CHAPTER 28 Nursing Care of Clients with Urinary Tract Disorders

LEARNING OUTCOMES

- Explain the pathophysiology of common urinary tract disorders.
- Describe the manifestations of urinary tract disorders, relating manifestations to the pathophysiology of the disorder.
- Discuss tests used to diagnose disorders affecting the urinary tract with their nursing implications.
- Discuss the nursing implications of medications and treatments prescribed for clients with urinary tract disorders.
- Describe surgical procedures used in treating urinary tract disorders.

CLINICAL COMPETENCIES

- Assess the functional health status of clients with urinary tract disorders, using data to determine priority nursing diagnoses and select individualized nursing interventions.
- Identify, report, and document abnormal or unexpected assessments, monitoring client status.
- Use evidence-based research to plan and implement nursing care for clients with urinary tract disorders.
- Integrate the interdisciplinary plan of care into care for clients with urinary tract disorders.
- Knowledgeably and safely administer prescribed medications and treatments for clients with urinary tract disorders.
- Provide effective nursing care for clients undergoing surgery of the urinary tract.
- Plan and provide appropriate teaching for prevention of and self-care of urinary tract disorders.
- Evaluate client responses, revising plan of care as needed to promote, maintain, or restore functional health of clients with urinary tract disorders.

MEDIALINK

Resources for this chapter can be found on the Prentice Hall Nursing MediaLink DVD-ROM accompanying this textbook, and on the Companion Website at http://www.prenhall.com/lemone

KEY TERMS

cystectomy, *864*
cystitis, *847*
dysuria, *847*
extracorporeal shock wave lithotripsy (EWSL), *858*
hematuria, *848*
hydronephrosis, *857*
lithiasis, *855*
lithotripsy, *858*
neurogenic bladder, *870*
nocturia, *847*
nosocomial, *847*
pyelonephritis, *847*
reflux, *847*
renal colic, *856*
ureteral stent, *851*
ureteroplasty, *851*
urgency, *847*
urinary calculi, *855*
urinary diversion, *864*
urinary drainage system, *846*
urinary incontinence (UI), *872*
urinary retention, *869*

The urinary system includes the kidneys, ureters, urinary bladder, and urethra. This organ system can be affected by a variety of disorders, including congenital malformations, infections, obstructions, trauma, tumors, and neurologic conditions. Any portion of the system—from the kidney through the urethra—can be affected with serious or even life-threatening consequences unless the problem is appropriately diagnosed and treated. Kidney disorders can affect urine production and waste elimination directly, and are discussed in the next chapter. Disorders of the **urinary drainage system** (the kidney pelvis, ureters, bladder, and urethra) may obstruct urine flow or spread to the kidneys, affecting urine production and elimination. The anatomy and physiology and nursing assessment related to the urinary tract is presented in Chapter 27 ∞.

When caring for clients with urinary tract disorders, it is important to consider the client's modesty in voiding, possible difficulty in discussing the genitals, embarrassment about being exposed for examination and testing, and fear of changes in body image or function. These psychosocial issues may interfere with the client's willingness to seek help, discuss treatment, and learn about preventive measures.

Nursing interventions for clients with urinary tract disorders are directed toward primary prevention, early detection, and management of the disorder through health teaching and nursing care.

THE CLIENT WITH A URINARY TRACT INFECTION

Bacterial infections of the urinary tract are a common reason for seeking health services, second only to upper respiratory infections. More than 8 million people are treated annually for urinary tract infection (UTI) (Porth, 2005). Community-acquired UTIs are common in young women, and unusual in men under the age of 50.

Most community-acquired UTIs are caused by *Escherichia coli,* a common gram-negative enteral bacteria. About 10% to 15% of symptomatic UTIs are caused by *Staphylococcus saprophyticus,* a gram-positive organism. Catheter-associated UTIs often involve other gram-negative bacteria such as *Proteus, Klebsiella, Serratia,* and *Pseudomonas.*

Risk Factors for UTI

Clients can be predisposed to UTI by a variety of factors (Box 28–1). Some risk factors cannot be changed (e.g., aging and the short urethra of the female). In women, sexual activity increases the risk for UTI, because bacteria can be introduced into the bladder via the urethra during sexual intercourse. Use of spermicidal compounds with a diaphragm, cervical cap, or condom alters the normal bacterial flora of the vagina and perineal tissues and further increases the risk for UTI. Some females lack a normally protective mucosal enzyme and have decreased levels of cervicovaginal antibodies to enterobacteria, further increasing their risk. Prostatic hypertrophy and bacterial prostatitis are risk factors among males. Circumcision appears to have a protective effect. Anal intercourse also is a risk factor for men. Congenital or acquired factors contributing to the risk of infection include urinary tract obstruction by tumors or calculi, structural abnormalities such as strictures, impaired bladder innervation, bowel incontinence, and chronic diseases such as diabetes mellitus. Instrumentation of the urinary tract (e.g., catheterization or cystoscopy) is a major risk factor for UTI. Even when performed under strict aseptic conditions, catheterization can result in bladder infection. Recent research indicates that the risk for catheter-associated UTI is reduced when anesthetic lubricating gels are inserted into the urethra prior to catheter insertion (Bardsley, 2005). The placement of the catheter prevents the flushing action of voiding, and bacteria may as-

BOX 28–1 Risk Factors for UTI

Female
- Short, straight urethra
- Proximity of urinary meatus to vagina and anus
- Sexual intercourse
- Use of diaphragm and spermicidal compounds for birth control
- Pregnancy

Male
- Uncircumcised
- Prostatic hypertrophy
- Anal intercourse

Both
- Aging
- Urinary tract obstruction
- Neurogenic bladder dysfunction
- Vesicoureteral reflux
- Genetic factors
- Catheterization

cend to the bladder either through the catheter lumen or via exudate between the urethral mucosa and the catheter.

FAST FACTS

- Up to three UTIs annually is considered to be within normal limits for sexually active women and does not usually warrant additional diagnostic tests beyond urine culture.
- In healthy adult men, however, UTIs are unusual and may prompt additional diagnostic testing.

Older clients have an increased incidence of UTI. The greatest degree of increase is seen in men, as the ratio of female-to-male UTI in older adults changes from 50:1 to less than 5:1. An increased risk of urinary stasis, chronic disease states (such as diabetes mellitus), and an impaired immune response contribute to the higher incidence of UTI in the older adult. In men, the prostate typically hypertrophies with aging, potentially resulting in urinary retention as the urethra narrows. Prostatic secretions are lessened, diminishing their protective, antibacterial effect. In older women, loss of tissue elasticity and weakening of perineal muscles often contribute to the development of a cystocele or rectocele. Resulting changes in bladder and urethral position increase the risk of incomplete bladder emptying.

Physiology Review

The urinary tract is normally sterile above the urethra. Adequate urine volume, a free flow from the kidneys through the urinary meatus, and complete bladder emptying are the most important mechanisms maintaining sterility. Pathogens that enter and contaminate the distal urethra are washed out during voiding. Other defenses for maintaining sterile urine include its normal acidity and bacteriostatic properties of the bladder and urethral cells. The peristaltic activity of the ureters and a competent vesicoureteral junction help maintain sterility of the upper urinary tract. As the ureter enters the bladder, its distal portion tunnels between the mucosa and muscle layers of the bladder wall (Figure 28–1 ■). During voiding, increased *intravesicular* (within the bladder) pressure compresses the ureter, preventing **reflux**, or backflow of urine toward the kidneys. In males, a long urethra and the antibacterial effect of zinc in prostatic fluid also help prevent contamination of this normally sterile environment.

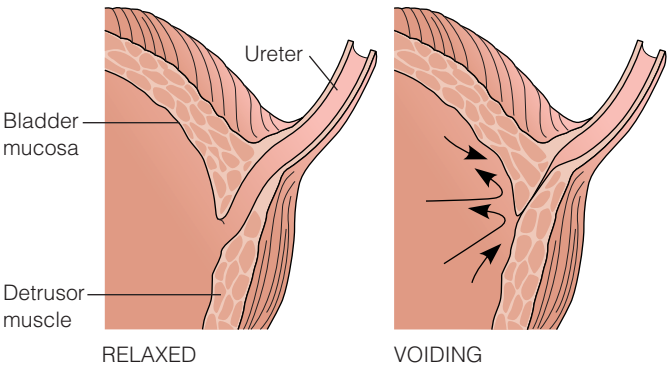


Figure 28–1 ■ A competent vesicoureteral junction. Note how increased intravesicular pressure during voiding occludes the distal portion of the ureter, preventing reflux.

