypovolemia is the immediate consequence of fluid loss and results in decreased perfusion and oxygen delivery.

• Cardiac output decreases and BP decrease.

• SNS releases adrenaline, resulting in peripheral vasoconstriction and increase in HR.

• Patient needs immediate fluid replacement.

• Most of fluid (in first 24-36 hr) leaks out of blood vessels.

• As the capillaries begin to regain their integrity, burn shock resolves and fluid returns to the vascular compartment.

• As fluid is reabsorbed from the interstitial tissue into the vascular compartment, blood volume increases.

• If renal and cardiac function is adequate, urinary output increases.

• Diuresis continues for several days to 2 weeks.

Fluid shift

- Local edema occurs if burn area is less that 25% TBSA
- Generalized edema if burn area is more than 25% TBSA
- Maximal edema is after 24 hours.
- Begins to resolve 1 to 2 days after the burn and usually is completely resolved within 7 to 10 days.
- As edema increases, pressure on small blood vessels and nerves in the distal extremities causes an obstruction of blood flow and consequent ischemia.
- This complication is similar to a compartment syndrome.
- The physician may need to perform an escharotomy , a surgical incision into the eschar (devitalized tissue resulting from a burn), to relieve the constricting effect of the burned tissue

• Circulating blood volume decreases during burn shock.

• Evaporative fluid loss through the burn wound may reach 3 to 5 L or more over a 24-hour period until the burn surfaces are covered.

• Usually, hyponatremia is present.

• Immediately after burn injury, hyperkalemia results from massive cell destruction. Hypokalemia (potassium depletion) may occur later with fluid shifts and inadequate potassium replacement.

Fluid Remobilization

• Occurs after 24 hours

• Capillary leak stops

• See diuretic stage where edema fluid shifts from the interstitial spaces into the vascular space

• Blood volume increases leading to increased renal blood flow and diuresis

• Body weight returns to normal

• ? Hypokalemia if no potassium replacement

Effects on blood volume

• At the time of burn injury, some red blood cells may be destroyed and other damaged, resulting in anemia

• Despite this the hematocrit may be elevated due to plasma loss

• Blood loss during surgical procedures, wound care, diagnostic studies and ongoing hemolysis further contribute to anemia

• Blood transfusions are required periodically to maintain adequate hemoglobin levels for oxygen delivery

• Abnormalities in coagulation, including a decrease in platelets (thrombocytopenia) and prolonged clotting and prothrombin times occur with burn injury

Pulmonary Alterations

• Inhalation injury is the leading cause of death in fire victims

• Half of these deaths could have been prevented with use of a smoke detector

• Burn victims make it out of a burning home safely

• Once they are outside they may realize that loved ones or valuable items are still inside the burning home

• They then reenter the burning home and are overcome with toxic smoke and fumes and become disoriented or unconcious

Pulmonary response

• Pulmonary imjuries fall into several categories, upper airway injury, inhalational injury, including carbon monoxide poisining, and restrictive defects

• Upper air way injury results from direct heat or edema

• It is manifested by mechanical obstruction of the upper airway, including the pharynx and larynx

• Upper airway injury is treated by early nasotracheal or endotracheal intubation

• Inhalation injury below the glottis results from inhaling products of incomplete combustion (Burning) or noxious gases: carbon monoxide, sulfer oxide, nitrogen oxide, & benzene

• The injury results directly from chemical irritation of the pulmonary tisues at the alveolar level

• Inhalation injuries below glottis cause loss of ciliary action, hypersecretion, severe mucosal edema and bronchospasm

• The pulmonary surfactant is reduced, resulting in atelectasis (collapse of alveoli)

• Expectoration of carbon particles in the sputum is the cardinal sign of this injury

• The pathophysiology effects are due to tissue hypoxia a result of carbon monoxide combining with hemoglobin to form carboxyhemoglobin which competes with oxygen for available hemoglobin sites

• The effinity of hemoglobin for carbon monoxide is 200 times greater than that for oxygen

• Treatment usually consists of ealy intubation and mechnical ventilation with 100% oxygen

• Administering 100% O2 is essential to accelerate the removal of carbon monoxide from the hemoglobin molecule

• restrictive defects arise when edema develops under full-thickness burns encircling the neck and thorax

• Chest expansion may be greatly restricted resulting in decreased tidal volume

• In such situation escharotomy is necessary

• More than half of all burn victims with pulmonary involvement do not initially demonstrate pulmonary signs and symptoms

• Any pat with possible inhalation injury must be observed for at least 24 h for respiratory complications

Pulmonary response

• Airway obstruction may occur very rapidly in hours

• Decreased lung compliance, decreased arterial oxygen levels and respiratory acidosis may occur gradually over the first 5 days after a burn

Indication of possible pulmonary damages include

• History indicating that the burn occured in an enclosed area

• Burns of the face and neck

• Hoarseness , voice change, dry cough, stridor.

• Bloody sputum

• Labored breathing or tachypnea (rapid breathing) and other signs of reduced oxygen levels

• Erythema and blistering of the oral or pharyngeal mucosa

• The immediate intervention is intubation and mechanical ventilation

• If ventilation is impaired by restricted chest excursion, immediate chest escharotomy is needed

• ARDS may develop in the first few days after the burn injury secondary to systemic and pulmonary responses to the burn and inhalation injury

Renal alteration

• Renal function may be altered as a result of decreased blood volume

• Destruction of red blood cells at the injury site frees hemoglobin in the urine

• If muscle damage occurs (from electric burns e..) myoglobin is released from the muscle cells and excreted by the kidney

• Adequate fluid volume replacement restores renal blood flow, increasing the glomerular filtration rate and urine volume

• If there is inadequate blood flow through the kidneys, the hemoglobin and myoglobin occlude the renal tubules, resultinh in acute tubular necrosis and renal failure

Immunologic Alterations

• The immunologic defences of the body are greatly altered by burn injury

• Serious burn injury diminishes resistance to the infection

• As a result, sepsis remains the leading cause of death in thermally injured patients

• The loss of skin integrity is compounded by the release of abnormal inflammatory factors, altered levels of immunglobulins, impared neutrophil function and a reduction in lymphocytes (lymphocytopeni)

• Research suggests that burn injury results in loss of T -helper.cell lymphocytes

Thermoregulatory Alterations

• Loss of skin results in an inability to regulate body temperature

• Burn patients may therefore exhibit low body temperature in the early hours after injury

• As of hypermetabolism, core temperature increase.

• Burn patients become hyperthermic for much of the postburn period, even in the absence of infection

GI responses

• **Paralytic ileus** (absence of intestinal peristalsis):

–decreased peristalsis and bowel sounds are manifestations of paralytic ileus resulting from burn trauma and

–Gastric distention and nausea may lead to vomiting unless gastric decompression is initiated

• **Curling´s ulcer** (gastric or deuodenal erosion)

–Gastric bleeding secondary to massive physiologic stress may be signaled by occult blood in the stool, regurgitation of coffee ground material from the stomach or bloody vomitus

Phases of Burn Injuries

• **Emergent Phase**: From onset of injury to completion of fluid resuscitation

• **Acute Phase**: From beginning of diuresis to near completion of wound closure

• **Rehabilitative Phase**: From major wound closure to return to individual's optimal level of physical and psychosocial adjustment

Emergent Phase

• Immediate problem is fluid loss, edema, reduced blood flow (fluid and electrolyte shifts)

• Goals:

1. First aid (A, B, C)

2. Intubation if needed

3. Prevention of shock

4. Prevention of respiratory distress

5. Detection and treatment of concomitant injuries

6. Wound assessment and initial care

Emergent phase/ at fire sceine

• Extinguish the flames , switch off power source, remove chemical soaked clothes, etc…

• Assess and maintain an open airway

• Cool the burn

• Remove restrictive objects.

• Cover the wound

• Irrigate chemical burns

First Aid Scene

• Cool burn wound:

- reduce direct thermal trauma & stabilize mast cells, reducing release of histamine and other inflammatory mediators, and will reduce edema

- pain relief

- running water (15 degree C.)

- worth considering for up to 2 hours

Intubation:

• Suspicion of inhalational injury

• Severe facial & neck burn

" easy early intubation will become difficult and impossible later on"

Inhalational injury

• Fires

• Closed space

• Carbonaceous material in nose & mouth

• Direct thermal injury (upper airway)

• Chemical injury ; products of combustion (lower airway)

• CO poisoning ; systemic effect

CO poisoning

• Toxic symptoms > 20%, death rate is 60%

• CO-Hb > 5% is indicative of inhalational injury but not severity

• 200 – 250 × greater affinity for Hb than oxygen

• Treatment: 100% O2, hyperbaric oxygen

EMERGENT PHASE

• Transfer to the nearest hospital

• Knowledge of circumstances surrounding the burn injury

• Obtain client's pre-burn weight to calculate fluid rates

Clinical Manifestations in the Emergent Phase

• Clients with major burn injuries and with inhalation injury are at risk for respiratory problems

• Inhalation injuries are present in 20% to 50% of the clients admitted to burn centers

• Assess the respiratory system by inspecting the mouth, nose, and pharynx

• Burns of the lips, face, ears, neck, eyelids, eyebrows, and eyelashes are strong indicators that an inhalation injury may be present

• Change in respiratory pattern may indicate a pulmonary injury.

• The client may: become progressively hoarse, develop a brassy cough, drool or have difficulty swallowing, produce expiratory sounds that include audible wheezes and strider

• Upper airway edema and inhalation injury are most common in the trachea and mainstem bronchi

• Auscultate these areas for wheezes

• If wheezes disappear, this indicates impending airway obstruction and demands immediate intubation

• Cardiovascular symptoms: will begin immediately which can include shock (Shock is a common cause of death in the emergent phase in clients with serious injuries)

• Obtain a baseline EKG

• Monitor for edema, measure central and peripheral pulses, blood pressure, capillary refill and pulse oximetry

• Changes in renal function are related to decreased renal blood flow

• Urine is usually highly concentrated and has a high specific gravity

• Urine output is decreased during the first 24 hours of the emergent phase

• Fluid resuscitation is provided at the rate needed to maintain adult urine output at 30 to 50-mL/hr.

• Measure BUN, creatinine and elesctrolyte levels

• Sympathetic stimulation during the emergent phase causes reduced GI motility and paralytic ileus

• Auscultate the abdomen to assess bowel sounds which may be reduced

• Monitor for n/v and abdominal distention

• Clients with burns of 25% TBSA or who are intubated generally require a NG tube inserted to prevent aspiration and removal of gastric secretions

Skin Assessment

• Assess the skin to determine the size and depth of burn injury

• The size of the injury is first estimated in comparison to the total body surface area (TBSA). For example, a burn that involves 40% of the TBSA is a 40% burn

• Use the rule of nines for clients whose weights are in normal proportion to their heights

Classification of Extent of Burn Injury

1. Minor Burn Injury

–Second-degree burn of <15% total body surface area (TBSA) in adults or <10% TBSA in children

–Third-degree burn of <2% TBSA not involving special care areas (eyes, ears, face, hands, feet, perineum, joints)

–Excludes all patients with electrical injury, inhalation injury, or concurrent trauma and all poor-risk patients (eg, extremes of age, intercurrent disease)

2. Moderate, Uncomplicated Burn Injury

–Second-degree burns of 15–25% TBSA in adults or 10–20% in children

–Third-degree burns of <10% TBSA not involving special care areas

–Excludes electrical injury, inhalation injury, or concurrent trauma and all poor-risk patients (eg, extremes of age, intercurrent disease)

3. Major Burn Injury

–Second-degree burns >25% TBSA in adults or >20% in children

–All third-degree burns >10% TBSA

–All burns involving eyes, ears, face, hands, feet, perineum, joints

–All inhalation injury, electrical injury, or concurrent trauma, and all poor-risk patients

Management of Major Burns

Initial patient management

1. Intravenous access established & I.V. fluids

2. N/G tube; enteral feeding

3. Folley's catheter

4. Analgesia

5. Tetanus vaccine

6. Patient must be kept warm

7. Dressing

IV Fluid Therapy

• Infusion of IV fluids is needed to maintain sufficient blood volume for normal Cardiac Output

• Clients with burns involving 15% to 20% of the TBSA require IV fluid

• Purpose is to prevent shock by maintaining adequate circulating blood fluid volume

• Severe burn requires large fluid loads in a short time to maintain blood flow to vital organs

• Fluid replacement formulas are calculated from the time of injury and not from the time of arrival at the hospital

• Diuretics should not be given to increase urine output.

• Change the amount and rate of fluid administration to improve urine output.

• Diuretics do not increase CO; they actually decrease circulating volume and CO by pulling fluid from the circulating blood volume to enhance diuresis

Guidelines and Formulas for Fluid Replacement in Burn Patients

• ***Consensus Formula***

• Lactated Ringer's solution (or other balanced saline solution): 2–4 mL × kg body weight × % total body surface area (TBSA) burned.

• Half to be given in first 8 hours; remaining half to be given over next 16 h.

• *Evans Formula*

–Colloids: 1 mL × kg body weight × % TBSA burned

–Electrolytes (saline): 1 mL × body weight × % TBSA burned

–Glucose (5% in water): 2000 mL for insensible loss

–Day 1: Half to be given in first 8 hours; remaining half over next 16 h.

–Day 2: Half of previous day's colloids and electrolytes; all of insensible fluid replacement.

–Maximum of 10,000 ML over 24 hr. Second- and

Nursing Diagnosis in the Emergent Phase

• Impaired gas exchange related to carbon monoxide poisoning, smoke inhalation, and upper airway obstruction

–Goal: Maintenance of adequate tissue oxygenation

• Ineffective airway clearance related to edema and effects of smoke inhalation

–Goal: Maintain patent airway and adequate airway clearance

• Fluid volume deficit related to increased capillary permeability and evaporative losses from the burn wound

–Goal: Restoration of optimal fluid and electrolyte balance and perfusion of vital organs

• Hypothermia related to loss of skin microcirculation and open wounds

–Goal: Maintenance of adequate body temperature

• Pain related to tissue and nerve injury and emotional impact of injury

–Goal: Control of pain

• Anxiety related to fear and the emotional impact of burn injury

–Goal: Minimization of patient's and family's anxiety

• Collaborative Problems:

• Acute respiratory failure, distributive shock, acute renal failure, compartment syndrome, paralytic ileus, Curling's ulcer

–Goal: Absence of complications

ACUTE PHASE OF BURN INJURY

• Lasts until wound closure is complete

• Care is directed toward continued assessment and maintenance of the CV and respiratory systems

• Pneumonia is a concern which can result in respiratory failure requiring mechanical ventilation

• Infection (Topical antibiotics – Silvadene)

• Tetanus toxoid

• Weight daily without dressings or splints and compare to pre-burn weight

• A 2% loss of body weight indicates a mild deficit

• A 10% or greater weight loss requires modification of calorie intake

• Monitor for signs of infection

Fluid and electrolytes changes in the acute phase

Observation	Explanation
Hemodilution (decreased hematocrit)	Blood cell concentration is diluted as fluid enters the intravascular compartment; loss of red blood cells destroyed at burn site
Increased urinary output	Fluid shift into intravascular compartment increases renal blood flow and causes increased urine formation.
Sodium (Na^+) deficit	With diuresis, sodium is lost with water; existing serum sodium is diluted by water influx.
Potassium (K^+) deficit (occurs occasionally in this phase)	Beginning on the fourth or fifth postburn day, K^+ shifts from extracellular fluid into cells.
Metabolic acidosis	Loss of sodium depletes fixed base; relative carbon dioxide content increases.

Local and Systemic Signs of Infection- Gram Negative Bacteria

• Pseudomonas, Proteus

• May led to septic shock

• Conversion of a partial-thickness injury to a full-thickness injury

• Ulceration of health skin at the burn site

• Erythematous, nodular lesions in uninvolved skin

• Excessive burn wound drainage

• Odor

• Sloughing of grafts

• Altered level of consciousness

• Changes in vital signs

• Oliguria

• GI dysfunction such as diarrhea, vomiting

• Metabolic acidosis

Lab Values

• Na – hyponatremia or Hypernatremia

• K – Hyperkalemia or Hypokalemia

• WBC – 10,000-20,000

Nursing Diagnosis In The Acute Phase

• Excessive fluid volume related to resumption of capillary integrity and fluid shift from the interstitial to the intravascular compartment

• Risk for infection related to loss of skin barrier and impaired immune response

• Imbalanced nutrition, less than body requirements, related to hypermetabolism and wound healing needs

• Impaired skin integrity related to open burn wounds

• Acute pain related to exposed nerves, wound healing, and treatments

• Impaired physical mobility related to burn wound edema, pain, and joint contractures

• Ineffective coping related to fear and anxiety, grieving, and forced dependence on health care providers

• Interrupted family processes related to burn injury

• Deficient knowledge about the course of burn treatment

Planning and Implementation

• Nonsurgical management: removal of exudates and necrotic tissue, cleaning the area, stimulating granulation and revascularization and applying dressings. Debridement may be needed

Prevent infection

• Major sources of pathogens:

–Intestine: Mucosa of intestine normally prevent bacteria in the GI to pass into the blood stream. But when blood vessels loose its permeability (due to burn), bacteria pass from the GI into circulation and causes infection.

–Environment

• Eschar (a nonviable crust with no blood supply) vent leukocytes & antibodies to reach the area.

• Wound infection may lead to septicemia.

Wound cleaning

• Hydrotherapy (whirl pool)

–Antiseptics added to the water

–Temp kept between 37-38º C

–Warmth allow for easier movement of joints which will prevent contracture

–Movement of water will remove dead tissue.

• Topical Antibacterial Therapy

–They does not sterilize the burn wound; but they reduce the number of bacteria. The overall microbial population can be controlled by the body's host defense mechanisms.

• Wound Dressing

–Remove old dressing gently, ? Give analgesia to control pain.

–Remove old ointment and clean thoroughly.

–Allow for movement at joint areas.

–The fingers and toes should be wrapped individually to promote adequate healing

–Burns to the face may be left open to air once they have been cleaned and the topical agent has been applied.

Dressing the Burn Wound

• After burn wounds are cleaned and debrided, topical antibiotics are reapplied to prevent infection

• Standard wound dressings are multiple layers of gauze applied over the topical agents on the burn wound

Wound Débridement

1. Natural Débridement
2. Mechanical Débridement
3. Surgical Débridement

Wound Grafting

• coverage of the burn wound is necessary until coverage with a graft is possible.

• The purposes of wound coverage are to:

–Decrease the risk of infection;

–Prevent further loss of protein, fluid, and electrolytes through the wound; and

–Minimize heat loss through evaporation.

• Wound coverage may consist of biologic:

1. Biosynthetic,
2. Synthetic, and
3. Autologous methods or
4. A combination of these approaches

• The main areas for skin grafting include the face (for cosmetic and psychological reasons); functional areas, such as the hands and feet; and areas that involve joints.

• Grafting permits earlier functional ability and reduces wound contractures.

• It should have a bacterial count of less than 100,000 per gram of tissue to optimize graft success.

• Biologic, Biosynthetic and Synthetic Dressings

Biologic Dressings (Homografts and Heterografts)

• In extensive burns, biologic dressing save lives by providing temporary wound coverage and protecting the granulation tissue until autografting is possible.

• used as temporary coverings, eventually rejected because of regiction.

• Two types of biologic dressing

1. Homografts (or allografts): skin obtained from living or recently deceased humans or amniotic membrane.

2. Heterografts (or xenografts): skin taken from

Autografts

• Graft taken from the same person

• Graft care (goal: not to dislodge the graft)

–Immobilize graft area (use splint)

–Occlusive dressing, first dressing removed by Dr (usually after 2-5 days in there is no infection.

–Graft could be left open and stabilized with staples.

–Turn and position patient carefully

–If graft get dislodged, immerse in in normal saline.

–Elevate grafted extremity, and bed rest for 5-7 days.

• Donor site care:

–Wet saline gauze dressing.

Other care during acute phase

• Pain management

• Nutrition

–Metabolic rate is very high because of anabolism

–High caloric high protein diet.

Disorders of Wound Healing

• hypertrophic scars: characterized by an overabundant formation of matrix, especially collagen, in wounds that heal by granulation

• Keloids: A large, heaped-up mass of scar tissue, a keloid, may develop and extend beyond the wound surface.

• Failure to Heal: due to infection, other disease process, pressure, or inadequate nutrition

• Contractures

Rehabilitative Phase of Burn Injury

• Starts at the time of admission

• Technically begins with wound closure and ends when the client returns to the highest possible level of functioning

• Provide psychosocial support

• Assess home environment, financial resources, medical equipment, prosthetic rehab

Prevention of Hypertrophic Scarring

• The wound is in a dynamic state for 1.5 to 2 years after the burn occurs.

• Wear pressure garments , massage, lubrication, exercise, splints, manual lymphatic drainage and injectable steroids

Nursing process: Care of the Patient during the Emergent/Resuscitative Phase of Burn Injury

Nursing Diagnosis: Impaired gas exchange related to carbon monoxide poisoning, smoke inhalation, and upper airway obstruction Goal: Maintenance of adequate tissue oxygenation		
Nursing Interventions	**Rationale**	**Expected Outcomes**
1. Provide humidified oxygen. 2. Assess breath sounds, and respiratory rate, rhythm, depth, and symmetry. Monitor patient for signs of hypoxia. 3. Observe for the following: a. Erythema or blistering of lips or buccal mucosa b. Singed nostrils c. Burns of face, neck, or chest d. Increasing hoarseness e. Soot in sputum or tracheal tissue in respiratory secretions 4. Monitor arterial blood gas values, pulse oximetry readings, and carboxyhemoglobin levels. 5. Report labored respirations, decreased depth of respirations, or signs of hypoxia to physician immediately. 6. Prepare to assist with intubation and escharotomies. 7. Monitor mechanically ventilated patient closely.	1. Humidified oxygen provides moisture to injured tissues; supplemental oxygen increases alveolar oxygenation. 2. These factors provide baseline data for further assessment and evidence of increasing respiratory compromise. 3. These signs indicate possible inhalation injury and risk of respiratory dysfunction. 4. Increasing $PaCO_2$ and decreasing PaO_2 and O_2 saturation may indicate need for mechanical ventilation. 5. Immediate intervention is indicated for respiratory difficulty. 6. Intubation allows mechanical ventilation. Escharotomy enables chest excursion in circumferential chest burns. 7. Monitoring	• Absence of dyspnea • Respiratory rate between 12 and 20 breaths/min • Lungs clear on auscultation • Arterial oxygen saturation >96% by pulse oximetry • Arterial blood gas levels within normal limits

	allows early detection of decreasing respiratory status or complications of mechanical ventilation.	
Nursing Diagnosis: Ineffective airway clearance related to edema and effects of smoke inhalation Goal: Maintain patent airway and adequate airway clearance		
1. Maintain patent airway through proper patient positioning, removal of secretions, and artificial airway if needed. 2. Provide humidified oxygen. 3. Encourage patient to turn, cough, and deep breathe. Encourage patient to use incentive spirometry. Suction as needed.	1. A patent airway is crucial to respiration. 2. Humidity liquefies secretions and facilitates expectoration. 3. These activities promote mobilization and removal of secretions.	• Patent airway • Respiratory secretions are minimal, colorless, and thin • Respiratory rate, pattern, and breath sounds normal
Nursing Diagnosis: Fluid volume deficit related to increased capillary permeability and evaporative losses from the burn wound Goal: Restoration of optimal fluid and electrolyte balance and perfusion of vital organs		
1. Observe vital signs (including central venous pressure or pulmonary artery pressure, if indicated) and urine output, and be alert for signs of hypovolemia or fluid overload. 2. Monitor urine output at least hourly and weigh patient daily. 3. Maintain IV lines and regulate fluids at appropriate rates, as prescribed. 4. Observe for symptoms of deficiency or excess of serum sodium, potassium, calcium, phosphorus, and bicarbonate. 5. Elevate head of patient's bed and elevate burned extremities.	1. Hypovolemia is a major risk immediately after the burn injury. Overresuscitation might cause fluid overload. 2. Output and weight provide information about renal perfusion, adequacy of fluid replacement, and fluid requirement and fluid status. 3. Adequate fluids are necessary to maintain fluid and electrolyte balance and perfusion of vital organs.	• Serum electrolytes within normal limits • Urine output between 0.5 and 1.0 mL/kg/hr • Blood pressure higher than 90/60 mm Hg • Heart rate less than 120 beats/min • Exhibits clear sensorium • Voids clear yellow urine with specific gravity within normal limits

6. Notify physician immediately of decreased urine output, blood pressure, central venous, pulmonary artery, or pulmonary artery wedge pressures, or increased pulse rate.	4. Rapid shifts in fluid and electrolyte status are possible in the postburn period. 5. Elevation promotes venous return. 6. Because of the rapid fluid shifts in burn shock, fluid deficit must be detected early so that distributive shock does not occur.	
Nursing Diagnosis: Hypothermia related to loss of skin microcirculation and open wounds Goal: Maintenance of adequate body temperature		
1. Provide a warm environment through use of heat shield, space blanket, heat lights, or blankets. 2. Work quickly when wounds must be exposed. 3. Assess core body temperature frequently.	1. A stable environment minimizes evaporative heat loss. 2. Minimal exposure minimizes heat loss from wound. 3. Frequent temperature assessments help detect developing hypothermia.	• Body temperature remains 36.1° to 38.3°C (97° to 101°F) • Absence of chills or shivering
Nursing Diagnosis: Pain related to tissue and nerve injury and emotional impact of injury Goal: Control of pain		
1. Use pain intensity scale to assess pain level (ie, 1 to 10). Differentiate restlessness due to pain from restlessness due to hypoxia. 2. Administer intravenous opioid analgesics as prescribed. Observe for respiratory depression in the patient who is not mechanically ventilated.	1. Pain level provides baseline for evaluating effectiveness of pain relief measures. Hypoxia can cause similar signs and must be ruled out before analgesic medication is	• States pain level is decreased • Absence of nonverbal cues of pain

Assess response to analgesic. 3. Provide emotional support and reassurance.	administered. 2. Intravenous administration is necessary because of altered tissue perfusion from burn injury. 3. Emotional support is essential to reduce fear and anxiety resulting from burn injury. Fear and anxiety increase the perception of pain.	
Nursing Diagnosis: Anxiety related to fear and the emotional impact of burn injury Goal: Minimization of patient's and family's anxiety		
1. Assess patient's and family's understanding of burn injury, coping skills, and family dynamics. 2. Individualize responses to the patient's and family's coping level. 3. Explain all procedures to the patient and the family in clear, simple terms. 4. Maintain adequate pain relief. 5. Consider administering prescribed anti-anxiety medications if the patient remains extremely anxious despite nonpharmacologic interventions.	1. Previous successful coping strategies can be fostered for use in the present crisis. Assessment allows planning of individualized interventions. 2. Reactions to burn injury are extremely variable. Interventions must be appropriate to the patient's and family's present level of coping. 3. Increased understanding alleviates fear of the unknown. High levels of anxiety may interfere with understanding of complex explanations.	• Patient and family verbalize understanding of emergent burn care • Able to answer simple questions

	4. Pain increases anxiety. 5. Anxiety levels during the emergent phase may exceed the patient's coping abilities. Medication decreases physiologic and psychological anxiety responses.	
Collaborative Problems: Acute respiratory failure, distributive shock, acute renal failure, compartment syndrome, paralytic ileus, Curling's ulcer Goal: Absence of complications		
Acute Respiratory Failure		
1. Assess for increasing dyspnea, stridor, changes in respiratory patterns. 2. Monitor pulse oximetry, arterial blood gas values for decreasing PaO_2 and oxygen saturation, and increasing $PaCO_2$. 3. Monitor chest x-ray results. 4. Assess for restlessness, confusion, difficulty attending to questions, or decreasing level of consciousness. 5. Report deteriorating respiratory status immediately to physician. 6. Prepare to assist with intubation or escharotomies as indicated.	1. Such signs reflect deteriorating respiratory status. 2. Such signs reflect decreased oxygenation status. 3. X-ray may disclose pulmonary injury. 4. Such manifestations may indicate cerebral hypoxia. 5. Acute respiratory failure is life-threatening, and immediate intervention is required. 6. Intubation allows mechanical ventilation. Escharotomies allow improved chest excursion with respirations.	• Arterial blood gas values within acceptable limits: PaO_2 >80 mm Hg, $PaCO_2$ <50 mm Hg • Breathes spontaneously with adequate tidal volume • Chest x-ray findings normal • Absence of cerebral signs of hypoxia
Distributive Shock		
1. Assess for decreasing urine output and blood pressure	1. Such signs and symptoms may	• Urine output between 0.5

as well as increasing pulse rate. (If hemodynamic monitoring is used, assess for decreasing pulmonary artery and pulmonary artery wedge pressures and cardiac output.) 2. Assess for progressive edema as fluid shifts occur. 3. Adjust fluid resuscitation in collaboration with the physician in response to physiologic findings.	indicate distributive shock and inadequate intravascular volume. 2. As fluid shifts into the interstitial spaces in burn shock, edema occurs and may compromise tissue perfusion. 3. Optimal fluid resuscitation prevents distributive shock and improves patient outcomes.	and 1.0 mL/kg/hr • Blood pressure within patient's normal range (usually >90/60 mm Hg) • Heart rate within patient's normal range (usually <110/min) • Pressures and cardiac output remain within normal limits
Acute Renal Failure		
1. Monitor urine output and blood urea nitrogen (BUN) and serum creatinine levels. 2. Report decreased urine output or increased BUN and creatinine values to physician. 3. Assess urine for hemoglobin or myoglobin. 4. Administer increased fluids as prescribed.	1. These values reflect renal function. 2. These laboratory values indicate possible renal failure. 3. Hemoglobin or myoglobin in the urine points to an increased risk of renal failure. 4. Fluids help to flush hemoglobin and myoglobin from renal tubules, decreasing the potential for renal failure.	• Adequate urine output • BUN and serum creatinine values remain normal
Compartment Syndrome		
1. Assess peripheral pulses hourly with Doppler ultrasound device. 2. Assess warmth, capillary refill, sensation, and movement of extremity hourly. Compare affected	1. Assessment with Doppler device substitutes for auscultation and indicates characteristics of arterial blood	• Absence of paresthesias or symptoms of ischemia of nerves and muscles • Peripheral

with unaffected extremity. 3. Remove blood pressure cuff after each reading. 4. Elevate burned extremities. 5. Report loss of pulse or sensation or presence of pain to physician immediately. 6. Prepare to assist with escharotomies.	flow. 2. These assessments indicate characteristics of peripheral perfusion. 3. Cuff may act as a tourniquet as extremities swell. 4. Elevation reduces edema formation. 5. These signs and symptoms may indicate inadequate tissue perfusion. 6. Escharotomies relieve the constriction caused by swelling under circumferential burns and improve tissue perfusion.	pulses detectable by Doppler
Curling's Ulcer		
1. Assess gastric aspirate for pH and blood. 2. Assess stools for occult blood. 3. Administer histamine blockers and antacids as prescribed.	1. Acidic pH indicates need for antacids or histamine blockers. Blood indicates possible gastric bleeding. 2. Blood in stools may indicate gastric or duodenal ulcer. 3. Such medications reduce gastric acidity and risk of ulceration.	• Absence of abdominal distention • Normal bowel sounds within 48 hours • Gastric aspirate and stools do not contain blood

Nursing Process
Care of the Patient during the Acute Phase

Assessment

Continued assessment of the patient during the early weeks after the burn injury focuses on hemodynamic alterations, wound healing, pain and psychosocial responses, and early detection of complications. Assessment of respiratory and fluid status remains the highest priority for detection of potential complications.

The nurse assesses vital signs frequently. Continued assessment of peripheral pulses is essential for the first few postburn days while edema continues to increase, potentially damaging peripheral nerves and restricting blood flow. Observation of the electrocardiogram may give clues to cardiac dysrhythmias resulting from potassium imbalance, preexisting cardiac disease, or the effects of electrical injury or burn shock. Assessment of residual gastric volumes and pH in the patient with a nasogastric tube is also important. Blood in the gastric fluid or in the stools must also be noted and reported.

Assessment of the burn wound requires an experienced eye, hand, and sense of smell. Important wound assessment features include size, color, odor, eschar, exudate, abscess formation under the eschar, epithelial buds (small pearl-like clusters of cells on the wound surface), bleeding, granulation tissue appearance, status of grafts and donor sites, and quality of surrounding skin. Any significant changes in the wound are reported to the physician, because they usually indicate burn wound or systemic sepsis and require immediate intervention.

Other significant and ongoing assessments focus on pain and psychosocial responses, daily body weights, caloric intake, general hydration, and serum electrolyte, hemoglobin, and hematocrit levels. Assessment for excessive bleeding from blood vessels adjacent to areas of surgical exploration and débridement is necessary as well.

Gerontologic Considerations

In elderly patients, a careful history of preburn medications and preexisting illnesses is essential. Nursing assessment of the elderly patient with burns should include particular attention to pulmonary function, response to fluid resuscitation, and signs of mental confusion or disorientation. Because of lowered resistance, burn wound sepsis and lethal systemic septicemia are more likely in elderly patients. Furthermore, fever may not be present in the elderly to signal such events. Therefore, surveillance for other signs of infection becomes even more important. Nursing care of the elderly patient with burn injuries promotes early mobilization, aggressive pulmonary care, and attention to preventing complications.

