

LESSON ASSIGNMENT

LESSON 2

Nursing Care Related to the Urinary System.

TEXT ASSIGNMENT

Paragraphs 2-1 through 2-40.

LESSON OBJECTIVES

After completing this lesson, you should be able to:

- 2-1. State the functions of the urinary system.
- 2-2. List the anatomical parts of the urinary system.
- 2-3. Identify the anatomical parts of the kidney.
- 2-4. Name the functional unit of the kidney.
- 2-5. Define polyuria.
- 2-6. Define oliguria.
- 2-7. Define anuria.
- 2-8. Define dysuria.
- 2-9. Define hematuria.
- 2-10. List two nursing implications associated with the care of a patient undergoing a cystoscopy.
- 2-11. List the steps for collection of a clean-catch urine specimen.
- 2-12. List the steps for collection of a 24-hour urine specimen.
- 2-13. List five purposes for cauterization of the urinary bladder.
- 2-14. List three general nursing implications associated with the insertion of a urinary catheter.
- 2-15. List the steps for insertion of a retention catheter.

- 2-16. State the purpose of a closed urinary drainage system.
- 2-17. List the steps for collecting a sterile urine specimen from an indwelling catheter.
- 2-18. List three purposes for continuous bladder irrigation.
- 2-19. List the steps for performing a continuous bladder irrigation.
- 2-20. State the route of entry of bacteria in most urinary tract infections.
- 2-21. List three nursing implications associated with care of a patient with a urinary tract infection.
- 2-22. Define pyelonephritis.
- 2-23. List three factors, which may precipitate urolithiasis.
- 2-24. List the symptoms associated with urolithiasis.
- 2-25. Define glomerulonephritis.
- 2-26. List at least three nursing implications associated with the care of a patient with glomerulonephritis.
- 2-27. Explain the purpose of restricting dietary protein in patients with renal disease.
- 2-28. Define renal failure.
- 2-29. List at least three nursing implications associated with care of a patient with renal failure.

SUGGESTION

After studying the assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 2

NURSING CARE RELATED TO THE URINARY SYSTEM

Section I. ANATOMY AND PHYSIOLOGY

2-1. INTRODUCTION

- a. The primary function of the urinary system is to control the composition, volume, and pressure of the body's fluids by regulating excretion of water and solutes.
- b. Circulating blood is filtered by the kidneys, where nonessential solutes are removed or "cleared" from the blood. Essential chemicals and water are restored to the blood in accordance with the body's homeostatic requirements.
- c. Metabolic waste products, foreign substances, and water are removed from the body in the form of urine.
- d. The urinary system consists of two kidneys, two ureters, one urinary bladder, and one urethra (figure 2-1).

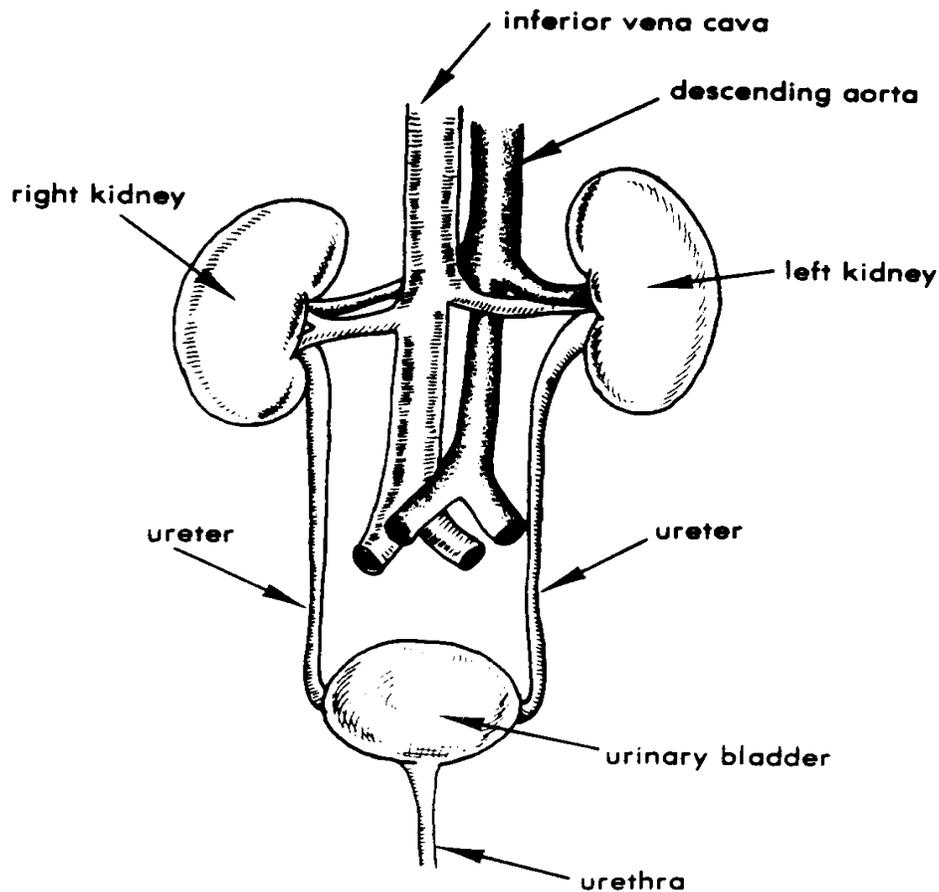


Figure 2-1. The urinary system.

2-2. THE KIDNEYS

a. The kidneys (figure 2-2) are a pair of bean-shaped organs about four inches long, two inches wide, one-inch thick, and weighing four to six ounces each.

b. One kidney is located on each side of the body. They are pressed against the posterior abdominal wall at about the level of the first lumbar vertebrae.

c. The medial side of each kidney is concave and has a central notch called the hilum. Here, the renal artery enters the kidney, and the renal vein and ureter exit the kidney. Nerves and lymphatic vessels also pass through the hilum.

d. The kidneys are enclosed by the renal capsule. Directly beneath the capsule lies a reddish area called the renal cortex. The cortex contains millions of microscopic filtration plants called nephrons. Nephrons are the functional units of the kidney.

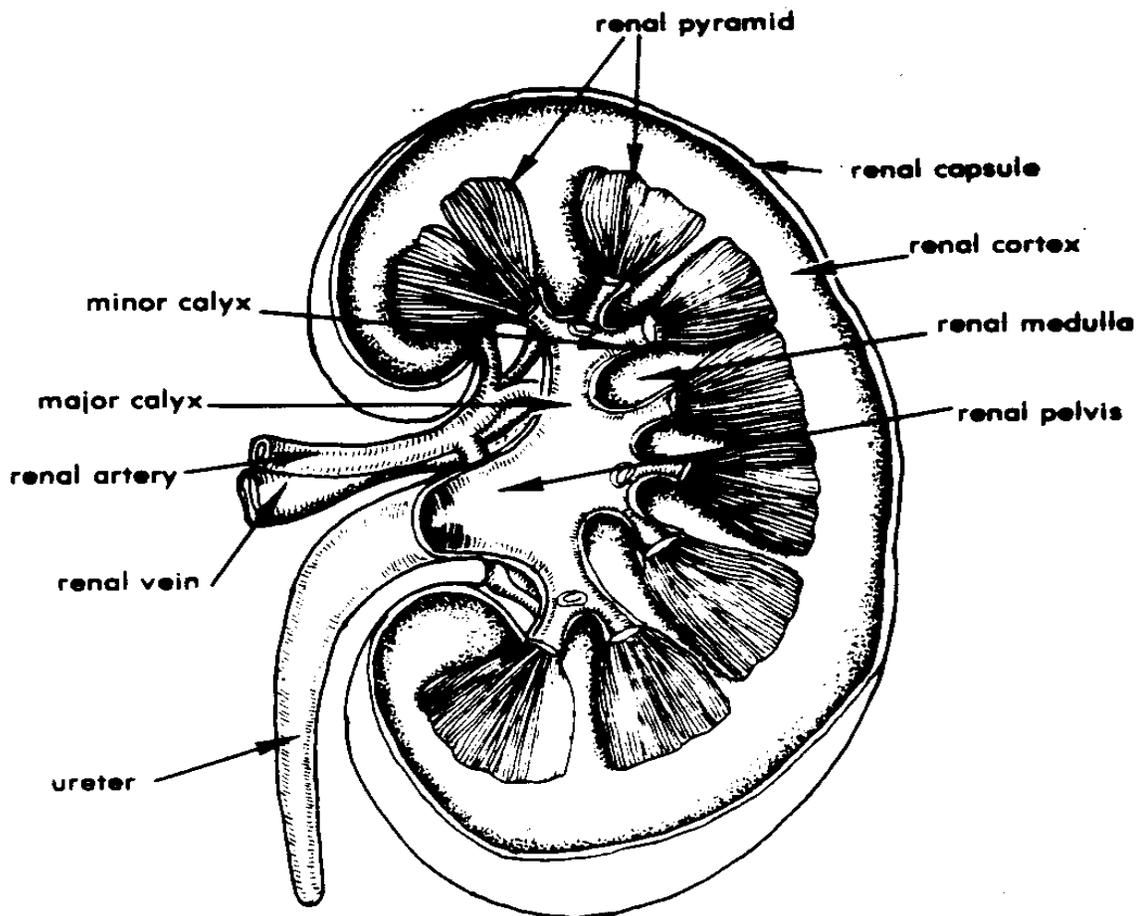


Figure 2-2. The kidney.

e. Beneath the cortex is a reddish-brown area called the renal medulla. Within the medulla are striated areas called the renal pyramids. Urine collecting tubules within the pyramids cause the striated appearance.

f. The collecting tubules terminate at the pyramid's point, emptying the urine into the renal pelvis. Along the edges of the renal pelvis are cup-like projections called the minor and major calyces. Each minor calyx collects urine from the pyramid and empties it into a major calyx. The major calyces empty into the renal pelvis.