Pathophysiology and Manifestations

Pathogens usually enter the urinary tract by ascending from the mucous membranes of the perineal area into the lower urinary tract. Bacteria that have colonized the urethra, vagina, or perineal tissues are the usual source of infection (Porth, 2005). From the bladder, bacteria may continue to ascend the urinary tract, eventually infecting the *parenchyma* (functional tissue) of the kidneys (Kasper et al., 2005). Hematogenous spread of infection to the urinary tract is rare. Infections introduced in this manner are usually associated with previous damage or scarring of the urinary tract. Bacteria introduced into the urinary tract may cause asymptomatic bacteriuria or an inflammatory response with manifestations of UTI.

Urinary tract infections can be categorized in several ways. Anatomically, UTIs may affect the lower or the upper urinary tract. Lower urinary tract infections include *urethritis,* inflammation of the urethra; *prostatitis,* inflammation of the prostate gland (discussed in Chapter 49 ∞); and **cystitis**, inflammation of the urinary bladder. The most common upper urinary tract infection is **pyelonephritis**, inflammation of the kidney and renal pelvis. The infection may involve superficial tissues such as the bladder mucosa, or may invade other tissues such as prostate or renal tissues. Epidemiologically, UTIs are identified as community acquired or **nosocomial**, associated with catheterization.

Cystitis

Cystitis, inflammation of the urinary bladder, is the most common UTI. The infection tends to remain superficial, involving the bladder mucosa. The mucosa becomes hyperemic (red) and may hemorrhage (Figure 28–2 ■). The inflammatory response causes pus to form. This process causes the classic manifestations associated with cystitis. Typical presenting symptoms of cystitis include **dysuria** (painful or difficult urination), urinary frequency and **urgency** (a sudden, compelling need to urinate), and **nocturia** (voiding two or more times at night). In addition,

Figure 28–2 ■ Appearance of the bladder wall affected by cystitis.
Source: Craig Zuckerman/Phototake NYC

MEDIALINK Case Study: Urinary Tract Infection

the urine may have a foul odor and appear cloudy (*pyuria*) or bloody (**hematuria**) because of mucus, excess white cells in the urine, and bleeding of the inflamed bladder wall. Suprapubic pain and tenderness also may be present. See the box below for manifestations of cystitis.

Cystitis occurs most frequently in adult females, usually because of colonization of the bladder by bacteria normally found in the lower gastrointestinal tract. These bacteria gain entry by ascending the short, straight female urethra. In addition to the risk factors listed on page 846, personal hygiene practices and voluntary urinary retention can contribute to the risk for UTI in women.

Older clients may not experience the classic symptoms of cystitis. Instead, they often present with nonspecific manifestations such as nocturia, incontinence, confusion, behavior change, lethargy, anorexia, or "just not feeling right." Fever may be present; however, hypothermia also may develop in an older adult.

Although the bacteriostatic effect of prostatic fluid and a longer urethra provide an effective barrier to bladder infection for adult males, the prostatic hypertrophy commonly associated with aging increases the risk of cystitis in elderly males. An enlarged prostate can impede urine flow, leading to incomplete bladder emptying and urinary stasis. Bacteria are not completely flushed with voiding, allowing colonization of the bladder.

Cystitis is usually uncomplicated and readily responds to treatment. When left untreated, the infection can ascend to involve the kidneys. Severe or prolonged infection may lead to sloughing of bladder mucosa and ulcer formation. Chronic cystitis can lead to bladder stones (discussed later in this chapter).

Catheter-Associated UTI

At least 10% to 15% of hospitalized clients with indwelling urinary catheters develop bacteriuria. The longer the catheter remains in place, the greater the risk for infection. Bacteria, including *E. coli, Proteus, Pseudomonas,* and *Klebsiella,* reach the bladder by either migrating through the column of urine within the catheter or by moving up the mucous sheath of the urethra outside the catheter (Kasper et al., 2005). Bacteria enter the catheter system at the connection between the catheter and drainage system or through the emptying tube of the drainage bag. Colonization of perineal skin by bowel flora is a common source of infection in catheterized women.

Catheter-associated UTIs often are asymptomatic. Gram-negative bacteremia is the most significant complication associated with these UTIs. Most catheter-associated UTIs resolve quickly when the catheter is removed and a short course of antibiotic is administered. Intermittent catheterization carries a lower risk of infection than does an indwelling catheter, and is preferred for clients who are unable to empty their bladder by voiding.

Instillation of anesthetic lubricating gel into the urethra prior to catheter insertion further reduces the risk by dilating the urethra and reducing trauma to fragile urethral tissues (Bardsley, 2005).

Pyelonephritis

Pyelonephritis is inflammation of the renal pelvis and parenchyma, the functional kidney tissue. *Acute pyelonephritis* is a bacterial infection of the kidney; *chronic pyelonephritis* is associated with nonbacterial infections and inflammatory processes that may be metabolic, chemical, or immunologic in origin.

ACUTE PYELONEPHRITIS Acute pyelonephritis usually results from an infection that ascends to the kidney from the lower urinary tract. Asymptomatic bacteriuria or cystitis can lead to acute pyelonephritis. Risk factors include pregnancy (because of slowed ureteral peristalsis), urinary tract obstruction, and congenital malformation. Urinary tract trauma, scarring, calculi (stones), kidney disorders such as polycystic or hypertensive kidney disease, and chronic diseases such as diabetes may also contribute to pyelonephritis. *Vesicoureteral reflux,* a condition in which urine moves from the bladder back toward the kidney, is a common risk factor in children who develop pyelonephritis and is also seen in adults when bladder outflow is obstructed.

The infection spreads from the renal pelvis to the renal cortex. The pelvis, calyces, and medulla of the kidney are primarily affected, with white blood cell (WBC) infiltration and inflammation. The kidney becomes grossly edematous. Localized abscesses may develop on the cortical surface of the kidney. As with cystitis, *E. coli* is the organism responsible for 85% of the cases of acute pyelonephritis. Other organisms commonly found include *Proteus* and *Klebsiella,* bacteria that normally inhabit the intestinal tract.

The onset of acute pyelonephritis is typically rapid, with chills and fever, malaise, vomiting, flank pain, costovertebral tenderness, urinary frequency, and dysuria (see the Manifestations box below). Symptoms of cystitis also may be present. The older adult may present with a change in behavior, acute confusion, incontinence, or a general deterioration in condition.

CHRONIC PYELONEPHRITIS Chronic pyelonephritis involves chronic inflammation and scarring of the tubules and interstitial tissues of the kidney. It is a common cause of chronic renal fail-

MANIFESTATIONS of Cystitis

- Dysuria
- Frequency
- Urgency
- Nocturia
- Pyuria
- Hematuria
- Suprapubic discomfort

MANIFESTATIONS of Acute Pyelonephritis

URINARY
- Urinary frequency
- Dysuria
- Pyuria
- Hematuria
- Flank pain
- Costovertebral tenderness

SYSTEMIC
- Vomiting
- Diarrhea
- Acute fever
- Shaking chills
- Malaise

ure. It may develop as a result of UTIs or other conditions that damage the kidneys, such as hypertension or vascular conditions, severe vesicoureteral reflux, or obstruction of the urinary tract.

The client with chronic pyelonephritis may be asymptomatic or have mild manifestations such as urinary frequency, dysuria, and flank pain. Hypertension can develop as kidney tissue is destroyed.

FAST FACTS

- The most common route of entry for a urinary tract infection is ascending, from colonization of the perineal tissues by fecal bacteria (usually *E. coli*), through the urethra, into the bladder (cystitis) and possibly kidney tissue (pyelonephritis).

INTERDISCIPLINARY CARE

Treatment of UTI focuses on eliminating the causative organism, preventing relapse or reinfection, and identifying and correcting any contributing factors. Drug treatment with antibiotics and urinary anti-infectives is commonly used. In some cases, surgery may be indicated to correct contributing factors.

Diagnosis

Laboratory testing for UTI includes:

- *Urinalysis* to assess for pyuria, bacteria, and blood cells in the urine. A bacteria count greater than 100,000 (10^5) per milliliter is indicative of infection. Rapid tests for bacteria in the urine include using a *nitrite dipstick* (which turns pink in the presence of bacteria) and the *leukocyte esterase test,* an indirect method of detecting bacteria by identifying lysed or intact WBCs in the urine.