Diagnosis

Nursing Diagnoses

Based on the assessment data, priority nursing diagnoses in the acute phase of burn care may include the following:

- Excessive fluid volume related to resumption of capillary integrity and fluid shift from the interstitial to the intravascular compartment
- Risk for infection related to loss of skin barrier and impaired immune response
- Imbalanced nutrition, less than body requirements, related to hypermetabolism and wound healing needs
- Impaired skin integrity related to open burn wounds
- Acute pain related to exposed nerves, wound healing, and treatments
- Impaired physical mobility related to burn wound edema, pain, and joint

contractures
- Ineffective coping related to fear and anxiety, grieving, and forced dependence on health care providers
- Interrupted family processes related to burn injury
- Deficient knowledge about the course of burn treatment

Collaborative Problems/Potential Complications
Based on the assessment data, potential complications that may develop in the acute phase of burn care may include:

- Heart failure and pulmonary edema
- Sepsis
- Acute respiratory failure
- Acute respiratory distress syndrome
- Visceral damage (electrical burns)

Planning and Goals
The major goals for the patient may include restoration of normal fluid balance, absence of infection, attainment of anabolic state and normal weight, improved skin integrity, reduction of pain and discomfort, optimal physical mobility, adequate patient and family coping, adequate patient and family knowledge of burn treatment, and absence of complications. Achieving these goals requires a collaborative, interdisciplinary approach to patient management.

Nursing Interventions
Restoring Normal Fluid Balance
To reduce the risk of fluid overload and consequent heart failure and pulmonary edema, the nurse closely monitors IV and oral fluid intake, using IV infusion pumps to minimize the risk of rapid fluid infusion. To monitor changes in fluid status, careful intake and output and daily weights are obtained. Changes, including those of blood pressure and pulse rate, are reported to the physician (invasive hemodynamic monitoring is avoided because of the high risk of infection). Low-dose dopamine to increase renal perfusion and diuretics may be prescribed to promote increased urine output. The nurse's role is to administer these medications as prescribed and to monitor the patient's response.

Preventing Infection
A major part of the nurse's role during the acute phase of burn care is detecting and preventing infection. The nurse is responsible for providing a clean and safe environment and for closely scrutinizing the burn wound to detect early signs of infection. Culture results and white blood cell counts are monitored.
Clean technique is used for wound care procedures. Aseptic technique is used for any invasive procedures, such as insertion of IV lines and urinary catheters or tracheal suctioning. Meticulous hand hygiene before and after each patient contact is also an essential component of preventing infection, even though gloves are worn to provide care.
The nurse protects the patient from sources of contamination, including other patients, staff members, visitors, and equipment. Invasive lines and tubing must be routinely changed according to recommendations of the CDC. Tube feeding reservoirs, ventilator circuits, and drainage containers are replaced regularly. Fresh flowers, plants, and fresh fruit baskets are not permitted in the patient's room because of the risk of

microorganism growth. Visitors are screened to avoid exposure of the immunocompromised patient to pathogens.
Patients can inadvertently promote migration of microorganisms from one burned area to another by touching their wounds or dressings. Bed linens also can spread infection through either colonization with wound microorganisms or fecal contamination. Regular bathing of unburned areas and changing of linens can help prevent infection.

Maintaining Adequate Nutrition
Oral fluids should be initiated slowly after bowel sounds resume. The patient's tolerance is recorded. If vomiting and distention do not occur, fluids may be increased gradually and the patient may be advanced to a normal diet or to tube feedings.
The nurse collaborates with the dietitian or nutrition support team to plan a protein- and calorie-rich diet that is acceptable to the patient. Family members may be encouraged to bring nutritious and favorite foods to the hospital. Milkshakes and sandwiches made with meat, peanut butter, and cheese may be offered as snacks between meals and late in the evening. High-calorie nutritional supplements such as Ensure and Resource may be provided. Caloric intake must be documented. Vitamin and mineral supplements may be prescribed.
If caloric goals cannot be met by oral feeding, a feeding tube is inserted and used for continuous or bolus feedings of specific formulas. The volume of residual gastric secretions should be checked to ensure absorption. Parenteral nutrition may also be required but should be used only if gastrointestinal function is compromised (see Chapter 36).
The patient should be weighed each day and his or her weights graphed. The patient can use this information to set goals for nutritional intake and to monitor weight loss and gain. Ideally, the patient will lose no more than 5% of preburn weight if aggressive nutritional management is implemented.
The patient with anorexia requires encouragement and support from the nurse to increase food intake. The patient's surroundings should be as pleasant as possible at mealtime. Catering to food preferences and offering high-protein, high-vitamin snacks are ways of encouraging the patient to increase intake.

Promoting Skin Integrity
Wound care is usually the single most time-consuming element of burn care after the emergent phase. The physician prescribes the desired topical antibacterial agents and specific biologic, biosynthetic, or synthetic wound coverings and plans for surgical excision and grafting. The nurse needs to make astute assessments of wound status, use creative approaches to wound dressing, and support the patient during the emotionally distressing and very painful experience of wound care.
The nurse serves as the coordinator of the complex aspects of wound care and dressing changes for the patient. The nurse must be aware of the rationale and nursing implications for the various wound management approaches. Nursing functions include assessing and recording any changes or progress in wound healing and keeping all members of the health care team informed of changes in the wound or in treatment. A diagram, updated daily by the nurse responsible for the patient's care, helps inform all those concerned about the latest wound care procedures in use for the patient.
The nurse also assists the patient and family by providing instruction, support, and encouragement to take an active part in dressing changes and wound care when appropriate. Discharge planning needs for wound care are anticipated early in the course of burn management, and the strengths of the patient and family are assessed and used in preparing for the patient's eventual discharge and home care.

Relieving Pain and Discomfort

Pain measures, discussed earlier, are continued during the acute phase of burn recovery. Analgesic agents and anxiolytic medications are administered as prescribed. Frequent assessment of pain and discomfort is essential. To increase its effectiveness, analgesic medication is provided before the pain becomes severe. Nursing interventions such as teaching the patient relaxation techniques, giving the patient some control over wound care and analgesia, and providing frequent reassurance are helpful. Guided imagery may be effective in altering the patient's perceptions of and responses to pain. Other pain-relieving approaches include distraction through video programs or video games, hypnosis, biofeedback, and behavioral modification.

The nurse assesses the patient's sleep patterns daily. Lack of sleep and rest interferes with healing, comfort, and restoration of energy. If necessary, sedatives are prescribed on a regular basis in addition to analgesics and anxiolytics.

The nurse works quickly to complete treatments and dressing changes to reduce pain and discomfort. The patient is encouraged to take analgesic medications before painful procedures. The patient's response to the medication and other interventions is assessed and documented.

Healing burn wounds are typically described by patients as itchy and tight. Oral antipruritic agents, a cool environment, frequent lubrication of the skin with water or a silica-based lotion, exercise and splinting to prevent skin contracture, and diversional activities all help promote comfort in this phase.

Promoting Physical Mobility

An early priority is to prevent complications of immobility. Deep breathing, turning, and proper positioning are essential nursing practices that prevent atelectasis and pneumonia, control edema, and prevent pressure ulcers and contractures. These interventions are modified to meet the patient's needs. Low-air-loss and rotation beds may be useful, and early sitting and ambulation are encouraged. If the lower extremities are burned, elastic pressure bandages should be applied before the patient is placed in an upright position. These bandages promote venous return and minimize edema formation.

The burn wound is in a dynamic state for at least 1 year after wound closure. During this time, aggressive efforts must be made to prevent contracture and hypertrophic scarring. Both passive and active range-of-motion exercises are initiated from the day of admission and are continued after grafting, within prescribed limitations. Splints or functional devices may be applied to extremities for contracture control. The nurse monitors the splinted areas for signs of vascular insufficiency and nerve compression.

Strengthening Coping Strategies

In the acute phase of burn care, the patient is facing the reality of the burn trauma and is grieving over obvious losses. Depression, regression, and manipulative behavior are common responses of patients who have burn injuries. Withdrawal from participation in required treatments and regression must be viewed with an understanding that such behavior may help the patient cope with an enormously stressful event. Although most patients recover emotionally from a burn injury, some have more difficult psychological reactions to the injury and its outcomes (Morton, Willebrand, Gerhard, et al. 2005).

Personality characteristics, rather than the size or severity of the injury, determine the ability of the patient to cope after burn injury (Kidal, Willebrand, Andersson, et al., 2004). Difficulty coping along with other psychological stressors often limits the

patient's physical and psychological recovery (Fauerbach, Lezotte, & Hills, 2005). Patients who experience a burn injury tend to have high rates of involvement in risky behaviors (eg, alcohol and substance abuse, depression) before the injury (Morton et al., 2005). They may also have poor coping skills. Coping styles and perceived threat of death at the time of the burn injury are strong predictors of how well the patient recovers psychologically in the postburn period (Willebrand, Anderson & Ekselius, 2004). Intrusive thoughts of the burn event and reliving it over and over may also occur and can indicate posttraumatic stress disorder.

Much of the patient's energy goes into maintaining vital physical functions and wound healing in the early postburn weeks, leaving little emotional energy for coping in a more effective manner. The nurse can assist the patient to develop effective coping strategies by setting specific expectations for behavior, promoting truthful communication to build trust, helping the patient practice appropriate strategies, and giving positive reinforcement when appropriate. Most importantly, the nurse and all members of the health care team must demonstrate acceptance of the patient.

The patient frequently vents feelings of anger. At times the anger may be directed inward because of a sense of guilt, perhaps for causing the fire or even for surviving when loved ones perished. The anger may be directed outward toward those who escaped unharmed or toward those who are now providing care. One way to help the patient handle these emotions is to enlist someone to whom the patient can vent feelings without fear of retaliation. A nurse, social worker, psychiatric liaison nurse, or spiritual advisor who is not involved in direct care activities may fill this role successfully.

Patients with burn injuries are very dependent on health care team members during the long period of treatment and recovery. However, even when physically unable to contribute much to self-care, they should be included in decisions regarding care and encouraged to assert their individuality in terms of preferences and recognition of their unique identities. As the patient improves in mobility and strength, the nurse works with the patient to set realistic expectations for self-care, including self-feeding, assistance with wound care procedures, exercise, and planning for the future. Many patients respond positively to the use of contractual agreements and other strategies that recognize their independence and their specific role as part of the health care team moving toward the goal of self-care. Consultation with psychiatric/mental health care providers may be helpful to assist the patient in developing effective coping strategies.

Supporting Patient and Family Processes

Family functioning is disrupted with burn injury. One of the nurse's responsibilities is to support the patient and family and to address their spoken and unspoken concerns. Family members need to be instructed about ways that they can support the patient as adaptation to burn trauma occurs. The family also needs support from the health care team. The burn injury has tremendous psychological, economic, and practical impact on the patient and family. Referrals for social services or psychological counseling should be made as appropriate. This support continues into the rehabilitation phase.

Patients who experience major burns are commonly sent to burn centers far from home. Because burn injuries are sudden and unexpected, family roles are disrupted. Therefore, both the patient and the family need thorough information about the patient's burn care and expected course of treatment. Patient and family education begins at the initiation of burn management. Barriers to learning are assessed and considered in teaching. The preferred learning styles of both the patient and family are assessed. This information is used to tailor teaching activities. The nurse assesses the ability of the patient and family to grasp and cope with the information. Verbal information is supplemented by videos,

models, or printed materials if available. Patient and family education is a priority in the acute and rehabilitation phases.
Nurses must remain sensitive to the possibility of changing family dynamics. It is not unusual for the provider in the family to be the one who is injured. Roles begin to change, which adds more stress to the family. In addition, families are often relocated due to loss of property from the fire. Social services play an integral part in providing support at this time.

Monitoring and Managing Potential Complications
Heart Failure and Pulmonary Edema
The patient is assessed for fluid overload, which may occur as fluid is mobilized from the interstitial compartment back into the intravascular compartment. If the cardiac and renal systems cannot compensate for the excess vascular volume, heart failure and pulmonary edema may result. The patient is assessed for signs of heart failure, including decreased cardiac output, oliguria, jugular vein distention, edema, and the onset of an S_3 or S_4 heart sound. If invasive hemodynamic monitoring is used, increasing central venous, pulmonary artery, and wedge pressures indicate increased fluid volume.
Crackles in the lungs and increased difficulty with respiration may indicate a fluid buildup in the lungs, which is reported promptly to the physician. In the meantime, the patient is positioned comfortably, with the head of the bed raised (if not contraindicated because of other treatments or injuries) to promote lung expansion and gas exchange. Management of this complication includes providing supplemental oxygen, administering IV diuretic agents, carefully assessing the patient's response, and providing vasoactive medications, if indicated.

Sepsis
The signs of early systemic sepsis are subtle and require a high index of suspicion and very close monitoring of changes in the patient's status. Early signs of sepsis may include increased temperature, increased pulse rate, widened pulse pressure, and flushed dry skin in unburned areas. As with many observations of the patient with a burn injury, one needs to look for patterns or trends in the data. (See Chapter 15 for a more detailed discussion of septic shock.)
Wound and blood cultures are performed as prescribed, and results are reported to the physician immediately. The nurse also observes for and reports early signs of sepsis and promptly intervenes, administering prescribed IV fluids and antibiotics to prevent septic shock, a complication with a high mortality rate. Antibiotics must be administered as scheduled to maintain proper blood concentrations. Serum antibiotic levels are monitored for evidence of maximal effectiveness, and the patient is monitored for toxic side effects.

Acute Respiratory Failure and Acute Respiratory Distress Syndrome
The patient's respiratory status is monitored closely for increased difficulty in breathing, change in respiratory pattern, or onset of adventitious (abnormal) sounds. Typically at this stage, signs and symptoms of injury to the respiratory tract become apparent. Respiratory failure may follow. As described previously, signs of hypoxia (decreased oxygen to the tissues), decreased breath sounds, wheezing, tachypnea, stridor, and sputum tinged with soot (or in some cases containing sloughed tracheal tissue) are among the many possible findings. Patients receiving mechanical ventilation must be assessed for a decrease in tidal volume and lung compliance. The key sign of the onset of ARDS is hypoxemia while receiving 100% oxygen, with decreased lung

compliance and significant shunting. The physician should be notified immediately of deteriorating respiratory status.

Medical management of the patient with acute respiratory failure requires intubation and mechanical ventilation (if not already in use). If ARDS has developed, higher oxygen levels, positive end-expiratory pressure, and pressure support are used with mechanical ventilation to promote gas exchange across the alveolar–capillary membrane (see Chapter 25).

Visceral Damage

The nurse must be alert to signs of necrosis of visceral organs due to electrical injury. Tissues affected are usually located between the entrance and exit wounds of the electrical burn. All patients with electrical burns should undergo cardiac monitoring, with dysrhythmias being reported to the physician. Careful attention must also be paid to signs or reports of pain related to deep muscle ischemia. To minimize the severity of complications, visceral ischemia must be detected as early as possible. In the operating room, the physician may perform fasciotomies to relieve the swelling and ischemia in the muscles and fascia and to promote oxygenation of the injured tissues. Because of the deep incisions involved with fasciotomies, the patient must be monitored carefully for signs of excessive blood loss and hypovolemia.

Evaluation

Expected Patient Outcomes

Expected patient outcomes may include the following:

- Achieves optimal fluid balance
    - Maintains intake and output and body weight that correlate with expected pattern
    - Exhibits vital signs and hemodynamic values within designated limits
    - Demonstrates increased urine output in response to diuretic and vasoactive medications
    - Has heart rate less than 110 beats/min in normal sinus rhythm
- Has no localized or systemic infection
    - Has wound culture results showing minimal bacteria
    - Has normal urine and sputum culture results
- Demonstrates anabolic nutritional status
    - Gains weight daily after initial loss secondary to fluid diuresis and no oral intake of food or fluid
    - Shows no signs of protein, vitamin, or mineral deficiencies
    - Meets required nutritional needs entirely by oral intake
    - Participates in selecting diet containing prescribed nutrients
    - Exhibits normal serum protein levels
- Demonstrates improved skin integrity
    - Exhibits generally intact skin that remains free of infection, pressure, and injury
    - Demonstrates remaining open wound areas that are pink, re-epithelializing, and free of infection
    - Demonstrates donor graft sites that are clean and healing
    - Has healed wounds that are soft and smooth
    - Demonstrates skin that is lubricated and elastic
- Has minimal pain
    - Requests analgesic agents before specific wound care procedures or physical therapy activities

    - Reports minimal pain
    - Gives no physiologic, verbal, or nonverbal cues that pain is moderate or severe
    - Uses pain control measures such as nitrous oxide, relaxation, imagery, and distraction techniques to cope with and alleviate pain and discomfort
    - Can sleep without being disturbed by pain
    - Reports that skin is comfortable, with no pruritus or tightness
- Demonstrates optimal physical mobility and function
    - Improves range of motion of joints daily
    - Demonstrates preinjury range of motion of all joints
    - Has no signs of calcification around the joints
    - Participates in activities of daily living
- Uses appropriate coping strategies to deal with postburn problems
    - Verbalizes reactions to burns, therapeutic procedures, losses
    - Identifies coping strategies used effectively in previous stressful situations
    - Accepts dependency on health care providers during acute phase
    - Verbalizes realistic view of problems resulting from burn injury and plans for future
    - Cooperates with health care providers in required therapy
    - Participates in decision making regarding care
    - Begins to manage grief over losses resulting from burn injury and circumstances surrounding injury (eg, death of others, damage to home or other property)
    - States realistic objectives for plastic surgery, further medical intervention, and results
    - Verbalizes realistic abilities and goals
    - Displays hopeful attitude toward future
- Relates appropriately in patient/family processes
    - Patient and family verbalize feelings regarding change in family interactions
    - Family emotionally supports the patient during the hospitalization
    - Family states that their own needs are being met
- Patient and family verbalize understanding of the treatment course
    - State rationales for the various aspects of treatment
    - State realistic time period for recovery
- Absence of complications
    - Lungs clear on auscultation
    - Exhibits no dyspnea or orthopnea and can breathe easily when standing, sitting, and lying down
    - Exhibits no S_3 or S_4 heart sounds or jugular venous distention
    - Exhibits adequate urine output
    - Exhibits normal blood, sputum, and urine culture results
    - Maintains arterial blood gas values or O_2 saturation within normal or acceptable limits
    - Has normal lung compliance
    - Has no visceral organ damage
    - Has stable cardiac rhythm

Nursing Process
Care of the Patient during the Rehabilitation Phase

Assessment

Information about the patient's educational level, occupation, leisure activities, cultural background, religion, and family interactions is obtained early. The patient's self-concept, mental status, emotional response to the injury and hospitalization, level of intellectual functioning, previous hospitalizations, response to pain and pain relief measures, and sleep pattern are also essential components of a comprehensive assessment. Information about the patient's general selfconcept, self-esteem, and coping strategies in the past are valuable in addressing emotional needs. Ongoing physical assessments related to rehabilitation goals include range of motion of affected joints, functional abilities in activities of daily living, early signs of skin breakdown from splints or positioning devices, evidence of neuropathies (neurologic damage), activity tolerance, and quality or condition of healing skin. The patient's participation in care and ability to demonstrate self-care in such areas as ambulation, eating, wound cleaning, and applying pressure wraps are documented on a regular basis. In addition to these assessment parameters, specific complications and treatments require additional specific assessments; for example, the patient undergoing primary excision requires postoperative assessment. Recovery from burn injury involves every system of the body. Therefore, assessment of the patient with a burn injury must be comprehensive and continuous. Priorities vary at different points during the rehabilitation phase. Understanding the pathophysiologic responses to burn injury forms the framework for detecting early progress or signs and symptoms of complications. Early detection leads to early intervention and enhances the potential for successful rehabilitation.

Diagnosis

Nursing Diagnoses

Based on the assessment data, priority nursing diagnoses in the long-term rehabilitation phase of burn care may include the following:

- Activity intolerance related to pain on exercise, limited joint mobility, muscle wasting, and limited endurance
- Disturbed body image related to altered physical appearance and self-concept
- Deficient knowledge about postdischarge home care and follow-up needs

Collaborative Problems/Potential Complications

Based on the assessment data, potential complications that may develop in the rehabilitation phase include:

- Contractures
- Inadequate psychological adaptation to burn injury

Planning and Goals

The major goals for the patient include increased participation in activities of daily living; increased understanding of the injury, treatment, and planned followup care; adaptation and adjustment to alterations in body image, self-concept, and lifestyle; and absence of complications.

Nursing Interventions

Promoting Activity Tolerance

Nursing interventions that must be carried out according to a strict regimen and the pain that accompanies movement take their toll on the patient. The patient may become confused and disoriented and lack the energy to participate optimally in care. The nurse must schedule care in such a way that the patient has periods of uninterrupted sleep. A good time for planned patient rest is after the stress of dressing changes and exercise, while pain interventions and sedatives are still effective. This plan must be communicated to family members and other care providers.

The patient may have insomnia related to frequent nightmares about the burn injury or to other fears and anxieties about the outcome of the injury. The nurse listens to and reassures the patient and administers hypnotic agents, as prescribed, to promote sleep. Reducing metabolic stress by relieving pain, preventing chilling or fever, and promoting the physical integrity of all body systems help the patient conserve energy for therapeutic activities and wound healing.

The nurse incorporates physical therapy exercises in the patient's care to prevent muscle atrophy and to maintain the mobility required for daily activities. The patient's activity tolerance, strength, and endurance gradually increase if activity occurs over increasingly longer periods. Fatigue, fever, and pain tolerance are monitored and used to determine the amount of activity to be encouraged on a daily basis. Activities such as family visits and recreational or play therapy (eg, video games, radio, TV) can provide diversion, improve the patient's outlook, and increase tolerance for physical activity. In elderly patients and those with chronic illnesses and disabilities, rehabilitation must take into account preexisting functional abilities and limitations.

Improving Body Image and Self-Concept

Patients who have survived burn injuries frequently suffer profound losses. These include not only a loss of body image due to disfigurement but also losses of personal property, homes, loved ones, and ability to work. They lack the benefit of anticipatory grief often seen in a patient who is approaching surgery or dealing with the terminal illness of a loved one.

As care progresses, the patient who is recovering from burns becomes aware of daily improvement and begins to exhibit basic concerns: Will I be disfigured or be disabled? How long will I be in the hospital? What about my job and family? Will I ever be independent again? How can I pay for my care? Was my burn the result of my carelessness? As the patient expresses such concerns, the nurse must take time to listen and to provide realistic support. The nurse can refer the patient to a support group, such as those usually available at regional burn centers or through organizations such as the Phoenix Society. Through participation in such groups, the patient will meet others with similar experiences and learn coping strategies to help him or her deal with losses. Interaction with other burn survivors allows the patient to see that adaptation to the burn injury is possible. If a support group is not available, visits from other survivors of burn injuries can be helpful to the patient coping with such a traumatic injury.

A major responsibility of the nurse is to constantly assess the patient's psychosocial reactions. Questions to consider include the following: What are the patient's fears and concerns? Does the patient fear loss of control of care, independence, or sanity itself? Is the patient afraid of rejection by family and loved ones? Does he or she fear being unable to cope with pain or physical appearance? Does the patient have concerns about sexuality, including sexual function? Being aware of these anxieties and understanding the basis of the patient's fears enable the nurse to provide support and to cooperate with other members of the health care team in developing a plan to help the patient deal with these feelings.

When caring for a patient with a burn injury, the nurse needs to be aware that there are prejudices and misunderstandings in society about those who are viewed as different. Opportunities and accommodations available to others are often denied those who are disfigured. Such amenities include social participation, employment, prestige, various roles, and status. The health care team must actively promote a healthy body image and self-concept in patients with burn injuries so that they can accept or challenge others' perceptions of those who are disfigured or disabled. Survivors themselves must show others who they are, how they function, and how they want to be treated.

The nurse can help patients practice their responses to people who may stare or inquire about their injury once they are discharged from the hospital. The nurse can help patients build self-esteem by recognizing their uniqueness—for example, with small gestures such as providing a birthday cake, combing the patient's hair before visiting hours, giving information about the availability of a cosmetician to enhance appearance, and teaching the patient ways to direct attention away from a disfigured body to the self within. Consultants such as psychologists, social workers, vocational counselors, and teachers are valuable participants in assisting burn patients to regain their self-esteem.

Monitoring and Managing Potential Complications

Contractures

With early and aggressive physical and occupational therapy, contractures are rarely a long-term complication. However, surgical intervention is indicated if a full range of motion in the burn patient is not achieved. (See Chapter 11 for a discussion of prevention of contractures.)

Impaired Psychological Adaptation to the Burn Injury

Some patients, particularly those with limited coping skills or psychological function or a history of psychiatric problems before the burn injury, may not achieve adequate psychological adaptation to the burn injury. Psychological counseling or psychiatric referral may be made to assess the patient's emotional status, to help the patient develop coping skills, and to intervene if major psychological issues or ineffective coping is identified.

Promoting Home and Community-Based Care
Teaching Patients Self-Care

As the inpatient phase of recovery becomes shorter, the focus of rehabilitative interventions is directed toward outpatient care or care in a rehabilitation center. In the long term, much of the care of healing burns will be performed by the patient and others at home. Throughout the phases of burn care, efforts are made to prepare the patient and family for the care that will continue at home. They are instructed about the measures and procedures that they will need to perform. For example, patients commonly have small areas of clean, open wounds that are healing slowly. They are instructed to wash these areas daily with mild soap and water and to apply the prescribed topical agent or dressing.

In addition to instructions about wound care, patients and families require careful written and verbal instructions about pain management, nutrition, and prevention of complications. Information about specific exercises and use of pressure garments and

splints is reviewed with both the patient and the family, and written instructions are provided for their use at home. The patient and family are taught to recognize abnormal signs and report them to the physician. This information helps the patient progress successfully through the rehabilitative phase of burn management. The patient and family are assisted in planning for the patient's continued care by identifying and acquiring supplies and equipment that are needed at home (Chart 57-8).

Continuing Care

Follow-up care by an interdisciplinary burn care team is necessary. Preparations should begin during the early stages of care. Patients who receive care in a burn center usually return to the burn clinic or center periodically for evaluation by the burn team, modification of home care instructions, and planning for reconstructive surgery. Other patients receive ongoing care from the surgeon who cared for them during the acute phase of their management. Still other patients require the services of a rehabilitation center and may be transferred to such a center for aggressive rehabilitation before going home. Many patients require outpatient physical or occupational therapy, often several times weekly. It is often the nurse who is responsible for coordinating all aspects of care and ensuring that the patient's needs are met. Such coordination is an important aspect of assisting the patient to achieve independence.

Patients who return home after a severe burn injury, those who cannot manage their own burn care, and those with inadequate support systems need referral for home care. For example, elderly patients commonly lack family members who can provide home care; therefore, social services and community nursing services must be contacted to provide optimal care and supervision after hospital discharge. During visits to the patient at home, the home care nurse assesses the patient's physical and psychological status as well as the adequacy of the home setting for safe and adequate care. The nurse monitors the patient's progress and adherence to the plan of care and notes any problems that interfere with the patient's ability to carry out the care. During the visit, the nurse assists the patient and family with wound care and exercises. Patients with severe or persistent depression or difficulty adjusting to changes in their social or occupational roles are identified and referred to the burn team for possible referral to a psychologist, psychiatrist, or vocational counselor.

The burn team or home care nurse identifies community resources that may be helpful for the patient and family. Several burn patient support groups and other organizations throughout the United States offer services for burn survivors. They provide caring people (often people who have themselves recovered from burn injuries) who can visit the patient in the hospital or home or telephone the patient and family periodically to provide support and counseling about skin care, cosmetics, and problems related to psychosocial adjustment. Such organizations, and many regional burn centers, sponsor group meetings and social functions at which outpatients are welcome. Some also provide school-reentry programs and are active in burn prevention activities. If more information is needed regarding burn prevention, the American Burn Association can help locate the nearest burn center and offer current burn prevention tips

Because so much attention is given to the burn wound and the treatments that are necessary to treat the burn wound and prevent complications, the patient, family, and health care providers may inadvertently ignore the patient's ongoing needs for health promotion and screening. Therefore, the patient and family are reminded of the importance of periodic health screening and preventive care (eg, gynecologic examinations, dental care).

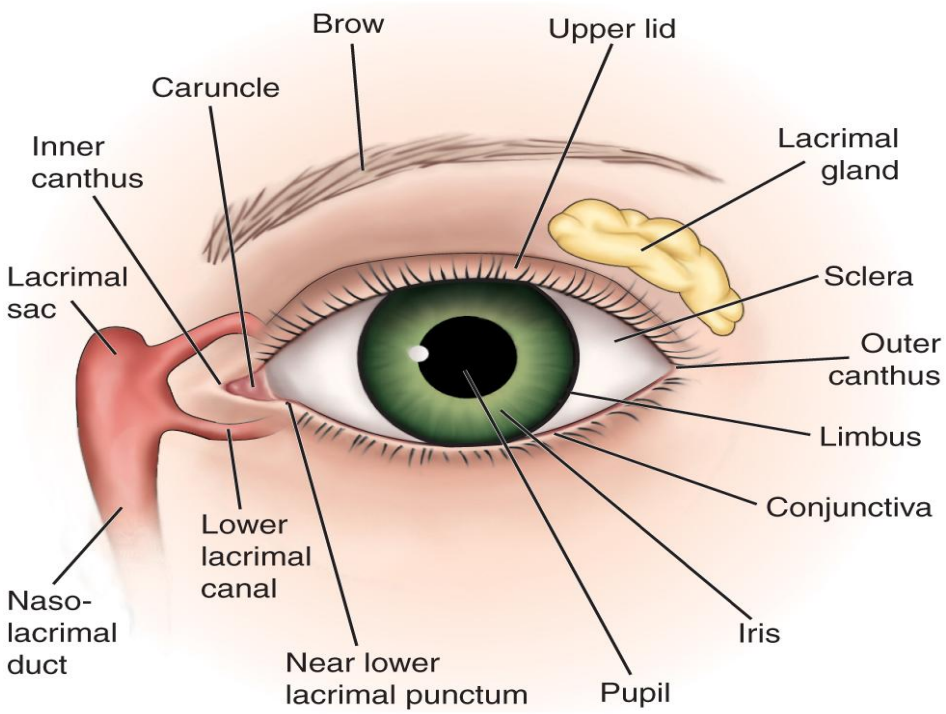
Evaluation
Expected Patient Outcomes
Expected patient outcomes may include the following:

- Demonstrates activity tolerance required for desired daily activities
    - Obtains adequate sleep daily
    - Reports absence of nightmares or sleep disturbances
    - Shows gradually increasing tolerance and endurance in physical activities
    - Can concentrate during conversations
    - Has energy available to sustain desired daily activities
- Adapts to altered body image
    - Verbalizes accurate description of alterations in body image and accepts physical appearance
    - Demonstrates interest in resources that may improve body appearance and function
    - Uses cosmetics, wigs, and prostheses as desired to achieve acceptable appearance
    - Socializes with significant others, peers, and usual social group
    - Seeks and achieves return to role in family, school, and community as a contributing member
- Demonstrates knowledge of required self-care and follow-up care
    - Describes surgical procedures and treatments accurately
    - Verbalizes detailed plan for follow-up care
    - Demonstrates ability to perform wound care and prescribed exercises
    - Returns for follow-up appointments as scheduled
    - Identifies resource people and agencies to con tact for specific problems
- Exhibits no complications
    - Demonstrates full range of motion
    - Shows no signs of withdrawal or depression
    - Displays no psychotic behaviors

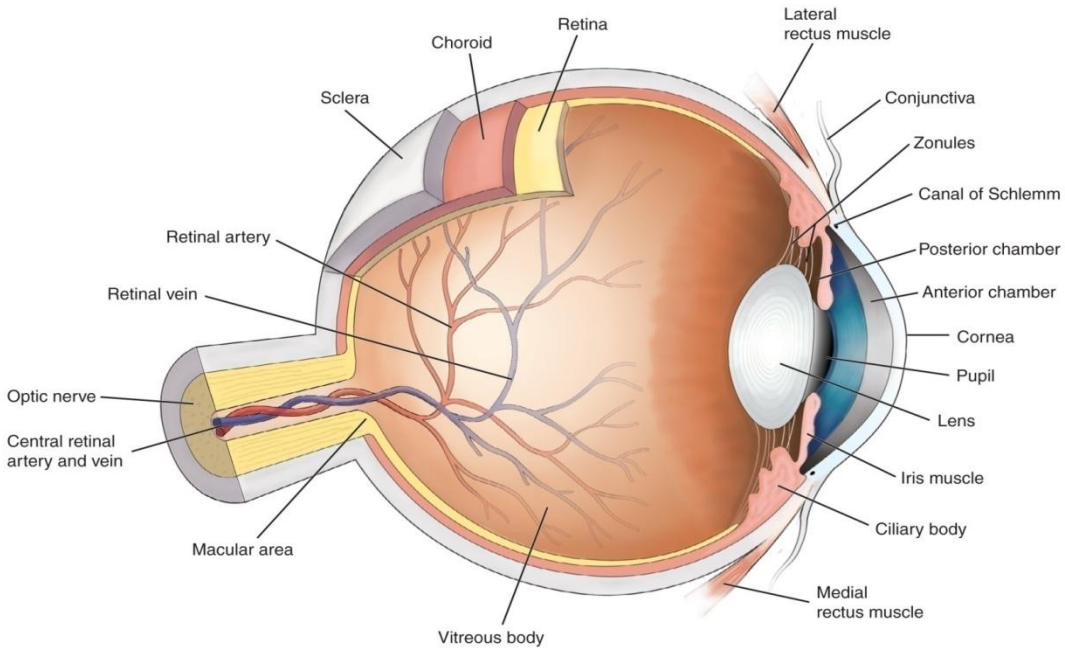
Chapter 58

Assessment and Management of Patients with Eye and Vision Disorders

External Structures of the Eye



Cross-Section of the Eye



Assessment and Evaluation of Vision

• Ocular history

• Visual acuity

–Snellen chart

• Record each eye

• 20/20 means the patient can read the "20" line at a distance of 20 feet

• Finger count or hand motion

Diagnostic Evaluation

• Ophthalmoscopy

–Direct and indirect

–Examines the cornea, lens and retina

• Tonometry

–Measures intraocular pressure

Impaired Vision

• **Refractive errors**

–Can be corrected by lenses which focus light rays on the retina

• **Myopia:** nearsighted

• **Hyperopia:** farsighted

• **Astigmatism:** distortion due to irregularity of the cornea. Due to refractive error in which light rays are spread over a diffuse area rather than sharply focused on the retina, a condition caused by differences in the curvature of the cornea and lens

Glaucoma

— A group of ocular conditions in which damage to the optic nerve is related to increased intraocular pressure (IOP) caused by congestion of the aqueous humor

— The leading cause of blindness in adults in the U.S.