2-3. URETERS

The pelvis of each kidney is drained by a ureter, a muscular tube extending from the hilum to the posterior portion of the urinary bladder. Ureters are smooth muscle structures, and urine is passed through each ureter by peristalsis. Drop by drop, urine passes into the bladder. Ureters are about 15 to 18 inches in length and about 1/5 inch in diameter.

2-4. URINARY BLADDER

The urinary bladder, a muscular sac located in the lowest part of the abdominal cavity, stores urine. Normally it holds 300 to 500 ml. The bladder is emptied by contraction of its muscular walls that force urine out through the urethra.

2-5. URETHRA

The urethra is the tube that carries urine from the urinary bladder to the external opening, the urinary meatus.

a. In the male, the urethra will vary in length. Including the portion within the body, it is approximately 6 to 7 1/2 inches in length. It is divided into three areas: the prostatic area, which passes through the prostate gland; the membranous area, beneath the prostate; and the penile area, which passes through the penis.

b. The female urethra, about 1 1/2 inches long, extends from the bladder to the meatus, which is located above the vaginal opening.

2-6. URINATION

Urination is the discharge or voiding of urine. It is done by a contraction of the bladder and relaxation of the sphincters. In the adult, the act of voiding, although dependent on involuntary reflexes, is partly under voluntary control. Voluntary contraction of abdominal muscles usually accompanies and aids urination.

2-7. URINE FORMATION

a. Urine is formed by the kidneys in millions of tiny filtration plants called nephrons. The nephrons receive and filter all the blood in the body about once every 12 minutes.

b. Each nephron (figure 2-3) is composed of 3 parts: the glomerulus, the capsule, and the tubule. Each part is essential in the filtration, re-absorption, and excretion processes.

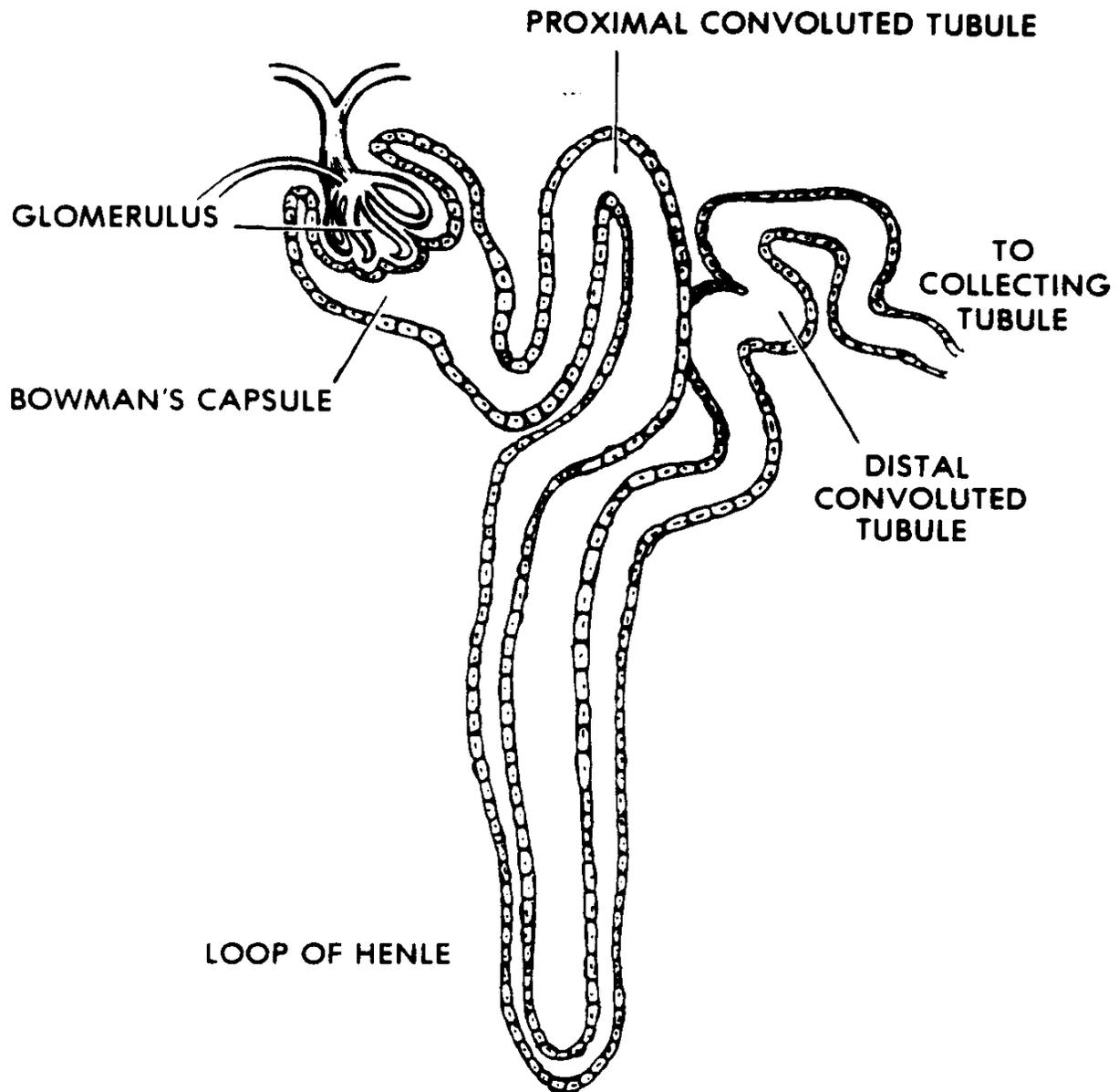


Figure 2-3. The kidney nephron.

c. Circulating blood enters the cluster of capillaries known as the glomerulus. Water, electrolytes, and small organic molecules are filtered from the capillary blood and pass into the capsule. Blood cells and large protein molecules cannot pass through the glomerulus into the capsule.

d. The "filtrate" (water and solutes filtered from the blood) passes from the capsule into the tubule. In the tubule, water and usable chemical products are reabsorbed.

e. The final waste product, urine, drains from the last loop of the nephron's tubule into a collecting tubule for drainage into the renal pelvis.

2-8. CHARACTERISTICS OF URINE

a. **Composition.** Normal urine is composed of about 95 percent water and 5 percent solutes. Normal solutes found in urine include:

- (1) Urea.
- (2) Creatinine.
- (3) Uric acid.
- (4) Ketone bodies.
- (5) Potassium.
- (6) Sodium.
- (7) Chloride.

b. **Specific Gravity.** The specific gravity of urine depends upon the amount of solutes present. The greater the concentration of solutes, the higher the specific gravity. Normal range for specific gravity is from 1.008 to 1.030.

c. **Appearance.** Urine is a transparent (clear) fluid. Color varies from pale yellow to dark amber, depending upon its concentration. (Concentration is the ratio of solutes to water.)

- (1) Dilute urine may be pale, straw colored, or even appear colorless.
- (2) Concentrated urine appears highly colored (for example, bright yellow or deep amber).
- (3) Turbid (cloudy) urine is usually considered abnormal. It may be the result of blood, pus, sperm, or bacteria present in the urine.

d. **Odor.** Normal, freshly voided urine has a faint aromatic odor. Old, stale urine develops a strong ammonia odor from chemical breakdown.