  Urine should be a midstream clean-catch specimen; if necessary, straight catheterization or "mini-cath," with strict aseptic technique, may be used. Catheterization is avoided if possible to reduce the risk of further infection. See the Diagnostic Tests table beginning on page 835 for nursing care related to collecting a urinalysis specimen.
- *Gram stain of the urine* may be done to identify the infecting organism by shape and characteristic (gram-positive or gram-negative).
- *Urine culture and sensitivity* tests may be ordered to identify the infecting organism and the most effective antibiotic. Culture requires 24 to 72 hours, so treatment to eliminate the most common organisms often is initiated without culture.
- *WBC with differential* may be done to detect typical changes associated with infection, such as *leukocytosis* (elevated WBC) and increased numbers of neutrophils.

In men and in adult women with recurrent infections or persistent bacteriuria, additional diagnostic testing may be ordered to evaluate for structural abnormalities and other contributing factors:

- *Intravenous pyelography (IVP),* also known as *excretory urography,* is used to evaluate the structure and excretory function of the kidneys, ureters, and bladder. As the kidneys clear an intravenously injected contrast medium from the blood, the size and shape of the kidneys, their calyces and pelvises, the ureters, and the bladder can be evaluated, and structural or functional abnormalities, such as vesicoureteral reflux, may be detected.
- *Voiding cystourethrography* involves instilling contrast medium into the bladder, then using x-rays to assess the bladder and urethra when filled and during voiding. This study can detect structural or functional abnormalities of the bladder and urethral strictures. This test has a lower risk of allergic response to the contrast dye than IVP.
- *Cystoscopy,* direct visualization of the urethra and bladder through a cystoscope, may be used to diagnose conditions such as prostatic hypertrophy, urethral strictures, bladder calculi, tumors, polyps or diverticula, and congenital abnormalities. A tissue biopsy may be obtained during the procedure, and other interventions performed (e.g., stone removal or stricture dilation).
- *Manual pelvic* or *prostate examinations* are done to assess for structural changes of the genitourinary tract, such as prostatic enlargement, cystocele, or rectocele.

Nursing implications for these diagnostic procedures are presented in Chapter 27 ∞.

Medications

Most uncomplicated infections of the lower urinary tract can be treated with a short course of antibiotic therapy. Upper urinary tract infections, in contrast, usually require longer treatment (2 or more weeks) to eradicate the infecting organism.

Short-course therapy (either a single antibiotic dose or a 3-day course of treatment) reduces treatment cost, increases compliance, and has a lower rate of side effects. Single-dose therapy is associated with a higher rate of recurrent infection and continued vaginal colonization with *E. coli,* making a 3-day course of treatment the preferred option for uncomplicated cystitis. Oral trimethoprim-sulfamethoxazole (TMP-SMZ), TMP, or a quinolone antibiotic such as ciprofloxacin (Cipro) or enoxacin (Penetrex) may be ordered.

Men and women with pyelonephritis, urinary tract abnormalities or stones, or a history of previous infections with antibiotic-resistant infections require a 7- to 10-day course of TMP-SMZ, ciprofloxacin, ofloxacin (Floxin), or an alternate antibiotic. The client with severe illness may need hospitalization. Intravenous ciprofloxacin, gentamicin, ceftriaxone (Rocephin), or ampicillin may be prescribed for severe illness or sepsis associated with UTI. See Chapter 12 ∞ for the nursing implications for antibiotic therapy.

The outcome of treatment for UTI is determined by follow-up urinalysis and culture. *Cure,* as evidenced by no pathogens present in the urine, is the desired outcome. When therapy fails to eradicate bacteria in the urine, it is known as *unresolved bacteriuria. Persistent bacteriuria* or *relapse* occurs when a persistent source of infection causes repeated infection after initial cure. *Reinfection* is the development of a new infection with a different pathogen following successful UTI treatment (Tierney et al., 2005).

PRACTICE ALERT

Follow-up urine culture is scheduled 10 days to 2 weeks following completion of antibiotic therapy for UTI to ensure that bacteria have been eradicated from the urinary tract.

Clients who experience frequent symptomatic UTIs may be treated with prophylactic antibiotic therapy with a drug such as TMP-SMZ, TMP, or nitrofurantoin (Furadantin, Macrodantin, Macrobid). TMP and nitrofurantoin do not achieve effective plasma concentrations at recommended doses, but do reach effective concentrations in the urine. Nitrofurantoin also may be used to treat UTI in pregnant women. Nursing implications for these urinary anti-infectives and for phenazopyridine (Pyridium), a urinary analgesic, are outlined in the Medication Administration box below.

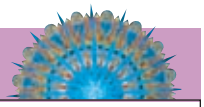
Antibiotics and urinary anti-infectives are not generally recommended to treat asymptomatic bacteriuria in catheterized clients. The preferred treatment for catheter-associated UTI is removal of the indwelling catheter followed by a 10- to 14-day course of antibiotic therapy to eliminate the infection.

Surgery

Surgery may be indicated for recurrent UTI if diagnostic testing indicates calculi, structural anomalies, or strictures that contribute to the risk of infection. Table 28–1 lists major causes of urinary tract obstruction that may contribute to UTI.

Stones, or *calculi,* in the renal pelvis or in the bladder are an irritant and provide a matrix for bacterial colonization. Treatment may include surgical removal of a large calculus from the renal

MEDICATION ADMINISTRATION Urinary Anti-Infectives and Analgesics



URINARY ANTI-INFECTIVES

Nitrofurantoin (Furadantin, Macrodantin, Macrobid)
Trimethoprim (Proloprim, Trimpex)

Urinary anti-infectives are usually used prophylactically to prevent recurrence of UTI in clients with frequent symptomatic infections. Nitrofurantoin also may be used to treat UTI in pregnant women.

Nursing Responsibilities

- Ensure adequate fluid intake (1500 to 2000 mL/day) to maintain a urine output of at least 1500 mL of urine per 24 hours. Do not overhydrate.
- Administer with meals to minimize GI side effects, such as nausea, gastric upset, and abdominal cramping.
- Trimethoprim is contraindicated for use in clients with renal or hepatic impairment; nitrofurantoin is contraindicated for clients with impaired renal function. Report abnormal laboratory values such as elevated creatinine or BUN, bilirubin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), and lactic dehydrogenase (LDH).
- Use with caution in older or chronically ill clients. Monitor closely for adverse effects.
- Do not administer trimethoprim to pregnant women because of possible adverse effects on the fetus.
- Monitor the client taking nitrofurantoin for an acute or chronic pulmonary reaction with manifestations of dyspnea, cough, chills, fever, and chest pain. Discontinue the drug and notify the physician.
- Nitrofurantoin may cause peripheral neuropathy, especially in older clients and adult diabetics. Notify the physician if symptoms develop.
- Nitrofurantoin oral suspension may stain the teeth; have the client rinse the mouth thoroughly after administering.
- Monitor for signs of phenytoin toxicity (sedation, ataxia, and increased blood levels) if trimethoprim is given concurrently. Phenytoin doses may need to be reduced.

Health Education for the Client and Family

- These drugs are used along with hygiene practices to prevent recurrent UTI. Take as directed, even when no symptoms are present.
- Drink six to eight glasses of water or fluid per day while taking these drugs.
- Take the drug with meals or food to reduce gastric effects; however, avoid milk products because they may interfere with absorption.
- Trimethoprim should not be taken during pregnancy. Contact your physician before attempting to become pregnant.
- Contact your doctor if you develop any of the following: chest pain, difficulty breathing, cough, chills, and fever; numbness and tingling or weakness of the extremities; rash or pruritus (itching).
- If you are taking an oral suspension of nitrofurantoin, rinse your mouth thoroughly after each dose to avoid staining the teeth.
- Nitrofurantoin turns the urine brown. This is not harmful and subsides when the drug is discontinued.
- If you are taking trimethoprim along with phenytoin (Dilantin) or a related anticonvulsant, contact your doctor if you become sedated or begin to stagger.

URINARY ANALGESIC

Phenazopyridine (Pyridium)

Phenazopyridine is a urinary tract analgesic that may be used for symptomatic relief of the pain, burning, frequency, and urgency associated with UTI during the first 24 to 48 hours of therapy. Its use is somewhat controversial, because it does not treat the infection and may delay effective treatment in the client with recurrent UTI who saves a dose or two "for the next time."