— Incidence increases with age

Risk factors

— Family history of glaucoma

— Older age

— Diabetes mellitus

— Cardiovascular disease

— Nearsightedness (myopia)

— Eye trauma

— Prolonged use of topical or systemic corticosteroids

Pathophysiology of Glaucoma

— In glaucoma, aqueous production and drainage are not in balance.

— When aqueous outflow is blocked, pressure builds up in the eye.

— Increased IOP causes irreversible mechanical and/or ischemic damage to the optic nerve.

Types of glaucoma:

1. Open-angle

2. Angle-closure (pupillary block) glaucoma

3. Congenital glaucomas

4. Glaucoma secondary to other conditions

Clinical Manifestations

• "Silent thief" of vision; unaware of the condition until there is significant vision loss; peripheral vision loss, blurring, halos, difficulty focusing, difficulty adjusting eyes to low lighting

• May also have aching or discomfort around eyes or headache

• **Diagnosis:** Tonometry to assess IOP

Treatment

• Goal is to prevent further optic nerve damage

• Maintain IOP within a range unlikely to cause damage

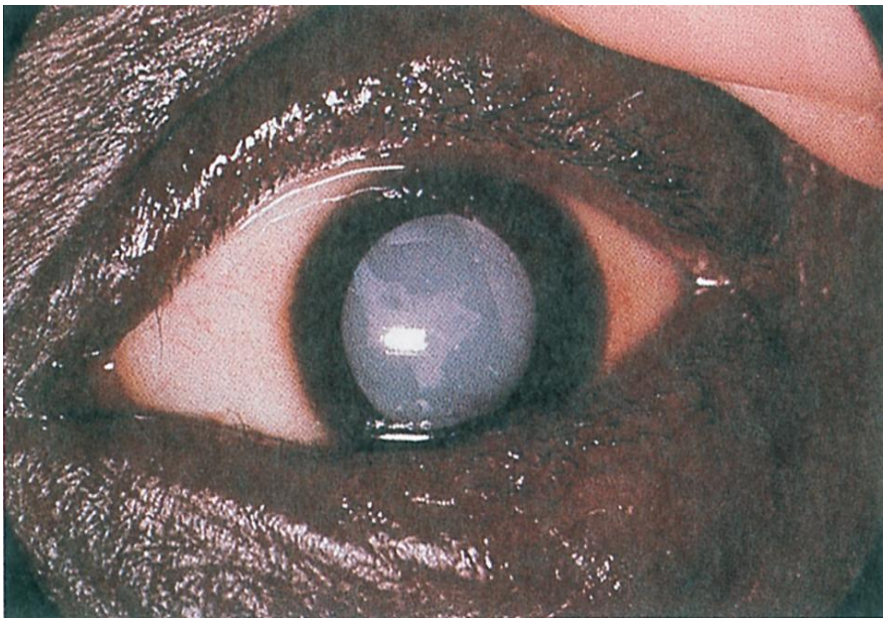
• Pharmacologic therapy

• Surgery (nursing care)

Cataracts

— An opacity or cloudiness of the lens

— Increased incidence with aging; by age 80 more than half of all Americans have cataracts



— Risk factors

— Aging (Clumping or aggregation of lens protein)

— Associated Ocular Conditions (Myopia, retenal surgery)

— Toxic Factors (Corticosteroids, smoking)

— Nutritional Factors (low antioxidants, poor nutrition)

— Physical Factors (dehydration, trauma, ultraviolet ray)

— Systemic Diseases and Syndromes (DM, MS Renal)

Clinical Manifestations

• Painless, blurry vision

• Sensitivity to glare

• Reduced visual acuity

• Other effects include astigmatism, diplopia (double vision), and color (color value shift to yellow-brown)

• Diagnostic findings include decreased visual acuity and opacity of the lens by ophthalmoscope, or inspection

Surgical Management

• If reduced vision does not interfere with normal activities, surgery is not needed.

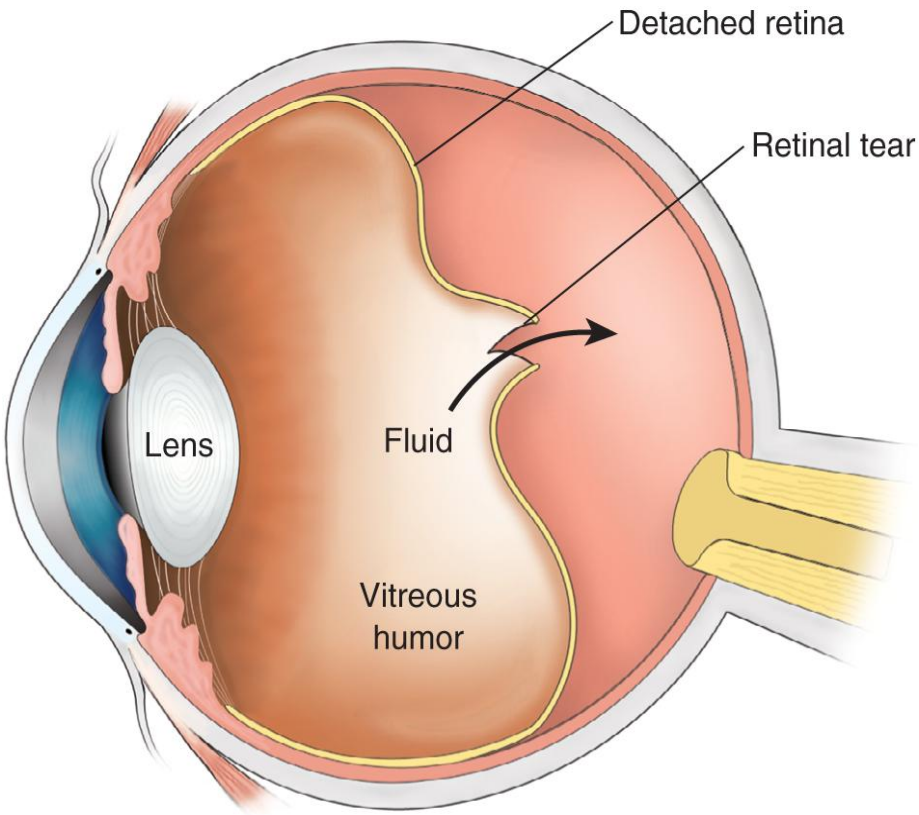
• Removal of the lens and replacing it with an artificial lens

Retinal Detachment

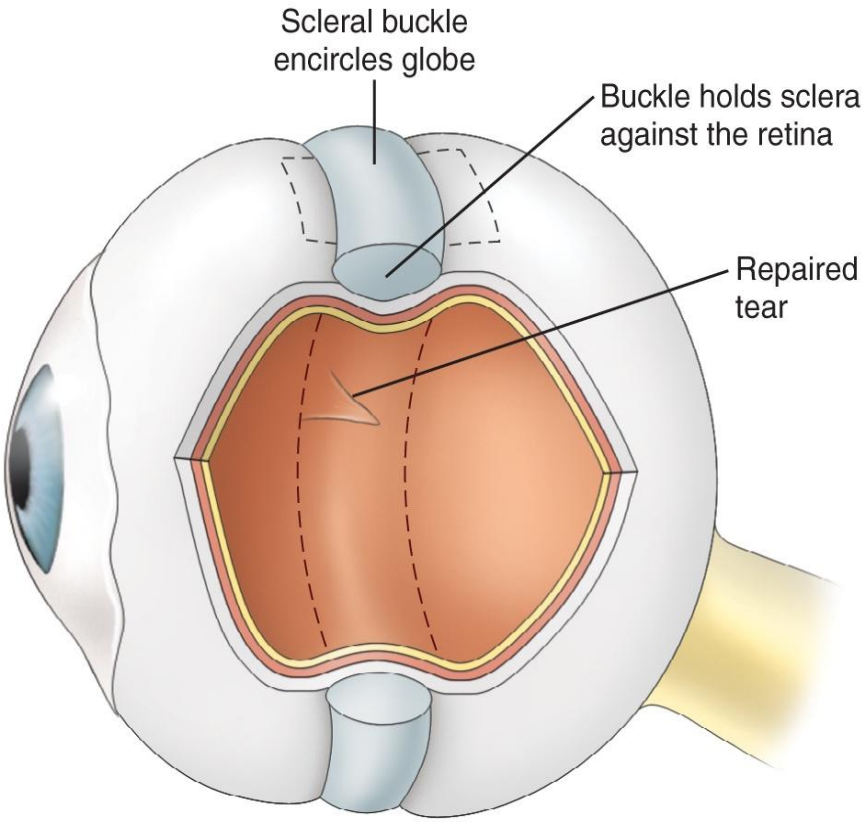
• Separation of the sensory retina and the RPE (retinal pigment epithelium)

• Manifestations: sensation of a shade or curtain coming across the vision of one eye, bright flashing lights, sudden onset of floaters

• Diagnostic findings: assess visual acuity, assessment of retina by indirect ophthalmoscope and fluorescein angiography. Tomography and ultrasound may also be used



Surgical Treatment: Scleral Buckle



Trauma

• Prevention of injury

• Patient and public education

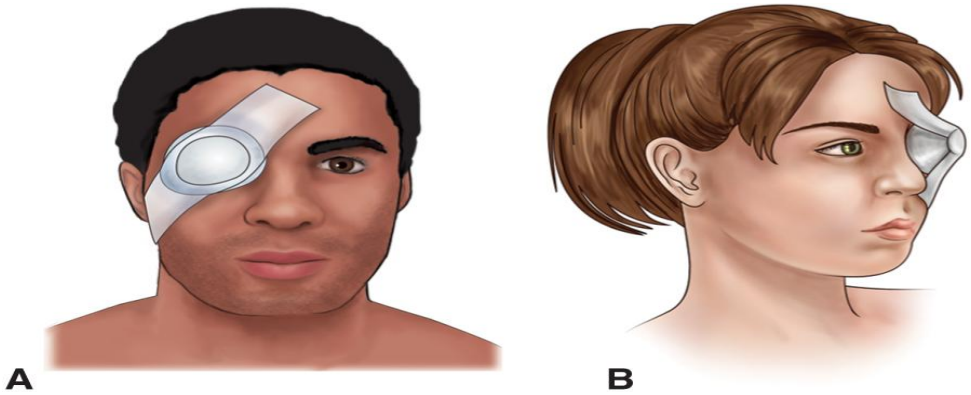
• Emergency treatment

–Flush chemical injuries

–Do not remove foreign objects

–Protect using metal shield or paper cup

Protective Eye Patches



Chapter-60-Assessment-of-Neurologic-Function

The Human Nervous System

• Its purpose is to control all motor, sensory, autonomic, cognitive, and behavioral activities.

• This is accomplished by coordination and initiation of cellular activity through the transmission of electrical impulses and various hormones.

The Nervous System: Structure

• The nervous system is divided into:

–The central nervous system, consisting of the brain and spinal cord.

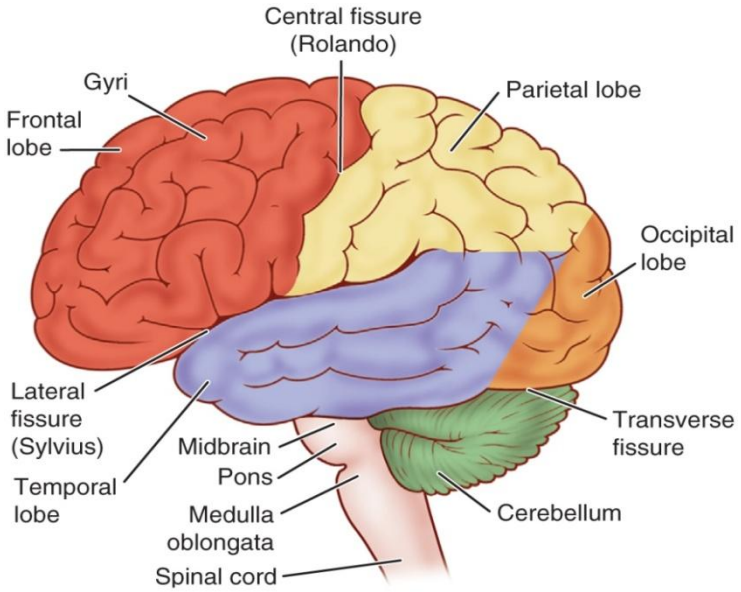
–The peripheral nervous system, which consists of the cranial nerves and spinal nerves.

–Basic functional unit—neuron

–The autonomic nervous system, which is part of the peripheral nervous system and consists of sympathetic and para-sympathetic systems.

The Brain

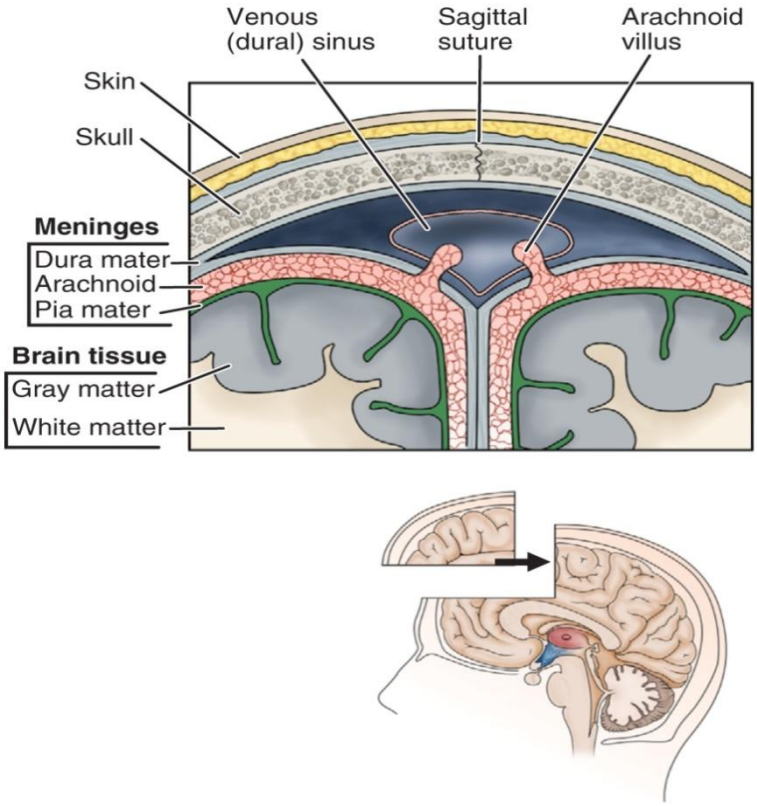
• Composed of gray matter and white matter, the brain controls, initiates, and integrates body functions through the use of electrical impulses and complex molecules.



Physiology of the Brain

• The brain is contained within the skull, or cranium.

• Three coverings of the brain, called the meninges. They are the dura mater, arachnoid mater, and pia mater.



The Brain Hemispheres

• The right side receives information from and controls the left side of the body. Specializes in perception of physical environment, art, music, nonverbal communication, spiritual aspects.

• The left receives information from and controls the right side of the body. Specializes in analysis, calculation, problem solving, verbal communication, interpretation, language, reading, & writing.

The Spinal Cord

• A continuation of the brain stem.

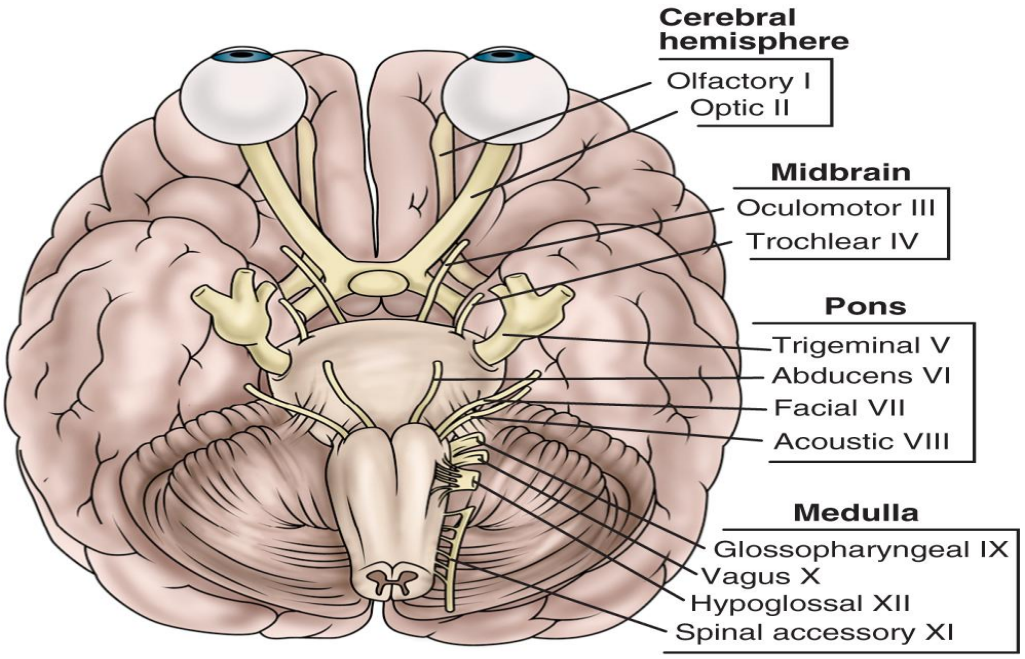
• Exits the skull through the foramen magnum, an opening in the base of the skull.

Cerebrospinal Fluid

• Provides for shock absorption and bathes the brain and spinal cord.

Peripheral Nervous System: Cranial Nerves

• Twelve pairs of cranial nerves have sensory, motor, or mixed functions.



Olfactory Sensory; smell	**Optic** Sensory; Vision	**Oculomotor** Motor; Pupil Constriction	**Trochlear** Motor;upper eyelid elevation
Trigeminal cornea, nose, oral mucosa; mastication	**Abducens** Motor; Extraocular eye movement	**Facial** Motor (facial muscles); Sensory (taste)	**Acoustic** Sensory; Hearing; Equilibrium
Glosso- **Pharyngeal** Taste; Swallowing	**Vagus** Motor and Sensory	**Spinal** **Accessory** Motor	**Hypoglossal** Tongue Movement

Peripheral Nervous System: Spinal Nerves

- Cervical 8
- Thoracic 12
- Lumbar 5
- Sacral 5
- Coccyx 1

Peripheral Nervous System: Autonomic Nervous System

- Main function is to maintain internal homeostasis.

• Two subdivisions of ANS:

–The sympathetic system (activated by stress, prepares body for “fight or flight” response).

–The parasympathetic system (conserves, restores, and maintains vital body functions, slowing heart rate, increasing gastrointestinal activity, and activating bowel and bladder evacuation).

Neurologic Assessment: Health History

• Pain

• Seizures

• Dizziness (abnormal sensation of imbalance or movement) and vertigo (illusion of movement, usually rotation)

• Visual disturbances

• Weakness

• Abnormal sensations

Neurologic Assessment

• Cerebral function; mental status, intellectual function thought content, emotional status, perception, motor ability, and language ability

–Note the impact of any neurologic impairment on lifestyle and patient abilities and limitations

–Agnosia is the inability to interpret or recognize objects seen through the special senses.

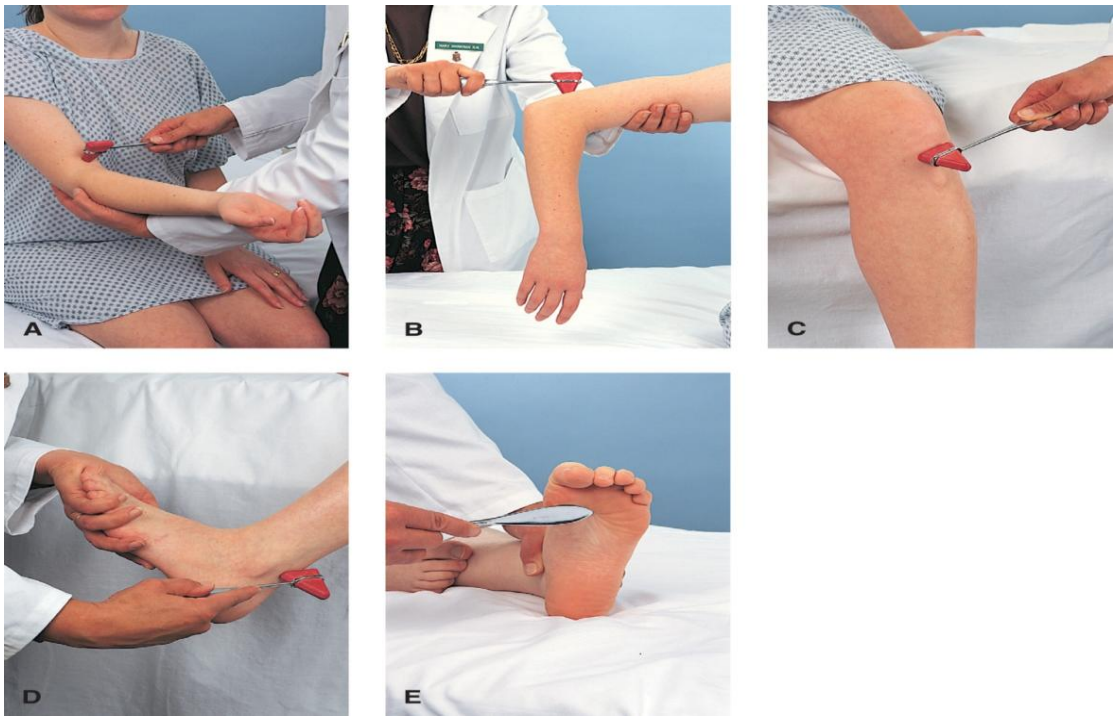
• Motor system; posture, gait, muscle tone and strength, coordination and balance, Romberg test

• Sensory system; tactile sensation, superficial pain, vibration and position sense

• Reflexes; DTRs, abdominal, and plantar (Babinski)

- The **Romberg test** is a screening test for balance. The patient stands with feet together and arms at the side, first with eyes open and then with both eyes closed for 20 to 30 seconds. The examiner stands close to reassure the patient of support if he or she begins to fall. Slight swaying is normal, but a loss of balance is abnormal and is considered a positive Romberg test.

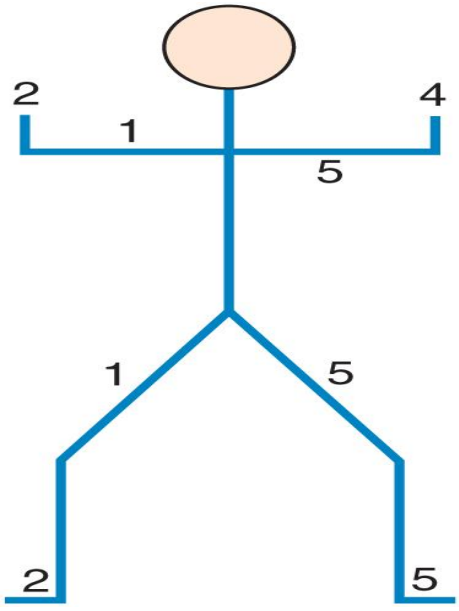
Techniques Eliciting Major Reflexes



(A) Biceps reflex. (B) Triceps reflex. (C) Patellar reflex. (D) Ankle or Achilles reflex. (E) Babinski response.

Figure Used to Record Muscle Strength

• 5, full range of motion against gravity and resistance; 4, full range of motion against gravity and a moderate amount of resistance; 3, full range of motion against gravity only; 2, full range of motion when gravity is eliminated; 1, a weak muscle contraction when muscle is palpated, but no movement; and 0, complete paralysis.



Gerontological Considerations

• Important to distinguish normal aging changes from abnormal changes

• Determine previous mental status for comparison. Assess mental status carefully to distinguish delirium from dementia.

• Normal changes may include:

–Losses in strength and agility; changes in gait, posture and balance; slowed reaction times and decreased reflexes; visual and hearing alterations; deceased sense of taste and smell; dulling of tactile sensations; changes in the perception of pain; and decreased thermoregulatory ability

Pupil Size

• Normal range: 2 - 6 mm

–Drugs: pinpoint pupils

–Increased intracranial pressure: pupils begin to dilate

• Dilated and fixed, poor prognosis

Glascow Coma Scale

• Score BEST response in each category

• Highest score = 15 (normal)

• Lowest score = 3 (deep coma)

Eye Opening	Spontaneous	4
	To Voice	3
	To Pain	2
	None	1
Best Verbal	Oriented	5
	Confused	4
	Inappropriate Words	3
	Incomprehensible Sounds	2
	None	1
Best Motor	Obeys Commands	6
	Localizes Pain	5
	Withdraws to Pain	4
	Flexion to Pain (decorticate)	3
	Extension to Pain (decerebrate)	2
	None	1

Diagnostic Tests

• Computed tomography (CT)

• Magnetic resonance imaging (MRI)

• Cerebral angiography

• Myelography

• Noninvasive carotid flow studies

• Transcranial doppler

• Electroencephalography (EEG)

• Electromyography (EMG)

• Lumbar puncture and analysis of cerebrospinal fluid

Chapter 61

Management of Patients with Neurologic Dysfunction

Altered Level of Consciousness (LOC)

• LOC: is apparent in the patient who is not oriented, does not follow commands, or needs persistent stimuli to achieve a state of alertness.

• Level of responsiveness and consciousness is the most important indicator of the patient's condition

• LOC is a continuum from normal alertness and full cognition (consciousness) to coma

• Altered LOC is not the disorder but the result of a pathology

• Coma: unconsciousness, unarousable unresponsiveness

• Akinetic mutism: unresponsiveness to the environment, makes no movement or sound but sometimes opens eyes

• Persistent vegetative state: devoid of cognitive function but has sleep-wake cycles

• Locked-in syndrome: inability to move or respond except for eye movements due to a lesion affecting the pons

- Coma is a clinical state of unarousable unresponsiveness in which there are no purposeful responses to internal or external stimuli, although nonpurposeful responses to painful stimuli and brain stem reflexes may be present (Hickey, 2003). The duration of coma is usually limited to 2 to 4 weeks.
- Altered LOC is not a disorder itself; rather, it is a result of multiple pathophysiologic phenomena. The cause may be neurologic (head injury, stroke), toxicologic (drug overdose, alcohol intoxication), or metabolic (hepatic or renal failure, diabetic ketoacidosis).

Nursing Process: The Care of the Patient with Altered Level of Consciousness—Assessment

• Assess verbal response and orientation

• Alertness

• Motor responses

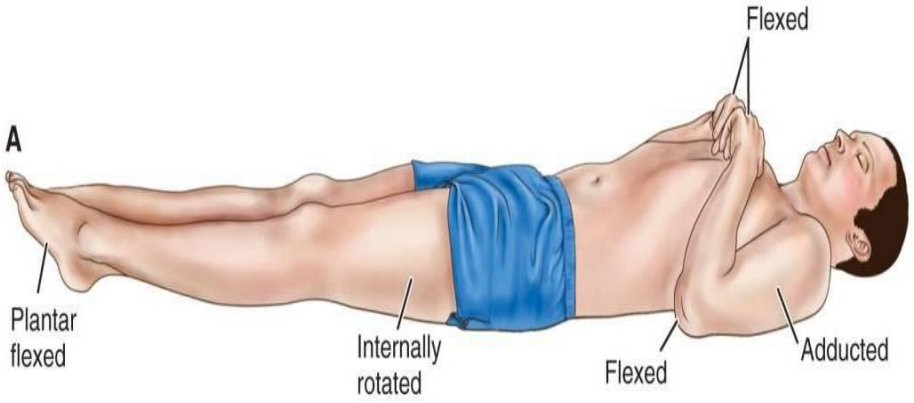
• Respiratory status

• Eye signs

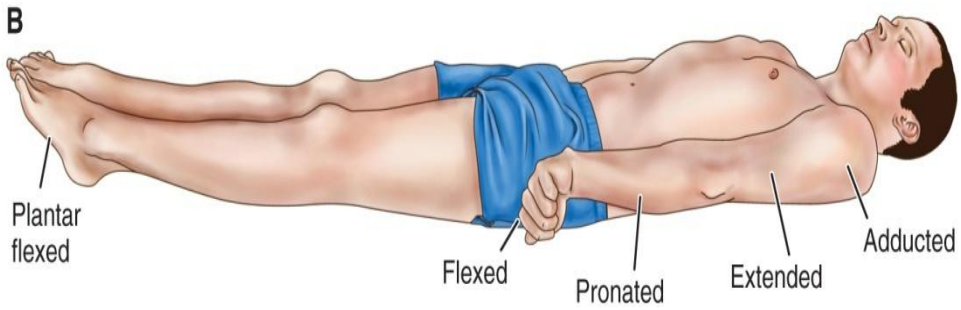
• Reflexes

• Postures
• Glasgow Coma Scale

Decorticate and Decerebrate Posturing
Abnormal posture response to stimuli. (A) Decorticate posturing, involving adduction and flexion of the upper extremities, internal rotation of the lower extremities, and plantar flexion of the feet.



(B) Decerebrate posturing, involving extension and outward rotation of upper extremities and plantar flexion of the feet.



Nursing Process: The Care of the Patient with Altered Level of Consciousness—Diagnoses

• Ineffective airway clearance

• Risk of injury

• Deficient fluid volume

• Impaired oral mucosa

• Risk for impaired skin integrity and impaired tissue integrity (cornea)

• Ineffective thermoregulation

• Impaired urinary elimination and bowel incontinence

• Disturbed sensory perception

• Interrupted family processes

Collaborative Problems/Potential Complications

• Respiratory distress or failure

• Pneumonia

• Aspiration

• Pressure ulcer

• Deep vein thrombosis (DVT)

• Contractures

Nursing Process: The Care of the Patient with Altered Level of Consciousness—Planning

• Goals may include:

–Maintenance of clear airway

–Protection from injury

–Attainment of fluid volume balance

–Maintenance of skin integrity

–Absence of corneal irritation

–Effective thermoregulation

–Accurate perception of environmental stimuli

–Maintenance of intact family or support system

–Absence of complications

Interventions

• A major nursing goal is to compensate for the patient's loss of protective reflexes and to assume responsibility for total patient care. Protection also includes maintaining the patient's dignity and privacy.

1. Maintaining an airway

–Frequent monitoring of respiratory status including auscultation of lung sounds

–Positioning to promote accumulation of secretions and prevent obstruction of upper airway—HOB elevated 30°, lateral or semiprone position

–Suctioning, oral hygiene, and Chest Physiotherapy

2. Maintaining Tissue Integrity

• Assess skin frequently, especially areas with high potential for breakdown

• Frequent turning; use turning schedule

• Careful positioning in correct body alignment

• Passive ROM

• Use of splints, foam boots, trochanter rolls, and specialty beds as needed

• Clean eyes with cotton balls moistened with saline

• Use artificial tears as prescribed

• Measures to protect eyes; use eye patches cautiously as the cornea may contact patch

• Frequent oral care

3. Maintaining fluid status

–Assess fluid status by examining tissue turgor and mucosa, lab data, and I&O.

–Administer IVs, tube feedings, and fluids via feeding tube as required— monitor ordered rate of IV fluids carefully.

4. Maintaining body temperature

–Adjust environment and cover patient appropriately.

–If temperature is elevated, use minimum amount of bedding, administer acetaminophen, use hypothermia blanket, give a cooling sponge bath, and allow fan to blow over patient to increase cooling.

–Monitor temperature frequently and use measures to prevent shivering.