- (1) A strongly offensive odor may indicate the presence of bacteria.
- (2) Diet selection can alter normal odor. Asparagus is a good example.
- (3) Some medications may alter the normal odor of urine. Ampicillin is one example.

e. **Amount.** The average, normal adult will excrete approximately 1,500 to 2,000 ml of urine each day (every 24 hours). This will vary with fluid intake and fluid loss. Fluid losses other than urination include fluid lost through vomiting, diarrhea, and "insensible" losses. Insensible fluid loss is that which is not perceptible or appreciable. Such loss includes that fluid which is lost through respiration, evaporation from the skin, and fecal content.

Section II. NURSING ASSESSMENT AND DIAGNOSTIC PROCEDURES

2-9. NURSING ASSESSMENT

When performing a nursing assessment of a patient with a suspected disorder of the urinary system, it is important to question the patient about urinary output and changes in voiding patterns.

a. Urinary Output.

(1) During the act of micturition (urination), the bladder contracts and urine is expelled from the body through the urethra. The average urine output for a normal adult is considered to be about 1500-2000ml/24 hours. This, of course, will vary with fluid intake and other fluid losses (as discussed in Section I).

(2) Polyuria is the passage of a large volume of urine in a given period of time. Polyuria is seen with diabetes. It may also occur with excessive fluid intake.

(3) Oliguria is the passage of a small amount of urine in a given period of time. This is generally considered to be 100-500 ml/24 hours. Oliguria may indicate renal failure, shock, dehydration, or a fluid and electrolyte imbalance.

(4) Anuria is the absence of urine. Passage of less than 50 ml/24 hours is considered to be anuria. This condition indicates a serious renal dysfunction and requires emergency medical intervention.

b. **Changes in Voiding Patterns.** When interviewing the patient, ask about changes in their normal voiding pattern. Identification of signs and symptoms is a

valuable tool in diagnosis of the condition. The following symptoms are significant and should be recorded in the nursing assessment.

- (1) Frequency. Voiding that occurs more often than usual (in comparison to the patient's regular pattern).
- (2) Urgency. A strong desire (or urge) to urinate.
- (3) Hesitancy. Undo difficulty or delay in initiating voiding.
- (4) Incontinence. Involuntary loss of urine.
- (5) Stress incontinence. Intermittent leakage of urine is caused by sudden strain.
- (6) Nocturia. Excessive urination at night.
- (7) Enuresis. Involuntary voiding during sleep. Bedwetting is considered abnormal after the age of three.
- (8) Dysuria. Painful or difficult urination.
- (9) Hematuria. The presence of blood in the urine.
- (10) Retention. Accumulation of urine within the bladder caused by the inability to urinate.

2-10. URINALYSIS

a. Urinalysis is the examination and analysis of urine. It is routinely performed to detect abnormalities. The results of urinalysis are used by the physician in diagnosis of urinary conditions.

b. Basic principles for collecting urine specimens include the following:

(1) The first morning urine specimen is the most concentrated and would be required for tests where identification of specific elements is required (hormones, for example).

(2) Never leave urine standing at room temperature. It will begin to breakdown, preventing accurate analysis.

(3) Urine specimens should be collected using "clean-catch" technique (see paragraph 2-11).

(4) When collecting a 24-hour specimen, ensure that the patient fully understands the collection procedure. If the patient fails to collect all the urine voided in a 24-hour period, the resulting evaluation will be erroneous.

(5) If a "sterile" sample of urine is required, it should be obtained by catheterization. Such a sample might be necessary for a urine culture and sensitivity test. Catheterization is discussed in Section III.

2-11. COLLECTING A CLEAN CATCH URINE SPECIMEN

a. Review patient's clinical record to verify physician's order for a clean catch urine specimen.

b. Assemble the necessary equipment.

(1) Antiseptic towelettes.

(2) Disposable gloves for nurse if assisting a female patient.

(3) Sterile specimen container.

c. Approach and identify the patient.

d. Explain the procedure to the patient. Patient will be asked to collect a virtually uncontaminated midstream urine specimen. (This is commonly referred to as a "clean-catch" urine specimen.) Because the urethra orifice is colonized by bacteria, urine readily becomes contaminated during voiding.

e. Instruct the male patient in the steps of collecting a clean-catch urine specimen.

(1) Instruct the patient to expose glands and cleanse area around meatus. Wash area with a mild antiseptic solution (towelettes).

(2) Allow the initial urinary flow to escape into toilet or urinal.

(3) Collect the midstream urine specimen in a sterile container.

(4) Avoid collecting the last few drops of urine. (Prostatic secretions may be introduced into urine at the end of the urinary stream.)

f. Instruct the female patient in the steps of collecting a clean catch urine specimen.

(1) Ask the patient to separate her labia to expose the urethra orifice. Keeping the labia separated prevents labial or vaginal contamination of the urine specimen.

(2) Cleanse the area around the urinary meatus with antiseptic towelettes.

(3) While the patient keeps her labia separated, instruct her to void forcibly. This helps wash away urethra contaminants.

(4) Allow initial urinary flow to drain into bedpan (toilet) and catch the midstream specimen in a sterile container.

g. Instruct the patient to repeat the steps of the procedure. Correct misinformation/understanding as needed.

h. Instruct patient to obtain the required specimen. (Assist as necessary.)

i. Send the specimen to the laboratory immediately.

j. Record the procedure in the patient's clinical records and report significant observation to the Charge Nurse.

2-12. COLLECTING A TWENTY-FOUR HOUR SPECIMEN

a. Review the patient's clinical record to verify the physician's order and identify the purpose of the 24-hour specimen.

(1) Urine is routinely collected for 24 hours in order to obtain a substantial quantity of urine for measuring solutes that are normally excreted in small amounts (such as hormones, proteins, and electrolytes).

(2) Urine is also collected for 24 hours in order to test excretion rates in one day's function.

b. Some tests require dietary restrictions prior to and/or during the exam. Be certain these restrictions are followed.

c. Assemble the necessary equipment.

(1) Twenty-four hour urine collection container. (Container should have required chemical preservatives inside, as appropriate for test.)

(2) Urine collection pan/urinal.

(3) Intake and output worksheet.

- (4) Signs stating "twenty-four hour urine collection in progress."
- (5) Urine specimens cup (if initial specimen is required).
- d. Approach and identify the patient.
- e. Explain the procedure and its purpose to the patient. Be certain the patient understands what must be done.
- f. At the designated time on the designated day, begin the collection.
 - (1) A twenty-four-hour collection normally begins in the early morning, at the time of the patient's first morning void.
 - (2) Instruct the patient to empty his bladder. (Sometimes, a specimen is collected at this time. If not required, discard the urine.)
 - (3) Record the time the patient emptied his bladder in the patient's chart and on the twenty-four hour collection container. This is the start time.
- g. Instruct the patient that all urine voided for the next 24 hours must be saved and placed into the twenty-four hour collection container.
 - (1) Provide the patient with a urine collection pan or urinal, as appropriate.
 - (2) Instruct the patient to notify the nursing staff each time he urinates into the collection pan, so the urine can be measured and added to the twenty-four hour collection container.
 - (3) Record each voiding on the I & O sheet, if required.
- h. Post signs saying " twenty-four hour urine collection in progress" on the patient's chart, the bed, the door, and in the bathroom, as appropriate.
- i. Once the first urine specimen has been placed into the twenty-four hour collection container, the container must be kept on ice or in a specimen refrigerator (**never**, a food refrigerator).
- j. The following day, at the same time the test was initiated, ask the patient to void one last time. This specimen is added to the twenty-four hour collection container.
- k. Record date and time of completion on the container and in the patient's chart. Remove "24-hour urine collection in progress" signs.
- l. Complete the appropriate laboratory request slips and transport the specimen to the laboratory within 30 minutes of completion.

m. Record the procedure and significant nursing observations in the patient's clinical records.

2-13. RADIOLOGIC EXAMS

The two radiographic procedures used most frequently to aid in diagnosis of urinary disorders are the kidneys, ureters, and bladder (KUB) and Intravenous pyelogram (IVP).

a. A flat plate X-ray of the abdomen to visualize the KUB.

- (1) It is used to show the size, shape, and positioning of the kidneys.
- (2) It serves as a baseline reference for follow-up X-rays.
- (3) It is used to visualize the size and position of urinary tract calculi (stones).

b. Intravenous pyelogram is the intravenous introduction of a contrast medium that concentrates in the urine. This visualizes the KUB.

- (1) It is customary to keep the patient N.P.O. for 8-10 hours prior to the exam.
- (2) Laxatives are given the evening prior to the exam to eliminate fecal matter from the GI tract.
- (3) The patient should not be overly hydrated, as this will dilute the contrast medium and reduce visualization.

2-14. CYSTOSCOPY

a. Cystoscopy is the direct visualization of the urethra and bladder by means of a special device called a cystoscope. The lighted, tubular, scope is inserted into the urethra. It is used to:

- (1) Inspect the urethra and bladder.
- (2) Remove calculi from the urethra, bladder, and ureters.
- (3) Allow insertion of catheters for removal of specimens.

b. Preparation is minimal and involves:

- (1) Administration of prescribed medications and anesthetic.