Nursing Responsibilities

- Monitor renal function (urine output, weight, serum creatinine, and BUN) during treatment; report changes.
- Stop the drug and contact the physician if sclera or skin become yellow, tinged. This may indicate reduced excretion and toxicity.

Health Education for the Client and Family

- Take with meals to minimize gastric upset.
- Consume 2 to 3 quarts of fluid daily while taking this drug.
- If you are a diabetic, check your blood sugars regularly while taking this drug.
- This drug turns urine orange or red. Protect your clothing from staining.
- Contact lenses may become stained if worn while taking this drug.
- Promptly contact your doctor if symptoms of UTI recur; do not take phenazopyridine before you seek medical treatment.
- If you develop itching or notice a yellow tinge to your skin or eyes, stop taking the drug and notify the physician.

TABLE 28–1 Major Causes of Urinary Tract Obstruction by Location

LOCATION	OBSTRUCTIVE PROCESS
Kidney pelvis	Calculi (stones) Polycystic kidney disease Infection and scarring
Ureters	Calculi Scarring and stricture Congenital defects or strictures External processes such as pregnancy, tumors, lymph node enlargement
Bladder	Neurogenic bladder Tumors Calculi and other foreign bodies
Urethra	Benign prostatic hypertrophy Tumors Scarring and stricture Trauma

pelvis or cystoscopic removal of bladder calculi. *Percutaneous ultrasonic pyelolithotomy* or *extracorporeal shock wave lithotripsy* (described in the next section of this chapter) may be used instead of surgery to crush and remove stones. (See the Diagnostic Tests box on page 837 for nursing care related to cystoscopy.)

Ureteroplasty, surgical repair of a ureter, may be indicated for structural abnormality or stricture of a ureter. This may be combined with a ureteral reimplantation if vesicoureteral reflux is present. The client returns from these surgeries with an indwelling urinary catheter (Foley or suprapubic) and a **ureteral stent** (a thin catheter inserted into the ureter to provide for urine flow and ureteral support), which remains in place for 3 to 5 days. Care of the client with a ureteral stent is outlined in the box below.

COMPLEMENTARY THERAPIES Complementary therapies such as aromatherapy or herbal preparations may be used in conjunction with antibiotics to treat UTI. Low-sugar cranberry juice or extract and blueberry juice also are commonly used to prevent and treat UTI. Adding bergamot, sandalwood, lavender, or juniper oil to bath water helps relieve the discomfort of UTI. Herbal supplements such as saw palmetto have a urinary antiseptic effect, and may be beneficial in treating or preventing UTI. Consult a qualified herbologist for recommended doses and appropriate use.

NURSING CARE

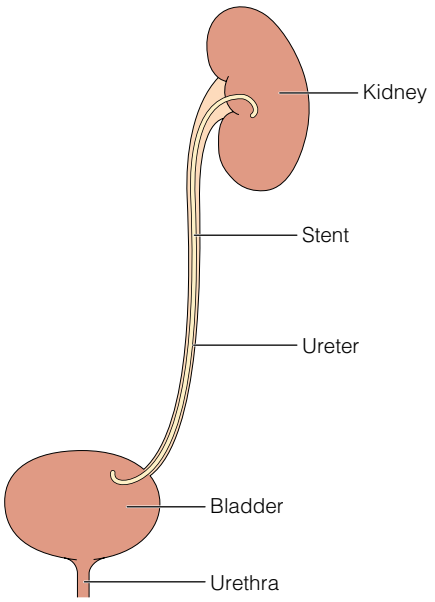
Health Promotion

Teach measures to prevent UTI to all clients, particularly to young, sexually active women. Encourage clients to maintain a generous fluid intake of 2.0 to 2.5 quarts per day, increasing

NURSING CARE OF THE CLIENT WITH A Ureteral Stent

Ureteral stents are used to maintain patency and promote healing of the ureters (see figure below). A stent may be temporary, used during and after a surgical procedure, or it may be used for longer periods in clients with ureteral obstruction due to tumors, strictures, or other causes.

Stents may be positioned during surgery or cystoscopy. They are made of a nontoxic material such as silicone or polyurethane, with side drainage holes placed along the length of the stent. Stents are radiopaque for easy radiographic identification. One or both ends of the stent may be pigtail or J shaped to prevent migration.



- Label all drainage tubes including stents for easy identification. Attach each catheter and stent to a separate closed drainage system. *Careful labeling allows close monitoring of output from all sources and reservoirs. Separate drainage systems minimize the risk of infection.*
- If the stent has been brought to the surface, secure it and maintain its position. *The stent is usually placed in the renal pelvis. It is important to secure it well to prevent trauma to the kidney, inadvertent removal of the stent, and ureter obstruction.*
- Monitor urine output, including color, consistency, and odor. Monitor for signs of infection or bleeding: fever, tachycardia, pain, hematuria, and cloudy or malodorous urine. *The stent facilitates urine flow but may become obstructed because of bleeding, calculi, or sediment. Obstruction may result in hydronephrosis and kidney damage. The stent itself is a foreign body in the urinary tract and can increase the risk of UTI.*
- Maintain fluid intake, encouraging fluids that acidify urine, such as low-sugar apple, cranberry, and blueberry juice. *The stent can precipitate calculus formation as well as UTI. Increasing fluid intake and acidifying the urine help prevent these complications.*
- For an indwelling stent, stress the need for regular follow-up to monitor for and prevent complications such as UTI and calculi. *The client with an indwelling stent may tend to forget that the stent is in place and become lax in compliance with follow-up and preventive measures.*

intake during hot weather or strenuous activity. Discuss the need to avoid voluntary urinary retention, emptying the bladder every 3 to 4 hours. Instruct women to cleanse the perineal area from front to back after voiding and defecating. Teach to void before and after sexual intercourse to flush out bacteria introduced into the urethra and bladder. Teach measures to maintain the integrity of perineal tissues: Avoid bubble baths, feminine hygiene sprays, and vaginal douches; wear cotton briefs, avoid synthetic materials; if postmenopausal, use hormone replacement therapy or estrogen cream. Unless contraindicated, suggest measures to maintain acid urine: Drink two glasses of low-sugar cranberry juice daily; take ascorbic acid (vitamin C), and avoid excess intake of milk and milk products, other fruit juices, and sodium bicarbonate (baking soda).

Assessment

Focused assessment data for the client with a UTI includes the following:

- *Health history:* Current symptoms, including frequency, urgency, burning on urination, voidings per night; color, clarity, and odor of urine; other manifestations such as lower abdominal, back, or flank pain, nausea or vomiting, fever; duration of symptoms and any treatment attempted; history of previous UTIs and their frequency; possibility of pregnancy and type of birth control used; chronic diseases such as diabetes; current medications and any known allergies.
- *Physical examination:* General health; vital signs including temperature; abdominal shape, contour, tenderness to palpation (especially suprapubic); percuss for costovertebral tenderness (see Box 27–1).

See Chapter 27 ∞ for complete nursing assessment of the urinary system.

Nursing Diagnoses and Interventions

The client's general health, abilities for self-care, and risk factors that may contribute to UTI are considered when planning and implementing nursing care for the client with a UTI. Priority nursing diagnoses focus on comfort, urinary elimination, and teaching/learning needs. A nursing care plan for the client with cystitis can be found on page 853.

Pain

Pain is a common manifestation of both lower and upper UTI. Urinary tract pain is caused primarily by distention and increased pressure within the tract. The severity of the pain is related to the rate at which inflammation and distention develop, not their degree.

In cystitis, inflammation causes a sensation of fullness; dull, constant suprapubic pain; and possibly low back pain. The inflamed bladder wall and urethra cause dysuria, pain, and burning on urination. Bladder spasms may develop, causing periodic severe, stabbing discomfort. Pain associated with pyelonephritis is often steady and dull, localized to the outer abdomen or flank region. Urologic disorders rarely cause central abdominal pain.

- Assess pain: timing, quality, intensity, location, duration, and aggravating and alleviating factors. *A change in the nature, location, or intensity of the pain could indicate an extension of the infection or a related but separate problem.*

PRACTICE ALERT

The older adult with a UTI may not complain of dysuria with a UTI. Be alert for other manifestations of UTI such as incontinence or cloudy or malodorous urine. Inflammatory and immune responses tend to diminish with aging, reducing the irritative symptoms of UTI.