5. Promoting Bowel and Bladder Function

• Assess for urinary retention and urinary incontinence

• May require indwelling or intermittent catherization

• Bladder-training program

• Assess for abdominal distention, potential constipation, and bowel incontinence

• Monitor bowel movements

• Promote elimination with stool softeners, glycerin suppositories, or enemas as indicated

• Diarrhea may result from infection, medications, or hyperosmolar fluids

6. Sensory Stimulation and Communication

• Talk to and touch patient and encourage family to talk to and touch the patient

• Maintain normal day night pattern of activity

• Orient the patient frequently

• Note: When arousing from coma, a patient may experience a period of agitation; minimize stimulation at this time

• Programs for sensory stimulation

• Allow family to ventilate and provide support

• Reinforce and provide and consistent information to family

• Referral to support groups and services for family

Increased Intracranial Pressure

• Monro-Kellie hypothesis: because of limited space in the skull, an increase in any one of components of the skull—brain tissue, blood, and CSF—will cause a change in the volume of the others

• Compensation to maintain a normal ICP of 10–20 mm Hg is normally accomplished by shifting or displacing CSF

• Elevated ICP is most commonly associated with head injury, it also may be seen as a secondary effect in other conditions, such as brain tumors, subarachnoid hemorrhage, and toxic and viral encephalopathies

• Increased ICP decreases cerebral perfusion and causes ischemia, cell death, and (further) edema

• Brain tissues may shift through the dura and result in herniation

• CO_2 plays a role; decreased CO_2 results in vasoconstriction, increased CO_2 results in vasodilatation

Manifestations of Increased ICP: Early

• Changes in LOC

• Any change in condition

–Restlessness, confusion, increasing drowsiness, increased respiratory effort, purposeless movements

• Pupillary changes and impaired ocular movements

• Weakness in one extremity or one side

• Headache—constant, increasing in intensity or aggravated by movement or straining

Manifestations of Increased ICP: Late

• Respiratory and vasomotor changes

• VS: Increase in systolic blood pressure, widening of pulse pressure, and slowing of the heart rate; pulse may fluctuate rapidly from tachycardia to bradycardia; temperature increase

–Cushing's triad: bradycardia, hypertension, bradypnea

• Projectile vomiting

• Further deterioration of LOC; stupor (reacting only to loud or painful stimuli) to coma

• Hemiplegia, decortication, decerebration, or flaccidity

• Respiratory pattern alterations including Cheyne-Stokes breathing and respiratory arrest

• Loss of brainstem reflexes—pupil, gag, corneal, and swallowing

Nursing Process: The Care of the Patient with Increased Intracranial Pressure—Assessment

• Frequent and ongoing neurologic assessment

• Evaluate neurologic status as completely as possible

• Glasgow Coma Scale

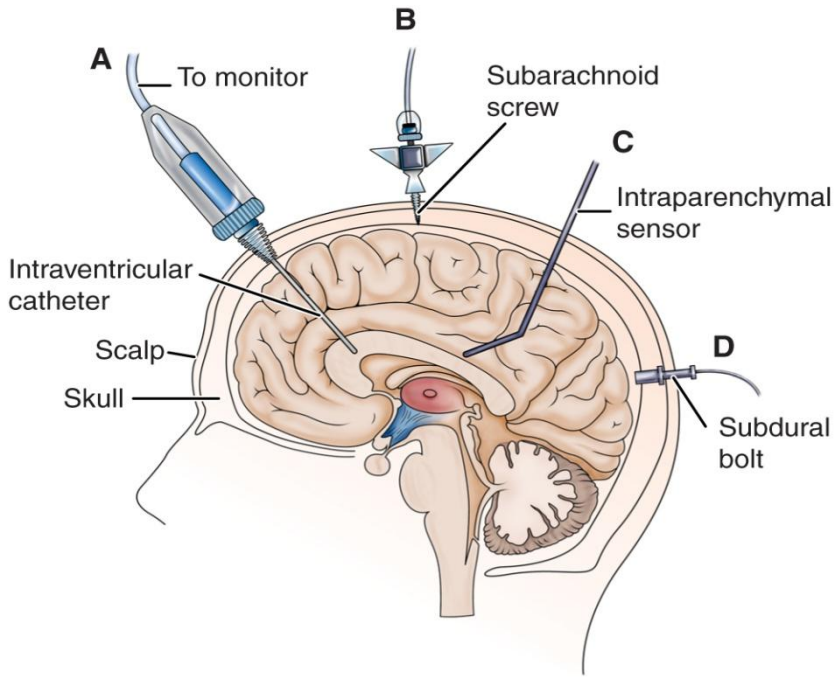
• Pupil checks

• Assessment of selected cranial nerves

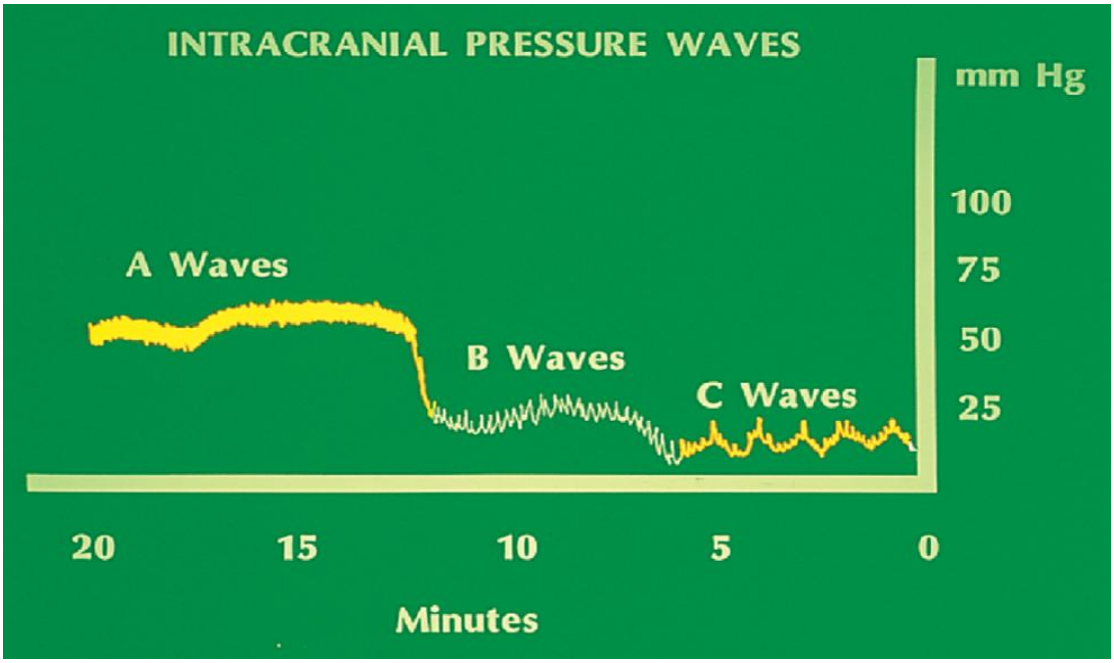
• Frequent vital signs

• Assessment of intracranial pressure

ICP Monitoring



Intracranial Pressure Waves



Nursing Process: The Care of the Patient with Increased Intracranial Pressure—Diagnoses

• Ineffective airway clearance

• Ineffective breathing pattern

• Ineffective cerebral perfusion

• Deficient fluid volume related to fluid restriction

• Risk for infection related to ICP monitoring

Collaborative Problems/Potential Complications

• Brainstem herniation

• Diabetes insipidus

• SIADH

• Infection

Nursing Process: The Care of the Patient with Increased Intracranial Pressure—Planning

• Major goals may include:

–Maintaining a Patent Airway

–Achieving an Adequate Breathing Pattern

–Preventing Infection

–Optimizing Cerebral Tissue Perfusion

–Maintaining Negative Fluid Balance

–Absence of complications

Interventions

• Frequent monitoring of respiratory status and lung sounds and measures to maintain a patent airway (suction is contraindicated)

• Position with head in neutral position and elevation of HOB 0–60° to promote venous drainage

• Avoid hip flexion, Valsalva maneuver, abdominal distention, or other stimuli that may increase ICP

• Maintain a calm, quiet atmosphere and protect patient from stress

• Monitor fluid status carefully; every hour I&O during acute phase

• Use strict aseptic technique for management of ICP monitoring system

Intracranial Surgery

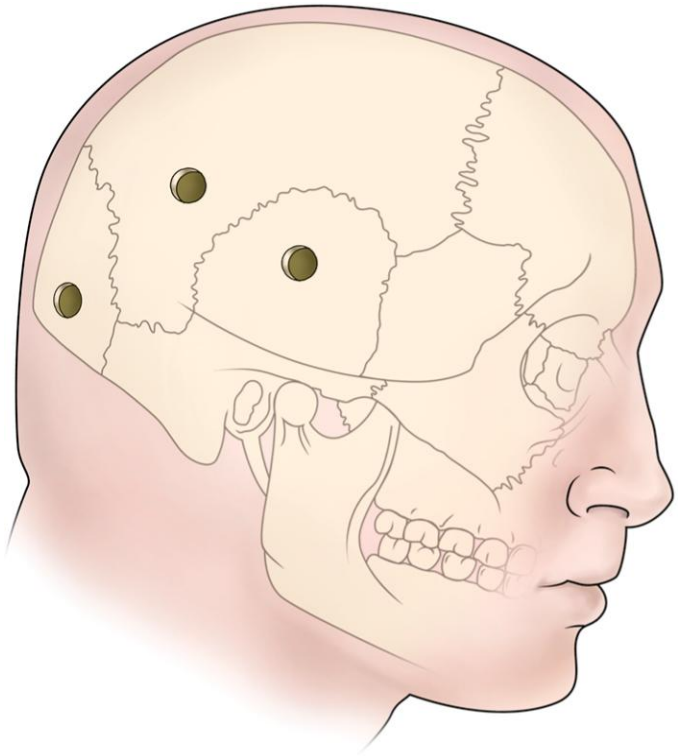
• Craniotomy: opening of the skull

–Purposes: remove tumor, relieve elevated ICP, evacuate a blood clot, control hemorrhage

• Craniectomy: excision of portion of skill

• Burr holes: circular openings for exploration or diagnosis, to provide access to ventricles or for shunting procedures, to aspirate a hematoma or abscess, or to make a bone flap

Burr Holes



Preoperative Care: Medical Management

• Preoperative diagnostic procedures may include CT scan, MRI, angiography, or transcranial Doppler flow

• Medications are usually given to reduce risk of seizures

• Corticosteroids, fluid restriction, hyperosmotic agent (mannitol), and diuretics may be used to reduce cerebral edema

• Antibiotics may be administered to reduce potential infection

• Diazepam may be used to alleviate anxiety

Preoperative Care: Nursing Management

• Obtain baseline neurologic assessment

• Assess patient and family understanding of and preparation for surgery.

• Provide information, reassurance, and support

Postoperative Care

• Postoperative care is aimed at detecting and reducing cerebral edema, relieving pain, preventing seizures, monitoring ICP, and neurologic status.

• The patient may be intubated and have arterial and central venous lines.

Nursing Process: The Care of the Patient Undergoing Intracranial Surgery:

Assessment

• Careful, frequent monitoring of respiratory function including ABGs

• Monitor VS and LOC frequently; note any potential signs of increasing ICP

• Assess dressing and for evidence of bleeding or CSF drainage

• Monitor for potential seizures; if seizures occur, carefully record and report these

• Monitor for signs and symptoms of complications

• Monitor fluid status and laboratory data

Diagnoses

• Ineffective cerebral tissue perfusion

• Risk for imbalanced body temperature

• Potential for impaired gas exchange

• Disturbed sensory perception

• Body image disturbance

• Impaired communication (aphasia)

• Risk for impaired skin integrity

• Impaired physical mobility

Collaborative Problems/Potential Complications

• Increased ICP

• Bleeding and hypovolemic shock

• Fluid and electrolyte disturbances

• Infection

• Seizures

Planning

• Major goals may include:

–Improved tissue perfusion

–Adequate thermoregulation

–Normal ventilation and gas exchange

–Ability to cope with sensory deprivation

–Adaptation to changes in body image

–Absence of complications

Maintaining Cerebral Perfusion

• Monitor respiratory status; even slight hypoxia or hypercapnia can effect cerebral perfusion

• Assess VS and neurologic status every 15 minutes to every hour

• Strategies to reduce cerebral edema; cerebral edema peaks 24–36 hours

• Strategies to control factors that increase ICP

• Avoid extreme head rotation

• Head of bed may be flat or elevated 30° according to needs related to the surgery and surgeon preference

Interventions

1. Regulating temperature

–Cover patient appropriately.

–Treat high temperature elevations vigorously; apply ice bags, use hypothermia blanket, administer prescribed acetaminophen.

2. Improving gas exchange

–Turn and reposition every 2 hours.

–Encourage deep breathing and incentive spirometry.

–Suction or encourage coughing cautiously as needed (suctioning and coughing increase ICP).

–Humidification of oxygen may help loosen secretions.

3. Sensory deprivation

– Periorbital edema may impair vision, announce presence to avoid startling the patient; cool compresses over eyes and elevation of HOB may be used to reduce edema if not contraindicated.

4. Enhancing self-image

–Encourage verbalization.

–Encourage social interaction and social support.

–Attention to grooming.

–Cover head with turban and, later, a wig.

5. Monitor I&O, weight, blood glucose, serum and urine electrolyte levels, and osmolality and urine specific gravity.

6. Preventing infections

–Assess incision for signs of hematoma or infection.

–Assess for potential CSF leak.

–Instruct patient to avoid coughing, sneezing, or nose blowing, which may increase the risk of CSF leakage.

–Use strict aseptic technique.

• Patient teaching for self-care

Seizures

• Abnormal episodes of motor, sensory, autonomic, or psychic activity (or a combination of these) resulting from a sudden, abnormal, uncontrolled electrical discharge from cerebral neurons

• Classification of seizures Partial seizures: begin in one part of the brain

• Simple partial: consciousness remains intact

• Complex partial: impairment of consciousness

– Generalized seizures: involve the whole brain

Specific Causes of Seizures

• Cerebrovascular disease

• Hypoxemia

• Fever (childhood)

• Head injury

• Hypertension

• Central nervous system infections

• Metabolic and toxic conditions

• Brain tumor

• Drug and alcohol withdrawal

• Allergies

Plan of Care for a Patient Experiencing a Seizure

• Observation and documentation of patient signs and symptoms before, during, and after seizure

• Nursing actions during seizure for patient safety and protection

• After seizure care to prevent complications

Nursing Care after the Seizure

• Keep the patient on one side to prevent aspiration. Make sure the airway is patent.

• There is usually a period of confusion after a grand mal seizure.

• A short apneic period may occur during or immediately after a generalized seizure.

• The patient, on awakening, should be reoriented to the environment.

• If the patient becomes agitated after a seizure, use calm persuasion and gentle restraint.

Nursing Care during a Seizure

• Provide privacy and protect the patient from curious onlookers. (The patient who has an aura [warning of an impending seizure] may have time to seek a safe, private place.)

• Ease the patient to the floor, if possible.

• Protect the head with a pad to prevent injury (from striking

a hard surface).

• Loosen constrictive clothing.

• Push aside any furniture that may injure the patient during the seizure.

• If the patient is in bed, remove pillows and raise side rails.

• If an aura precedes the seizure, insert an oral airway to reduce the possibility of the patient's biting the tongue or cheek.

• Do not attempt to open jaws that are clenched in a spasm or to insert anything. Broken teeth and injury to the lips and tongue may result from such an action.

• No attempt should be made to restrain the patient during the seizure, because muscular contractions are strong and restraint can produce injury.

• If possible, place the patient on one side with head flexed forward, which allows the tongue to fall forward and facilitates drainage of saliva and mucus. If suction is available, use it if necessary to clear secretions.

Status Epilepticus

• Status epilepticus (acute prolonged seizure activity) is a series of generalized seizures that occur without full recovery of consciousness between attacks

Chapter 61
Nursing Process
The Patient with an Altered Level of Consciousness

Assessment

Assessment of the patient with an altered LOC depends on the patient's circumstances, but clinicians often start by assessing the verbal response. Determining the patient's orientation to time, person, and place assesses verbal response. The patient is asked to identify the day, date, or season of the year and to identify where he or she is or to identify the clinicians, family members, or visitors present. Other questions such as, "Who is the president?" or "What is the next holiday?" may be helpful in determining the patient's processing of information in the environment. (Verbal response cannot be evaluated if the patient is intubated or has a tracheostomy, and this should be clearly documented.)

Alertness is measured by the patient's ability to open the eyes spontaneously or in response to a vocal or noxious stimulus (pressure or pain). Patients with severe neurologic dysfunction cannot do this. The nurse assesses for periorbital edema (swelling around the eyes) or trauma, which may prevent the patient from opening the eyes, and documents any such condition that interferes with eye opening.

Motor response includes spontaneous, purposeful movement (eg, the awake patient can move all four extremities with equal strength on command), movement only in response to painful stimuli, or abnormal posturing (Hickey, 2003; Seidel, Ball, Dains, et al., 2003). If the patient is not responding to commands, the motor response is tested by applying a painful stimulus (firm but gentle pressure) to the nailbed or by squeezing a muscle. If the patient attempts to push away or withdraw, the response is recorded as purposeful or appropriate ("patient withdraws to painful stimuli"). This response is considered purposeful if the patient can cross the midline from one side of the body to the other in response to painful stimuli. An inappropriate or nonpurposeful response is random and aimless. Posturing may be decorticate or decerebrate (Fig. 61-1; see also Chapter 60). The most severe neurologic impairment results in flaccidity. The motor response cannot be elicited if the patient has been administered pharmacologic paralyzing agents.

In addition to LOC, the nurse monitors parameters such as respiratory status, eye signs, and reflexes on an ongoing basis. Table 61-1 summarizes the assessment and the clinical significance of the findings. Body functions (circulation, respiration, elimination, fluid and electrolyte balance) are examined in a systematic and ongoing manner.

Diagnosis

Nursing Diagnoses

Based on the assessment data, the major nursing diagnoses may include the following:

- Ineffective airway clearance related to altered LOC
- Risk of injury related to decreased LOC
- Deficient fluid volume related to inability to take fluids by mouth
- Impaired oral mucous membrane related to mouth-breathing, absence of pharyngeal reflex, and altered fluid intake
- Risk for impaired skin integrity related to immobility
- Impaired tissue integrity of cornea related to diminished or absent corneal reflex
- Ineffective thermoregulation related to damage to hypothalamic center
- Impaired urinary elimination (incontinence or retention) related to impairment in neurologic sensing and control

- Bowel incontinence related to impairment in neurologic sensing and control and also related to changes in nutritional delivery methods
- Disturbed sensory perception related to neurologic impairment
- Interrupted family processes related to health crisis

Collaborative Problems/Potential Complications
Based on the assessment data, potential complications may include:

- Respiratory distress or failure
- Pneumonia
- Aspiration
- Pressure ulcer
- Deep vein thrombosis (DVT)
- Contractures

Planning and Goals
The goals of care for the patient with altered LOC include maintenance of a clear airway, protection from injury, attainment of fluid volume balance, achievement of intact oral mucous membranes, maintenance of normal skin integrity, absence of corneal irritation, attainment of effective thermoregulation, and effective urinary elimination. Additional goals include bowel continence, accurate perception of environmental stimuli, maintenance of intact family or support system, and absence of complications (Rice et al., 2005).

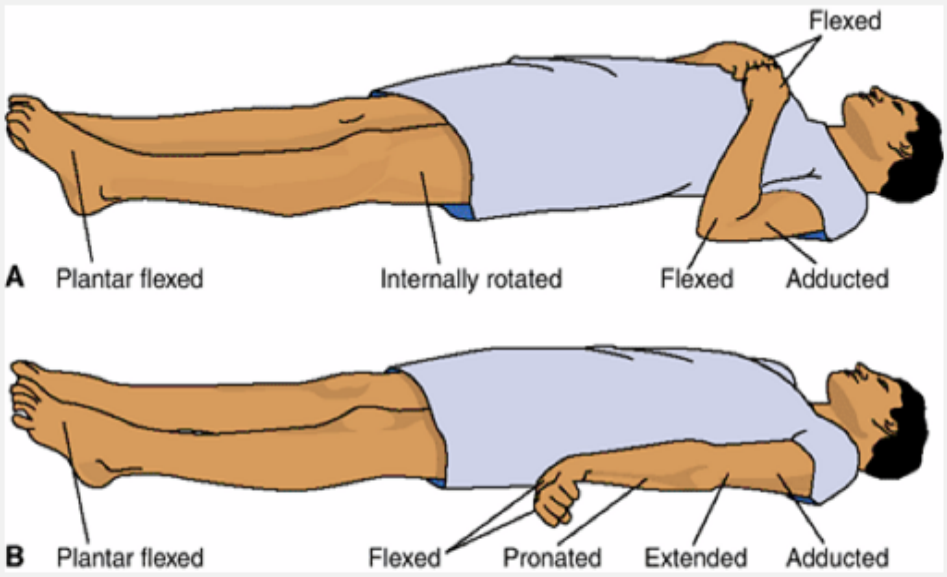


FIGURE 61-1. Abnormal posture response to stimuli. (**A**) Decorticate posturing, involving adduction and flexion of the upper extremities, internal rotation of the lower extremities, and plantar flexion of the feet. (**B**) Decerebrate posturing, involving extension and outward rotation of upper extremities and plantar flexion of the feet.

Examination	Clinical Assessment	Clinical Significance
Level of responsiveness or consciousness	Eye opening; verbal and motor responses; pupils (size, equality, reaction to light)	Obeying commands is a favorable response and demonstrates a return to consciousness.
Pattern of respiration	Respiratory pattern	Disturbances of respiratory center of brain may result in various respiratory patterns.
	Cheyne-Stokes respiration	Suggests lesions deep in both hemispheres; area of basal ganglia and upper brain stem
	Hyperventilation	Suggests onset of metabolic problem or brain stem damage
	Ataxic respiration with irregularity in depth/rate	Ominous sign of damage to medullary center
Eyes		
Pupils (size, equality, reaction to light)	Equal, normally reactive pupils	Suggests that coma is toxic or metabolic in origin
	Equal or unequal diameter	Helps determine location of lesion
	Progressive dilation	Indicates increasing intracranial pressure
	Fixed dilated pupils	Indicates injury at level of midbrain
Eye movements	Normally, eyes should move from side to side.	Functional and structural integrity of brain stem is assessed by inspection of extraocular movements; usually absent in deep coma.
Corneal reflex	When cornea is touched with a wisp of clean cotton, blink response is normal.	Tests cranial nerves V and VII; helps determine location of lesion if unilateral; absent in deep coma
		
Facial symmetry	Asymmetry (sagging, decrease in wrinkles)	Sign of paralysis
Swallowing reflex	Drooling versus spontaneous swallowing	Absent in coma
		Paralysis of cranial nerves X and XII
Neck	Stiff neck	Subarachnoid hemorrhage, meningitis
	Absence of spontaneous neck movement	Fracture or dislocation of cervical spine
Response of extremity to noxious stimuli	Firm pressure on a joint of the upper and lower extremity	Asymmetric response in paralysis
	Observe spontaneous movements.	Absent in deep coma
Deep tendon reflexes	Tap patellar and biceps tendons.	Brisk response may have localizing value
		Asymmetric response in paralysis
		Absent in deep coma
Pathologic reflexes	Firm pressure with blunt object on sole of foot, moving along lateral margin and crossing to the ball of foot	Flexion of the toes, especially the great toe, is normal except in newborn
		Dorsiflexion of toes (especially great toe) indicates contralateral pathology of corticospinal tract (Babinski reflex)
		Helps determine location of lesion in brain
Abnormal posture	Observation for posturing (spontaneous or in response to noxious stimuli)	Deep extensive brain lesion
	Flaccidity with absence of motor response	Seen with cerebral hemisphere pathology and in metabolic depression of brain function
	Decorticate posture (flexion and internal rotation of forearms and hands)	Decerebrate posturing indicates deeper and more severe dysfunction than does decorticate posturing; implies brain pathology; poor prognostic sign.
	Decerebrate posture (extension and external rotation)	

TABLE 61-1 Nursing Assessment of the Unconscious Patient

Because the unconscious patient's protective reflexes are impaired, the quality of nursing care provided literally may mean the difference between life and death. The nurse must assume responsibility for the patient until the basic reflexes (coughing, blinking, and swallowing) return and the patient becomes conscious and oriented. Therefore, the major nursing goal is to compensate for the absence of these protective reflexes.

Nursing Interventions

Maintaining the Airway

The most important consideration in managing the patient with altered LOC is to establish an adequate airway and ensure ventilation. Obstruction of the airway is a risk because the epiglottis and tongue may relax, occluding the oropharynx, or the patient may aspirate vomitus or nasopharyngeal secretions.

The accumulation of secretions in the pharynx presents a serious problem. Because the patient cannot swallow and lacks pharyngeal reflexes, these secretions must be removed to eliminate the danger of aspiration. Elevating the head of the bed to 30 degrees helps prevent aspiration. Positioning the patient in a lateral or semiprone position also helps, because it permits the jaw and tongue to fall forward, thus promoting drainage of secretions.

Positioning alone is not always adequate, however. Suctioning and oral hygiene may be required. Suctioning is performed to remove secretions from the posterior pharynx and upper trachea. Before and after suctioning, the patient is hyperoxygenated and adequately ventilated to prevent hypoxia (Hickey, 2003). In addition to these interventions, chest physiotherapy and postural drainage may be initiated to promote pulmonary hygiene, unless contraindicated by the patient's underlying condition. The chest should be auscultated at least every 8 hours to detect adventitious breath sounds or absence of breath sounds.

Despite these measures, or because of the severity of impairment, the patient with altered LOC often requires intubation and mechanical ventilation. Nursing actions for the mechanically ventilated patient include maintaining the patency of the endotracheal tube or tracheostomy, providing frequent oral care, monitoring arterial blood gas measurements, and maintaining ventilator settings (see Chapter 25).

Protecting the Patient

For the protection of the patient, side rails are padded. Two rails are kept in the raised position during the day and three at night; however, raising all four side rails is considered a restraint by the Joint Commission on Accreditation of Healthcare Organizations. Care should be taken to prevent injury from invasive lines and equipment, and other potential sources of injury should be identified, such as restraints, tight dressings, environmental irritants, damp bedding or dressings, and tubes and drains.

Protection also includes protecting the patient's dignity during altered LOC. Simple measures such as providing privacy and speaking to the patient during nursing care activities preserve the patient's dignity. Not speaking negatively about the patient's condition or prognosis is also important, because patients in a light coma may be able to hear. The comatose patient has an increased need for advocacy, and the nurse is responsible for seeing that these advocacy needs are met (Hickey, 2003).

Maintaining Fluid Balance and Managing Nutritional Needs
Hydration status is assessed by examining tissue turgor and mucous membranes, assessing intake and output trends, and analyzing laboratory data. Fluid needs are met initially by administering the required IV fluids. However, IV solutions (and blood component therapy) for patients with intracranial conditions must be administered slowly. If they are administered

too rapidly, they can increase ICP. The quantity of fluids administered may be restricted to minimize the possibility of cerebral edema.
If the patient does not recover quickly and sufficiently enough to take adequate fluids and calories by mouth, a feeding or gastrostomy tube will be inserted for the administration of fluids and enteral feedings (Dudek, 2006; Worthington, 2004).

Providing Mouth Care
The mouth is inspected for dryness, inflammation, and crusting. The unconscious patient requires conscientious oral care, because there is a risk of parotitis if the mouth is not kept scrupulously clean. The mouth is cleansed and rinsed carefully to remove secretions and crusts and to keep the mucous membranes moist. A thin coating of petrolatum on the lips prevents drying, cracking, and encrustations. If the patient has an endotracheal tube, the tube should be moved to the opposite side of the mouth daily to prevent ulceration of the mouth and lips.

Maintaining Skin and Joint Integrity
Preventing skin breakdown requires continuing nursing assessment and intervention. Special attention is given to unconscious patients, because they cannot respond to external stimuli. Assessment includes a regular schedule of turning to avoid pressure, which can cause breakdown and necrosis of the skin. Turning also provides kinesthetic (sensation of movement), proprioceptive (awareness of position), and vestibular (equilibrium) stimulation. After turning, the patient is carefully repositioned to prevent ischemic necrosis over pressure areas. Dragging or pulling the patient up in bed must be avoided, because this creates a shearing force and friction on the skin surface (see Chapter 11).
Maintaining correct body position is important; equally important is passive exercise of the extremities to prevent contractures. The use of splints or foam boots aids in the prevention of foot drop and eliminates the pressure of bedding on the toes. The use of trochanter rolls to support the hip joints keeps the legs in proper alignment. The arms are in abduction, the fingers lightly flexed, and the hands in slight supination. The heels of the feet are assessed for pressure areas. Specialty beds, such as fluidized or low-air-loss beds, may be used to decrease pressure on bony prominences (Hickey, 2003).

Preserving Corneal Integrity
Some unconscious patients have their eyes open and have inadequate or absent corneal reflexes. The cornea may become irritated, dried out, or scratched, leading to ulceration. The eyes may be cleansed with cotton balls moistened with sterile normal saline to remove debris and discharge (Hickey, 2003). If artificial tears are prescribed, they may be instilled every 2 hours. Periorbital edema (swelling around the eyes) often occurs after cranial surgery. Cold compresses may be prescribed, and care must be exerted to avoid contact with the cornea. Eye patches should be used cautiously because of the potential for corneal abrasion from contact with the patch.

Maintaining Body Temperature

High fever in the unconscious patient may be caused by infection of the respiratory or urinary tract, drug reactions, or damage to the hypothalamic temperature-regulating center. A slight elevation of temperature may be caused by dehydration. The environment can be adjusted, depending on the patient's condition, to promote a normal body temperature. If body temperature is elevated, a minimum amount of bedding—a sheet, small drape, or towel—is used. The room may be cooled to 18.3°C (65°F). However, if the patient is elderly and does not have an elevated temperature, a warmer environment is needed.

Because of damage to the temperature center in the brain or severe intracranial infection, unconscious patients often develop very high temperatures. Such temperature elevations must be controlled, because the increased metabolic demands of the brain can exceed cerebral circulation and oxygenation, resulting in cerebral deterioration (Diringer, 2004; Hickey, 2003). Persistent hyperthermia with no identified clinical source of infection indicates brain stem damage and a poor prognosis.

Strategies for reducing fever include:

- Removing all bedding over the patient (with the possible exception of a light sheet or small drape)
- Administering acetaminophen as prescribed
- Giving cool sponge baths and allowing an electric fan to blow over the patient to increase surface cooling
- Using a hypothermia blanket
- Frequent temperature monitoring is indicated to assess the patient's response to the therapy and to prevent an excessive decrease in temperature and shivering.

Preventing Urinary Retention

The patient with an altered LOC is often incontinent or has urinary retention. The bladder is palpated or scanned at intervals to determine whether urinary retention is present, because a full bladder may be an overlooked cause of overflow incontinence. A portable bladder ultrasound instrument is a useful tool in bladder management and retraining programs (O'Farrell, Vandervoort, Bisnaire, et al., 2001).

If the patient is not voiding, an indwelling urinary catheter is inserted and connected to a closed drainage system. A catheter may also be inserted during the acute phase of illness to monitor urinary output. Because catheters are a major factor in causing urinary tract infection, the patient is observed for fever and cloudy urine. The area around the urethral orifice is inspected for drainage. The urinary catheter is usually removed if the patient has a stable cardiovascular system and if no diuresis, sepsis, or voiding dysfunction existed before the onset of coma. Although many unconscious patients urinate spontaneously after catheter removal, the bladder should be palpated or scanned with a portable ultrasound device periodically for urinary retention (O'Farrell et al., 2001). An intermittent catheterization program may be initiated to ensure complete emptying of the bladder at intervals, if indicated.

An external catheter (condom catheter) for the male patient and absorbent pads for the female patient can be used for unconscious patients who can urinate spontaneously although involuntarily. As soon as consciousness is regained, a bladder-training program is initiated (Hickey, 2003). The incontinent patient is monitored frequently for skin irritation and skin breakdown. Appropriate skin care is implemented to prevent these complications.

Promoting Bowel Function

The abdomen is assessed for distention by listening for bowel sounds and measuring the girth of the abdomen with a tape measure. There is a risk for diarrhea from infection, antibiotics, and hyperosmolar fluids. Frequent loose stools may also occur with fecal impaction. Commercial fecal collection bags are available for patients with fecal incontinence.

Immobility and lack of dietary fiber can cause constipation. The nurse monitors the number and consistency of bowel movements and performs a rectal examination for signs of fecal impaction. Stool softeners may be prescribed and can be administered with tube feedings. To facilitate bowel emptying, a glycerin suppository may be indicated. The patient may require an enema every other day to empty the lower colon.

Providing Sensory Stimulation

Once increased ICP is not a problem, sensory stimulation can help overcome the profound sensory deprivation of the unconscious patient. Efforts are made to restore the sense of daily rhythm by maintaining usual day and night patterns for activity and sleep. The nurse touches and talks to the patient and encourages family members and friends to do so. Communication is extremely important and includes touching the patient and spending enough time with the patient to become sensitive to his or her needs. It is also important to avoid making any negative comments about the patient's status or prognosis in the patient's presence.

The nurse orients the patient to time and place at least once every 8 hours. Sounds from the patient's usual environment may be introduced using a tape recorder. Family members can read to the patient from a favorite book and may suggest radio and television programs that the patient previously enjoyed as a means of enriching the environment and providing familiar input (Hickey, 2003).

When arousing from coma, many patients experience a period of agitation, indicating that they are becoming more aware of their surroundings but still cannot react or communicate in an appropriate fashion. Although this is disturbing for many family members, it is actually a positive clinical sign. At this time, it is necessary to minimize stimulation by limiting background noises, having only one person speak to the patient at a time, giving the patient a longer period of time to respond, and allowing for frequent rest or quiet times. After the patient has regained consciousness, videotaped family or social events may assist the patient in recognizing family and friends and allow him or her to experience missed events.

Various programs of structured sensory stimulation for patients with brain injury have been developed to improve outcomes. Although these are controversial programs with inconsistent results, some research supports the concept of providing structured stimulation (Davis & Gimenez, 2003).

Meeting the Family's Needs

The family of the patient with altered LOC may be thrown into a sudden state of crisis and go through the process of severe anxiety, denial, anger, remorse, grief, and reconciliation. Depending on the disorder that caused the altered LOC and the extent of the patient's recovery, the family may be unprepared for the changes in the cognitive and physical status of their loved one. If the patient has significant residual deficits, the family may require considerable time, assistance, and support to come to terms with these changes. To help family members mobilize resources and coping skills, the nurse reinforces and clarifies information about the patient's condition, permits the family to be involved in care, and listens to and encourages ventilation of feelings and concerns while supporting decision making about posthospitalization management and

placement (Bond, Draeger, Mandleco, et al., 2003). Families may benefit from participation in support groups offered through the hospital, rehabilitation facility, or community organizations.

In some circumstances, the family may need to face the death of their loved one. The patient with a neurologic disorder is often pronounced brain dead before the heart stops beating. The term brain death describes irreversible loss of all functions of the entire brain, including the brain stem (Booth, Boone, Tomlinson, et al., 2004). The term may be misleading to the family because, although brain function has ceased, the patient appears to be alive, with the heart rate and blood pressure sustained by vasoactive medications and breathing continued by mechanical ventilation. When discussing a patient who is brain dead with family members, it is important to provide accurate, timely, understandable, and consistent information (Henneman & Karras, 2004). End-of-life care is discussed in Chapter 17.

Monitoring and Managing Potential Complications

Pneumonia, aspiration, and respiratory failure are potential complications in any patient who has a depressed LOC and who cannot protect the airway or turn, cough, and take deep breaths. The longer the period of unconsciousness, the greater the risk for pulmonary complications.