- (2) Patient education about the procedure.
- c. Nursing implications.

(1) The patient will experience some burning and passage of blood when urinating following the procedure. This is due to irritation of the mucous membrane.

(2) If urinary retention occurs, it may be necessary to insert an indwelling catheter (on physician's order only).

Section III. CATHETERIZATION AND DRAINAGE

2-15. INTRODUCTION

Catheterization is the procedure of introducing a catheter through the urethra into the urinary bladder. The procedure may be ordered by the physician for any of the following reasons:

- a. To relieve distention of the bladder due to inability to void. Distention is caused by retention of urine. Retention can occur with cystitis (inflammation of the bladder), with paralysis, or following surgical procedures.
- b. To obtain a sterile specimen of urine for laboratory analysis and culture.
- c. To determine residual urine. (Residual urine is defined as that amount of urine remaining in the bladder after voiding.)
- d. To provide continuous drainage of the bladder.
- e. To irrigate or instill liquid medications into the bladder. Medications and fluids for irrigation are prescribed by the physician.

2-16. GENERAL NURSING IMPLICATIONS

Because both the bladder and the urethra are easily injured and highly susceptible to infection, it is important to stress several precautions in the performance of the procedure.

a. **Aseptic Technique.** Each catheterization is a potential source of infection if not carried out properly. Most cases of cystitis and other urinary tract infections, which develop after catheterization, are usually caused by improper technique.

b. **Lubricated Catheter.** The catheter must be well lubricated prior to insertion to reduce friction and trauma to the mucous membrane lining of the urethra and the bladder. The disposable catheterization kits used today contain sufficient lubricant within the kit.

c. **Gentle Insertion.** The catheter is inserted only far enough to enter the bladder. Use only mild pressure during insertion. **Never** force a catheter if resistance is met. Stop the procedure and inform the professional nurse.

2-17. RETENTION CATHETERS

A retention (indwelling) catheter is ordered to permit continued drainage of the urinary bladder without repeated catheterization. The catheter commonly used is a self-retaining urethra catheter (Foley type). This tube has a double lumen: one lumen is for drainage and the other is for inflation of the retention device (a small balloon at the tip of the catheter). The retention balloon is inflated with a measured amount of sterile water following its placement in the bladder. When a retention catheter is used, provision is usually made for bladder drainage by means of drainage tubing connected to a plastic drainage bag. Following insertion of the catheter, it is a nursing responsibility to set up and maintain the drainage system. Aseptic technique in maintaining urinary drainage is required since the patient is exposed to a source of chronic irritation from the indwelling catheter and is therefore more susceptible to any source of infection.

2-18. SUPPLIES AND EQUIPMENT

- a. Disposable sterile catheterization set, containing:
 - (1) Catheter (straight or indwelling).
 - (2) Gloves, sterile.
 - (3) Sterile detergent-disinfectant solution, for cleansing skin, as prescribed.
 - (4) Water soluble lubricant, sterile.
 - (5) Protective, sterile drapes.
 - (6) Chux pads.
 - (7) Sterile specimen container.
- b. Specimen label and appropriate laboratory request forms.
- c. Floor lamp, adjustable.
- d. Portable screen (according as circumstances may require (p.r.n.)).
- e. Kelly forceps (p.r.n.).
- f. Adhesive tape.

g. Waste receptacle.

**If inserting an indwelling (retention) catheter, you will also need:

h. Sterile water (usually included in kit).

i. Sterile syringe (10 cc) (usually included in kit).

j. Sterile urine drainage bag with collecting tubing.

2-19. CATHETERIZING THE FEMALE PATIENT

a. Preparatory Phase.

(1) Check physician's order.

(2) Approach and identify the patient and explain the procedure.

(3) Place patient in supine position with knees bent and feet resting flat on the bed about two feet apart. Drape the patient.

(4) Position moisture-proof pad under patient's buttocks.

(5) Place waste receptacle in accessible place.

(6) Direct light for visualization of genital area.

(7) Wash hands.

(8) Open catheter kit using aseptic technique.

(9) Squeeze lubricant into plastic tray.

(10) Pour cleansing solution over cotton balls or open swab packet.

(11) Wash hands and put on sterile gloves.

**If inserting retention catheter, you must also:

(12) Inspect catheter for defects. Test the balloon by injecting 10 cc of sterile water into the balloon. Allow water to drain back into syringe.

NOTE: If there is a leak in the balloon, the catheter must be discarded and replaced.

(13) Connect the catheter to the connecting tubing on the drainage bag. Maintain sterility of catheter and drainage bag.

b. Performance Phase.

(1) Using your non-dominant hand, separate the labia, so that the urethra meatus is visualized. This hand maintains separation of the labia until catheterization is finished. This helps prevent labial contamination of the catheter.

NOTE: This glove is no longer sterile.

(2) With dominant sterile hand, pick up cotton ball (with forceps) or one swab stick. With downward stroke, from anterior to posterior, cleanse the labia farthest from you. **DO NOT RETRACE.**

(3) Repeat the procedure to cleanse the labia closest to you.

(4) Repeat the procedure a third time to cleanse the area between the two labia. Stroke from top to bottom, cleansing the urinary meatus. Discard cotton balls or swabs.

(5) Grasp the catheter about 3 inches from the tip and lubricate it, keeping the remainder coiled in the palm of the hand.

(6) Gently insert the catheter about 2 inches into the urethra or until urine begins to flow. Aim the catheter downward and to the back.

NOTE: If the catheter is accidentally introduced into the vagina, remove the catheter and discard it. Obtain another sterile catheter and begin the procedure again.

(7) Allow the urine to flow into the catheter tray (drainage bag, if retention catheter).

****If inserting a retention catheter, skip steps (8) through (11) and go to step (12).**

(8) Collect a sterile specimen (if ordered) in the sterile specimen cup contained in the kit.

NOTE: Never allow more than 1000 cc of urine to drain from the bladder at one time. Clamp the catheter and wait about 15 minutes before allowing the remainder of the urine to drain.

(9) When the urine has stopped flowing, pinch off the catheter and gently remove it.

(10) Dry the patient and leave her in a comfortable position. Replace any soiled linen.

(11) Wash hands. Skip steps (12) through (18) and go to follow-up phase (item c).

(12) When urine is observed moving through the collecting tubing, advance the catheter another 1/2 inch. (This will ensure that the catheter tip is fully within the bladder.)

(13) Inflate the balloon with 10 cc of sterile water.

(14) GENTLY pull on the catheter to ensure that it is properly placed, and then gently push back into the bladder about 1/4 inch.

(15) Secure catheter in place with adhesive tape. Anchor the catheter to the skin of the inner thigh.

(16) Dry the patient and leave her in a comfortable position.

(17) Wash hands.

(18) If collection of a sterile specimen is ordered, you may collect it from the urinary drainage bag at this time. (Closed system is sterile until opened.)

NOTE: This is the ONLY time it is acceptable to collect urine from the drainage bag for testing purposes.

c. **Follow-Up Phase.**

(1) Remove all equipment from the patient's bedside. Discard disposable items and return other equipment to the appropriate storage areas.

(2) Measure the urine. Send the sterile specimen to the laboratory with the appropriate request slips.

(3) Record the procedure in the Nursing Notes: include the date, time, amount and appearance of urine obtained, whether specimen was sent to the lab, and the patient's tolerance.

2-20. CATHETERIZING THE MALE PATIENT

a. **Preparatory Phase.**

(1) Check physician's order.

(2) Approach and identify the patient and explain the procedure.

(3) Place the patient in a supine position with legs extended.

- (4) Place a sterile moisture proof drape across upper thighs.
- (5) Place waste receptacle in accessible place.
- (6) Direct light for visualization of genital area, if necessary.
- (7) Wash hands.
- (8) Open catheter kit using aseptic technique.
- (9) Squeeze lubricant into plastic tray.
- (10) Pour cleansing solution over cotton balls or open swab packet.
- (11) Wash hands and put on sterile gloves.

****If inserting a retention catheter, you must also:**

(12) Inspect catheter for defects. Test the balloon by injecting 10 cc of sterile water into the balloon. Allow the water to drain back into the syringe.

NOTE: If there is a leak in the balloon, the catheter must be discarded and replaced.

(13) Connect catheter to the connecting tubing on the drainage bag. Maintain sterility of catheter and bag.

b. Performance Phase.

(1) Using your non-dominant hand, grasp penis, raising it almost straight up. (This maneuver straightens the urethra and facilitates catheterization.) Maintain grasp on penis until procedure is completed.

NOTE: This glove is no longer sterile.