- Teach or provide comfort measures such as warm sitz baths, warm packs or heating pads, and balanced rest and activity. Systemic analgesics, urinary analgesics, or antispasmodic medication may be used as ordered. *Warmth relaxes muscles, relieves spasms, and increases local blood supply. Because pain can stimulate a stress response and delay healing, it should be relieved when possible.*
- Increase fluid intake unless contraindicated. *Increased fluid dilutes urine, reducing irritation of the inflamed bladder and urethral mucosa.*
- Instruct to notify primary care provider if pain and discomfort continue or intensify after therapy is initiated. *Pain and discomfort in voiding typically are relieved within 24 hours of the initiation of antibiotic therapy. Continued discomfort may indicate a complicated UTI or other urinary tract disorder.*

Impaired Urinary Elimination

Inflammation of the bladder and urethral mucosa affects the normal process and patterns of voiding, causing frequency, urgency, and burning on urination, as well as nocturia. Urine may be blood tinged, cloudy, and malodorous. The client with short- or long-term urinary retention (see the section on urinary retention later in this chapter) requires additional measures to assess for and prevent UTI.

- Monitor (or instruct the client to monitor) color, clarity, and odor of urine. *Urine should return to clear yellow within 48 hours, unless drug therapy causes a change in the color of urine. If clarity does not return, further investigation may be necessary.*

PRACTICE ALERT

Provide for easy access to a bedpan, urinal, commode, or bathroom. Make sure that lighting is adequate and that pathways are free of obstacles. Frequency, urgency, and nocturia increase the risk of urinary incontinence and of injury due to falls, particularly in the older or debilitated client.

- Instruct to avoid caffeinated drinks, including coffee, tea, and cola; citrus juices; drinks containing artificial sweeteners; and alcoholic beverages. *Caffeine, citrus juices, and artificial sweeteners irritate bladder mucosa and the detrusor muscle, and can increase urgency and bladder spasms.*
- Use strict aseptic technique and a closed urinary drainage system when inserting a straight or indwelling urinary catheter. Insert indwelling catheters to the full recommended length (4 or more inches in women and to the bifurcation in men) before inflating the balloon. *Bacteria colonizing the perineal tissues or on the nurse's hands can be introduced into the bladder during catheterization. Aseptic technique*

MEDIALINK Care Plan Activity: Urinary Tract Infection

NURSING CARE PLAN A Client with Cystitis

Miija Waisanen is a 25-year-old second-year nursing student. She was recently married, and she and her husband live in an apartment near the college she attends. Mrs. Waisanen has never been pregnant, and she is using a diaphragm for birth control. She presents at the local urgent care clinic complaining of low back pain, frequency, urgency, and burning on urination that began the day before.

ASSESSMENT

Patrice Ramiros, RN, admits Mrs. Waisanen to the clinic. Mrs. Waisanen denies having had similar symptoms in the past or ever having been diagnosed with a urinary tract infection. She describes her pain as a constant, dull ache that does not change with movement. She feels the need to urinate almost constantly, but experiences difficulty in starting her stream, and burning pain and cramping when voiding. She reports getting up four times the night before to urinate. She denies painful intercourse and states that her last menstrual period began only 2 weeks ago. Physical examination reveals: BP 112/68; P 90 and regular, afebrile. Suprapubic tenderness noted but no flank or costovertebral angle tenderness. Clean-catch urine specimen shows hematuria, multiple WBCs, and a bacteria count greater than 10^5 per milliliter.

The nurse practitioner prescribes trimethoprim-sulfamethoxazole (TMP-SMZ) 160 mg/800 mg PO bid for 3 days, and aspirin or acetaminophen gr × PO every 4 hours as needed for pain. Mrs. Waisanen is instructed to return to the clinic in 7 days for a follow-up urine culture, or sooner if her symptoms do not improve.

DIAGNOSES

- *Pain* related to infection and inflammatory process in the urinary tract
- *Impaired Urinary Elimination* related to inflammation as evidenced by frequency, urgency, nocturia, and dysuria
- *Deficient Knowledge* related to lack of information about risk factors for UTI

EXPECTED OUTCOMES

- Report relief of low back pain and burning on urination.
- Regain a normal voiding pattern without frequency, urgency, nocturia, and abnormal urine characteristics.
- Verbalize understanding of the disease process, related risk factors, follow-up instructions, and symptoms of recurrence indicating the need for medical attention.

PLANNING AND IMPLEMENTATION

- Teach comfort measures: warm sitz baths, a heating pad on low heat applied to her lower back or abdomen, rest, increased fluid intake, avoiding caffeinated beverages, and aspirin or acetaminophen as ordered.
- Advise to refrain from sexual intercourse until infection and inflammation have cleared to avoid further irritation of inflamed tissues.
- Discuss the possible relationship between using a diaphragm for birth control and UTI in women.
- Discuss dietary and hygiene practices to prevent UTI, symptoms indicating the need for further intervention, and the risks of undertreatment.

EVALUATION

Six months later, Mrs. Waisanen rotates through the urgent care clinic for her community-based nursing experience. Ms. Ramiros asks how she is doing. Mrs. Waisanen reports that her symptoms and urine cleared within about a day after starting the antibiotic and she has had no further problems. She has seen her women's healthcare nurse practitioner to change her birth control to oral contraceptives, increased her intake of fluid and vitamin C, and no longer puts off urinating until she "has time to go!"

CRITICAL THINKING IN THE NURSING PROCESS

1. What physiologic and psychosocial factors put Mrs. Waisanen at risk for developing a UTI?
2. Compare and contrast the benefits and drawbacks to short-course therapy versus conventional therapy for UTI.
3. Why was it appropriate for the nurse practitioner to use short-course therapy with the advice to return if symptoms did not clear?
4. Develop a care plan for Mrs. Waisanen for the nursing diagnosis *Ineffective Health Maintenance.*

See Evaluating Your Response in Appendix C.

reduces this risk. Inflation of the balloon while in the urethra damages urethral tissues and can cause significant discomfort for the client. See page 854 for evidence-based practice for male catheterization.

PRACTICE ALERT

Unless contraindicated, instillation of an anesthetic lubricating gel into the urethra (10 mL for a male and 6 mL for a female) promotes comfort during the procedure, protects fragile urethral tissues from trauma, and reduces the risk for catheter-associated UTI (Bardsley, 2005).

- When possible, use intermittent straight catheterization to relieve urinary retention. Remove indwelling urinary catheters as soon as possible. *Using intermittent straight catheterization allows the bladder to fill and completely empty in a more normal manner, maintaining physiologic function. The risk of infection associated with an indwelling catheter is about 3% to 5% per day of catheterization* (Kasper et al., 2005).
- Maintain the closed urinary drainage system, and use aseptic technique when emptying the catheter drainage bag. Maintain gravity flow, preventing reflux of urine into the bladder from the drainage system. *Bacteria can enter the drainage system when its integrity is interrupted (e.g., disconnecting the catheter from the drainage system) or during emptying of the drainage bag. These bacteria can ascend the column of urine to the bladder, causing UTI.*
- Provide perineal care on a regular basis and following defecation. Use antiseptic preparations only as ordered. *Regular cleansing of perineal tissues reduces the risk of colonization by bowel or other bacteria. While antiseptic solutions may be ordered for catheter care, they can dry perineal tissues and*

NURSING RESEARCH Evidence-Based Practice: Male Catheterization

Insertion of an indwelling (retention) catheter is a commonly performed procedure in hospitals and long-term care facilities. While the location of the female urethral meatus presents a challenge to maintaining catheter sterility during insertion, the anatomy of the male urethra presents a different set of challenges. Little research is available to support evidence-based practice for male urethral catheterization. In addition, reports of urethral injury in men related to catheter insertion and balloon inflation are not uncommon. A multidisciplinary team of researchers at University of Colorado Hospital conducted a study to determine the correct urethral catheter placement in male adults (Daneshgari et al., 2002). Their research showed that inserting the catheter to the bifurcation (attachment of the arm for balloon inflation) always placed the retention balloon well within the urinary bladder prior to its inflation. Insertion to any lesser distance was inadequate to ensure safe balloon inflation without potential damage to the urethra.

IMPLICATIONS FOR NURSING

Nursing fundamentals and skills texts recommend inserting the catheter from 6 to 8 or 10 inches into the male urethra before inflating the balloon of a retention catheter. Some texts recommend inserting the catheter 1 to 2 inches beyond the point at which urine is obtained before inflating the balloon. This study (Daneshgari et al., 2002) showed that these recommendations could result in an attempt to inflate the balloon while that portion of the catheter is still in the urethra, not fully into the bladder. To ensure safe practice and reduce the risk for injury and discomfort, insert a retention catheter to the bifurcation before inflating the balloon.