Vital signs and respiratory function are monitored closely to detect any signs of respiratory failure or distress. Total blood count and arterial blood gas measurements are assessed to determine whether there are adequate red blood cells to carry oxygen and whether ventilation is effective. Chest physiotherapy and suctioning are initiated to prevent respiratory complications such as pneumonia. If pneumonia develops, cultures are obtained to identify the organism so that appropriate antibiotics can be administered.

The patient with altered LOC is monitored closely for evidence of impaired skin integrity, and strategies to prevent skin breakdown and pressure ulcers are continued through all phases of care, including hospitalization, rehabilitation, and home care. Factors that contribute to impaired skin integrity (eg, incontinence, inadequate dietary intake, pressure on bony prominences, edema) are addressed. If pressure ulcers develop, strategies to promote healing are undertaken. Care is taken to prevent bacterial contamination of pressure ulcers, which may lead to sepsis and septic shock. Assessment and management of pressure ulcers are discussed in Chapter 11.

The patient should also be monitored for signs and symptoms of deep vein thrombosis (DVT). Patients who develop DVT are at risk for pulmonary embolism. Prophylaxis such as subcutaneous heparin or low-molecular-weight heparin (Fragmin, Orgaran) should be prescribed if not contraindicated (Kurtoglu, Yanar, Bilsel, et al., 2004). Thigh-high elastic compression stockings or pneumatic compression devices should also be prescribed to reduce the risk for clot formation. The nurse observes for signs and symptoms of DVT.

Evaluation

Expected Patient Outcomes

Expected patient outcomes may include the following:

- Maintains clear airway and demonstrates appropriate breath sounds
- Experiences no injuries
- Attains or maintains adequate fluid balance
    - Has no clinical signs or symptoms of dehydration
    - Demonstrates normal range of serum electrolytes
    - Has no clinical signs or symptoms of overhydration

- Achieves healthy oral mucous membranes
- Maintains normal skin integrity
- Has no corneal irritation
- Attains or maintains thermoregulation
- Has no urinary retention
- Has no diarrhea or fecal impaction
- Receives appropriate sensory stimulation
- Family members cope with crisis
    - Verbalize fears and concerns
    - Participate in patient's care and provide sensory stimulation by talking and touching
- Patient is free of complications
    - Has arterial blood gas values or O_2 saturation levels within normal range
    - Displays no signs or symptoms of pneumonia
    - Exhibits intact skin over pressure areas
    - Does not develop DVT or pulmonary embolism (PE)

Nursing Process
The Patient with Increased Intracranial Pressure

Assessment
Initial assessment of the patient with increased ICP includes obtaining a history of events leading to the present illness and the pertinent past medical history. It is usually necessary to obtain this information from family or friends. The neurologic examination should be as complete as the patient's condition allows. It includes an evaluation of mental status, LOC, cranial nerve function, cerebellar function (balance and coordination), reflexes, and motor and sensory function. Because the patient is critically ill, ongoing assessment is more focused, including pupil checks, assessment of selected cranial nerves, frequent measurements of vital signs and ICP, and use of the Glasgow Coma Scale. Assessment of the patient with altered LOC is summarized in Table 61-1.

Diagnosis
Nursing Diagnoses
Based on the assessment data, the major nursing diagnoses for patients with increased ICP include the following:

- Ineffective airway clearance related to diminished protective reflexes (cough, gag)
- Ineffective breathing patterns related to neurologic dysfunction (brain stem compression, structural displacement)
- Ineffective cerebral tissue perfusion related to the effects of increased ICP
- Deficient fluid volume related to fluid restriction
- Risk for infection related to ICP monitoring system (fiberoptic or intraventricular catheter)

Other relevant nursing diagnoses are included in the section on altered LOC.

Collaborative Problems/Potential Complications
Based on the assessment data, potential complications include:

- Brain stem herniation
- Diabetes insipidus
- SIADH

Planning and Goals
The goals for the patient include maintenance of a patent airway, normalization of respiration, adequate cerebral tissue perfusion through reduction in ICP, restoration of fluid balance, absence of infection, and absence of complications.

Nursing Interventions

Maintaining a Patent Airway
The patency of the airway is assessed. Secretions that are obstructing the airway must be suctioned with care, because transient elevations of ICP occur with suctioning (Hickey, 2003). The patient is hyperoxygenated before and after suctioning to maintain adequate oxygenation. Hypoxia caused by poor oxygenation leads to cerebral ischemia and edema. Coughing is discouraged, because coughing and straining increase ICP. The lung fields are auscultated at least every 8 hours to determine the presence of adventitious sounds or any areas of congestion. Elevating the head of the bed may aid in clearing secretions and improve venous drainage of the brain.

Achieving an Adequate Breathing Pattern
The patient must be monitored constantly for respiratory irregularities. Increased pressure on the frontal lobes or deep midline structures may result in Cheyne-Stokes respirations, whereas pressure in the midbrain can cause hyperventilation. If the lower portion of the brain stem (the pons and medulla) is involved, respirations become irregular and eventually cease.
If hyperventilation therapy is deemed appropriate to reduce ICP (by causing cerebral vasoconstriction and a decrease in cerebral blood volume), the nurse collaborates with the respiratory therapist in monitoring the $PaCO_2$, which is usually maintained at 30 to 35 mm Hg (Hickey, 2003).
A neurologic observation record (Fig. 61-6) is maintained, and all observations are made in relation to the patient's baseline condition. Repeated assessments of the patient are made (sometimes minute by minute) so that improvement or deterioration may be noted immediately. If the patient's condition deteriorates, preparations are made for surgical intervention.

Optimizing Cerebral Tissue Perfusion
In addition to ongoing nursing assessment, strategies are initiated to reduce factors contributing to the elevation of ICP (Table 61-2).
Proper positioning helps to reduce ICP. The head is kept in a neutral (midline) position, maintained with the use of a cervical collar if necessary, to promote venous drainage. Elevation of the head is maintained at 0 to 60 degrees to aid in venous drainage unless otherwise prescribed (Fan, 2004). Extreme rotation of the neck and flexion of the neck are avoided, because compression or distortion of the jugular veins increases ICP. Extreme hip flexion is also avoided, because this position causes an increase in intra-abdominal and intrathoracic pressures, which can produce an increase in ICP. Relatively minor changes in position can significantly affect ICP (Fan, 2004). If monitoring reveals that turning the patient raises ICP, rotating beds, turning sheets, and holding the patient's head during turning may minimize the stimuli that increase ICP.

The Valsalva maneuver, which can be produced by straining at defecation or even moving in bed, raises ICP and is to be avoided. Stool softeners may be prescribed. If the patient is alert and able to eat, a diet high in fiber may be indicated. Abdominal distention, which increases intra-abdominal and intrathoracic pressure and ICP, should be noted. Enemas and cathartics are avoided if possible. When moving or being turned in bed, the patient can be instructed to exhale (which opens the glottis) to avoid the Valsalva maneuver.

Mechanical ventilation presents unique problems for the patient with increased ICP. Before suctioning, the patient should be preoxygenated and briefly hyperventilated using 100% oxygen on the ventilator (Hickey, 2003). Suctioning should not last longer than 15 seconds. High levels of positive end-expiratory pressure (PEEP) are avoided, because they may decrease venous return to the heart and decrease venous drainage from the brain through increased intrathoracic pressure (Hickey, 2003).

Activities that increase ICP, as indicated by changes in waveforms, should be avoided if possible. Spacing of nursing interventions may prevent transient increases in ICP. During nursing interventions, the ICP should not increase more than 25 mm Hg, and it should return to baseline levels within 5 minutes. Patients with increased ICP should not demonstrate a significant increase in pressure or change in the ICP waveform. Patients with the potential for a significant increase in ICP may need sedation and a paralytic agent before initiation of nursing activities (Hickey, 2003).

Emotional stress and frequent arousal from sleep are avoided. A calm atmosphere is maintained. Environmental stimuli (eg, noise, conversation) should be minimal.

Maintaining Negative Fluid Balance

The administration of various osmotic and loop diuretics is part of the treatment protocol to reduce ICP. Corticosteroids may be used to reduce cerebral edema (except when it results from trauma), and fluids may be restricted (Brain Trauma Foundation, 2003). All of these treatment modalities promote dehydration.

Skin turgor, mucous membranes, urine output, and serum and urine osmolality are monitored to assess fluid status. If IV fluids are prescribed, the nurse ensures that they are administered at a slow to moderate rate with an IV infusion pump, to prevent too-rapid administration and avoid overhydration. For the patient receiving mannitol, the nurse observes for the possible development of heart failure and pulmonary edema, because the intent of treatment is to promote a shift of fluid from the intracellular compartment to the intravascular system, thus controlling cerebral edema.

For patients undergoing dehydrating procedures, vital signs, including blood pressure, must be monitored to assess fluid volume status. An indwelling urinary catheter is inserted to permit assessment of renal function and fluid status. During the acute phase, urine output is monitored hourly. An output greater than 250 mL/hour for 2 consecutive hours may indicate the onset of diabetes insipidus (Suarez, 2004). These patients also need careful oral hygiene, because mouth dryness occurs with dehydration. Frequently rinsing the mouth with nondrying solutions, lubricating the lips, and removing encrustations relieve dryness and promote comfort.

Preventing Infection

Risk for infection is greatest when ICP is monitored with an intraventricular catheter, and the risk of infection increases with the duration of the monitoring (Park, Garton, Kocan, et al., 2004). Most health care facilities have written protocols for managing these systems and maintaining their sterility; strict adherence to the protocols is essential.

Aseptic technique must be used when managing the system and changing the ventricular drainage bag. The drainage system is also checked for loose connections, because they can cause leakage and contamination of the CSF as well as inaccurate readings of ICP. The nurse observes the character of the CSF drainage and reports observations of increasing cloudiness or blood. The patient is monitored for signs and symptoms of meningitis: fever, chills, nuchal (neck) rigidity, and increasing or persistent headache. (See Chapter 64 for a discussion of meningitis.)

Monitoring and Managing Potential Complications

The primary complication of increased ICP is brain herniation resulting in death (see Fig. 61-2). Nursing management focuses on detecting early signs of increasing ICP, because medical interventions are usually ineffective once later signs develop. Frequent neurologic assessments and documentation and analysis of trends will reveal the subtle changes that may indicate increasing ICP.

Detecting Early Indications of Increasing Intracranial Pressure

The nurse assesses for and immediately reports any of the following early signs or symptoms of increasing ICP:

- Disorientation, restlessness, increased respiratory effort, purposeless movements, and mental confusion; these are early clinical indications of increasing ICP because the brain cells responsible for cognition are extremely sensitive to decreased oxygenation
- Pupillary changes and impaired extraocular movements; these occur as the increasing pressure displaces the brain against the oculomotor and optic nerves (cranial nerves II, III, IV, and VI), which arise from the midbrain and brain stem (see Chapter 60)
- Weakness in one extremity or on one side of the body; this occurs as increasing ICP compresses the pyramidal tracts
- Headache that is constant, increasing in intensity, and aggravated by movement or straining; this occurs as increasing ICP causes pressure and stretching of venous and arterial vessels in the base of the brain

Detecting Later Indications of Increasing ICP

As ICP increases, the patient's condition worsens, as manifested by the following signs and symptoms:

- The LOC continues to deteriorate until the patient is comatose.
- The pulse rate and respiratory rate decrease or become erratic, and the blood pressure and temperature increase. The pulse pressure (the difference between the systolic and the diastolic pressures) widens. The pulse fluctuates rapidly, varying from bradycardia to tachycardia.
- Altered respiratory patterns develop, including Cheyne-Stokes breathing (rhythmic waxing and waning of rate and depth of respirations alternating with brief periods of apnea) and ataxic breathing (irregular breathing with a random sequence of deep and shallow breaths).
- Projectile vomiting may occur with increased pressure on the reflex center in the medulla.
- Hemiplegia or decorticate or decerebrate posturing may develop as pressure on the brain stem increases; bilateral flaccidity occurs before death.

- Loss of brain stem reflexes, including pupillary, corneal, gag, and swallowing reflexes, is an ominous sign of approaching death.

Monitoring Intracranial Pressure

Because clinical assessment is not always a reliable guide in recognizing increased ICP, especially in comatose patients, monitoring of ICP and cerebral oxygenation is an essential part of management (Hickey, 2003). ICP is monitored closely for continuous elevation or significant increase over baseline. The trend of ICP measurements over time is an important indication of the patient's underlying status. Vital signs are assessed when an increase in ICP is noted.

Strict aseptic technique is used when handling any part of the monitoring system. The insertion site is inspected for signs of infection. Temperature, pulse, and respirations are closely monitored for systemic signs of infection. All connections and stopcocks are checked for leaks, because even small leaks can distort pressure readings and lead to infection.

When ICP is monitored with a fluid system, the transducer is calibrated at a particular reference point, usually 2.5 cm (1 inch) above the ear with the patient in the supine position; this point corresponds to the level of the foramen of Monro (Fig. 61-7). CSF pressure readings depend on the patient's position. For subsequent pressure readings, the head should be in the same position relative to the transducer. Fiberoptic catheters are calibrated before insertion and do not require further referencing; they do not require the head of the bed to be at a specific position to obtain an accurate reading.

Whenever technology is associated with patient management, the nurse must be certain that the technological equipment is functioning properly. The most important concern, however, must be the patient who is attached to the equipment. The patient and family must be informed about the technology and the goals of its use. The patient's response is monitored, and appropriate comfort measures are implemented to ensure that the patient's stress is minimized.

ICP measurement is only one parameter; repeated neurologic checks and clinical examinations remain important measures. Astute observation, comparison of findings with previous observations, and interventions can assist in preventing life-threatening ICP elevations.

Monitoring for Secondary Complications

The nurse also assesses for complications of increased ICP, including diabetes insipidus and SIADH (see Chapters 14 and 42). Urine output should be monitored closely. Diabetes insipidus requires fluid and electrolyte replacement, along with the administration of vasopressin, to replace and slow the urine output. Serum electrolyte levels are monitored for imbalances. SIADH requires fluid restriction and monitoring of serum electrolyte levels.

Evaluation

Expected Patient Outcomes

Expected patient outcomes may include the following:

- Maintains patent airway
- Attains optimal breathing pattern
    - Breathes in a regular pattern
    - Attains or maintains arterial blood gas values within acceptable range
- Demonstrates optimal cerebral tissue perfusion
    - Increasingly oriented to time, place, and person

    - Follows verbal commands; answers questions correctly
- Attains desired fluid balance
    - Maintains fluid restriction
    - Demonstrates serum and urine osmolality values within acceptable range
- Has no signs or symptoms of infection
    - Has no fever
    - Shows no signs of infection at arterial, IV, and urinary catheter sites
    - Has no redness, swelling, or purulent drainage from invasive intracranial monitoring device
- Absence of complications
    - Has ICP values that remain within normal limits
    - Demonstrates urine output and serum electrolyte levels within acceptable limits

Nursing Process
The Patient Undergoing Intracranial Surgery

Assessment

After surgery, the frequency of postoperative monitoring is based on the patient's clinical status. Assessing respiratory function is essential, because even a small degree of hypoxia can increase cerebral ischemia. The respiratory rate and pattern are monitored, and arterial blood gas values are assessed frequently. Fluctuations in vital signs are carefully monitored and documented, because they may indicate increased ICP. The patient's temperature is measured to assess for hyperthermia secondary to infection or damage to the hypothalamus. Neurologic checks are made frequently to detect increased ICP resulting from cerebral edema or bleeding. A change in LOC or response to stimuli may be the first sign of increasing ICP.

The surgical dressing is inspected for evidence of bleeding and CSF drainage. The nurse must be alert to the development of complications; all assessments are carried out with these problems in mind. Chart 61-2 provides an overview of the nursing management of the patient who has undergone intracranial surgery. Seizures are a potential complication, and any seizure activity is carefully recorded and reported. Restlessness may occur as the patient becomes more responsive, or restlessness may be caused by pain, confusion, hypoxia, or other stimuli.

Nursing Diagnoses

Based on the assessment data, the patient's major nursing diagnoses after intracranial surgery may include the following:

- Ineffective cerebral tissue perfusion related to cerebral edema
- Risk for imbalanced body temperature related to damage to the hypothalamus, dehydration, and infection
- Potential for impaired gas exchange related to hypoventilation, aspiration, and immobility
- Disturbed sensory perception related to periorbital edema, head dressing, endotracheal tube, and effects of ICP
- Body image disturbance related to change in appearance or physical disabilities

Other nursing diagnoses may include impaired communication (aphasia) related to insult to brain tissue and high risk for impaired skin integrity related to immobility, pressure, and incontinence; impaired physical mobility related to a neurologic deficit secondary to the neurosurgical procedure or to the underlying disorder may also occur.
Collaborative Problems/Potential Complications
Potential complications include the following:

- Increased ICP
- Bleeding and hypovolemic shock
- Fluid and electrolyte disturbances
- Infection
- Seizures

Planning and Goals
The major goals for the patient include neurologic homeostasis to improve cerebral tissue perfusion, adequate thermoregulation, normal ventilation and gas exchange, ability to cope with sensory deprivation, adaptation to changes in body image, and absence of complications.
Nursing Interventions
Maintaining Cerebral Tissue Perfusion
Attention to the patient's respiratory status is essential, because even slight decreases in the oxygen level (hypoxia) or slight increases in the carbon dioxide level (hypercarbia) can affect cerebral perfusion, the clinical course, and the patient's outcome. The endotracheal tube is left in place until the patient shows signs of awakening and has adequate spontaneous ventilation, as evaluated clinically and by arterial blood gas analysis. Secondary brain damage can result from impaired cerebral oxygenation. Some degree of cerebral edema occurs after brain surgery; it tends to peak 24 to 36 hours after surgery, producing decreased responsiveness on the second postoperative day. The control of cerebral edema was discussed earlier. Nursing strategies used to control factors that may raise ICP were presented in the previous Nursing Process section on increased ICP.

Intraventricular drainage is carefully monitored, using strict asepsis when any part of the system is handled.

Overview of Nursing Management for the Patient after Intracranial Surgery
Postoperative Interventions

Nursing Diagnosis: Risk for ineffective breathing pattern related to postoperative cerebral edema
Goal: Achievement of adequate respiratory function

- Establish proper respiratory exchange to eliminate systemic hypercapnia and hypoxia, which increase cerebral edema.
    - Unless contraindicated, place the patient in a lateral or a semiprone position to facilitate respiratory gas exchange until consciousness returns.
    - Suction trachea and pharynx cautiously to remove secretions; suctioning can raise ICP.

    - Maintain patient on controlled ventilation if prescribed to maintain normal ventilatory status; monitor arterial blood gas results to determine respiratory status.
    - Elevate the head of the bed as prescribed.
    - Administer nothing by mouth until active coughing and swallowing reflexes are demonstrated, to prevent aspiration.

Nursing Diagnosis: Risk for imbalanced fluid volume related to intracranial pressure or diuretics
Goal: Attainment of fluid and electrolyte balance

- Monitor for polyuria, especially during first postoperative week; diabetes insipidus may develop in patients with lesions around the pituitary or hypothalamus.
    - Monitor urinary specific gravity.
    - Monitor serum and urinary electrolyte levels.
- Evaluate patient's electrolyte status; patients may retain water and sodium.
    - Early postoperative weight gain indicates fluid retention; a greater-than-estimated weight loss indicates negative water balance.
    - Loss of sodium and chloride can produce weakness, lethargy, and coma.
    - Low potassium levels can cause confusion, decreased level of responsiveness, and cardiac dysrhythmias.
- Weigh patient daily; keep intake and output record.
- Administer prescribed IV fluids cautiously—rate and composition depend on fluid deficit, urine output, and blood loss. Fluid intake and fluid losses should remain relatively equal.

Nursing Diagnosis: Disturbed sensory perception (visual/auditory) related to periorbital edema and head dressings
Goal: Compensate for sensory deprivation; prevent injury

- Perform supportive measures until the patient can care for self.
    - Change position as indicated; position changes can increase ICP.
    - Administer prescribed analgesics (eg, codeine) that do not mask the level of responsiveness.
- Use measures prescribed to relieve signs of periocular edema.
    - Lubricate eyelids and around eyes with petrolatum.
    - Apply light, cold compresses over eyes at specified intervals.
    - Observe for signs of keratitis if cornea has no sensation.
- Put extremities through range-of-motion exercises.
- Evaluate and support patient during episodes of restlessness.
    - Evaluate for airway obstruction, distended bladder, meningeal irritation from bloody CSF.
    - Pad patient's hands and bed rails to prevent injury.
- Reinforce blood-stained dressings with sterile dressing; blood-soaked dressings act as a culture medium for bacteria.
- Orient patient frequently to time, place, and person.

Monitor and Manage Complications

- Cerebral edema

- Assess patient's level of responsiveness/consciousness; decreased level of consciousness may be the first sign of increased ICP.
    - Eye opening (spontaneous, to sound, to pain); pupillary reactions to light
    - Response to commands
    - Assessment of spinal motor reflexes (pinch Achilles tendon, arm, or other body site)
    - Observation of patient's spontaneous activity
- Maintain a neurologic flow sheet to assess and document neurologic status, fluid administration, laboratory data, medications, and treatments.
- Evaluate for signs and symptoms of increasing ICP, which can lead to ischemia and further impairment of brain function.
    - Assess patient minute by minute, hour by hour, for
        - Diminished response to stimuli
        - Fluctuations of vital signs
        - Restlessness
        - Weakness and paralysis of extremities
        - Increasing headache
        - Changes or disturbances of vision; pupillary changes
    - Modify nursing management to prevent further increases in ICP.
- Control postoperative cerebral edema as prescribed.
    - Administer corticosteroids and osmotic diuretics as prescribed to reduce brain swelling.
    - Monitor fluid intake; avoid overhydration.
    - Maintain a normal temperature. Temperature control may be impaired in certain neurologic states, and fever increases the metabolic demands of the brain.
        - Monitor rectal temperature at specified intervals. Assess temperature of extremities, which may be cold and dry due to impaired heat-losing mechanisms (vasodilation and sweating).
        - Employ measures as prescribed to reduce fever: ice bags to axillae and groin; hypothermia blanket. Use ECG monitoring to detect dysrhythmias during hypothermia procedures.
    - Employ hyperventilation when prescribed and indicated (results in respiratory alkalosis, which causes cerebral vasoconstriction and reduces intracranial pressure).
    - Elevate head of bed to reduce ICP and facilitate respirations.
    - Avoid excessive stimuli.
    - Use ICP monitoring if patient is at risk for intracranial hypertension.
- Intracranial hemorrhage
    - Postoperative bleeding may be intraventricular, intracerebellar, subdural, or extradural.
    - Observe for progressive impairment of state of consciousness and other signs of increasing ICP.
    - Prepare deteriorating patient for return to surgery for evacuation of hematoma.
- Seizures (greater risk with supratentorial operations)

    - Administer prescribed antiseizure agents; monitor antiseizure medication blood levels.
    - Observe for status epilepticus, which may occur after any intracranial surgery.
- Infections
    - Urinary tract infections
    - Pulmonary infections related to aspiration secondary to depressed level of responsiveness; may result in atelectasis and aspiration pneumonia
    - CNS infections (postoperative meningitis, CSF shunt infection)
    - Surgical site infections/septicemia
- Venous thrombosis
    - Assess for pain, redness, warmth, and edema.
    - Apply sequential compression device.
    - Administer anticoagulant therapy as prescribed.
- Leakage of CSF
    - Differentiate between CSF and mucus.
        - Collect fluid on Dextrostix; if CSF is present, the indicator will have a positive reaction, as CSF contains glucose.
        - Assess for moderate elevation of temperature and mild neck rigidity.
    - Caution patient against nose blowing or sniffing.
    - Elevate head of bed as prescribed.
    - Assist with insertion of lumbar CSF drainage system if inserted to reduce CSF pressure.
        - Ventricular catheters may be inserted in the patient undergoing surgery of the posterior fossa (ventriculostomy); the catheter is connected to a closed drainage system.
        - Administer antibiotics as prescribed.
    - Gastrointestinal ulceration (probably caused by stress response); monitor for signs and symptoms of hemorrhage, perforation, or both.

Evaluation
Expected patient outcomes

- Demonstrates normal breathing pattern
    - Absence of crackles
    - Demonstrates active swallowing and coughing reflexes
- Attains/maintains fluid balance
    - Takes fluids orally
    - Maintains weight within expected range
- Compensates for sensory deprivation
    - Makes needs known
    - Demonstrates improvement of vision
- Exhibits absence of complications
    - No evidence of increased ICP
    - Opens eyes on request
    - Obeys commands
    - Has appropriate motor responses
    - Shows increasing alertness
    - No evidence of rhinorrhea, otorrhea, or CSF leakage
    - Absence of fever

- No evidence of inflammation or infection at surgical site
- Absence of seizures
- No evidence of DVT or GI bleeding

Nursing Process
The Patient with Epilepsy

Assessment

The nurse elicits information about the patient's seizure history. The patient is asked about the factors or events that may precipitate the seizures. Alcohol intake is documented. The nurse determines whether the patient has an aura before an epileptic seizure, which may indicate the origin of the seizure (eg, seeing a flashing light may indicate that the seizure originated in the occipital lobe). Observation and assessment during and after a seizure assist in identifying the type of seizure and its management. The effects of epilepsy on the patient's lifestyle are assessed (Stafstrom & Rho, 2004). What limitations are imposed by the seizure disorder? Does the patient have a recreational program? Social contacts? Is the patient working, and is it a positive or stressful experience? What coping mechanisms are used?

Diagnosis

Nursing Diagnoses

Based on the assessment data, the patient's major nursing diagnoses may include the following:

- Risk for injury related to seizure activity
- Fear related to the possibility of seizures
- Ineffective individual coping related to stresses imposed by epilepsy
- Deficient knowledge related to epilepsy and its control

Collaborative Problems/Potential Complications

The major potential complications for patients with epilepsy are status epilepticus and medication side effects (toxicity).

Planning and Goals

The major goals for the patient may include prevention of injury, control of seizures, achievement of a satisfactory psychosocial adjustment, acquisition of knowledge and understanding about the condition, and absence of complications.

Nursing Interventions

Preventing Injury

Injury prevention for the patient with seizures is a priority. If the type of seizure the patient is having places him or her at risk for injury, the patient should be lowered gently to the floor (if not in bed), and any potentially harmful items nearby (eg, furniture) should be removed. The patient should never be restrained or forced into a position, nor should anyone attempt to insert anything into the patient's mouth once a seizure has begun. Patients for whom seizure precautions are instituted should have pads applied to the side rails while in bed.

Reducing Fear of Seizures

Fear that a seizure may occur unexpectedly can be reduced by the patient's adherence to the prescribed treatment regimen. Cooperation of the patient and family and their trust in the prescribed regimen are essential for control of seizures. The nurse emphasizes that the prescribed antiseizure medication must be taken on a continuing basis and that drug dependence or addiction does not occur. Periodic monitoring is necessary to ensure the adequacy of the treatment regimen, to prevent side effects, and to monitor for drug resistance (Rho et al., 2004).

In an effort to control seizures, factors that may precipitate them are identified, such as emotional disturbances, new environmental stressors, onset of menstruation in female patients, or fever (Rho et al., 2004). The patient is encouraged to follow a regular and moderate routine in lifestyle, diet (avoiding excessive stimulants), exercise, and rest (sleep deprivation may lower the seizure threshold). Moderate activity is therapeutic, but excessive exercise should be avoided. An additional dietary intervention, referred to as the ketogenic diet, may be helpful for control of seizures in some patients (Stafstrom & Rho, 2004). This high-protein, low-carbohydrate diet is most effective in children whose seizures have not been controlled with two antiepileptic medications, but it is sometimes used for adults who have had poor seizure control (Stafstrom & Rho, 2004). Photic stimulation (bright flickering lights, television viewing) may precipitate seizures; wearing dark glasses or covering one eye may be preventive. Tension states (anxiety, frustration) induce seizures in some patients. Classes in stress management may be of value. Because seizures are known to occur with alcohol intake, alcoholic beverages should be avoided.

Improving Coping Mechanisms

The social, psychological, and behavioral problems that frequently accompany epilepsy can be more of a disability than the actual seizures. Epilepsy may be accompanied by feelings of stigmatization, alienation, depression, and uncertainty. The patient must cope with the constant fear of a seizure and the psychological consequences (Rho et al., 2004). Children with epilepsy may be ostracized and excluded from school and peer activities. These problems are compounded during adolescence and add to the challenges of dating, not being able to drive, and feeling different from other people. Adults face these problems in addition to the burden of finding employment, concerns about relationships and childbearing, insurance problems, and legal barriers. Alcohol abuse may complicate matters. Family reactions may vary from outright rejection of the person with epilepsy to overprotection. As a result, many people with epilepsy have psychological and behavioral problems.

Counseling assists the patient and family to understand the condition and the limitations it imposes. Social and recreational opportunities are necessary for good mental health. Nurses can improve the quality of life for patients with epilepsy by teaching them and their families about symptoms and their management (Bader & Littlejohns, 2004).

Providing Patient and Family Education

Perhaps the most valuable facets of care contributed by the nurse to the person with epilepsy are education and efforts to modify the attitudes of the patient and family toward the disorder. The person who experiences seizures may consider every seizure a potential source of humiliation and shame. This may result in anxiety, depression, hostility, and secrecy on the part of the patient and family. Ongoing education and encouragement should be given to patients to enable them to overcome these reactions. The patient with epilepsy should carry an emergency medical identification card or

wear a medical information bracelet. The patient and family need to be educated about medications as well as care during a seizure.

Monitoring and Managing Potential Complications

Status epilepticus, the major complication, is described later in this chapter. Another complication is the toxicity of medications. The patient and family are instructed about side effects and are given specific guidelines to assess and report signs and symptoms that indicate medication overdose. Many antiseizure medications require careful monitoring for therapeutic levels. The patient should plan to have serum drug levels assessed at regular intervals. Many known drug interactions occur with antiseizure medications. A complete pharmacologic profile should be reviewed with the patient to avoid interactions that either potentiate or inhibit the effectiveness of the medications.

Promoting Home and Community-Based Care

Teaching Patients Self-Care

Thorough oral hygiene after each meal, gum massage, daily flossing, and regular dental care are essential to prevent or control gingival hyperplasia in patients receiving phenytoin (Dilantin). The patient is also instructed to inform all health care providers of the medication being taken, because of the possibility of drug interactions. An individualized comprehensive teaching plan is needed to assist the patient and family to adjust to this chronic disorder. Written patient education materials must be appropriate for the patient's reading level and must be provided in alternative formats if warranted (Murphy, Chesson, Berman et al., 2001). See Chart 61-5 for home care instruction points.

Continuing Care

Because epilepsy is a long-term disorder, the use of costly medications can create a significant financial burden. The Epilepsy Foundation of America (EFA) offers a mail-order program to provide medications at minimal cost and access to life insurance. This organization also serves as a referral source for special services for people with epilepsy.

For many, overcoming employment problems is a challenge. State vocational rehabilitation agencies can provide information about job training. The EFA has a training and placement service. If seizures are not well controlled, information about sheltered workshops or home employment programs may be obtained. Federal and state agencies and federal legislation may be of assistance to people with epilepsy who experience job discrimination. As a result of the Americans with Disabilities Act, the number of employers who knowingly hire people with epilepsy is increasing, but barriers to employment still exist (Bader & Littlejohns, 2004).

People who have uncontrollable seizures accompanied by psychological and social difficulties can be referred to comprehensive epilepsy centers where continuous audio-video and EEG monitoring, specialized treatment, and rehabilitation services are available (Bader & Littlejohns, 2004). Patients and their families need to be reminded of the importance of following the prescribed treatment regimen and of keeping follow-up appointments. In addition, they are reminded of the importance of participating in health promotion activities and recommended health screenings to promote a healthy lifestyle. Genetic and preconception counseling is advised.

Evaluation

Expected Patient Outcomes

Expected patient outcomes may include the following:

- Sustains no injury during seizure activity
    - Complies with treatment regimen and identifies the hazards of stopping the medication
    - Patient and family can identify appropriate care during seizure
- Indicates a decrease in fear
- Displays effective individual coping
- Exhibits knowledge and understanding of epilepsy
    - Identifies the side effects of medications
    - Avoids factors or situations that may precipitate seizures (eg, flickering lights, hyperventilation, alcohol)
    - Follows a healthy lifestyle by getting adequate sleep and eating meals at regular times to avoid hypoglycemia
- Absence of complications

Chapter 62

Management of Patients with Cerebrovascular Disorders

Cerebrovascular Disorders

• Functional abnormality of the CNS that occurs when the blood supply is disrupted

• Stroke is the primary cerebrovascular disorder and the third leading cause of death in the U.S.

• Stroke is the leading cause of serious long-term disability in the U.S.