(2) With dominant sterile hand, pick up cotton ball (with forceps) or one swab stick. Cleanse urethra meatus in a circular motion. Repeat as required, using a new swab or cotton ball each time. **DO NOT RETRACE.** Discard swabs/cotton balls.

(3) Grasp the catheter about three inches from the tip and lubricate it, keeping the remainder coiled in the palm of the hand.

(4) Gently insert the catheter into the urethra until urine begins to flow (6-9 inches). The catheter may be held with Kelly forceps rather than the gloved hand, if preferred.

(5) Allow the urine to flow into the catheter tray (drainage bag, if retention catheter).

****If inserting a retention catheter, skip steps (6) through (9) and go to step (10).**

(6) Collect a sterile specimen (if ordered) in the sterile specimen cup contained in the kit.

NOTE: Never allow more than 1000 cc of urine to drain from the bladder at one time. Clamp the catheter and wait about 15 minutes before allowing the remainder of the urine to drain.

(7) When the urine has stopped flowing, pinch off the catheter and gently remove it.

(8) Dry the patient and leave him in a comfortable position. Replace any soiled linen.

(9) Wash hands. Skip steps (10) through (16). Go to follow-up phase (item c).

(10) When urine is observed moving through the collecting tubing, advance the catheter another 1/2 inch. (This will ensure that the catheter tip is fully within the bladder.)

(11) Inflate the balloon with 10 cc of sterile water.

(12) GENTLY pull on catheter to ensure that it is properly placed, and then gently push back into the bladder about 1/4 inch.

(13) Secure catheter in place with adhesive tape. Anchor the catheter to the skin of the abdomen, with the penis pointing toward the patient's head.

(14) Dry the patient and leave him in a comfortable position.

(15) Wash hands.

(16) If collection of a sterile specimen is ordered, you may collect it from the drainage bag at this time. (Closed system is sterile until opened.)

NOTE: This is the ONLY time it is acceptable to collect urine from the drainage bag for testing purposes.

c. Follow-Up Phase.

(1) Remove all equipment from the patient's bedside. Discard disposable items and return other equipment to the appropriate storage areas.

(2) Measure the urine. Send the sterile specimen to the laboratory with the appropriate request slips.

(3) Record the procedure in the Nursing Notes: include the date, time, amount and appearance of urine obtained, whether specimen was sent to the lab, and patient's tolerance.

2-21. FOLLOW-UP NURSING CARE FOR RETENTION CATHETER AND CLOSED DRAINAGE SYSTEM

The retention catheter and drainage system may be continued for days, weeks, or indefinitely. As a general rule, the retention catheter is changed in accordance with the infection control standard operating procedure (SOP). Daily, continuing care of the patient and the equipment includes the following essentials:

a. Maintain an accurate intake and output record. Unless otherwise ordered, encourage the patient to drink at least 3000 ml of fluids daily to provide an effective "internal irrigation" system for the bladder, catheter, and drainage tubing.

b. Observe the tubing and catheter connections frequently for kinks. Make sure the patient is not lying on the tubing since this both obstructs drainage and causes undue pressure on the skin.

c. Maintain cleanliness and protect the urethral meatus. This requires direct observation and specific hygiene measures. Wash the perineal area carefully, from front to back. Remove secretions of mucus and other discharge gently but thoroughly to help reduce irritation and possible infection. Follow infection control SOP for guidance on frequency of catheter care and choice of antiseptic/antimicrobial cleansers to be used.

d. Measure and record the collected output in accordance with (IAW) local SOP. Never permit the drainage bag to become more than three-fourths full in order to prevent any possibility of the tubing outlet becoming immersed in the draining urine.

e. Do not disconnect tubing from drainage bag.

f. Keep the collecting bag below the level of the bladder, but never allow it to touch the floor.

g. Provide continued gravity drainage for the ambulating patient. Check to see that the tubing is not excessively long or looped below the level of the bag when he is standing upright.

h. DO NOT separate connecting tube and catheter. Obtain a urine specimen without disrupting the closed system. A needle and syringe is used to aspirate urine from a special port on the collecting tubing.

i. Change the catheter as ordered or IAW local infection control policy. The order may be to remove the catheter and then to replace it following several hours interval to relieve pressure on the urethra. Remember:

(1) Always deflate the balloon of a self-retaining catheter before removal.

(2) Use aseptic techniques for any procedure involving the urethra and bladder. Each catheterization is a potential source of injury and infection if not performed properly.

2-22. COLLECTING A URINE SPECIMEN FROM AN INDWELLING CATHETER

a. Review the patient's clinical record to verify the physician's order and determine the reason for collection of the urine specimen.

b. Assemble the necessary equipment.

(1) Rubber band or screw clamp.

(2) Sterile syringe.

(3) Sterile 20-gauge needle.

(4) Alcohol sponge.

(5) Sterile specimen collection container.

(6) Identification labels and laboratory request slips.

c. Wash your hands.

d. Approach and identify the patient.

e. Explain the procedure to the patient.

f. Provide for privacy.

g. Wash your hands.

h. Clamp the drainage tubing directly below the aspiration port with a rubber band or clamp to ensure a sufficient amount of pooled urine for a specimen. Fifteen minutes is generally sufficient.

NOTE: Remember, a urine specimen collected from an indwelling catheter bag is **not acceptable** for laboratory testing unless it is the first urine drained into a new sterile bag.

i. Place a sign above the patient's bed "Urine Tubing Temporarily Clamped."
j. When sufficient urine has accumulated in the tubing, cleanse the aspiration port with an alcohol swab.

k. Expel all air from the syringe.

l. Insert the needle into the aspirating port.

m. Withdraw the desired volume of urine.

(1) The amount of urine needed will vary, depending on the laboratory testing methods.

(2) Refer questions to your laboratory technician.

n. Withdraw the needle and transfer the urine from the syringe into the sterile specimen container.

o. Remove the rubber band or screw clamp so urine can drain freely into the drainage bag once again.

p. Remove the sign placed above the patient's bed.

q. Complete the appropriate laboratory request slips.

r. Label urine specimen and send it to the laboratory within 30 minutes of collection.

s. Dispose of the needle and syringe in the appropriate location.

t. Record procedure in patient's clinical record. Report significant observations to professional nurse, as appropriate.

2-23. CONTINUOUS BLADDER IRRIGATION

a. Preparatory Phase.

(1) Review the patient's clinical record to verify physician's order and to become familiar with reason(s) for performing continuous bladder irrigation. Irrigation of the bladder is done for the following reasons:

(a) To help prevent urinary tract obstruction by flushing out small blood clots that form after prostate or bladder surgery.

(b) To create mild tamponade that may help prevent venous hemorrhaging.

(c) To treat an irritated, inflamed, or infected bladder lining.

(2) Check the patient's medication history for hypersensitivity to antibiotics, and report significant findings to professional nurse.

(3) Wash your hands.

(4) Collect the equipment needed.

(a) Two containers of irrigating solution (usually 1,000 ml containers of normal saline or prescribed amount of antibiotic solution).

(b) Y-type IV tubing.

(c) Sterile alcohol or povidone-iodine sponge.

(d) Catheter kit with a triple lumen catheter.

NOTE: A three-way or triple lumen catheter has three separate openings. One lumen inflates the balloon holding the catheter in place. The second lumen allows for the outflow of urine and the outflow of drainage solution. The third lumen allows for the inflow of irrigating solution (antibacterial rinse) into the bladder (figure 2-4).

(e) Closed drainage system.

(5) Approach and identify the patient and explain the procedure.

b. Performance Phase.

(1) Attach catheter to the drainage apparatus before inserting the catheter into the urethra. Catheterize the patient according to the steps previously mentioned.

(2) To prevent the introduction of organisms where the catheter enters the urethral meatus, apply an antimicrobial ointment.

(3) Begin irrigation.

(a) Provide for privacy and drape as necessary.

(b) Insert one spike of the Y-type tubing into each container of irrigating solution.

(c) Squeeze the drip chamber on each spike of the tubing.

(d) Open the flow clamps to remove air from the tubing. Close them when the fluid reaches the end of the tubing.

(e) Hang the two containers of irrigating solution on an IV pole.