CRITICAL THINKING IN CLIENT CARE

1. Why is insertion of a urinary catheter frequently a more uncomfortable and difficult procedure for a male client than a female client? What nursing measures or techniques can be used to reduce this discomfort?
2. Sterile technique generally is used when catheterizing clients in acute care settings. However, clients who require intermittent catheterization to empty their bladder typically use clean technique. Would clean technique be appropriate in an acute or long-term care setting? Why or why not?

Source: From "Evidence-Based Multidisciplinary Practice: Improving the Safety and Standards of Male Bladder Catheterization" by F. Daneshgari, M. Krugman, A. Bahn, and R. S. Lee, 2002, *Medsurg Nursing, 11*(5), 236–241, 246.

reduce normal flora, increasing the risk of colonization by pathogens, and should not routinely be used.

Ineffective Health Maintenance

The client with a urinary tract infection is at an increased risk for future UTI and needs to understand the disease process, risk factors, measures to prevent recurrent infection, diagnostic procedures, and home care. In addition, once the manifestations of UTI are relieved, motivation to continue the treatment plan declines. Failure to complete the full course of therapy and recommended follow-up can lead to continued bacteriuria and recurrent infections.

- Teach how to obtain a midstream clean-catch urine specimen. *Cleansing of the urinary meatus and perineal area reduces contamination of the specimen by external cells and bacteria. Ninety percent of urethral bacteria are cleared in the first 10 mL of voided urine; a midstream specimen is representative of urine in the bladder.*
- Assess knowledge about the disease process, risk factors, and preventive measures. *The client may have little understanding of UTI, its causes, and contributing factors.*
- Discuss the prescribed treatment plan and the importance of taking all prescribed antibiotics.

PRACTICE ALERT

Symptoms are largely relieved within 24 to 48 hours of starting antibiotic therapy; however, bacteria may remain in the urinary tract. Completing the prescribed regime is important to prevent recurrent infections and resistant bacteria.

- Help the client develop a plan for taking medications, such as taking them with meals (unless contraindicated) or setting out all doses for the day in the morning. *Missed doses of antibiotic can result in subtherapeutic blood levels and reduced effectiveness. Taking medication in association with a regular daily activity such as meals helps clients remember doses.*
- Instruct to keep appointments for follow-up and urine culture. *Follow-up urine culture, often scheduled 7 to 14 days after completion of antibiotic therapy, is vital to ensure complete eradication of bacteria and prevent relapse or recurrence.*
- Teach measures to prevent future UTI (see the preceding Health Promotion section). *Keeping urine dilute and acidic and voiding regularly flush bacteria out of the bladder and urethra. The proximity of the female urethral meatus to the vagina and anus increases the risk of bacterial contamination, especially during intercourse. Bubble baths, feminine hygiene sprays, synthetic fibers, and douches may dry and irritate perineal tissues, promoting bacterial growth.*

Community-Based Care

Because both upper and lower urinary tract infections are usually managed in the community, teaching is the most important nursing intervention. Provide instruction on the following topics:

- Risk factors for UTI and how to minimize or eliminate these factors through increased fluid intake, regular elimination, and personal hygiene measures
- Early manifestations of UTI and the importance of seeking medical intervention promptly
- Maintaining optimal immune system function by attending to physical and psychosocial stressors, such as lack of adequate rest, poor nutrition, and high levels of emotional stress
- The importance of completing the prescribed treatment and keeping follow-up appointments

- Minimizing the risk of UTI when an indwelling urinary catheter is necessary:
  a. Use alternatives to an indwelling catheter when possible. For urinary incontinence, try scheduled toileting, incontinence pads or diapers, and external catheters if possible. For urinary retention, teach the client or a family member to perform straight catheterization every 3 to 4 hours using clean technique.
  b. Teach care measures such as perineal care, managing and emptying the collection chamber, maintaining a closed system, and bladder irrigation or flushing if ordered when an indwelling catheter is necessary.

THE CLIENT WITH URINARY CALCULI

Urinary calculi, stones in the urinary tract, are the most common cause of upper urinary tract obstruction (Porth, 2005). The term **lithiasis** means "stone formation"; when the stones form in the kidney, it is known as *nephrolithiasis;* when they form elsewhere in the urinary tract (for example, the bladder), it is called *urolithiasis.* Stones may form and obstruct the urinary tract at any point (Figure 28–3 ■). In the United States and other industrialized countries, renal or kidney stones are the most common.

Incidence and Risk Factors

Urolithiasis affects up to 720,000 people annually in the United States (Tierney et al., 2005). In the United States, the incidence varies by region, with the highest frequency in southern and midwestern states. Males are affected two or three times more often than females (Porth, 2005). Calculi are more common among whites than blacks. Most people affected are in young or middle adulthood.

Although the majority of stones are idiopathic (having no demonstrable cause), a number of risk factors have been identified. The greatest risk factor for stone formation is a prior personal or family history of urinary calculi. A genetic predisposition toward the accumulation of certain mineral substances in the urine or a congenital lack of protective factors may explain the familial link. Other identified risk factors include dehydration with resultant increased urine concentration, immobility, and excess dietary intake of calcium, oxalate, or proteins. Gout, hyperparathyroidism, and urinary stasis or repeated infections also contribute to calculus formation.

Physiology Review

Normally, a balance exists in the kidneys between the need to conserve water and to eliminate poorly soluble materials such as calcium salts. This balance is affected by factors such as diet, environmental temperature, and activity. Protective inorganic and organic substances in the urine, such as pyrophosphate, citrate, and glycoproteins, normally inhibit stone formation.

Pathophysiology

Three factors contribute to urolithiasis: supersaturation, nucleation, and lack of inhibitory substances in the urine.

When the concentration of an insoluble salt in the urine is very high, that is, when the urine is supersaturated, crystals may form. Usually, these crystals disperse and are eliminated because the bonds holding them together are weak. However, a nucleus of crystals may develop stable bonds to form a stone. More often, crystals form around an organic matrix or mucoprotein nucleus to become a stone. The stimulus required to initiate crystallization in supersaturated urine may be minimal. Ingesting a meal high in insoluble salt, or decreased fluid intake as occurs

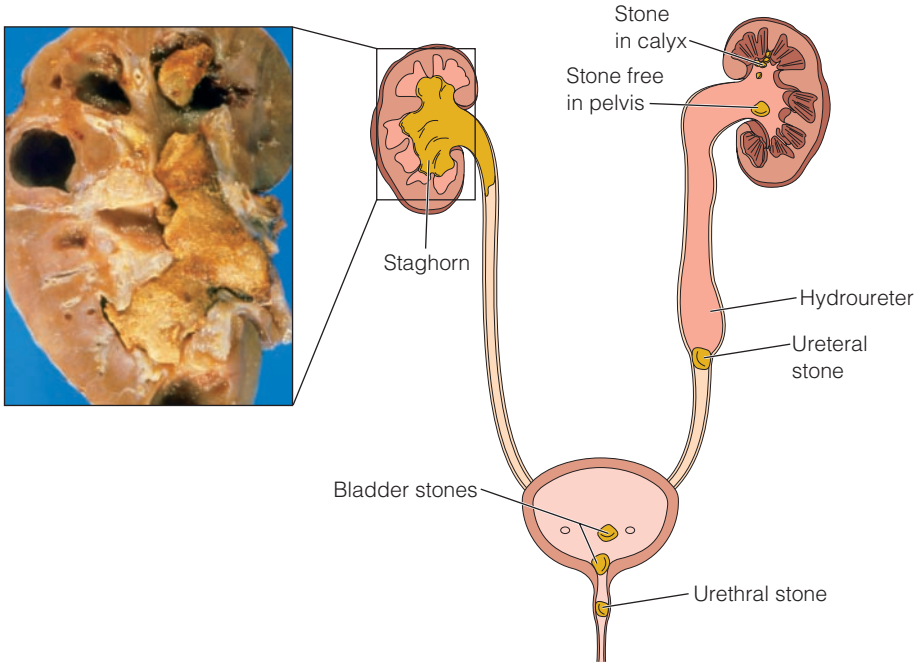


Figure 28–3 ■ Development and location of calculi within the urinary tract.