Prevention

• Nonmodifiable risk factors

–Age (over 55), male gender, African-American race

• Modifiable risk factors

–Hypertension is the primary risk factor

–Cardiovascular disease

–Elevated cholesterol or elevated hematocrit

–Obesity

–Diabetes

–Oral contraceptive use

–Smoking and drug and alcohol abuse

Stroke

• "Brain attack"

• Sudden loss of function resulting from a disruption of the blood supply to a part of the brain

• **Types of stroke**

–Ischemic (80–85%)

–Hemorrhagic (15–20%)

Ischemic Stroke

• Disruption of the blood supply due to an obstruction, usually a thrombus or embolism, that causes infarction of brain tissue

• Types

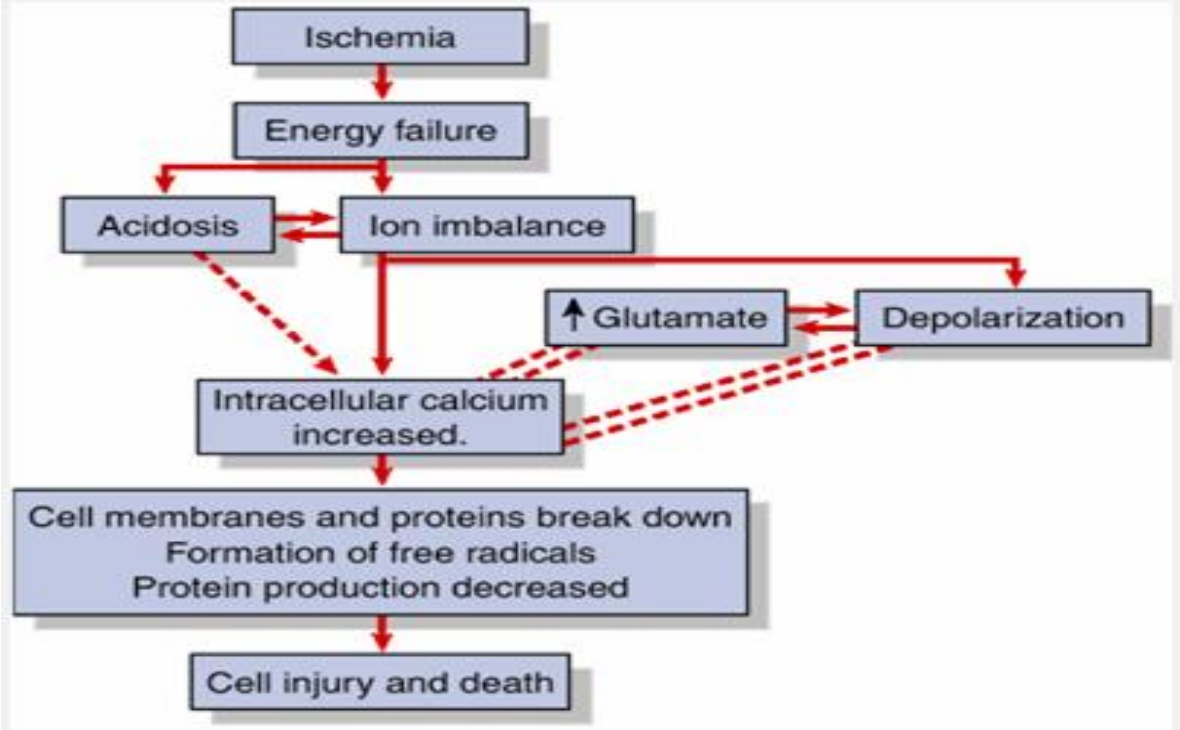
–Large artery thrombosis

–Small artery thrombosis

–Cardiogenic embolism

–Other

Pathophysiology



Manifestations of Ischemic Stroke

— Symptoms depend upon the location and size of the affected area

— Numbness or weakness of face, arm, or leg, especially on one side

— Confusion or change in mental status

— Trouble speaking or understanding speech

— Difficulty in walking, dizziness, or loss of balance or coordination

— Sudden, severe headache

— Perceptual disturbances

— loss of half of the visual field, Loss of peripheral vision, diplopia.

Cognitive Deficits (Short- and long-term memory loss, Decreased attention span, Impaired ability to concentrate

Emotional Deficits (Depression, Withdrawal, Fear, hostility, and anger, Feelings of isolation)

Cognitive Deficits: (Short- and long-term memory loss, Decreased attention span, Impaired ability to concentrate, Poor abstract reasoning, Altered judgment)

Emotional Deficits: (Loss of self-control, Emotional lability, Decreased tolerance to stressful situations, Depression, Withdrawal, Fear, hostility, and anger, Feelings of isolation)

Terms:

• Hemiplegia

• Hemiparesis

• Dysarthria (Difficulty in forming words)

• Aphasia: expressive aphasia, receptive aphasia

• Hemianopsia: blindness of half of the field of vision in one or both eyes

• Apraxia: inability to perform previously learned purposeful motor acts on a voluntary basis

Comparison of Left and Right Hemispheric Strokes

Left Hemispheric Stroke	Right Hemispheric Stroke
Paralysis or weakness on right side of body	Paralysis or weakness on left side of body
Right visual field deficit	Left visual field deficit
Aphasia (expressive, receptive, or global)	Spatial-perceptual deficits Increased distractibility
Altered intellectual ability	Impulsive behavior and poor judgment
Slow, cautious behavior	Lack of awareness of deficits

Transient Ischemic Attack (TIA)

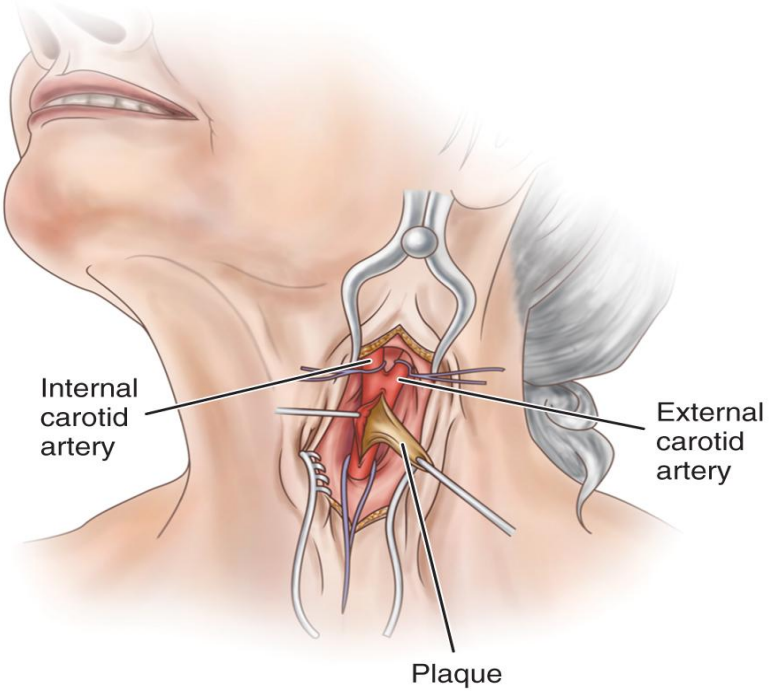
• Temporary neurologic deficit resulting from a temporary impairment of blood flow

• "Warning of an impending stroke"

• Classic symptom is fleeting blindness in one eye.

• Diagnostic workup is required to treat and prevent irreversible deficits

Carotid Endarterectomy



Preventive Treatment and Secondary Prevention

• Health maintenance measures including a healthy diet, exercise, and the prevention and treatment of periodontal disease

• Carotid endarterectomy

• Anticoagulant therapy

• Antiplatelet therapy: aspirin,

• Antihypertensive medications

Medical Management—Acute Phase of Stroke

• Prompt diagnosis and treatment

• Assessment of stroke

• Thrombolytic therapy

–IV dosage and administration

–Patient monitoring

–Side effects—potential bleeding

• Elevate head of bed (HOB) unless contraindicated

• Maintain airway and ventilation

• Continuous hemodynamic monitoring and neurologic assessment

Hemorrhagic Stroke

• Caused by bleeding into brain tissue, the ventricles, or subarachnoid space.

• May be due to spontaneous rupture of small vessels primarily related to hypertension; subarachnoid hemorrhage due to a ruptured aneurysm; or intracerebral hemorrhage related to angiopathy, arterial venous malformations, intracranial aneurysms, or medications such as anticoagulants.

• Brain metabolism is disrupted by exposure to blood.

• ICP increases due to blood in the subarachnoid space.

• Compression or secondary ischemia from

Manifestations

• Similar to ischemic stroke

• **Severe headache**

• Early and sudden changes in LOC

• Vomiting

Medical Management

• Prevention: control of hypertension

• Diagnosis: CT scan, cerebral angiography, lumbar puncture if CT is negative and ICP is not elevated to confirm subarachnoid hemorrhage

• Care is primarily supportive

• Bed rest with sedation

• Oxygen

• Treatment of vasospasm, increased ICP, hypertension, potential seizures, and

Nursing Process: The Patient Recovering from an Ischemic Stroke

Assessment

• Acute phase

–Ongoing/frequent monitoring of all systems including vital signs and neurologic assessment— LOC, motor symptoms, speech, eye symptoms

–Monitor for potential complications including musculoskeletal problems, swallowing difficulties, respiratory problems, and signs and symptoms of increased ICP and meningeal irritation

• After the stroke is complete

–Focus on patient function; self-care ability, coping, and teaching needs to facilitate rehabilitation

Nursing Process: Diagnoses

— Impaired physical mobility

— Acute pain

— Self-care deficits

— Disturbed sensory perception

— Impaired swallowing

— Urinary incontinence

— Disturbed thought processes

— Impaired verbal communication

— Risk for impaired skin integrity

— Interrupted family processes

— Sexual dysfunction

Collaborative Problems/Potential Complications

• Decreased cerebral blood flow

• Inadequate oxygen delivery to brain

• Pneumonia

Nursing Process: Planning

• Major goals may include:

–Improved mobility

–Avoidance of shoulder pain

–Achievement of self-care

–Relief of sensory and perceptual deprivation

–Prevention of aspiration

–Continence of bowel and bladder

–Improved thought processes

–Achieving a form of communication

–Maintaining skin integrity

–Restored family functioning

–Improved sexual function

–Absence of complications

Nursing Process: Interventions

• Focus on the whole person

• Provide interventions to prevent complications and to promote rehabilitation

• Provide support and encouragement

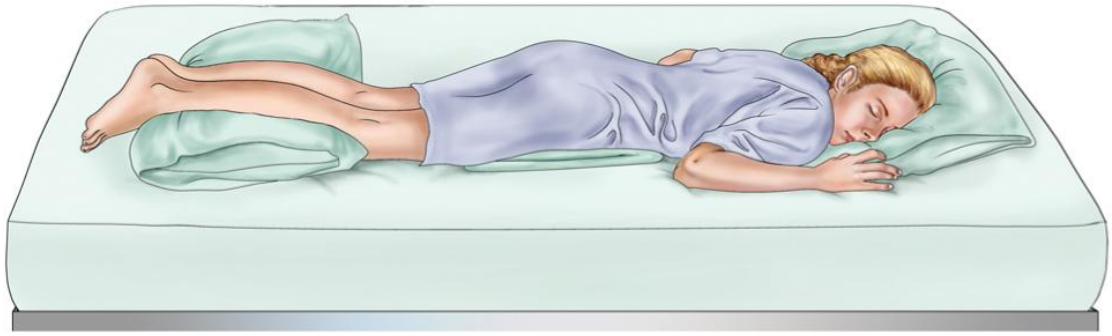
• Listen to the patient

Improving Mobility and Preventing Joint Deformities

- Turn and position in correct alignment every 2 hours
- Use of splints
- Passive or active ROM 4–5 times day
- Positioning of hands and fingers
- Prevention of flexion contractures
- Prevention of shoulder abduction
- Do not lift by flaccid shoulder
- Measures to prevent and treat shoulder proclaims

Positioning to Prevent Shoulder Abduction

Prone Positioning to Help Prevent Hip Flexion



Improving Mobility and Preventing Joint Deformities

- Passive or active ROM 4–5 times day
- Encourage patient to exercise unaffected side
- Establish regular exercise routine
- Quadriceps setting and gluteal exercises
- Assist patient out of bed as soon as possible-assess and help patient achieve balance, move slowly
- Ambulation training

• ***Enhancing self-care***

–Set realistic goals with the patient

–Encourage personal hygiene

–Assure that patient does not neglect the affected side

–Use of assistive devices and modification of clothing

• Support and encouragement

• Strategies to enhance communication

• Encourage patient to turn head, look to side with visual field loss

• ***Nutrition***

–Consult with speech therapy or nutritional services

–Have patient sit upright, preferably OOB, to eat

–Chin tuck or swallowing method

–Use of thickened liquids or pureed (مهروس) diet

• ***Bowel and bladder control***

–Assessment of voiding and scheduled voiding

–Measures to prevent constipation—fiber, fluid, toileting schedule

–Bowel and bladder retraining

Nursing Process: The Patient with a Hemorrhagic Stroke

Assessment

• Complete and ongoing neurologic assessment—use neurologic flow chart

• Monitor respiratory status and oxygenation

• Monitoring of ICP

• Patients with intracerebral or subarachnoid hemorrhage should be monitored in the ICU

• Monitor for potential complications

• Monitor fluid balance and laboratory data

• All changes must be **reported immediately**

Nursing Process: Diagnoses

• Ineffective tissue perfusion (cerebral)

• Disturbed sensory perception

• Anxiety

Collaborative Problems/Potential Complications

• Vasospasm

• Seizures

• Hydrocephalus

• Rebleeding

• Hyponatremia

Nursing Process: Planning

• Goals may include:

–Improved cerebral tissue perfusion

–Relief of sensory and perceptual deprivation

–Relief of anxiety

–The absence of complications

Aneurysm Precautions

• Absolute bed rest

• Elevate HOB 30° to promote venous drainage or flat to increase cerebral perfusion

• Avoid all activity that may increase ICP or BP; Valsalva maneuver, acute flexion or rotation of neck or head

• Exhale through mouth when voiding or defecating to decrease strain

• Nurse provides all personal care and hygiene

• Nonstimulating, nonstressful environment; dim lighting, no reading, no TV, no radio

• Prevent constipation

Interventions

• Relieving sensory deprivation and anxiety

• Keep sensory stimulation to a minimum for aneurysm precautions

• Realty orientation

• Patient and family teaching

• Support and reassurance

• Seizure precautions

• Strategies to regain and promote self-care and rehabilitation

Home Care and Teaching for the Patient Recovering from a Stroke

• Prevention of subsequent strokes, health promotion, and follow-up care

• Prevention of and signs and symptoms of complications

• Medication teaching

• Safety measures

• Adaptive strategies and use of assistive devices for ADLs

• Nutrition—diet, swallowing techniques, tube feeding administration

• Elimination—bowel and bladder programs, catheter use

Nursing Process
The Patient Recovering From an Ischemic Stroke

The acute phase of an ischemic stroke may last 1 to 3 days, but ongoing monitoring of all body systems is essential as long as the patient requires care. The patient who has had a stroke is at risk for multiple complications, including deconditioning and other musculoskeletal problems, swallowing difficulties, bowel and bladder dysfunction, inability to perform self-care, and skin breakdown. After the stroke is complete, management focuses on the prompt initiation of rehabilitation for any deficits.

Assessment
During the acute phase, a neurologic flow sheet is maintained to provide data about the following important measures of the patient's clinical status:

- Change in level of consciousness or responsiveness as evidenced by movement, resistance to changes of position, and response to stimulation; orientation to time, place, and person
- Presence or absence of voluntary or involuntary movements of the extremities; muscle tone; body posture; and position of the head
- Stiffness or flaccidity of the neck
- Eye opening, comparative size of pupils and pupillary reactions to light, and ocular position
- Color of the face and extremities; temperature and moisture of the skin
- Quality and rates of pulse and respiration; arterial blood gas values as indicated, body temperature, and arterial pressure
- Ability to speak
- Volume of fluids ingested or administered; volume of urine excreted each 24 hours
- Presence of bleeding
- Maintenance of blood pressure within the desired parameters

After the acute phase, the nurse assesses mental status (memory, attention span, perception, orientation, affect, speech/language), sensation/perception (usually the patient has decreased awareness of pain and temperature), motor control (upper and lower extremity movement), swallowing ability, nutritional and hydration status, skin integrity, activity tolerance, and bowel and bladder function. Ongoing nursing assessment continues to focus on any impairment of function in the patient's daily activities, because the quality of life after stroke is closely related to the patient's functional status.

Diagnosis
Nursing Diagnoses
Based on the assessment data, the major nursing diagnoses for a patient with a stroke may include the following:

- Impaired physical mobility related to hemiparesis, loss of balance and coordination, spasticity, and brain injury
- Acute pain (painful shoulder) related to hemiplegia and disuse
- Self-care deficits (bathing, hygiene, toileting, dressing, grooming, and feeding) related to stroke sequelae

- Disturbed sensory perception related to altered sensory reception, transmission, and/or integration
- Impaired swallowing
- Total urinary incontinence related to flaccid bladder, detrusor instability, confusion, or difficulty in communicating
- Disturbed thought processes related to brain damage, confusion, or inability to follow instructions
- Impaired verbal communication related to brain damage
- Risk for impaired skin integrity related to hemiparesis, hemiplegia, or decreased mobility
- Interrupted family processes related to catastrophic illness and caregiving burdens
- Sexual dysfunction related to neurologic deficits or fear of failure

Collaborative Problems/Potential Complications
Potential complications include:

- Decreased cerebral blood flow due to increased ICP
- Inadequate oxygen delivery to the brain
- Pneumonia

Planning and Goals
Although rehabilitation begins on the day the patient has the stroke, the process is intensified during convalescence and requires a coordinated team effort. It is helpful for the team to know what the patient was like before the stroke: his or her illnesses, abilities, mental and emotional state, behavioral characteristics, and activities of daily living (ADLs). It is also helpful for clinicians to be knowledgeable about the relative importance of predictors of stroke outcome (age, NIHSS score, and level of consciousness at time of admission) in order to provide stroke survivors and their families with realistic goals.
The major goals for the patient (and family) may include improved mobility, avoidance of shoulder pain, achievement of self-care, relief of sensory and perceptual deprivation, prevention of aspiration, continence of bowel and bladder, improved thought processes, achieving a form of communication, maintaining skin integrity, restored family functioning, improved sexual function, and absence of complications.

Nursing Interventions
Nursing care has a significant impact on the patient's recovery. Often, many body systems are impaired as a result of the stroke, and conscientious care and timely interventions can prevent debilitating complications. During and after the acute phase, nursing interventions focus on the whole person. In addition to providing physical care, the nurse encourages and fosters recovery by listening to the patient and asking questions to elicit the meaning of the stroke experience.

Improving Mobility and Preventing Joint Deformities
A patient with hemiplegia has unilateral paralysis (paralysis on one side). When control of the voluntary muscles is lost, the strong flexor muscles exert control over the extensors. The arm tends to adduct (adductor muscles are stronger than abductors) and to rotate internally. The elbow and the wrist tend to flex, the affected leg tends to rotate externally at the hip joint and flex at the knee, and the foot at the ankle joint supinates and tends toward plantar flexion.

Correct positioning is important to prevent contractures; measures are used to relieve pressure, assist in maintaining good body alignment, and prevent compressive neuropathies, especially of the ulnar and peroneal nerves. Because flexor muscles are stronger than extensor muscles, a posterior splint applied at night to the affected extremity may prevent flexion and maintain correct positioning during sleep. (See Chapter 11 for additional information.)

Preventing Shoulder Adduction

To prevent adduction of the affected shoulder while the patient is in bed, a pillow is placed in the axilla when there is limited external rotation; this keeps the arm away from the chest. A pillow is placed under the arm, and the arm is placed in a neutral (slightly flexed) position, with distal joints positioned higher than the more proximal joints (ie, the elbow is positioned higher than the shoulder and the wrist higher than the elbow). This helps to prevent edema and the resultant joint fibrosis that will limit range of motion if the patient regains control of the arm (Fig. 62-3).

Positioning the Hand and Fingers

The fingers are positioned so that they are barely flexed. The hand is placed in slight supination (palm faces upward), which is its most functional position. If the upper extremity is flaccid, a volar resting splint can be used to support the wrist and hand in a functional position. If the upper extremity is spastic, a hand roll is not used, because it stimulates the grasp reflex. In this instance a dorsal wrist splint is useful in allowing the palm to be free of pressure. Every effort is made to prevent hand edema.

Spasticity, particularly in the hand, can be a disabling complication after stroke. Researchers reported that repeated intramuscular injections of botulinum toxin A into wrist and finger muscles reduced upper limb spasticity after stroke, resulting in significant and sustained improvements in muscle tone.

Changing Positions

The patient's position should be changed every 2 hours. To place a patient in a lateral (side-lying) position, a pillow is placed between the legs before the patient is turned. To promote venous return and prevent edema, the upper thigh should not be acutely flexed. The patient may be turned from side to side, but if sensation is impaired, the amount of time spent on the affected side should be limited.

FIGURE 62-3. Correct positioning to prevent shoulder adduction.

If possible, the patient is placed in a prone position for 15 to 30 minutes several times a day. A small pillow or a support is placed under the pelvis, extending from the level of the umbilicus to the upper third of the thigh (Fig. 62-4). This position helps to promote hyperextension of the hip joints, which is essential for normal gait and helps prevent knee and hip flexion contractures. The prone position also helps to drain bronchial secretions and prevents contractural deformities of the shoulders and knees. During positioning, it is important to reduce pressure and change position frequently to prevent pressure ulcers.

Establishing an Exercise Program

The affected extremities are exercised passively and put through a full range of motion four or five times a day to maintain joint mobility, regain motor control, prevent contractures in the paralyzed extremity, prevent further deterioration of the neuromuscular system, and enhance circulation. Exercise is helpful in preventing venous stasis, which may predispose the patient to thrombosis and pulmonary embolus. Repetition of an activity forms new pathways in the CNS and therefore encourages new patterns of motion. At first, the extremities are usually flaccid. If tightness occurs in any area, the range-of-motion exercises should be performed more frequently (see Chapter 11).

The patient is observed for signs and symptoms that may indicate pulmonary embolus or excessive cardiac workload during exercise; these include shortness of breath, chest pain, cyanosis, and increasing pulse rate with exercise. Frequent short periods of exercise always are preferable to longer periods at infrequent intervals. Regularity in exercise is most important. Improvement in muscle strength and maintenance of range of motion can be achieved only through daily exercise.

The patient is encouraged and reminded to exercise the unaffected side at intervals throughout the day. It is helpful to develop a written schedule to remind the patient of the exercise activities. The nurse supervises and supports the patient during these activities. The patient can be taught to put the unaffected leg under the affected one to assist in moving it when turning and exercising. Flexibility, strengthening, coordination, endurance, and balancing exercises prepare the patient for ambulation.

Quadriceps muscle setting and gluteal setting exercises are started early to improve the muscle strength needed for walking; these are performed at least five times daily for 10 minutes at a time.

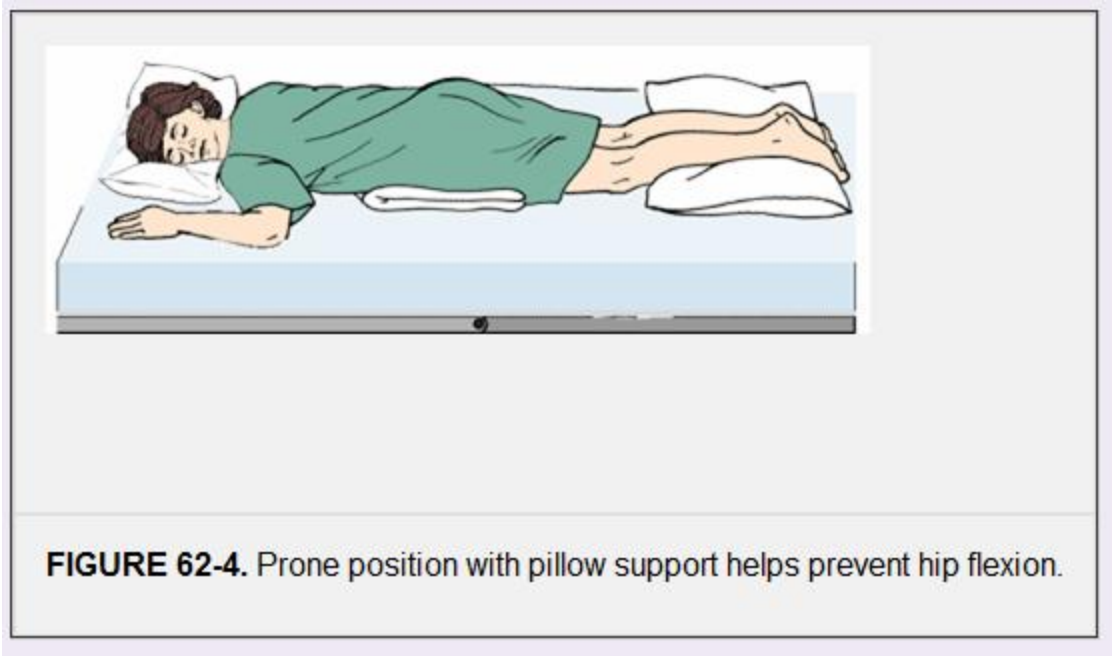


FIGURE 62-4. Prone position with pillow support helps prevent hip flexion.

Preparing for Ambulation

As soon as possible, the patient is assisted out of bed. Usually an active rehabilitation program is started as soon as the patient regains consciousness. The patient is first taught to maintain balance while sitting and then to learn to balance while standing. If the patient has difficulty in achieving standing balance, a tilt table, which slowly brings the patient to an upright position, can be used. Tilt tables are especially helpful for patients who have been on bed rest for prolonged periods and have orthostatic blood pressure changes.

If the patient needs a wheelchair, the folding type with hand brakes is the most practical because it allows the patient to manipulate the chair. The chair should be low enough to allow the patient to propel it with the uninvolved foot and narrow enough to permit it to be used in the home. When the patient is transferred from the wheelchair, the brakes must be applied and locked on both sides of the chair.

The patient is usually ready to walk as soon as standing balance is achieved. Parallel bars are useful in these first efforts. A chair or wheelchair should be readily available in case the patient suddenly becomes fatigued or feels dizzy.

The training periods for ambulation should be short and frequent. As the patient gains strength and confidence, an adjustable cane can be used for support. Generally, a three- or four-pronged cane provides a stable support in the early phases of rehabilitation.

Preventing Shoulder Pain

As many as 70% of stroke patients suffer severe pain in the shoulder that prevents them from learning new skills. Shoulder function is essential in achieving balance and performing transfers and self-care activities. Three problems can occur: painful shoulder, subluxation of the shoulder, and shoulder–hand syndrome.

A flaccid shoulder joint may be overstretched by the use of excessive force in turning the patient or from overstrenuous arm and shoulder movement. To prevent shoulder pain, the nurse should never lift the patient by the flaccid shoulder or pull on the

affected arm or shoulder. If the arm is paralyzed, subluxation (incomplete dislocation) at the shoulder can occur as a result of overstretching of the joint capsule and musculature by the force of gravity when the patient sits or stands in the early stages after a stroke. This results in severe pain. Shoulder–hand syndrome (painful shoulder and generalized swelling of the hand) can cause a frozen shoulder and ultimately atrophy of subcutaneous tissues. When a shoulder becomes stiff, it is usually painful. Many shoulder problems can be prevented by proper patient movement and positioning. The flaccid arm is positioned on a table or with pillows while the patient is seated. Some clinicians advocate the use of a properly worn sling when the patient first becomes ambulatory, to prevent the paralyzed upper extremity from dangling without support. Range-of-motion exercises are important in preventing painful shoulder. Overstrenuous arm movements are avoided. The patient is instructed to interlace the fingers, place the palms together, and push the clasped hands slowly forward to bring the scapulae forward; he or she then raises both hands above the head. This is repeated throughout the day. The patient is instructed to flex the affected wrist at intervals and move all the joints of the affected fingers. He or she is encouraged to touch, stroke, rub, and look at both hands. Pushing the heel of the hand firmly down on a surface is useful. Elevation of the arm and hand is also important in preventing dependent edema of the hand. Patients with continuing pain after attempted movement and positioning may require the addition of analgesia to their treatment program.

Medications are helpful in the management of poststroke pain. Amitriptyline hydrochloride (Elavil) has been used, but it can cause cognitive problems, has a sedating effect, and is not effective in all patients. The antiseizure medication lamotrigine (Lamictal) has been found to be effective for poststroke pain, and it may serve as an alternative for patients who cannot tolerate amitriptyline (Nicholson, 2004).

Enhancing Self-Care

As soon as the patient can sit up, personal hygiene activities are encouraged. The patient is helped to set realistic goals; if feasible, a new task is added daily. The first step is to carry out all self-care activities on the unaffected side. Such activities as combing the hair, brushing the teeth, shaving with an electric razor, bathing, and eating can be carried out with one hand and are suitable for self-care. Although the patient may feel awkward at first, the various motor skills can be learned by repetition, and the unaffected side will become stronger with use. The nurse must be sure that the patient does not neglect the affected side. Assistive devices will help make up for some of the patient's deficits (Chart 62-3). A small towel is easier to control while drying after bathing, and boxed paper tissues are easier to use than a roll of toilet tissue.

Return of functional ability is important to the patient recovering after a stroke. An early baseline assessment of functional ability with an instrument such as the Functional Independence Measure (FIM^{TM}) is important in team planning and goal setting for the patient. The FIM^{TM} is a widely used instrument in stroke rehabilitation and provides valuable information about motor, social, and cognitive function (Kelly-Hayes, 2004). The patient's morale will improve if ambulatory activities are carried out in street clothes. The family is instructed to bring in clothing that is preferably a size larger than that normally worn. Clothing fitted with front or side fasteners or Velcro closures is the most suitable. The patient has better balance if most of the dressing activities are carried out while seated.

Chapter 63

Management of Patients with Neurologic Trauma

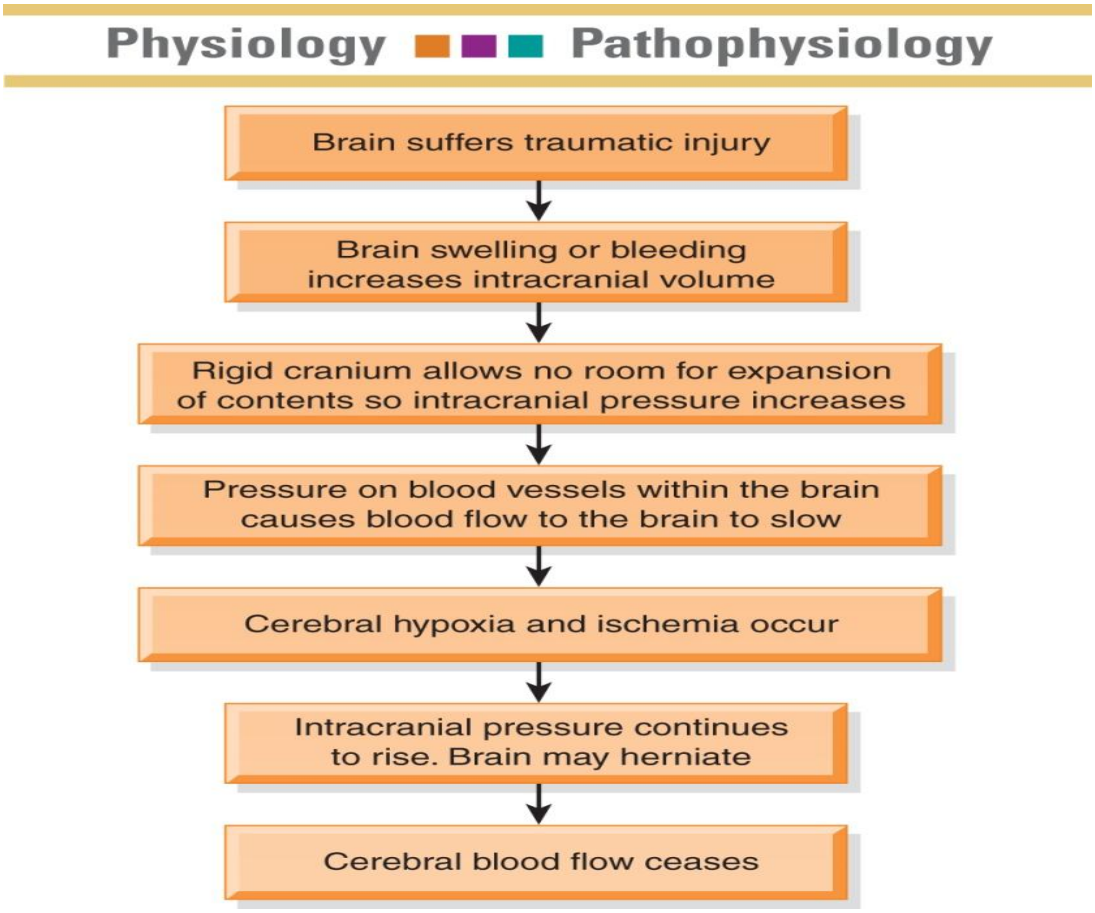
Head Injury

• A broad classification that includes injury to the scalp, skull, or brain
• 1.4 million people receive head injuries every year in the U.S.
• The most common cause of death from trauma
• Most common cause of brain trauma is MVA
• Group at highest risk group for brain trauma is males age 15–24
• Those younger than 5 years and the elderly are also at increased risk
• Prevention

Pathophysiology of Brain Damage

• Primary injury: due to the initial damage
–Contusions, lacerations, damage to blood vessels, acceleration/deceleration injury, or due to foreign object penetration
• Secondary injury: damage evolves after the initial insult
–Due to cerebral edema, ischemia, or chemical changes associated with the trauma

Pathophysiology of Traumatic Brain Injury



Manifestations

• Manifestations depend upon the severity and location of the injury

• Scalp wounds

–Tend to bleed heavily, and are also portals for infection

• Skull fractures

–Usually have localized, persistent pain

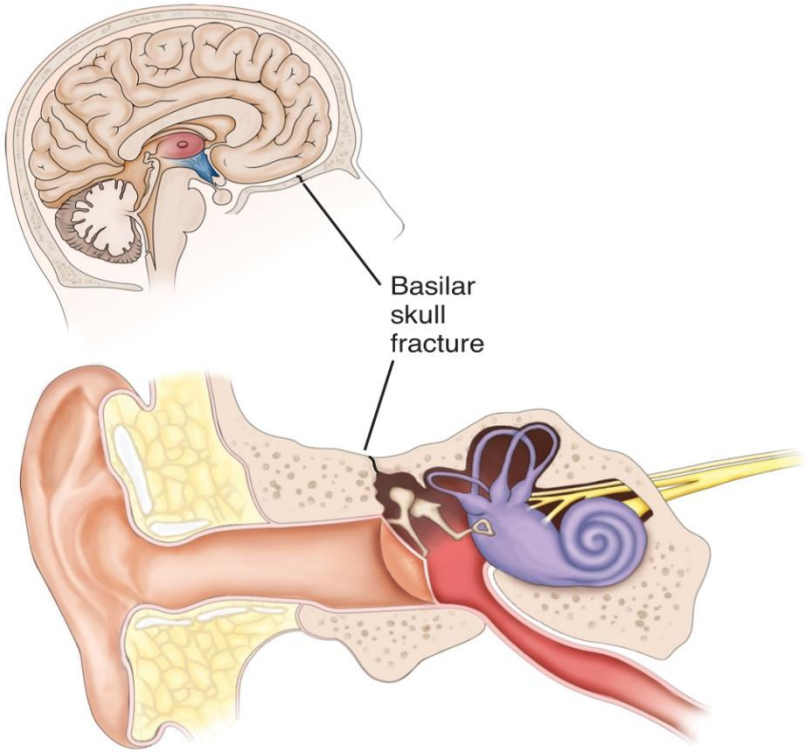
–Fractures of the base of the skull

• Bleeding from nose, pharynx, or ears

• **Battle's sign**—ecchymosis behind the ear

• CSF leak—halo sign—ring of fluid around the blood stain from drainage

Basilar Fractures Allow CSF to Leak from the Nose and Ears



Manifestations of Brain Injury

• Altered LOC

• Pupillary abnormalities

• Sudden onset of neurologic deficits and neurologic changes; changes in sense, movement, reflexes

• Changes in vital signs

• Headache

• Seizures

Brain Injury

• Closed brain injury (blunt trauma): acceleration/deceleration injury occurs when the head accelerates and then rapidly decelerates, damaging brain tissue

• Open brain injury: object penetrates the brain or trauma is so severe that the scalp and skull are opened

• **Concussion**: a temporary loss of consciousness with no apparent structural damage

• **Contusion**: more severe injury with possible surface hemorrhage

–Symptoms and recovery depend upon the amount of damage and associated cerebral edema

–Longer period of unconsciousness with more symptoms of neurologic deficits and changes in vital signs

• Diffuse axonal injury: involves widespread damage to axons in the cerebral hemispheres, corpus callosum, and brain stem. It can be seen with mild, moderate, or severe head trauma. Patient develops immediate coma.