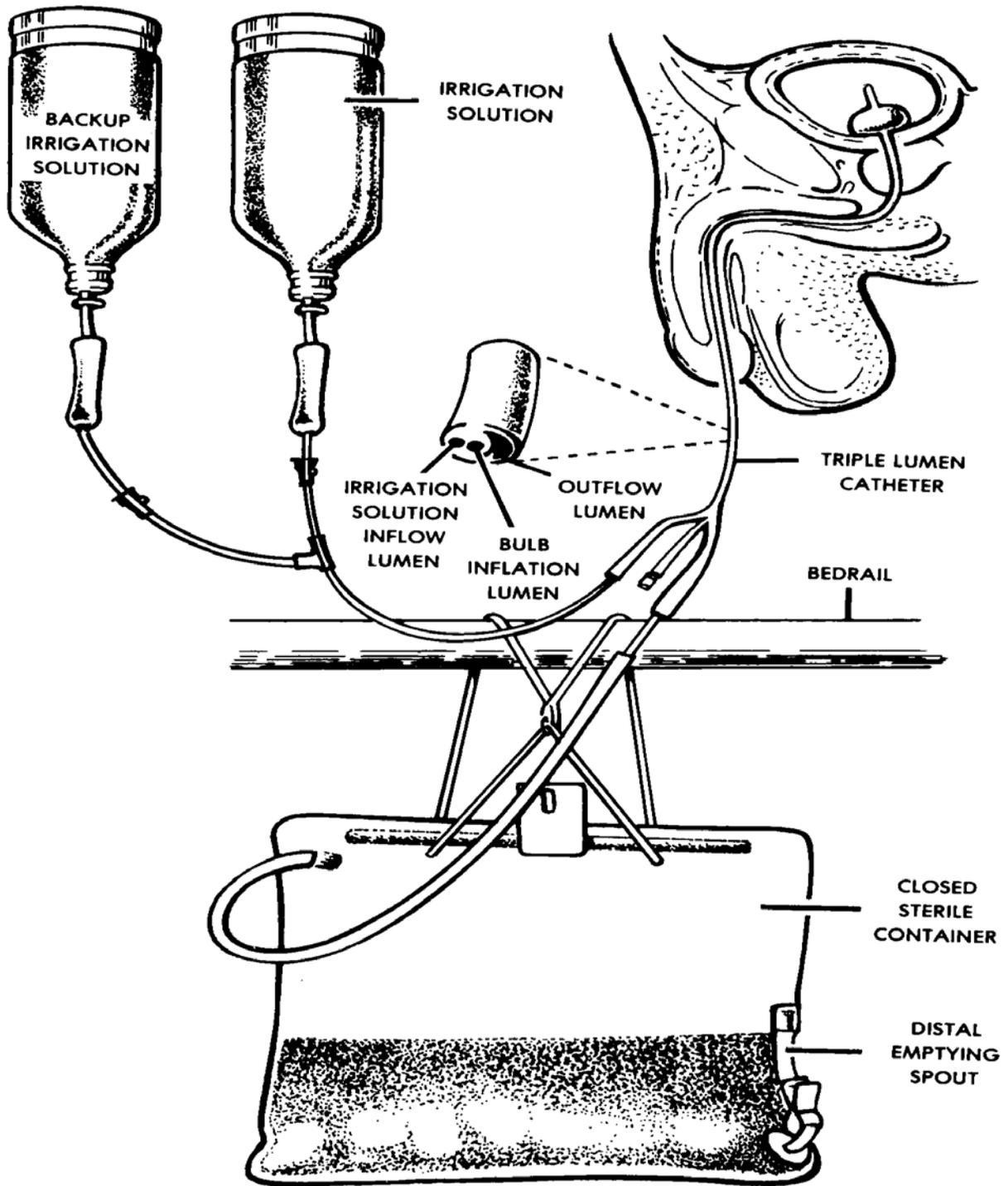


Figure 2-4. Continuous bladder irrigation.

(f) Clean the opening to the inflow lumen of the catheter with the sterile alcohol or povidone-iodine sponge.

(g) Insert the distal end of the I.V. tubing securely into the inflow lumen of the catheter. (The outflow lumen should already be attached to tubing leading to the drainage collection bag.)

(h) Open the flow clamp on one of the containers of irrigating solution and set the drip rate as ordered.

(4) Switch to the reserve container when the first container of irrigating solution is nearly empty.

(a) To prevent air from entering the system, do not allow the primary container to empty completely. Simultaneously close the flow clamp on the nearly empty container and open the flow clamp on the second container.

(b) Adjust the drip rate, as ordered.

(c) Disconnect the tubing from the nearly empty container with a twisting motion, being careful not to contaminate the tubing.

(d) Hang a new reserve container on the IV pole and insert the tubing, maintaining asepsis.

(e) Discard the empty container appropriately.

(f) As the irrigating solution containers become nearly empty, repeat the exchange procedure in order to maintain a constant flow of irrigation solution.

c. Follow-Up Phase.

Observe special considerations while performing continuous irrigations:

(1) Always have a second container of irrigating solution available to replace the one that's nearly empty.

(2) Check the inflow and outflow lines periodically for kinks, to make sure the solution is running freely.

(3) Measure the outflow volume correctly.

(a) Outflow volume should equal or, allowing for urine production, slightly surpass inflow volume.

(b) If inflow volume exceeds the outflow volume, suspect bladder rupture or renal damage, and notify the professional nurse immediately.

(4) Assess outflow for blood clots and/or changes in appearance.

(5) Empty drainage collection bags frequently.

(6) Document in the patient's clinical record. Record procedure, significant nursing observations, and amount of fluid instilled and drained. Report same to professional nurse.

Section IV. URINARY DISORDERS

2-24. URINARY TRACT INFECTIONS

a. Urinary tract infections (UTI) are caused by the presence of pathogenic microorganisms in the urinary tract. In most urinary tract infections, bacteria enter through the urethra and ascend to the bladder. Once established within the bladder, the bacteria are able to ascend through the ureters to the kidneys. Contamination of the urinary tract can occur in the following ways:

(1) Reflux of urine from the bladder, into the urethra, and back up into the bladder.

(2) Reflux of urine from the bladder into the ureters.

(3) Fecal contamination of the urinary meatus.

(4) Introduction of instruments for examination or catheterization.

b. Urinary tract infections may occur in the urethra (urethritis), the urinary bladder (cystitis), the prostate gland (prostatitis), and the kidney (pyelonephritis).

(1) Cystitis is more common in females because the female urethra is short and in close anatomical proximity to the vagina and rectum. The male urethra is longer, and the prostatic secretions have an antibacterial property that discourages passage of bacteria.

(2) Urethritis may be associated with cystitis, may occur as a result of trauma from a catheter or cystoscope, or may be sexually transmitted. If urethral discharge is present, with or without other symptoms, a urethral smear should be sent to the laboratory for analysis along with the standard urine culture.

(3) Pyelonephritis is an infection of the kidney's renal pelvis, tubules, or interstitial tissue. It may occur as an acute or chronic condition. Pyelonephritis can result in renal insufficiency, which may lead to renal failure.

(4) Prostatitis is inflammation of the male prostate gland. Inflammation of the prostate commonly occurs without the presence of infection. However, bacterial invasion of the prostate may occur as a result of bacteria descending from the kidney or bacteria ascending from the urethra.

- c. Certain factors predispose the urinary tract to infection:
 - (1) Urinary stasis.
 - (2) Obstructions to urine flow such as strictures or stones.
 - (3) Systemic infection, which may enter the kidney through the blood or lymph.
 - (4) The presence of other renal disease.

2-25. SIGNS AND SYMPTOMS OF URINARY TRACT INFECTIONS

Infections of the urinary tract may occur with or without symptoms. When symptoms do occur, they may include the following:

- a. Lower urinary tract infections (cystitis, urethritis).
 - (1) Dysuria.
 - (2) Hematuria.
 - (3) Frequency.
 - (4) Urgency.
 - (5) Nocturia.
 - (6) Bacteria/pus in urine.
 - (7) Back pain.
 - (8) Sensation of "bearing down" or spasm in suprapubic region.
 - (9) Urethral discharge (urethritis).
- b. Upper urinary tract infections (pyelonephritis).
 - (1) All the symptoms of a lower UTI, plus:
 - (2) Flank pain.
 - (3) Fever.
 - (4) Chills.

2-26. NURSING IMPLICATIONS

a. Successful treatment of UTI involves a urine culture to identify the bacteria present and a sensitivity test to determine the most effective antibiotic. Nursing personnel must ensure that proper technique is used during collection of the specimen in order to prevent contamination of the specimen. Contamination by other substances will result in an inaccurate test.

b. Fluids should be encouraged in order to "flush" the system of the bacteria.

c. Frequent voiding should be encouraged to prevent urinary stasis.

d. I.V. fluids and antibiotics should be administered as ordered.

2-27. UROLITHIASIS

a. Urolithiasis is the presence of stones in the urinary system. These stones are formed by the deposit of crystalline substances excreted in the urine.

(1) Variations in sizes range from sand-like granules to stones the size of a baseball.

(2) Most stones are combinations of calcium and phosphate.

(3) Different stone compositions develop in association with the pH of the urine. For example:

(a) Phosphate, oxalate, and carbonate stones form in alkaline urine.

(b) Uric acid, urate, and cystine stones form in acid urine.

b. Factors that precipitate stone formation include:

(1) Infections.