Source: Dr. E. Walker/Photo Researchers, Inc.

during sleep, allows the concentration to increase to the point where precipitation occurs and stones are formed and grow. When fluid intake is adequate, no stone growth occurs. The acidity or alkalinity of the urine and the presence or absence of calculus-inhibiting compounds also affect lithiasis.

Most (75% to 80%) kidney stones are *calcium stones,* composed of calcium oxalate and/or calcium phosphate. These stones are generally associated with high concentrations of calcium in the blood or urine. *Uric acid stones* develop when the urine concentration of uric acid is high. They are more common in men, and may be associated with gout. Genetic factors contribute to the development of uric acid stones and calcium stones. *Struvite stones* are associated with UTI caused by urease-producing bacteria such as *Proteus.* These stones can grow to become very large, filling the renal pelvis and calyces. They often are called *staghorn stones* because of their shape. *Cystine stones* are rare, and are associated with a genetic defect. The types of renal calculi, contributing factors, and recommended dietary modifications are listed in Table 28–2.

FAST FACTS

- Most urinary stones form in the renal pelvis and are composed primarily of calcium salts.
- Loss of calcium from the bones (e.g., due to immobility) and dehydration are major risk factors for urinary stones.

Manifestations

The symptoms caused by urinary calculi vary with their size and location (see the Manifestations box on this page). Manifestations develop as a result of obstructed urine flow with resulting distention, and tissue trauma caused by passage of the rough-edged, crystalline stone.

Calculi affecting the kidney calyces and pelvis may cause few symptoms. If the stone has gradually or partially obstructed urinary flow, dull, aching flank pain may be present, but renal calculi often are silent, without symptoms. Bladder calculi may cause few symptoms other than dull suprapubic pain with exercise or after voiding.

Renal colic, acute, severe flank pain on the affected side, develops when a stone obstructs the ureter, causing ureteral spasm. The pain of renal colic may radiate to the suprapubic region, groin, and external genitals (the scrotum or labia). The severity of the pain often causes a sympathetic response with associated nausea, vomiting, pallor, and cool, clammy skin.

Manifestations of UTI, including chills and fever, frequency, urgency, and dysuria, may accompany urinary calculi at any level. Trauma to the urinary tract by the calculi may cause gross or microscopic hematuria. Gross hematuria is often the only sign of bladder stones.

MANIFESTATIONS of Urinary Calculi

KIDNEY STONES
- Often asymptomatic
- Dull, aching flank pain
- Microscopic hematuria
- Manifestations of UTI

URETERAL STONES
- Renal colic
  - Acute, severe flank pain on affected side
  - Often radiates to suprapubic region, groin, and external genitals
- Nausea, vomiting, pallor, and cool, clammy skin

BLADDER STONES
- May be asymptomatic
- Dull suprapubic pain, possibly associated with exercise or voiding
- Gross or microscopic hematuria
- Manifestations of UTI

TABLE 28–2 **Risk Factors and Interventions for Renal Calculi**

STONE TYPE AND INCIDENCE	RISK FACTORS	MANAGEMENT
Calcium phosphate and/or oxalate 75–80%	Hypercalciuria and hypercalcemia: hyperparathyroidism, immobility, bone disease, vitamin D intoxication, multiple myeloma, renal tubular acidosis, prolonged steroid intake Alkaline urine Dehydration Inflammatory bowel disease	Pharmacology: Thiazide diuretics, phosphates, calcium-binding agents Dietary: Limit foods high in calcium and oxalate, increase foods that acidify urine Other: Increase hydration, exercise
Struvite 15–20%	UTIs, especially *Proteus* infections	Pharmacology: Antibiotic therapy for UTI Other: Surgical intervention or lithotripsy to remove stone
Uric acid 5–10%	Gout, increased purine intake, acid urine	Pharmacology: Potassium citrate, allopurinol Dietary: Low purine diet Other: Increase hydration
Cystine (uncommon)	Genetic defect, acid urine	Pharmacology: Penicillamine, sodium bicarbonate Dietary: Sodium restriction Other: Increase hydration

Complications

Urinary stones may obstruct urine flow at any point of the urinary tract, leading to complications such as hydronephrosis and urinary stasis with subsequent infection.

Obstruction

Stones can obstruct the urinary tract at any point from the calyces of the kidney to the distal urethra, impeding the outflow of urine. If the obstruction develops slowly, there may be few or no symptoms, whereas sudden obstruction (e.g., blockage of a ureter by a passing stone) may cause severe manifestations. Urinary tract obstruction can ultimately lead to renal failure. The degree of obstruction, its location, and the duration of impaired urine flow determine the effect on renal function.

HYDRONEPHROSIS The kidneys continue to produce urine, causing increased pressure and distention of the urinary tract behind the obstruction. **Hydronephrosis**, distention of the renal pelvis and calyces, and *hydroureter,* distention of the ureter, are possible results. If the pressure is unrelieved, the collecting tubules, proximal tubules, and glomeruli of the kidney are damaged, causing a gradual loss of renal function.

Acute hydronephrosis typically causes colicky pain on the affected side. The pain may radiate into the groin. Chronic hydronephrosis develops slowly, and may have few manifestations other than dull, aching back or flank pain. When hydronephrosis is significant, a palpable mass may be felt in the flank region. Hematuria and signs of UTI such as pyuria, fever, and discomfort may occur. Gastrointestinal symptoms such as nausea, vomiting, and abdominal pain may accompany hydronephrosis (see the Manifestations box below).

INFECTION The urinary stasis associated with partial or complete obstruction increases the risk of urinary tract infection. Either upper or lower UTI may develop.

INTERDISCIPLINARY CARE

Management of urinary calculi focuses on relieving acute symptoms, destroying or removing stones, and preventing further stone formation. Asymptomatic stones (those not causing pain, infection, or obstruction) are treated conservatively.

MANIFESTATIONS of Acute and Chronic Hydronephrosis

ACUTE
- Acute, colicky pain; may radiate into groin
- Hematuria, pyuria
- Fever
- Nausea, vomiting, abdominal pain

CHRONIC
- Dull, aching flank pain
- Hematuria, pyuria
- Fever
- Palpable flank mass

Diagnosis

Laboratory and diagnostic tests that may be ordered when urinary calculi are suspected include the following:

- *Urinalysis* to assess for hematuria and the possible presence of WBCs and crystal fragments. The urine pH is helpful in identifying the type of stone.
- *Chemical analysis* of any stones passed in the urine determines the type of stone and suggests measures to prevent further stone formation. Retrieving stones or teaching the client to do so is a nursing responsibility. All urine is strained and may be saved. Any visible stones or sediment is sent for analysis.
- *Urine calcium, uric acid,* and *oxalate* levels measure the amount of these substances excreted over a 24-hour period, and may be assessed to help identify possible causes of lithiasis. Elevated calcium levels occur in hyperparathyroidism, Cushing's syndrome, and osteoporosis, all of which may contribute to lithiasis. Uric acid levels may be elevated in clients with gout and those at risk for forming uric acid calculi. Urine oxalate excretion may help to differentiate calcium oxalate from calcium phosphate stones.
- *Serum calcium, phosphorus,* and *uric acid* levels may be obtained to help identify factors contributing to calculus formation.
- *KUB* (kidneys, ureters, and bladder) is a flat-plate X-ray of the lower abdomen that requires no special preparation. Calculi may be identified as opacities in the kidneys, ureters, and bladder.
- *Renal ultrasonography* is a noninvasive test that uses reflected sound waves to detect stones and evaluate the kidneys for possible hydronephrosis.
- *Computed tomography (CT) scan* of the kidney, with or without contrast medium, uses x-rays directed at the kidney from many angles to provide a computer-generated photograph that shows calculi, ureteral obstruction, and other renal disorders.
- *IVP* may be done to visualize the kidneys, ureters, and bladder after injection of a contrast medium. IVP may be done when KUB, renal ultrasonography, and CT scan fail to demonstrate clear evidence of urinary calculi. (See nursing care of the client undergoing an IVP.)
- *Cystoscopy* is used to visualize and possibly remove calculi from the urinary bladder and distal ureters.

Nursing implications and care for clients undergoing these tests and procedures is outlined in Chapter 27 ∞.

Medications

An acute episode of renal colic is treated with analgesia and hydration. A narcotic analgesic such as morphine sulfate is given, often intravenously, to relieve pain and reduce ureteral spasm. Indomethacin, a nonsteroidal anti-inflammatory drug (NSAID), given as a suppository, may reduce the amount of narcotic analgesia required for acute renal colic. Oral or intravenous fluids reduce the risk of further stone formation and promote urine output.