• Intracranial bleeding

1. Epidural hematoma
2. Subdural hematoma
3. Acute and subacute
4. Chronic
5. Intracerebral hemorrhage and hematoma

Concussion

• Patient may be admitted for observation or sent home

• Observation of patients after head trauma; report immediately

–Observe for any changes in LOC

–Difficulty in awakening, lethargy, dizziness, confusion, irritability, anxiety

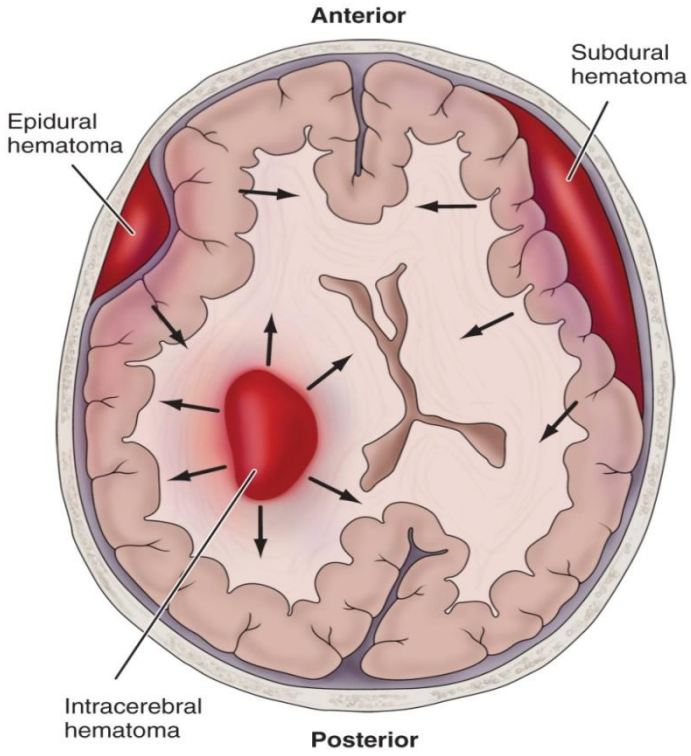
–Difficulty in speaking or movement

–Severe headache

–Vomiting

• Patient should be aroused and assessed frequently

Location of Subdural, Intracerebral and Epidural Hemorrhages



Epidural Hematoma

• Blood collection in the space between the skull and the dura.

• Patient may have a brief loss of consciousness with return of lucid state then as hematoma expands increased ICP will often suddenly reduce LOC.

• An emergency situation!

• Treatment include measures to reduce ICP, remove the clot and stop bleeding—burr holes or craniotomy.

• Patient will need monitoring and support of

Subdural Hematoma

• Collection of blood between the dura and the brain

• Acute/Subacute

–Acute: symptoms develop over 24–48 hours

–Subacute: symptoms develop over 48 hours to 2 weeks

–Requires immediate craniotomy and control of ICP

• Chronic

–Develops over weeks to months

–Causative injury may be minor and forgotten

–Clinical signs and symptoms may fluctuate

–Treatment is evacuation of the clot

Intracerebral Hemorrhage

• Hemorrhage occurs into the substance of the brain

• May be due to trauma or a nontraumatic cause

• Treatment

–Supportive care

–Control of ICP

–Administration of fluids, electrolytes, and antihypertensive medications

–Craniotomy or craniectomy to remove clot and control hemorrhage; this may not be possible due the location or lack of circumscribed area of hemorrhage

Diagnostic Evaluation

• Physical and neurologic exam

• Skull and spinal x-rays

• CT scan

• MRI

• PET (Positron emission tomography)

Management of the Patient with a Head Injury

• Assume cervical spine injury until this is ruled out

• Therapy to preserve brain homeostasis and prevent secondary damage

–Treat cerebral edema

–Maintain cerebral perfusion; treat hypotension, hypovolemia and bleeding, monitor and manage ICP

–Maintain oxygenation; cardiovascular and respiratory function

–Manage fluid and electrolyte balance

Supportive Measures

• Respiratory support; intubation and mechanical ventilation

• Seizure precautions and prevention

• NG to manage reduced gastric motility and prevent aspiration

• Fluid and electrolyte maintenance

• Pain and anxiety management

• Nutrition

Nursing Process: The Care of the Patient with Brain Injury

Assessment

• Health history with focus upon the immediate injury, time, cause, and the direction and force of the blow

• Baseline assessment

• LOC—Glasgow Coma Scale

• Frequent and ongoing neurologic assessment

• Multisystem assessment

Nursing Process: Diagnoses

• Ineffective airway clearance and impaired gas exchange

• Ineffective cerebral perfusion

• Deficient fluid volume

• Imbalanced nutrition

• Risk for injury

• Risk for imbalanced body temperature

• Risk for impaired skin integrity

• Disturbed thought patterns

• Disturbed sleep pattern

• Interrupted family process

• Deficient knowledge

Collaborative Problems/Potential Complications

• Decreased cerebral perfusion

• Cerebral edema and herniation

• Impaired oxygenation and ventilation

• Impaired fluid, electrolyte, and nutritional balance

• Risk of posttraumatic seizures

Nursing Process: Planning

— Major goals may include

— Maintenance of patent airway,

— Adequate cerebral perfusion pressure (CPP),

— Fluid and electrolyte balance,

— Adequate nutritional status,

— Prevention of secondary injury,

— Maintenance of normal temperature,

— Maintenance of skin integrity,

— Improvement of cognitive function,

— Prevention of sleep deprivation,

— Effective family coping,

— Increased knowledge about rehabilitation process, and

Nursing Process: Interventions

• Ongoing assessment and monitoring is vital

• Maintenance of airway

–Positioning to facilitate drainage of oral secretions with HOB usually elevated 30° to decrease venous pressure

–Suctioning with caution

–Prevention of aspiration and respiratory insufficiency

–Monitor ABGs, ventilation, and mechanical ventilation

–Monitor for pulmonary complications, potential

• I&O and daily weights

• Monitor blood and urine electrolytes and osmolality and blood glucose

• Measures to promote adequate nutrition

• Strategies to prevent injury

  –Assessment of oxygenation

  –Assessment of bladder and urinary output

  –Assessment for constriction due to dressings and casts

  –Pad side-rails

  –Mittens to prevent self-injury; avoid restraints

• Strategies to prevent injury

  –Reduce environmental stimuli

  –Adequate lighting to reduce visual hallucinations

  –Measures to minimize disruption of sleep-wake cycles

  –Skin care

  –Measures to prevent infection

• Maintaining body temperature

  –Maintain appropriate environmental temperature

  –Use of coverings—sheets, blankets to patient needs

  –Administration of acetaminophen for fever

  –Cooling blankets or cool baths; avoid shivering

• Support of cognitive function

• Support of family

  –Provide and reinforce information

  –Measures to promote effective coping

  –Setting of realistic, well-defined, short-term goals

  –Referral for counseling

  –Support groups

• Patient and family teaching

Spinal Cord Injury (SCI)

Definition:

• Fracture or displacement of one or more vertebrae causing damae to spinal cord and nerve roots with resulting neurological deficit and altered sensory perception or paralysis or both. There will be a total or partial absence of motor and/or sensory function below the level of injury. (Ignatavious and Workman, 2006)

Spinal Cord Injury (SCI)

• A major health problem

• 200,000 persons in the U.S. live with disability from SCI

• Causes include MVAs (35%), violence (24%), falls (22%), and sports injuries (8%)

• Males account for 82% of SCIs

• Young people ages 16–30 account for more than half of all new SCIs

• African–Americans are at higher risk

• Risk factors include alcohol and drug use

• Prevention

Spinal Cord Injury

— The result of concussion, contusion, laceration or compression of spinal cord.

— Primary injury is the result of the initial trauma.

— Secondary injury is usually the result of ischemia, hypoxia, and hemorrhage that destroys the nerve tissues.

— Secondary injuries are thought to be reversible/preventable during the first 4–6 hours after injury.

— Treatment is needed to prevent partial injury from developing into more extensive, permanent

Clinical Manifestations

— Manifestations depend on the type and level of injury

— Incomplete spinal cord lesions (the sensory or motor fibers, or both, are preserved below the lesion): below the injury; total sensory and motor paralysis, loss of bladder

and bowel control (usually with urinary retention and bladder distention), loss of sweating and vasomotor tone, & marked reduction of blood pressure.

— Complete spinal cord lesion (total loss of sensation and voluntary muscle control below the lesion): paraplegia or tetraplegia.

— If conscious, the patient usually complains of acute pain in the back or neck

Spinal and Neurogenic Shock

• ***Spinal shock***

–A sudden depression of reflex activity below the level of spinal injury

–develops due to the loss of autonomic nervous system function below the level of the lesion

–Muscular flaccidity, lack of sensation and reflexes

• ***Neurogenic shock***

–Due to the loss of function of the autonomic nervous system

–Blood pressure, heart rate, and cardiac output decrease

–Venous pooling occurs due to peripheral vasodilation

–Paralyzed portions of the body do not perspire

Medical Management: Acute Phase

• Goals:

–Prevent further SCI and observe for signs of neurological deficit

• High dose corticosteroids (controversial)

• Research is continuing

Medical management:

• Pharmacologic therapy

• Respiratory therapy

• Skeletal fracture reduction and traction

• Surgical management

Nursing Process: The Care of the Patient with SCI

Assessment

• Monitor respirations and breathing pattern

• Lung sounds and cough

• Monitor for changes in motor or sensory function; report immediately

• Assess for spinal shock

• Monitor for bladder retention or distention, gastric dilation, and ilieus

• Temperature; potential hyperthermia

Nursing Process: Diagnoses

• Ineffective breathing pattern

• Ineffective airway clearance

• Impaired physical mobility

• Disturbed sensory perception

• Risk for impaired skin integrity

• Impaired urinary elimination

• Constipation

• Acute pain

Collaborative Problems/Potential Complications

• DVT

• Orthostatic hypotension

• Autonomic dysreflexia

Nursing Process: Planning

• Major goals may include improved breathing pattern and airway clearance, improved mobility, improved sensory and perceptual awareness, maintenance of skin integrity, promotion of comfort, and absence of complications.

Promotion of Effective Breathing and Airway Clearance

• Monitor carefully to detect potential respiratory failure

–Pulse oximetry and ABGs

–Lung sounds

• Early and vigorous pulmonary care to prevent and remove secretions

• Suctioning with caution

• Breathing exercises

• Assisted coughing

• Humidification and hydration

Improving Mobility

• Maintain proper body alignment

• Turn only if spine is stable and as indicated by physician

• Monitor blood pressure with position changes

• PROM at least four times a day

• Use neck brace or collar, as prescribed, when patient is mobilized

• Move gradually to erect position

Nursing Process
The Patient with a Traumatic Brain Injury

Assessment

Depending on the patient's neurologic status, the nurse may elicit information from the patient, from the family, or from witnesses or emergency rescue personnel. Although all usual baseline data may not be collected initially, the immediate health history should include the following questions:

- When did the injury occur?
- What caused the injury? A high-velocity missile? An object striking the head? A fall?
- What was the direction and force of the blow?

A history of unconsciousness or amnesia after a head injury indicates a significant degree of brain damage, and changes that occur minutes to hours after the initial injury can reflect recovery or indicate the development of secondary brain damage. Therefore, the nurse also should try to determine if there was a loss of consciousness, what the duration of the unconscious period was, and whether the patient could be aroused.
In addition to asking questions that establish the nature of the injury and the patient's condition immediately after the injury, the nurse examines the patient thoroughly. This assessment includes determining the patient's LOC using the Glasgow Coma Scale and assessing the patient's response to tactile stimuli (if unconscious), pupillary response to light, corneal and gag reflexes, and motor function. The Glasgow Coma Scale (Chart 63-4) is based on the three criteria of eye opening, verbal responses, and motor responses to verbal commands or painful stimuli. It is particularly useful for monitoring changes during the acute phase, the first few days after a head injury. It does not take the place of an in-depth neurologic assessment. Additional detailed assessments are made initially and at frequent intervals throughout the acute phase of care (Hickey, 2003). The baseline and ongoing assessments are critical nursing interventions for the patient with brain injury, whose condition can worsen dramatically and irrevocably if subtle signs are overlooked. More information on assessment is provided in the following sections and in Figure 63-5 and Table 63-1.

Diagnosis

Nursing Diagnoses

Based on the assessment data, the patient's major nursing diagnoses may include the following:

- Ineffective airway clearance and impaired gas exchange related to brain injury
- Ineffective cerebral tissue perfusion related to increased ICP, decreased CPP, and possible seizures
- Deficient fluid volume related to decreased LOC and hormonal dysfunction
- Imbalanced nutrition, less than body requirements, related to increased metabolic demands, fluid restriction, and inadequate intake
- Risk for injury (self-directed and directed at others) related to seizures, disorientation, restlessness, or brain damage
- Risk for imbalanced body temperature related to damaged temperature-regulating mechanisms in the brain

- Risk for impaired skin integrity related to bed rest, hemiparesis, hemiplegia, immobility, or restlessness
- Disturbed thought processes (deficits in intellectual function, communication, memory, information processing) related to brain injury
- Disturbed sleep pattern related to brain injury and frequent neurologic checks
- Interrupted family processes related to unresponsiveness of patient, unpredictability of outcome, prolonged recovery period, and the patient's residual physical disability and emotional deficit
- Deficient knowledge about brain injury, recovery, and the rehabilitation process

The nursing diagnoses for the unconscious patient and the patient with increased ICP also apply (see Chapter 61).

Collaborative Problems/Potential Complications

Based on all the assessment data, the major complications include the following:

- Decreased cerebral perfusion
- Cerebral edema and herniation
- Impaired oxygenation and ventilation
- Impaired fluid, electrolyte, and nutritional balance
- Risk of posttraumatic seizures

Planning and Goals

The goals for the patient may include maintenance of a patent airway, adequate CPP, fluid and electrolyte balance, adequate nutritional status, prevention of secondary injury, maintenance of normal body temperature, maintenance of skin integrity, improvement of cognitive function, prevention of sleep deprivation, effective family coping, increased knowledge about the rehabilitation process, and absence of complications.

Nursing Interventions

The nursing interventions for the patient with a head injury are extensive and diverse; they include making nursing assessments, setting priorities for nursing interventions, anticipating needs and complications, and initiating rehabilitation.

Monitoring for Declining Neurologic Function

The importance of ongoing assessment and monitoring of the patient with brain injury cannot be overstated. The following parameters are assessed initially and as frequently as the patient's condition requires. As soon as the initial assessment is made, the use of a neurologic flow chart is started and maintained.

Level of Consciousness

The Glasgow Coma Scale is used to assess LOC at regular intervals, because changes in the LOC precede all other changes in vital and neurologic signs. The patient's best responses to predetermined stimuli are recorded (see Chart 63-4). Each response is scored (the greater the number, the better the functioning), and the sum of these scores gives an indication of the severity of coma and a prediction of possible outcome. The lowest score is 3 (least responsive); the highest is 15 (most responsive). A score of 8 or less is generally accepted as indicating a severe head injury (Haymore, 2004).

Vital Signs
Although a change in LOC is the most sensitive neurologic indication of deterioration of the patient's condition, vital signs also are monitored at frequent intervals to assess the intracranial status. Table 63-1 depicts the general assessment parameters for the patient with a head injury.
Signs of increasing ICP include slowing of the heart rate (bradycardia), increasing systolic blood pressure, and widening pulse pressure. As brain compression increases, respirations become rapid, the blood pressure may decrease, and the pulse slows further. This is an ominous development, as is a rapid fluctuation of vital signs (Hickey, 2003). A rapid increase in body temperature is regarded as unfavorable because hyperthermia increases the metabolic demands of the brain and may indicate brain stem damage, a poor prognostic sign. The temperature is maintained at less than 38°C (100.4°F). Tachycardia and arterial hypotension may indicate that bleeding is occurring elsewhere in the body.

Motor Function
Motor function is assessed frequently by observing spontaneous movements, asking the patient to raise and lower the extremities, and comparing the strength and equality of the upper and lower extremities at periodic intervals. To assess upper extremity strength, the nurse instructs the patient to squeeze the examiner's fingers tightly. The nurse assesses lower extremity motor strength by placing the hands on the soles of the patient's feet and asking the patient to push down against the examiner's hands. Examination of the motor system is discussed in Chapter 60 in more detail. The presence or absence of spontaneous movement of each extremity is also noted, and speech and eye signs are assessed.
If the patient does not demonstrate spontaneous movement, responses to painful stimuli are assessed (Haymore, 2004). Motor response to pain is assessed by applying a central stimulus, such as pinching the pectoralis major muscle, to determine the patient's best response. Peripheral stimulation may provide inaccurate assessment data because it may result in a reflex movement rather than a voluntary motor response. Abnormal responses (lack of motor response; extension responses) are associated with a poorer prognosis.

Other Neurologic Signs
In addition to the patient's spontaneous eye opening, evaluated with the Glasgow Coma Scale, the size and equality of the pupils and their reaction to light are assessed. A unilaterally dilated and poorly responding pupil may indicate a developing hematoma, with subsequent pressure on the third cranial nerve due to shifting of the brain. If both pupils become fixed and dilated, this indicates overwhelming injury and intrinsic damage to the upper brain stem and is a poor prognostic sign (Arbour, 2004; Hickey, 2003).
The patient with a head injury may develop deficits such as anosmia (lack of sense of smell), eye movement abnormalities, aphasia, memory deficits, and posttraumatic seizures or epilepsy. Patients may be left with residual psychological deficits (impulsiveness, emotional lability, or uninhibited, aggressive behaviors) and, as a consequence of the impairment, may lack insight into their emotional responses.

Maintaining the Airway
One of the most important nursing goals in the management of head injury is to establish and maintain an adequate airway. The brain is extremely sensitive to hypoxia, and a neurologic deficit can worsen if the patient is hypoxic. Therapy is directed toward

maintaining optimal oxygenation to preserve cerebral function. An obstructed airway causes carbon dioxide retention and hypoventilation, which can produce cerebral vessel dilation and increased ICP.
Interventions to ensure an adequate exchange of air are discussed in Chapter 61 and include the following:

- Maintain the unconscious patient in a position that facilitates drainage of oral secretions, with the head of the bed elevated about 30 degrees to decrease intracranial venous pressure (Fan, 2004).
- Establish effective suctioning procedures (pulmonary secretions produce coughing and straining, which increase ICP).
- Guard against aspiration and respiratory insufficiency.
- Closely monitor arterial blood gas values to assess the adequacy of ventilation. The goal is to keep blood gas values within the normal range to ensure adequate cerebral blood flow.
- Monitor the patient who is receiving mechanical ventilation.
- Monitor for pulmonary complications such as acute respiratory distress syndrome (ARDS) and pneumonia (Bader & Littlejohns, 2004).

Monitoring Fluid and Electrolyte Balance
Brain damage can produce metabolic and hormonal dysfunctions. The monitoring of serum electrolyte levels is important, especially in patients receiving osmotic diuretics, those with syndrome of inappropriate antidiuretic hormone (SIADH), and those with posttraumatic diabetes insipidus.
Serial studies of blood and urine electrolytes and osmolality are carried out, because head injuries may be accompanied by disorders of sodium regulation. Hyponatremia is common after head injury due to shifts in extracellular fluid, electrolytes, and volume. Hyperglycemia, for example, can cause an increase in extracellular fluid that lowers sodium (Hickey, 2003). Hypernatremia may also occur as a result of sodium retention that may last several days, followed by sodium diuresis. Increasing lethargy, confusion, and seizures may be due to electrolyte imbalance.
Endocrine function is evaluated by monitoring serum electrolytes, blood glucose values, and intake and output. Urine is tested regularly for acetone. A record of daily weights is maintained, especially if the patient has hypothalamic involvement and is at risk for the development of diabetes insipidus.

Promoting Adequate Nutrition
Head injury results in metabolic changes that increase calorie consumption and nitrogen excretion. Protein demand increases. Early initiation of nutritional therapy has been shown to improve outcomes in patients with head injury. Parenteral nutrition via a central line or enteral feedings administered via a nasogastric or nasojejunal feeding tube should be started within 48 hours after admission (Bader, Littlejohns & March, 2003). If CSF rhinorrhea occurs, an oral feeding tube should be inserted instead of a nasal tube.
Laboratory values should be monitored closely in patients receiving parenteral nutrition. Elevating the head of the bed and aspirating the enteral tube for evidence of residual feeding before administering additional feedings can help prevent distention, regurgitation, and aspiration. A continuous-drip infusion or pump may be used to regulate the feeding. The principles and technique of enteral feedings are discussed in Chapter 36. Enteral or parenteral feedings are usually continued until the swallowing reflex returns and the patient can meet caloric requirements orally.

Preventing Injury

Often, as the patient emerges from coma, a period of lethargy and stupor is followed by a period of agitation. Each phase is variable and depends on the individual, the location of the injury, the depth and duration of coma, and the patient's age. The patient emerging from a coma may become increasingly agitated toward the end of the day. Restlessness may be caused by hypoxia, fever, pain, or a full bladder. It may indicate injury to the brain but may also be a sign that the patient is regaining consciousness. (Some restlessness may be beneficial because the lungs and extremities are exercised.) Agitation may also be due to discomfort from catheters, IV lines, restraints, and repeated neurologic checks. Alternatives to restraints must be used whenever possible. Strategies to prevent injury include the following:

- The patient is assessed to ensure that oxygenation is adequate and the bladder is not distended. Dressings and casts are checked for constriction.
- Padded side rails are used or the patient's hands are wrapped in mitts to protect the patient from self-injury and dislodging of tubes (Fig. 63-6). Restraints are avoided, because straining against them can increase ICP or cause other injury. Enclosed or floor-level specialty beds may be indicated.
- Opioids are avoided as a means of controlling restlessness, because these medications depress respiration, constrict the pupils, and alter responsiveness.
- Environmental stimuli are reduced by keeping the room quiet, limiting visitors, speaking calmly, and providing frequent orientation information (eg, explaining where the patient is and what is being done).
- Adequate lighting is provided to prevent visual hallucinations.
- Efforts are made to minimize disruption of the patient's sleep/wake cycles.
- The patient's skin is lubricated with oil or emollient lotion to prevent irritation due to rubbing against the sheet.
- If incontinence occurs, an external sheath catheter may be used on a male patient. Because prolonged use of an indwelling catheter inevitably produces infection, the patient may be placed on an intermittent catheterization schedule.

Maintaining Body Temperature

An increase in body temperature in the patient with a head injury can be the result of damage to the hypothalamus, cerebral irritation from hemorrhage, or infection. The nurse monitors the patient's temperature every 2 to 4 hours. If the temperature increases, efforts are made to identify the cause and to control it using acetaminophen and cooling blankets to maintain normothermia (Bader & Littlejohns, 2004; Diringer, 2004). Cooling blankets should be used with caution so as not to induce shivering, which increases ICP. If infection is suspected, potential sites of infection are cultured and antibiotics are prescribed and administered.

Use of mild hypothermia to 34° to 35° C (94° to 96° F) has been tested in small randomized controlled trials for at least 12 hours versus normothermia (control) in patients with closed head injury (Alderson, Gadkary & Signorini, 2005). The clinical trials with small samples showed improvement in patient outcomes but need to be repeated in larger trials. Because hypothermia increases the risk of pneumonia and has other side effects, this treatment is not currently recommended outside of controlled clinical trials.

Maintaining Skin Integrity

Patients with traumatic head injury often require assistance in turning and positioning because of immobility or unconsciousness. Prolonged pressure on the tissues decreases

circulation and leads to tissue necrosis. Potential areas of breakdown need to be identified early to avoid the development of pressure ulcers. Specific nursing measures include the following:

- Assessing all body surfaces and documenting skin integrity every 8 hours
- Turning and repositioning the patient every 2 hours
- Providing skin care every 4 hours
- Assisting the patient to get out of bed to a chair three times a day

Improving Cognitive Functioning

Although many patients with head injury survive because of resuscitative and supportive technology, they frequently have significant cognitive sequelae that may not be detected during the acute phase of injury. Cognitive impairment includes memory deficits, decreased ability to focus and sustain attention to a task (distractibility), reduced ability to process information, and slowness in thinking, perceiving, communicating, reading, and writing. Psychiatric, emotional, and relationship problems develop in many patients after head injury (Hsueh-Fen & Stuifbergen, 2004). Resulting psychosocial, behavioral, emotional, and cognitive impairments are devastating to the family as well as to the patient.

These problems require collaboration among many disciplines. A neuropsychologist (specialist in evaluating and treating cognitive problems) plans a program and initiates therapy or counseling to help the patient reach maximal potential (Eslinger, 2002). Cognitive rehabilitation activities help the patient to devise new problem-solving strategies. The retraining is carried out over an extended period and may include the use of sensory stimulation and reinforcement, behavior modification, reality orientation, computer-training programs, and video games. Assistance from many disciplines is necessary during this phase of recovery. Even if intellectual ability does not improve, social and behavioral abilities may.

The patient recovering from a traumatic brain injury may experience fluctuations in the level of cognitive function, with orientation, attention, and memory frequently affected. Many types of sensory stimulation programs have been tried, and research on these programs is ongoing (Davis & Gimeniz, 2004). When pushed to a level greater than the impaired cortical functioning allows, the patient may show symptoms of fatigue, anger, and stress (headache, dizziness). The Rancho Los Amigos Level of Cognitive Function is a scale frequently used to assess cognitive function and evaluate ongoing recovery from head injury. Nursing management and a description of each level are included in Table 63-2. Progress through the levels of cognitive function can vary widely for individual patients.

Preventing Sleep Pattern Disturbance

Patients who require frequent monitoring of neurologic status may experience sleep deprivation as they are awakened hourly for assessment of LOC. To allow the patient longer times of uninterrupted sleep and rest, the nurse can group nursing care activities so that the patient is disturbed less frequently. Environmental noise is decreased, and the room lights are dimmed. Back rubs and other measures to increase comfort can assist in promoting sleep and rest.

Supporting Family Coping

Having a loved one sustain a serious head injury can produce a great deal of prolonged stress in the family. This stress can result from the patient's physical and emotional deficits, the unpredictable outcome, and altered family relationships. Families report

difficulties in coping with changes in the patient's temperament, behavior, and personality. Such changes are associated with disruption in family cohesion, loss of leisure pursuits, and loss of work capacity, as well as social isolation of the caretaker. The family may experience marital disruptions, anger, grief, guilt, and denial in recurring cycles (Hsueh-Fen & Stuifbergen, 2004).

To promote effective coping, the nurse can ask the family how the patient is different now, what has been lost, and what is most difficult about coping with this situation. Helpful interventions include providing family members with accurate and honest information and encouraging them to continue to set well-defined short-term goals. Family counseling helps address the family members' overwhelming feelings of loss and helplessness and gives them guidance for the management of inappropriate behaviors. Support groups help the family members share problems, develop insight, gain information, network, and gain assistance in maintaining realistic expectations and hope.

The Brain Injury Association (see Resources) serves as a clearinghouse for information and resources for patients with head injuries and their families, including specific information on coma, rehabilitation, behavioral consequences of head injury, and family issues. This organization can provide names of facilities and professionals who work with patients with head injuries and can assist families in organizing local support groups.

Many patients with severe head injury die of their injuries, and many of those who survive experience long-term disabilities that prevent them from resuming their previous roles and functions. During the most acute phase of injury, family members need support and facts from the health care team.

Many patients with severe head injuries that result in brain death are young and otherwise healthy and are therefore considered for organ donation. Family members of patients with such injuries need support during this extremely stressful time and assistance in making decisions to end life support and permit donation of organs. They need to know that the patient who is brain dead and whose respiratory and cardiovascular systems are maintained through life support is not going to survive and that the severe head injury, not the removal of the patient's organs or the removal of life support, is the cause of the patient's death. Bereavement counselors and members of the organ procurement team are often very helpful to family members in making decisions about organ donation and in helping them cope with stress.

Monitoring and Managing Potential Complications

Decreased Cerebral Perfusion Pressure

Maintenance of adequate CPP is important to prevent serious complications of head injury due to decreased cerebral perfusion (Bader et al., 2003; Littlejohns et al., 2003). Adequate CPP is greater than 70 mm Hg. Any decrease in this pressure can impair cerebral perfusion and cause brain hypoxia and ischemia, leading to permanent damage. Therapy (eg, elevation of the head of the bed and increased IV fluids) is directed toward decreasing cerebral edema and increasing venous outflow from the brain. Systemic hypotension, which causes vasoconstriction and a significant decrease in CPP, is treated with increased IV fluids.

Cerebral Edema and Herniation

The patient with a head injury is at risk for additional complications such as increased ICP and brain stem herniation. Cerebral edema is the most common cause of increased ICP in the patient with a head injury, with the swelling peaking approximately 48 to 72

hours after injury. Bleeding also may increase the volume of contents within the rigid, closed compartment of the skull, causing increased ICP and herniation of the brain stem and resulting in irreversible brain anoxia and brain death (Arbour, 2004; Censullo & Sebastian, 2004). Measures to control ICP are discussed in Chapter 61 and listed in Chart 63-5.

Impaired Oxygenation and Ventilation

Impaired oxygen and ventilation may require mechanical ventilatory support. The patient must be monitored for a patent airway, altered breathing patterns, and hypoxemia and pneumonia. Interventions may include endotracheal intubation, mechanical ventilation, and positive end-expiratory pressure. These topics are discussed in further detail in Chapters 25 and 61.

Impaired Fluid, Electrolyte, and Nutritional Balance

Fluid, electrolyte, and nutritional imbalances are common in the patient with a head injury. Common imbalances include hyponatremia, which is often associated with SIADH (see Chapters 14 and 42), hypokalemia, and hyperglycemia (Hickey, 2003). Modifications in fluid intake with tube feedings or IV fluids, including hypertonic saline, may be necessary to treat these imbalances (Johnson & Criddle, 2004). Insulin administration may be prescribed to treat hyperglycemia.

Undernutrition is also a common problem in response to the increased metabolic needs associated with severe head injury. If the patient cannot eat, enteral feedings or parenteral nutrition may be initiated within 48 hours after the injury to provide adequate calories and nutrients (Bader et al., 2003). Nutritional support in the form of early feeding after head injury is associated with better survival outcomes and decreased disability (Yanagawa, Bunn, Roberts, et al., 2002).

Post-traumatic Seizures

Patients with head injury are at an increased risk for post-traumatic seizures. Post-traumatic seizures are classified as immediate (within 24 hours after injury), early (within 1 to 7 days after injury), or late (more than 7 days after injury) (Somjen, 2004). Seizure prophylaxis is the practice of administering antiseizure medications to patients with head injury to prevent seizures. It is important to prevent post-traumatic seizures, especially in the immediate and early phase of recovery, because seizures may increase ICP and decrease oxygenation. However, many antiseizure medications impair cognitive performance and can prolong the duration of rehabilitation. Therefore, it is important to weigh the overall benefit of these medications against their side effects. Research evidence supports the use of prophylactic antiseizure agents to prevent immediate and early seizures after head injury, but not for prevention of late seizures (Somjen, 2004).

The nurse must assess the patient carefully for the development of post-traumatic seizures. Risk factors that increase the likelihood of seizures are brain contusion with subdural hematoma, skull fracture, loss of consciousness or amnesia of 1 day or more, and age older than 65 years (Somjen, 2004). The nursing management of seizures is addressed in Chapter 61.

Other complications after traumatic head injury include systemic infections (pneumonia, urinary tract infection [UTI], septicemia), neurosurgical infections (wound infection, osteomyelitis, meningitis, ventriculitis, brain abscess), and heterotrophic ossification (painful bone overgrowth in weight-bearing joints).