(2) Urinary stasis.

(3) Excess calcium.

(4) Vitamin deficiencies (especially vitamin A).

(5) Dehydration.

2-28. CLINICAL MANIFESTATIONS OF UROLITHIASIS

Signs and symptoms will vary according to the size and location of the stone. Symptoms also vary with the presence of infection and/or obstruction.

- a. General symptoms include:
 - (1) Pain.
 - (2) Diarrhea.
 - (4) Vomiting.
 - (5) Abdominal discomfort.
- b. Renal colic, associated with kidney stones, is manifested by:
 - (1) Acute renal area pain, radiating anteriorly and downward.
 - (2) Nausea.
 - (3) Vomiting.
 - (4) Loin tenderness.
- c. Ureteral colic, associated with stones in the ureters, is manifested by:
 - (1) Acute, colicky pains radiating to genital area and down the thigh.
 - (2) Frequent desire to void, with little urine passed.
 - (3) Hematuria.

2-29. NURSING IMPLICATIONS

Nursing care of patients with urolithiasis involves:

- a. **Controlling Pain.**
 - (1) Administer pain medications as prescribed and assess patient frequently, as this pain can be excruciating.
 - (2) Hot bath or moist heat to painful area.
- b. **Relief of Obstruction.**

- (1) Encourage fluids.
- (2) Observe strict I & O.
- (3) Assist physician in catheterization or cystoscopy, as ordered.

c. **Determine Stone Type.**

- (1) Strain all urine.
- (2) Send stones to laboratory for identification.

d. **Diet Modification.**

- (1) Implement diet modifications as ordered.
- (2) Alter the pH of the urine to reduce stone formation.
 - (a) To acidify urine, give citrus juices or ascorbic acid (vitamin C).
 - (b) To alkalinize urine, give sodium bicarbonate.

e. **Prepare Patient for Surgery.** Surgical intervention is indicated if the stone is causing:

- (1) An obstruction that cannot be relieved.
- (2) Infection that is not responsive to treatment.
- (3) Unrelenting pain.
- (4) Damage to the urinary system.

2-30. GLOMERULONEPHRITIS

a. Glomerulonephritis is an inflammatory disease of the kidneys. The inflammatory process is thought to be a result of an immune system response. Antigen-antibody reactions form molecule complexes that move through the circulatory system. Some of these complexes become lodged in the glomeruli, initiating the inflammatory response. The inflammation causes thickening of the glomerular filtration membrane, resulting in scarring and loss of filtering surface. Fibrous tissue forms and the kidney cannot function normally.

b. Repeated occurrences of mild glomerulonephritis may cause damage that goes unchecked for years because the patient is asymptomatic. Even the insidious

onset of symptoms may go unnoticed. The condition is often diagnosed during a routine physical exam or eye examination, when the patient may be found to have:

- (1) Mild hypertension.
 - (2) Pedal edema.
 - (3) Vascular changes or hemorrhages in the eyes.
 - (4) Abnormal urinalysis.
- c. An acute attack may be manifested by:
- (1) Scanty amounts of bloody, cloudy, sediment filled urine.
 - (2) Headache.
 - (3) Malaise.
 - (4) Flank pain.
 - (5) Swollen, congested kidneys.
 - (6) Edema, facial and extremity.
 - (7) Increased blood levels of urea and creatinine.
 - (8) Hypertension.
 - (9) Pulmonary edema.
 - (10) Congestive heart failure.
 - (11) Renal failure.

2-31. NURSING IMPLICATIONS

Nursing care of patients with glomerulonephritis involves observing for complications and protecting the kidneys from further damage. Nursing personnel should do the following:

- a. Monitor vital signs.
- b. Encourage bedrest.
- c. Observe strict I & O.

- d. Check weight daily.
- e. Observe for signs of impending renal failure.
 - (1) Lethargy.
 - (2) Nausea and vomiting.
 - (3) Oliguria or anuria.
- f. Implement and enforce ordered fluid and diet modifications.
 - (1) Protein restriction (for impaired renal function).
 - (2) Sodium restriction (if edema is present).
 - (3) Fluid restriction (if edema is present).
 - (4) Increased dietary carbohydrate (to provide energy and reduce the metabolism of protein).

2-32. CHRONIC RENAL FAILURE

a. Chronic renal failure is a progressive deterioration of renal function. Renal insufficiency progresses to renal failure, ending in uremia and its complications. Uremia is the accumulation, in the blood, of substances ordinarily filtered by the kidneys and excreted in the urine.

b. As renal function declines, the kidneys become increasingly unable to remove (filter) the body's metabolic wastes. The products of protein metabolism accumulate in the blood and other body fluids, causing disruption and imbalances throughout the body. Such alterations include:

- (1) Gastrointestinal: anorexia, nausea, vomiting, and diarrhea.
- (2) Hematological: anemia, bleeding tendencies.
- (3) Integumentary: skin discoloration, pruritis.
- (4) Skeletal: osteomalacia, uremic bone disease.
- (5) Sexual/reproductive: decreased libido, impotence, amenorrhea.
- (6) Cardiovascular: HTN, pulmonary congestion, pulmonary edema, and congestive heart failure.

(7) Neurological: anxiety, personality changes, delusions, hallucinations, and convulsions.

(8) Metabolic: water retention, sodium retention, potassium retention, and metabolic acidosis.

c. Chronic renal failure may be caused by:

- (1) Chronic glomerulonephritis.
- (2) Pyelonephritis.
- (3) Uncontrolled hypertension.
- (4) Nephrotoxic agents (drugs/toxins).
- (5) Dehydration.

d. Onset of symptoms begins with generalized weakness, lethargy, headache, and mild GI complaints, such as anorexia, nausea, and vomiting. If not diagnosed and treated, uremia will progress to a state of total body involvement. The patient will become increasingly somnolent. An ammonia odor will be evident on the breath, and respirations will become Kussmaul in character. "Uremic frost," a powdery substance composed of uric acid salts, will appear on the skin. Muscle twitching is followed by convulsions, coma, and death.

2-33. MEDICAL TREATMENT

The basis of care in managing a patient with chronic renal failure is to:

- a. Assist the diseased kidneys to maintain homeostasis for as long as possible.
- b. Prepare the patient for dialysis/transplant when conservative, symptomatic treatment is no longer effective.
 - (1) When the patient can no longer manage a normal lifestyle with conservative treatment, dialysis is indicated.
 - (2) When end-stage renal failure occurs and the patient is facing imminent death, kidney transplant is indicated.

2-34. NURSING IMPLICATIONS

Nursing management of the patient with chronic renal failure includes the following:

a. **Gastrointestinal.**

- (1) Symptomatic treatment for nausea, vomiting, and diarrhea.
- (2) Encourage a nutritious, appetizing diet of the patient's preferred foods to combat anorexia and improve nutritional status.

b. **Hematological.**

- (1) Administer vitamin and mineral supplements as ordered.
- (2) Observe skin and mucous membranes for evidence of bleeding or bruising.
- (3) Implement the use of soft bristle toothbrush and electric razor.

c. **Integumentary.**

- (1) Use mild cleansers to avoid further skin irritation.
- (2) Apply soothing lotions (p.r.n.).
- (3) Administer prescribed antipruritics to combat itching.

d. **Cardiovascular.**

- (1) Administer prescribed medications for control of hypertension, pulmonary edema, and congestive heart failure.
- (2) Monitor vital signs.
- (3) Observe for dependent edema.
- (4) Auscultate lungs for the presence of fluid.

e. **Metabolic.**

- (1) Observe strict I & O.
- (2) Monitor blood levels of electrolytes.
- (3) Check weight daily and assess for fluid retention.
- (4) Implement prescribed dietary modifications.
 - (a) Sodium restriction to decrease water retention.

(b) Limited protein to decrease protein metabolism (protein metabolism will result in more nitrogenous wastes that cannot be filtered by the kidneys).

(c) Any dietary protein allowed must be of high biological value to provide the essential amino acids.

(d) High carbohydrate diet to provide energy and decrease protein metabolism.

(e) Potassium restrictions to avoid hyperkalemia (cellular potassium is released during protein metabolism. Hyperkalemia, or potassium intoxication, can cause severe cardiac arrhythmia's).

f. Neurological.

(1) Frequent assessment of level of consciousness.

(2) Observation for mental status changes.

(3) Encourage family to report noted personality changes.

(4) Administer prescribed medications to manage muscle spasms and convulsive seizures.

2-35. ACUTE RENAL FAILURE

a. Acute renal failure is the sudden and severe loss of kidney function. As in chronic renal failure, all body systems become disrupted by the inability of the kidneys to filter metabolic wastes.

b. Acute renal failure may be the result of one of the following:

(1) Trauma.