Promoting Home and Community-Based Care

Teaching Patients Self-Care

Teaching early in the course of head injury often focuses on reinforcing information given to the family about the patient's condition and prognosis. As the patient's status and expected outcome change over time, family teaching may focus on interpretation and explanation of changes in the patient's physical and psychological responses.

If the patient's physical status allows discharge to home, the patient and family are instructed about limitations that can be expected and complications that may occur. The nurse explains to the patient and family, verbally and in writing, how to monitor for complications that merit contacting the neurosurgeon. Depending on the patient's prognosis and physical and cognitive status, the patient may be included in teaching about self-care management strategies.

If the patient is at risk for late posttraumatic seizures, antiseizure medications may be prescribed at discharge. The patient and family require instruction about the side effects of these medications and the importance of continuing to take them as prescribed.

Continuing Care

Rehabilitation of the patient with a head injury begins at the time of injury and continues into the home and community. Depending on the degree of brain damage, the patient may be referred to a rehabilitation setting that specializes in cognitive restructuring after brain injury (Ashley, 2004). The patient is encouraged to continue the rehabilitation program after discharge, because improvement in status may continue 3 or more years after injury. Changes in the patient with a head injury and the effects of long-term rehabilitation on the family and their coping abilities need frequent assessment. Continued teaching and support of the patient and family are essential as their needs and the patient's status change. Teaching points to address with the family of the patient who is about to return home are described in Chart 63-6.

Depending on his or her status, the patient is encouraged to return to normal activities gradually. Referral to support groups and to the Brain Injury Association may be warranted.

During the acute and rehabilitation phases of care, the focus of teaching is on obvious needs, issues, and deficits. The nurse needs to remind the patient and family of the need for continuing health promotion and screening practices after these initial phases. Patients who have not been involved in these practices in the past are educated about their importance and are referred to appropriate health care providers.

Evaluation

Expected Patient Outcomes

Expected patient outcomes may include the following:

- Attains or maintains effective airway clearance, ventilation, and brain oxygenation
    - Achieves normal blood gas values and has normal breath sounds on auscultation
    - Mobilizes and clears secretions
- Achieves satisfactory fluid and electrolyte balance
    - Demonstrates serum electrolytes within normal range
    - Has no clinical signs of dehydration or overhydration
- Attains adequate nutritional status
    - Has less than 50 mL of aspirate in stomach before each tube feeding
    - Is free of gastric distention and vomiting
    - Shows minimal weight loss

- Avoids injury
    - Shows lessening agitation and restlessness
    - Is oriented to time, place, and person
- Maintains normal body temperature
    - Absence of fever
    - Absence of hypothermia
- Demonstrates intact skin integrity
    - Exhibits no redness or breaks in skin integrity
    - Exhibits no pressure ulcers
- Shows improvement in cognitive function and improved memory
- Demonstrates normal sleep/wake cycle
- Demonstrates absence of complications
    - Exhibits normal vital signs and body temperature, and increasing orientation to time, place, and person
    - Demonstrates normal or reduced ICP
- Experiences no posttraumatic seizures
    - Takes antiseizure medications as prescribed
    - Identifies side effects/adverse effects of antiseizure medications
- Family demonstrates adaptive family processes
    - Joins support group
    - Shares feelings with appropriate health care personnel
    - Makes end-of-life decisions, if needed
- Participates in rehabilitation process as indicated for patient and family members
    - Takes active role in identifying rehabilitation goals and participating in recommended patient care activities
    - Prepares for discharge

Nursing Process
The Patient with Acute Spinal Cord Injury

Assessment

The breathing pattern is observed, the strength of the cough is assessed, and the lungs are auscultated, because paralysis of abdominal and respiratory muscles diminishes coughing and makes clearing of bronchial and pharyngeal secretions difficult. Reduced excursion of the chest also results.

The patient is monitored closely for any changes in motor or sensory function and for symptoms of progressive neurologic damage. In the early stages of SCI, determining whether the cord has been severed may be impossible, because signs and symptoms of cord edema are indistinguishable from those of cord transection. Edema of the spinal cord may occur with any severe cord injury and may further compromise spinal cord function.

Motor and sensory functions are assessed through careful neurologic examination. These findings usually are recorded on a flow sheet so that changes in the baseline neurologic status can be monitored closely and accurately. The ASIA classification is commonly used to describe level of function for SCI patients. Chart 63-7 gives examples of the effects of altered spinal cord function. At the minimum:

- Motor ability is tested by asking the patient to spread the fingers, squeeze the examiner's hand, and move the toes or turn the feet.
- Sensation is evaluated by gently pinching the skin or touching it lightly with an object such as a tongue blade, starting at shoulder level and working down both sides of the extremities. The patient should have both eyes closed so that the examination reveals true findings, not what the patient hopes to feel. The patient is asked where the sensation is felt.
- Any decrease in neurologic function is reported immediately.

The patient is also assessed for spinal shock, a complete loss of all reflex, motor, sensory, and autonomic activity below the level of the lesion that causes bladder paralysis and distention. The lower abdomen is palpated for signs of urinary retention and overdistention of the bladder. Further assessment is made for gastric dilation and ileus caused by an atonic bowel, a result of autonomic disruption.
Temperature is monitored, because the patient may have periods of hyperthermia as a result of alteration in temperature control due to autonomic disruption.

Diagnosis
Nursing Diagnoses
Based on the assessment data, the patient's major nursing diagnoses may include the following:

- Ineffective breathing patterns related to weakness or paralysis of abdominal and intercostal muscles and inability to clear secretions
- Ineffective airway clearance related to weakness of intercostal muscles
- Impaired bed and physical mobility related to motor and sensory impairments
- Disturbed sensory perception related to motor and sensory impairment
- Risk for impaired skin integrity related to immobility and sensory loss
- Impaired urinary elimination related to inability to void spontaneously
- Constipation related to presence of atonic bowel as a result of autonomic disruption
- Acute pain and discomfort related to treatment and prolonged immobility

Collaborative Problems/Potential Complications
Based on the assessment data, potential complications that may develop include:

- DVT
- Orthostatic hypotension
- Autonomic dysreflexia

Planning and Goals
The goals for the patient may include improved breathing pattern and airway clearance, improved mobility, improved sensory and perceptual awareness, maintenance of skin integrity, relief of urinary retention, improved bowel function, promotion of comfort, and absence of complications.

Nursing Interventions

Promoting Adequate Breathing and Airway Clearance
Possible impending respiratory failure is detected by observing the patient, measuring vital capacity, monitoring oxygen saturation through pulse oximetry, and monitoring

arterial blood gas values. Early and vigorous attention to clearing bronchial and pharyngeal secretions can prevent retention of secretions and atelectasis. Suctioning may be indicated, but caution must be used, because this procedure can stimulate the vagus nerve, producing bradycardia, which can result in cardiac arrest.

If the patient cannot cough effectively because of decreased inspiratory volume and inability to generate sufficient expiratory pressure, chest physical therapy and assisted coughing may be indicated. Specific breathing exercises are supervised by the nurse to increase the strength and endurance of the inspiratory muscles, particularly the diaphragm. Assisted coughing promotes clearing of secretions from the upper respiratory tract and is similar to the use of abdominal thrusts to clear an airway (see Chapter 25). Ensuring proper humidification and hydration is important to prevent secretions from becoming thick and difficult to remove even with coughing. The patient is assessed for signs of respiratory infection (cough, fever, dyspnea). Smoking is discouraged, because it increases bronchial and pulmonary secretions and impairs ciliary action.

Ascending edema of the spinal cord in the acute phase may cause respiratory difficulty that requires immediate intervention. Therefore, the patient's respiratory status must be monitored frequently.

Improving Mobility

Proper body alignment is maintained at all times. The patient is repositioned frequently and is assisted out of bed as soon as the spinal column is stabilized. The feet are prone to footdrop; therefore, various types of splints are used to prevent footdrop. When used, the splints are removed and reapplied every 2 hours. Trochanter rolls, applied from the crest of the ilium to the midthigh of both legs, help prevent external rotation of the hip joints.

Patients with lesions above the midthoracic level have loss of sympathetic control of peripheral vasoconstrictor activity, leading to hypotension. These patients may tolerate changes in position poorly and require monitoring of blood pressure when positions are changed. Usually, the patient is turned every 2 hours. If not on a rotating bed, the patient should not be turned unless the spine is stable and the physician has indicated that it is safe to do so.

Contractures develop rapidly with immobility and muscle paralysis. A joint that is immobilized too long becomes fixed as a result of contractures of the tendon and joint capsule. Atrophy of the extremities results from disuse. Contractures and other complications may be prevented by range-of-motion exercises that help preserve joint motion and stimulate circulation. Passive range-of-motion exercises should be implemented as soon as possible after injury. Toes, metatarsals, ankles, knees, and hips should be put through a full range of motion at least four, and ideally five, times daily.

For most patients who have a cervical fracture without neurologic deficit, reduction in traction followed by rigid immobilization for 6 to 8 weeks restores skeletal integrity. These patients are allowed to move gradually to an erect position. A four-poster neck brace or molded collar is applied when the patient is mobilized after traction is removed (see Fig. 63-8).

Promoting Adaptation to Sensory and Perceptual Alterations

The nurse assists the patient to compensate for sensory and perceptual alterations that occur with SCI. The intact senses above the level of the injury are stimulated through touch, aromas, flavorful food and beverages, conversation, and music. Additional strategies include the following:

- Providing prism glasses to enable the patient to see from the supine position
- Encouraging use of hearing aids, if indicated, to enable the patient to hear conversations and environmental sounds
- Providing emotional support to the patient
- Teaching the patient strategies to compensate for or cope with these deficits

Maintaining Skin Integrity

Because patients with SCI are immobilized and have loss of sensation below the level of the lesion, they have the highest prevalence of pressure ulcers in the United States (Phillips, 2003). Pressure ulcers have developed within 6 hours in areas of local tissue ischemia, where there is continuous pressure and where the peripheral circulation is inadequate as a result of spinal shock and a recumbent position. Prolonged immobilization of the patient on a transfer board also increases the risk for pressure ulcers. The most common sites are over the ischial tuberosity, the greater trochanter, the sacrum, and the occiput (back of head). Patients who wear cervical collars for prolonged periods may develop breakdown from the pressure of the collar under the chin, on the shoulders, and at the occiput.

The patient's position is changed at least every 2 hours. Turning not only assists in the prevention of pressure ulcers but also prevents pooling of blood and edema in the dependent areas.

Careful inspection of the skin is made each time the patient is turned. The skin over the pressure points is assessed for redness or breaks; the perineum is checked for soilage, and the catheter is observed for adequate drainage. The patient's general body alignment and comfort are assessed. Special attention should be given to pressure areas in contact with the transfer board.

The patient's skin should be kept clean by washing with a mild soap, rinsing well, and blotting dry. Pressure-sensitive areas should be kept well lubricated and soft with hand cream or lotion. To increase understanding of the reasons for preventive measures, the patient is educated about the danger of pressure ulcers and is encouraged to take control and make decisions about appropriate skin care (Kinder, 2005). See Chapter 11 for other aspects of the prevention of pressure ulcers.

Maintaining Urinary Elimination

Immediately after SCI, the urinary bladder becomes atonic and cannot contract by reflex activity. Urinary retention is the immediate result. Because the patient has no sensation of bladder distention, overstretching of the bladder and detrusor muscle may occur, delaying the return of bladder function.

Intermittent catheterization is carried out to avoid overdistention of the bladder and UTI. If this is not feasible, an indwelling catheter is inserted temporarily. At an early stage, family members are shown how to carry out intermittent catheterization and are encouraged to participate in this facet of care, because they will be involved in long-term follow-up and must be able to recognize complications so that treatment can be instituted.

The patient is taught to record fluid intake, voiding pattern, amounts of residual urine after catheterization, characteristics of urine, and any unusual sensations that may occur. The management of a neurogenic bladder (bladder dysfunction that results from a disorder or dysfunction of the nervous system) is discussed in detail in Chapter 11.

Improving Bowel Function

Immediately after SCI, a paralytic ileus usually develops due to neurogenic paralysis of the bowel; therefore, a nasogastric tube is often required to relieve distention and to prevent vomiting and aspiration.

Bowel activity usually returns within the first week. As soon as bowel sounds are heard on auscultation, the patient is given a high-calorie, high-protein, high-fiber diet, with the amount of food gradually increased. The nurse administers prescribed stool softeners to counteract the effects of immobility and analgesic agents. A bowel program is instituted as early as possible.

Providing Comfort Measures

A patient who has had pins, tongs, or calipers placed for cervical stabilization may have a slight headache or discomfort for several days after the pins are inserted. Patients initially may be bothered by the rather startling appearance of these devices, but usually they readily adapt to it because the device provides comfort for the unstable neck. The patient may complain of being caged in and of noise created by any object coming in contact with the steel frame of a halo device, but he or she can be reassured that adaptation to such annoyances will occur.

The Patient in Halo Traction

The areas around the four pin sites of a halo device are cleaned daily and observed for redness, drainage, and pain. The pins are observed for loosening, which may contribute to infection. If one of the pins becomes detached, the head is stabilized in a neutral position by one person while another notifies the neurosurgeon. A torque screwdriver should be readily available in case the screws on the frame need tightening.

The skin under the halo vest is inspected for excessive perspiration, redness, and skin blistering, especially on the bony prominences. The vest is opened at the sides to allow the torso to be washed. The liner of the vest should not become wet, because dampness causes skin excoriation. Powder is not used inside the vest, because it may contribute to the development of pressure ulcers. The liner should be changed periodically to promote hygiene and good skin care. If the patient is to be discharged with the vest, detailed instructions must be given to the family, with time allowed for them to return demonstrate the necessary skills of halo vest care (Chart 63-9).

Monitoring and Managing Potential Complications

Thrombophlebitis

Thrombophlebitis is a relatively common complication in patients after SCI. DVT occurs in a high percentage of SCI patients, placing them at risk for PE. The patient must be assessed for symptoms of thrombophlebitis and PE: chest pain, shortness of breath, and changes in arterial blood gas values must be reported promptly to the physician. The circumferences of the thighs and calves are measured and recorded daily; further diagnostic studies are performed if a significant increase is noted. Patients remain at high risk for thrombophlebitis for several months after the initial injury. Patients with paraplegia or tetraplegia are at increased risk for the rest of their lives. Immobilization and the associated venous stasis, as well as varying degrees of autonomic disruption, contribute to the high risk and susceptibility for DVT (Farray, Carman & Fernandez, 2004).

Anticoagulation is initiated once head injury and other systemic injuries have been ruled out. Low-dose fractionated or unfractionated heparin may be followed by long-term oral anticoagulation (ie, warfarin) or subcutaneous fractionated heparin injections. Additional measures such as range-of-motion exercises, thigh-high elastic compression stockings, and adequate hydration are important preventive measures. Pneumatic compression devices may also be used to reduce venous pooling and promote venous

return. It is also important to avoid exter-nal pressure on the lower extremities that may result from flexion of the knees while the patient is in bed.

Orthostatic Hypotension

For the first 2 weeks after SCI, the blood pressure tends to be unstable and quite low. It gradually returns to preinjury levels, but periodic episodes of severe orthostatic hypotension frequently interfere with efforts to mobilize the patient. Interruption in the reflex arcs that normally produce vasoconstriction in the upright position, coupled with vasodilation and pooling in abdominal and lower extremity vessels, can result in blood pressure readings of 40 mm Hg systolic and 0 mm Hg diastolic. Orthostatic hypotension is a particularly common problem for patients with lesions above T7. In some patients with tetraplegia, even slight elevations of the head can result in dramatic changes in blood pressure.

A number of techniques can be used to reduce the frequency of hypotensive episodes. Close monitoring of vital signs before and during position changes is essential. Vasopressor medication can be used to treat the profound vasodilation. Thigh-high elastic compression stockings should be applied to improve venous return from the lower extremities. Abdominal binders may also be used to encourage venous return and provide diaphragmatic support when the patient is upright. Activity should be planned in advance, and adequate time should be allowed for a slow progression of position changes from recumbent to sitting and upright. Tilt tables frequently are helpful in assisting patients to make this transition.

Autonomic Dysreflexia

Autonomic dysreflexia (autonomic hyperreflexia) is an acute emergency that occurs as a result of exaggerated autonomic responses to stimuli that are harmless in normal people. It occurs only after spinal shock has resolved. This syndrome is characterized by a severe, pounding headache with paroxysmal hypertension, profuse diaphoresis (most often of the forehead), nausea, nasal congestion, and bradycardia. It occurs among patients with cord lesions above T6 (the sympathetic visceral outflow level) after spinal shock has subsided. The sudden increase in blood pressure may cause a rupture of one or more cerebral blood vessels or lead to increased ICP. A number of stimuli may trigger this reflex: distended bladder (the most common cause); distention or contraction of the visceral organs, especially the bowel (from constipation, impaction); or stimulation of the skin (tactile, pain, thermal stimuli, pressure ulcer). Because this is an emergency situation, the objectives are to remove the triggering stimulus and to avoid the possibly serious complications.

The following measures are carried out:

- The patient is placed immediately in a sitting position to lower blood pressure.
- Rapid assessment is performed to identify and alleviate the cause.
- The bladder is emptied immediately via a urinary catheter. If an indwelling catheter is not patent, it is irrigated or replaced with another catheter.
- The rectum is examined for a fecal mass. If one is present, a topical anesthetic is inserted 10 to 15 minutes before the mass is removed, because visceral distention or contraction can cause autonomic dysreflexia.
- The skin is examined for any areas of pressure, irritation, or broken skin.
- Any other stimulus that could be the triggering event, such as an object next to the skin or a draft of cold air, must be removed.

- If these measures do not relieve the hypertension and excruciating headache, a ganglionic blocking agent (hydralazine hydrochloride [Apresoline]) is prescribed and administered slowly by the IV route.
- The medical record or chart is labeled with a clearly visible note about the risk for autonomic dysreflexia.
- The patient is instructed about prevention and management measures.
- Any patient with a lesion above the T6 segment is informed that such an episode is possible and may occur even many years after the initial injury.

Promoting Home and Community-Based Care

Teaching Patients Self-Care

In most cases, patients with SCI (ie, patients with tetraplegia or paraplegia) need long-term rehabilitation. The process begins during hospitalization, as acute symptoms begin to subside or come under better control and the overall deficits and long-term effects of the injury become clear. The goals begin to shift from merely surviving the injury to learning strategies necessary to cope with the alterations that the injury imposes on activities of daily living (ADLs). The emphasis shifts from ensuring that the patient is stable and free of complications to specific assessment and planning designed to meet the patient's rehabilitation needs. Patient teaching may initially focus on the injury and its effects on mobility, dressing, and bowel, bladder, and sexual function. As the patient and family acknowledge the consequences of the injury and the resulting disability, the focus of teaching broadens to address issues necessary for carrying out the tasks of daily living and taking charge of their lives (Kinder, 2005). Teaching begins in the acute phase and continues throughout rehabilitation and throughout the patient's life as changes occur, the patient ages, and problems arise (Capoor & Stein, 2005).

Caring for the patient with SCI at home may at first seem a daunting task to the family. They will require dedicated nursing support to gradually assume full care of the patient. Although maintaining function and preventing complications will remain important, goals regarding self-care and preparation for discharge will assist in a smooth transition to rehabilitation and eventually to the community.

Continuing Care

The ultimate goal of the rehabilitation process is independence. The nurse becomes a support to both the patient and the family, assisting them to assume responsibility for increasing aspects of patient care and management. Care for the patient with SCI involves members of all the health care disciplines, which may include nursing, medicine, rehabilitation, respiratory therapy, physical and occupational therapy, case management, and social services. The nurse often serves as coordinator of the management team and as a liaison with rehabilitation centers and home care agencies. The patient and family often require assistance in dealing with the psychological impact of the injury and its consequences; referral to a psychiatric clinical nurse specialist or other mental health care professional often is helpful.

The nurse should reassure female patients with SCI that pregnancy is not contraindicated, but that pregnant women with acute or chronic SCI pose unique management challenges (Jackson, Lindsey, Klebine, et al., 2004). The normal physiologic changes of pregnancy may predispose women with SCI to many potentially life-threatening complications, including autonomic dysreflexia, pyelonephritis, respiratory insufficiency, thrombophlebitis, PE, and unattended delivery. Preconception assessment and counseling are strongly recommended to ensure that the woman is in optimal health and to increase the likelihood of an uneventful pregnancy and healthy outcomes.

As more patients survive acute SCI, they face the changes associated with aging with a disability. Therefore, teaching in the home and community focuses on health promotion and addresses the need to minimize risk factors (eg, smoking, alcohol and drug abuse, obesity) (Mastrogiovanni, Phillips & Fine, 2003). Home care nurses and others who have contact with patients with SCI are in a position to teach patients about healthy lifestyles, remind them of the need for health screenings, and make referrals as appropriate. Assisting patients to identify accessible health care providers, clinical facilities, and imaging centers may increase the likelihood that they will participate in health screening.

Evaluation

Expected Patient Outcomes

Expected patient outcomes may include the following:

- Demonstrates improvement in gas exchange and clearance of secretions, as evidenced by normal breath sounds on auscultation
    - Breathes easily without shortness of breath
    - Performs hourly deep-breathing exercises, coughs effectively, and clears pulmonary secretions
    - Is free of respiratory infection (ie, has normal temperature, respiratory rate, and pulse, normal breath sounds, absence of purulent sputum)
- Moves within limits of the dysfunction and demonstrates completion of exercises within functional limitations
- Demonstrates adaptation to sensory and perceptual alterations
    - Uses assistive devices (eg, prism glasses, hearing aids, computers) as indicated
    - Describes sensory and perceptual alterations as a consequence of injury
- Demonstrates optimal skin integrity
    - Exhibits normal skin turgor; skin is free of reddened areas or breaks
    - Participates in skin care and monitoring procedures within functional limitations
- Regains urinary bladder function
    - Exhibits no signs of UTI (ie, has normal temperature; voids clear, dilute urine)
    - Has adequate fluid intake
    - Participates in bladder training program within functional limitations
- Regains bowel function
    - Reports regular pattern of bowel movement
    - Consumes adequate dietary fiber and oral fluids
    - Participates in bowel training program within functional limitations
- Reports absence of pain and discomfort
- Is free of complications
    - Demonstrates no signs of thrombophlebitis or DVT
    - Exhibits no manifestations of pulmonary embolism (eg, no chest pain or shortness of breath; arterial blood gas values are normal)
    - Maintains blood pressure within normal limits
    - Reports no lightheadedness with position changes
    - Exhibits no manifestations of autonomic dysreflexia (ie, absence of headache, diaphoresis, nasal congestion, bradycardia, or diaphoresis)

Chapter 64

Management of Patients with Neurologic Infections, Autoimmune Disorders, and Neuropathies

Meningitis

• Inflammation of the membranes and the fluid space surrounding the brain and spinal cord

• ***Types***

–Septic due to bacteria (Streptococcus pneumoniae, Neisseria meningitidis)

–Aseptic due viral infection, lymphoma, leukemia, or brain abscess

• N. meningitidis is transmitted by secretions or aerosol contamination and infection is most likely in dense community groups such as college campuses

• **Manifestations** include headache, fever, changes in LOC, behavioral changes, nuchal rigidity (stiff neck), projectile vomiting, positive Kernig's sign, positive Brudzinski's sign, and photophobia, ? seizure.

Kernig's Sign

When the patient is lying with the thigh flexed on the abdomen, the leg cannot be completely extended

Kernig's Sign

Brudzinski's Sign

When the patient's neck is flexed (after ruling out cervical trauma or injury), flexion of the knees and hips is produced; when the lower extremity of one side is passively flexed, a similar movement is seen in the opposite extremity

Brudzinski's Sign

Assessment and Diagnostic Findings

• Bacterial culture and Gram staining of CSF and blood are key diagnostic tests (Fischbach, 2002).

• The presence of polysaccharide antigen in CSF further supports the diagnosis of bacterial meningitis

Medical Management

• Prevention by vaccination against Haemophilus influenzae and S. pneumoniae for all children and all at-risk adults

• Early administration of high doses of appropriate IV antibiotics (should cross BBB) for bacterial meningitis

• Dexamethasone

• Treatment dehydration, shock, and seizures

Nursing Management

• Frequent/continual assessment including VS and LOC

• Protect patient form injury related to seizure activity or altered LOC

• Monitor daily weight, serum electrolytes, urine volume, specific gravity, and osmolality

• Prevent complications associated with immobility

• Infection control precautions

• Supportive care

• Measures to facilitate coping of patient and family

Brain Abscess

— Collection of infectious material within brain tissue

— Risk is increased in immunocompromised patient

— Prevent by treating otitis media, mastoiditis, sinusitis, dental infections, and systemic infections promptly

— Manifestations may include headache that is usually worse in the morning, fever, vomiting, neurologic deficits, signs and symptoms of increased ICP

— Diagnosis by MRI or CT

— CT-guided aspiration is used to identify the causative organisms

• Medical management

–Control ICP –Drain abscess

–Administer appropriate antibiotic therapy. Corticosteroids may be used to treat cerebral edema

• Nursing management

–Frequent and ongoing neurologic assessment and of responses to treatment

–Assure patient safety and protect from injury

–Provide supportive care

Encephalitis

• Acute, inflammatory process of the brain tissue

• Causes include viral infections (herpes simplex [HSV]), vector-borne viral infections (West Nile, St. Louis), and fungal infections

• Manifestations may include headache, fever, confusion, changes in LOC; rash, flaccid paralysis, Parkinson-like movements

• Medical management

–Acyclovir for HSV infection, amphotericin and/or other antifungal agents for fungal infection

• Nursing management

–Frequent and ongoing assessment

–Supportive care

Multiple Sclerosis (MS)

• A progressive immune-related demyelination disease of the CNS

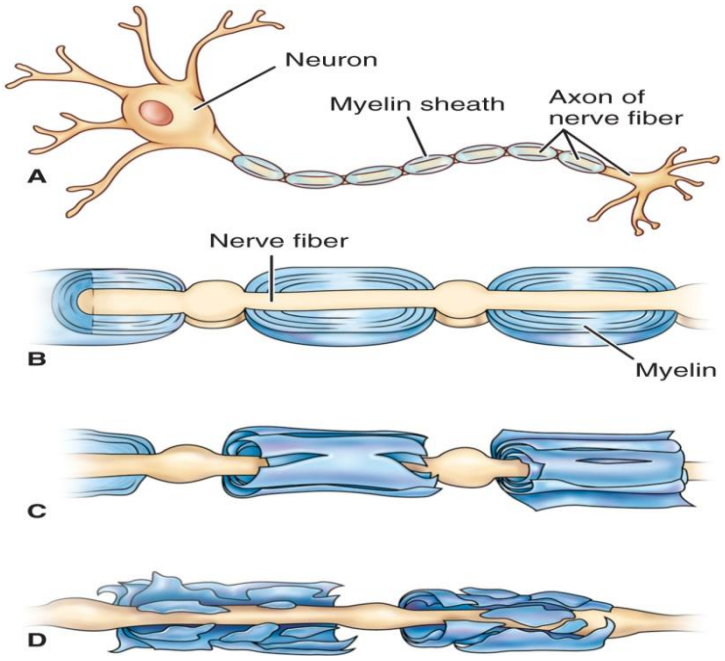
• Clinical manifestations vary and have different patterns

• Frequently, the disease is relapsing and remitting, has exacerbations and recurrences of symptoms including fatigue, weakness, numbness, difficulty in coordination, loss of balance, pain, and visual disturbances

• Medical management

–Disease-modifying therapies; interferon b-1a and interferon b-1b, glatiramer acetate (Copaxone), and IV methylprednisolone

Process of Demyelination



Clinical Manifestations

• Has a relapsing remitting (RR) course. With each relapse, recovery is usually complete.

• Quadriparesis, cognitive dysfunction, visual loss.

• Fatigue, depression, weakness, numbness, difficulty in coordination, loss of balance, and pain. Visual disturbances due to lesions in the optic nerves or their connections may include blurring of vision, diplopia (double vision), patchy blindness (scotoma), and total blindness.

Multiple Sclerosis treatment

• No cure exists for MS

• Treatment directed toward to relieving the patient's symptoms and provide continuing support.

• Immunosuppressive agents

Myasthenia Gravis

Autoimmune disorder affecting the myoneural junction

Antibodies directed at acetylcholine at the myoneural junction impair transmission of impulses

Manifestations

Myasthenia gravis, a motor disorder

Initially symptoms involve ocular muscles; diplopia and ptosis

Weakness of facial muscles, swallowing and voice impairment (dysphonia), generalized weakness, weakness affects all the extremities and the intercostal

Medical Management

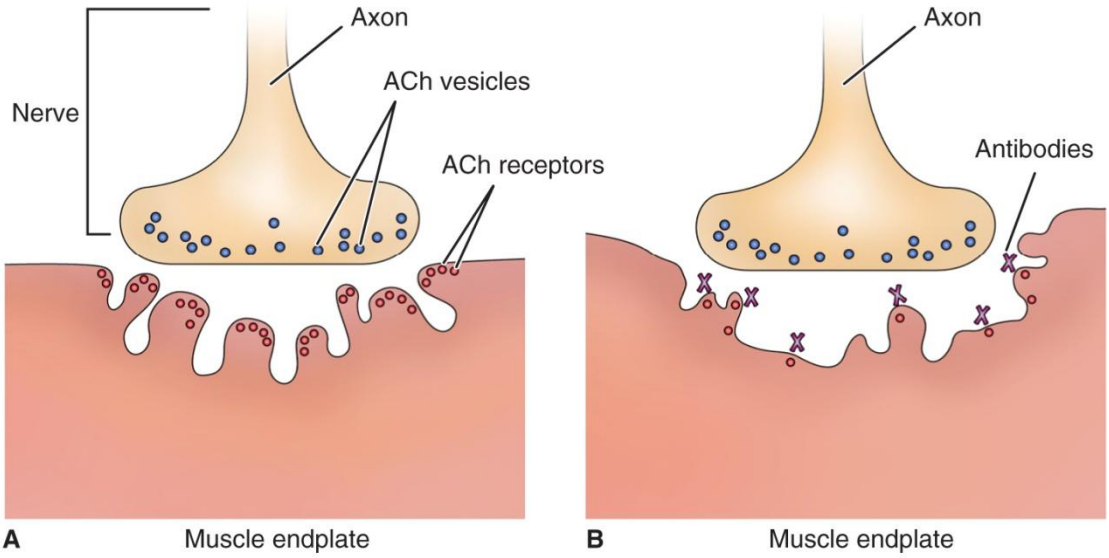
• Pharmacologic therapy

  –Cholinesterase inhibitor: pyrostigmine bromide (Mestinon)

  –Immunomodulating therapy

• Plasmapheresis

• Thymectomy



Normal ACh receptor site

ACh receptor site in myasthenia gravis

Guillain-Barré Syndrome

• Autoimmune disorder with acute attack of peripheral nerve myelin

• Rapid demyelination may produce respiratory failure and autonomic nervous system dysfunction with CV instability

• Most often follows a viral infection

• Manifestations are variable and may include weakness, paralysis, paresthesias, pain, and diminished or absent reflexes starting with the lower extremities and progressing upward; tachycardia; bradycardia; hypertension; or

• Medical management

–Requires intensive care management with continuous monitoring and respiratory support

–Plasmapheresis used to reduce circulating antibodies

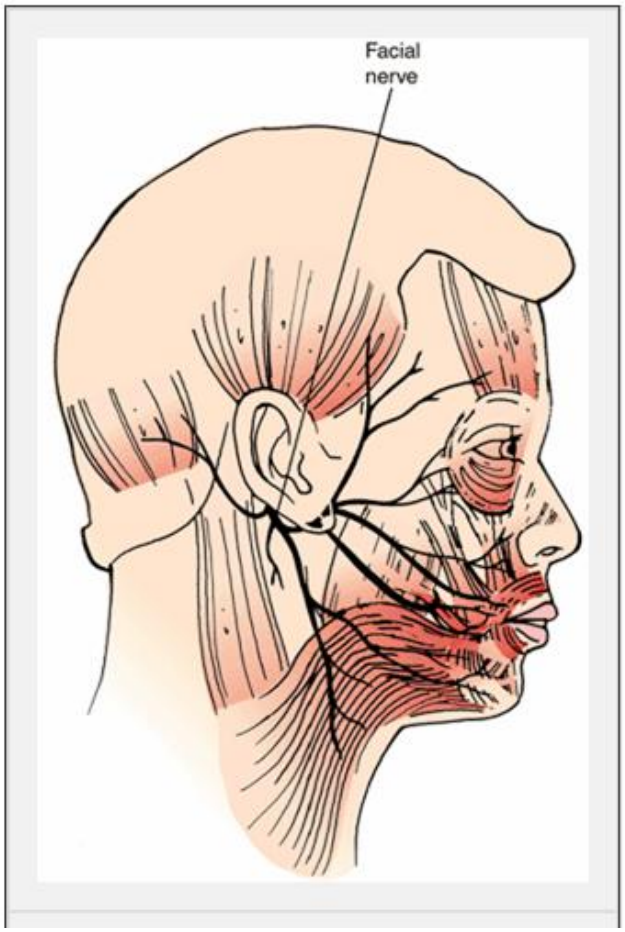
• Recovery rates vary, but most patients recover completely

Bell's Palsy

• Facial paralysis due to unilateral inflammation of the 7th cranial nerve

• Manifestations—unilateral facial muscle weakness or paralysis with facial distortion, increased lacrimation, and painful sensations in the face, may have difficulty with speech and eating

• Most patients recover completely in 3–5 weeks and the disorder rarely recurs.



Management

• Medical

–Corticosteroid therapy may be used to reduce inflammation and diminish severity of the disorder.

• Nursing

–Provide and reinforce information and reassurance that stroke has not occurred.

–Protection of the eye from injury; cover eye with shield at night, instruct patient to close eyelid, use of eye ointment, sunglasses.

–Facial exercises and massage to maintain muscle tone.