(2) Nephrotoxic drugs.

(3) Transfusion reaction.

(4) Cardiopulmonary bypass.

(5) Hypovolemic hypertension (as a result of hemorrhage or burns, for example).

(6) Dehydration.

(7) Sepsis.

- (8) Obstruction of the renal arteries.
- (9) Mechanical obstruction of the urinary tract (stones, strictures, tumor).

c. Clinical manifestations.

(1) Clinical manifestations are the same as for chronic renal failure, except that the onset of symptoms is not insidious as in chronic renal failure. An abrupt cessation of renal function will bring about rapid changes as the body struggles to maintain its homeostatic environment.

(2) Blood analysis will reveal a rise in serum levels of elements normally excreted by the kidneys.

- (a) Urea.
- (b) Uric acid.
- (c) Creatinine.
- (d) Potassium.

2-36. MEDICAL TREATMENT

- a. Effective treatment depends upon identification and treatment of the underlying condition responsible for the failure of the kidneys.
- b. Along with treatment of the primary condition, normal homeostasis must be restored and maintained in order to restore kidney function and allow for tissue repair.

2-37. NURSING IMPLICATIONS

- a. Nursing care considerations are the same as for a patient with chronic renal failure, remembering at all times that changes in status may occur very rapidly. For this reason, intense and vigilant nursing observation is required.
- b. Fluid replacement therapy will be based on the patient's weight, urinary output, and insensible losses. I & O must be accurate in order for the physician to prescribe the correct amount of IV fluids and P.O. intake.
- c. The patient must be continually assessed for fluid retention.
 - (1) Auscultate lungs for the presence of fluid.
 - (2) Observe for dependent edema.

d. Assess for circulatory overload to avoid damage to the heart and lungs.
Observe for:

- (1) Distended neck veins.
- (2) Dyspnea.
- (3) Orthopnea.
- (4) Pulmonary congestion.
- (5) Tachycardia.
- (6) Hypertension.

2-38. BLADDER TRAUMA

a. Trauma to the bladder includes contusions, rupture, or urethral injuries.

b. Causes include blunt trauma and penetrating injuries to the lower abdomen, fractures of the pelvis or symphysis pubis, and "seatbelt" rupture. (A full bladder can be ruptured by the force of impact in a collision when the seatbelt is worn snugly.)

c. Signs and symptoms of an injured or ruptured bladder include:

- (1) Hematuria.
- (2) Blood at the urinary meatus.
- (3) Failure to void.
- (4) Rigid abdomen.
- (5) Shock.
- (6) Hemorrhage.

d. Nursing implications.

- (1) Treat shock and hemorrhage.
- (2) Maintain strict I & O.
- (3) Catheterize as ordered.
- (4) Prepare for surgical repair of the bladder if indicated.

2-39. RENAL TRAUMA

a. Trauma to the kidneys includes contusions, lacerations, and rupture. Because the kidneys are very vascular organs, receiving about one half the blood flow from the abdominal aorta, even a small laceration can cause massive hemorrhage.

b. Any blunt or penetrating injury to the back, flank, or abdomen may bruise, lacerate, or rupture a kidney.

c. Signs and symptoms of kidney trauma include:

- (1) Nausea and vomiting.
- (2) Back pain.
- (3) Flank pain.
- (4) Abdominal tenderness.
- (5) Hematuria.
- (6) Palpable mass (indicating internal bleeding).
- (7) Shock.

d. Nursing implications.

- (1) Treat shock and hemorrhage.
- (2) Avoid administration of narcotic analgesics, as they mask symptoms that will indicate the onset of complications.
- (3) Observe vital signs closely.
- (4) Evaluate frequently for changes in status.
- (5) Monitor hemoglobin and hematocrit for signs of internal bleeding.
- (6) Maintain and monitor urinary drainage.
- (7) Enforce strict bedrest.
- (8) In cases of a severe or penetrating injury, surgical intervention is indicated. Prepare the patient for surgical repair or nephrectomy, as indicated.

2-40. CONCLUSION

a. This lesson has introduced the basic nursing care techniques and procedures involved in nursing care related to the urinary system.

b. Review the lesson objectives once again. If you feel confident that you have achieved the lesson objectives, complete the exercises at the end of the lesson.

c. If you do not feel that you have met the lesson objectives, review the necessary material before you attempt the end of lesson exercises.

[**Continue with Exercises**](#)

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EXERCISES, LESSON 2

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the question, by completing the incomplete statement, or by writing the answer in the space provided at the end of the question.

After you have completed all of these exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. The primary function of the urinary system is _____
_____.
2. The renal cortex contains millions of _____.
3. Along the edges of the renal pelvis are cup-like projections called the _____
_____ and _____.
4. Urine is passed through each ureter by _____.
5. The male urethra is how long? _____.
6. The female urethra is how long? _____.
7. Water and organic molecules are filtered from the blood in the
_____.
8. Water and usable chemicals are reabsorbed into the blood in the
_____.
9. Normal urine is composed of _____ and _____.
10. The passage of a small amount of urine in a given period of time is called
_____.

11. Anuria is considered to be the passage of _____ ml of urine in a 24-hour period.
12. The presence of blood in the urine is called _____.
13. When collecting a clean-catch urine specimen, cleansing the urinary meatus is necessary because _____.
14. Once the first urine specimen has been placed in the 24-hour collection container, you must _____.
15. A KUB is an X-ray of the _____, _____ and _____.
16. List 4 reasons for insertion of a catheter.
 - a. _____.
 - b. _____.
 - c. _____.
 - d. _____.
17. Why must a catheter be lubricated prior to insertion? _____
_____.
18. When inserting a retention catheter, you must inspect the catheter, _____, and connect the catheter to the drainage system, before insertion.
19. When is it acceptable to collect a urine specimen from the urine drainage bag?

_____.
20. Where should the retention catheter for a male patient be taped? _____
_____.

21. In most urinary tract infections, bacteria enters through _____.
22. Cystitis is more common in females because _____
_____.
23. Why are fluids encouraged in-patients with a urinary tract infection? _____
_____.
24. Infection of the renal pelvis, tubules, or interstitial tissue is called _____
_____.
25. Urinary stasis, infections, and dehydration may precipitate _____
_____.
26. Why should dietary protein be restricted in-patients with renal disease?

_____.
27. The sudden loss of kidney function is called _____.
28. The basis of care in managing a patient with chronic renal failure is to _____
and _____.
29. A high carbohydrate diet is prescribed for patients with renal insufficiency/renal failure because it _____
and _____.
30. What disease is associated with scarring and loss of glomerular filtering surface?
_____.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 2

1. To control the composition, volume, and pressure of the body's fluids by regulating excretion of water and solutes. (para 2-1a)
2. Nephrons. (para 2-2d)
3. Minor and major calyces. (para 2-2f)
4. Peristalsis. (para 2-3)
5. Approximately 6-7 1/2 inches. (para 2-5a)
6. Approximately 1 1/2 inches. (para 2-5b)
7. Glomerulus. (para 2-7c)
8. Tubules (of the nephrons). (para 2-7d)
9. Water (95 percent); solutes (5 percent). (para 2-8a)
10. Oliguria.(para 2-9a(3))
11. Less than 50. (para 2-9a(4))
12. Hematuria. (para 2-9b(9))
13. The urethral orifice is colonized by bacteria. (para 2-11d)
14. Keep container "on ice" or in a refrigerator. (para 2-12i)
15. Kidneys, ureters, bladder. (para 2-13a)
16. A correct answer consists of any four of the following:
 - a. To relieve distention.
 - b. To obtain a sterile specimen of urine.
 - c. To determine residual urine.
 - d. To provide continuous drainage of the bladder.
 - e. To irrigate or instill medications. (para 2-15a-e)
17. To reduce friction and trauma. (para 2-16b)
18. Inflate the balloon to test it, then deflate. (para 2-19a(12))

19. Only when collecting the initial specimen from a new, sterile bag after inserting the catheter. (para 2-19b(18))
20. To the abdomen. (para 2-20b(13))
21. The urethra. (para 2-24a)
22. The urethra is in close anatomical proximity to the vagina and rectum. (para 2-24b(1))
23. To "flush out" the bacteria. (para 2-26b)
24. Pyelonephritis. (para 2-24b(3))
25. Stone formation (urolithiasis). (para 2-27b)
26. To decrease protein metabolism, which produces nitrogenous wastes that cannot be filtered by the kidney. (para 2-34e(4)(b))
27. Acute renal failure. (para 2-35a)
28. Assist the kidneys to maintain homeostasis; prepare the patient for dialysis or transplant. (para 2-33a,b)
29. Provides energy; decreases protein metabolism. (para 2-34e(4)(d))
30. Glomerulonephritis. (para 2-30a)

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