After analysis of the calculus, various medications may be ordered to inhibit or prevent further lithiasis. A thiazide diuretic, frequently prescribed for calcium calculi, acts to reduce urinary calcium excretion and is very effective in preventing further stones. Potassium citrate alkalinizes urine (raises the pH), and is often prescribed to prevent stones that tend to form in acidic urine (uric acid, cystine, and some forms of calcium stones). See Table 28–2 for other preparations related to types of stones. Nursing responsibilities focus on teaching the client about the prescribed medication, its importance in preventing further stone formation, and potential adverse effects.

Nutrition and Fluid Management

Diet modifications are often prescribed to change the character of the urine and prevent further lithiasis.

Increased fluid intake of 2.5 to 3.0 L per day is recommended, regardless of stone composition. A fluid intake to ensure the production of approximately 2.0 to 2.5 L of urine a day prevents the stone-forming salts from becoming concentrated enough to precipitate. Fluid intake should be spaced throughout the day and evening. Some authorities recommend that clients drink one to two glasses of water at night to prevent concentration of urine during sleep.

Recommended dietary changes may include reduced intake of the primary substance forming the calculi. For calcium stones, dietary calcium and vitamin D–enriched foods are limited. Limiting vitamin D inhibits the absorption of calcium from the GI tract. Calcium stones may be either a calcium phosphate salt, calcium oxalate, or a combination of both; therefore, phosphorus and/or oxalate may also be limited in the diet.

The client with uric acid stones requires a diet low in purines. Organ meats, sardines, and other high-purine foods are eliminated from the diet. Foods with moderate levels of purines, such as red and white meats and some seafoods, may be limited.

In addition to limiting certain foods, the diet may be modified to maintain a urinary pH that does not promote lithiasis. Uric acid and cystine stones tend to form in acid urine. Foods that tend to alkalinize the urine may be recommended. Because alkaline urine promotes formation of calcium stones and urinary tract infections, the diet may be modified to lower the pH of the urine. Foods that affect urinary pH and foods high in various stone components are summarized in Table 28–3.

TABLE 28–3 Teaching Clients with Urolithiasis: Possible Food and Fluid Modifications

Foods high in calcium	Beans and lentils, chocolate and cocoa, dried fruits, canned or smoked fish except tuna, flour, milk and milk products
Foods high in oxalate	Asparagus, beer and colas, beets, cabbage, celery, chocolate and cocoa, fruits, green beans, nuts, tea, tomatoes
Purine-rich foods	Goose, organ meats, sardines and herring, venison; moderate in beef, chicken, crab, pork, salmon, veal
Acidifying foods	Cheese, cranberries, eggs, grapes, meat and poultry, plums and prunes, tomatoes, whole grains
Alkalinizing foods	Green vegetables, fruit (except as noted above), legumes, milk and milk products, rhubarb

Surgery

Treatment of existing calculi depends on the location of the stone, the extent of obstruction, renal function, the presence or absence of UTI, and the client's general state of health. In general, the stone is removed if it is causing severe obstruction, infection, unrelieved pain, or serious bleeding (Kasper et al., 2005).

Lithotripsy, using sound or shock waves to crush a stone, is the preferred treatment for urinary calculi. Several techniques are available. **Extracorporeal shock wave lithotripsy (ESWL)** is a noninvasive technique for fragmenting kidney stones using shock waves generated outside the body. Acoustic shock waves are aimed under fluoroscopic guidance at the stone (Figure 28–4 ■). These shock waves travel through soft tissue without causing damage, but shatter the stone as its greater density stops their progress. Repeated shock waves pulverize the stone into fragments small enough to be eliminated in the urine. The procedure may require 30 minutes to 2 hours to complete. Intravenous sedation generally is adequate to maintain comfort during the procedure (Way & Doherty, 2003). See the box on the next page for nursing care of the client undergoing a lithotripsy procedure.

Lithotripsy also may be performed using a percutaneous ultrasonic or laser technique. *Percutaneous ultrasonic lithotripsy* uses a nephroscope inserted into the kidney pelvis through a small flank incision (Figure 28–5 ■). The stone is fragmented using a small ultrasonic transducer, and the fragments are removed through the nephroscope. *Laser lithotripsy* is an alternative to ultrasonic lithotripsy. Laser beams are used to disintegrate the stone, without damaging soft tissue. A nephroscope or a ureteroscope (passed up the ureter from the bladder

Figure 28–4 ■ Extracorporeal shock-wave lithotripsy. Acoustic shock waves generated by the shock wave generator travel through soft tissue to shatter the urinary stone into fragments, which are then eliminated in the urine.

Source: Visuals Unlimited

NURSING CARE OF THE CLIENT HAVING **Lithotripsy**

PREOPERATIVE CARE

- Assess knowledge and understanding of the procedure, providing information as needed. *Anxiety is reduced, and recovery is enhanced and hastened when the client is fully prepared for surgery.*
- Follow directions from the radiology department, physician, or anesthetist for withholding food and fluids and for bowel preparation prior to surgery. *Conscious sedation, general anesthesia, or spinal anesthesia may be required, depending on the procedure. Fecal material in the bowel may impede fluoroscopic visualization of the kidney and stone.*

POSTOPERATIVE CARE

- In the initial period, monitor vital signs frequently. *The kidney is highly vascular; therefore, hemorrhage and resulting shock are potential complications of lithotripsy. Bleeding may be internal or retroperitoneal and difficult to detect.*
- Monitor amount, color, and clarity of urine output. *Urine is often bright red initially, but bleeding should diminish within 48 to 72 hours. Cloudy urine may indicate the presence of an infection.*
- Maintain placement and patency of urinary catheters. Anchor ureteral catheters or nephrostomy tubes securely. Irrigate gently if ordered. *A kinked or plugged catheter may result in hydroureter, hydronephrosis, and kidney damage. Decreased urinary output and flank pain are possible symptoms of obstructed urine flow. Excessive force in irrigation may cause trauma and bleeding.*
- Prepare for discharge by teaching care of the indwelling catheter, urine-collection device, and incision site (if present). Teach signs and symptoms to report: urine leakage from incision for more than 4 days, symptoms of infection, pain, bright hematuria. *Many clients are discharged with dressings and catheters in place. The client and family need necessary information to provide self-care.*
- Teach measures to reduce the risk of further lithiasis. *Many clients have repeated episodes of lithiasis and renal colic. Prevention of stone formation is important to preserve renal function.*

during cystoscopy) is used to guide the laser probe into direct contact with the stone.

A double J stent may be inserted into the affected ureter to maintain its patency following ESWL or other lithotripsy procedures. (See the box on page 851 for nursing care of the client with a ureteral stent.)

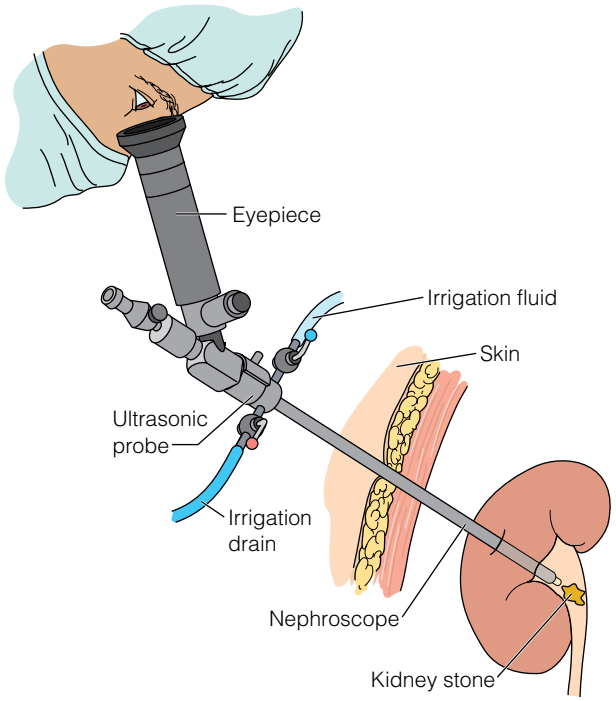


Figure 28–5 ■ Percutaneous ultrasonic lithotripsy. A nephroscope is inserted into the renal pelvis, and ultrasonic waves are used to fragment the stone. The fragments then are removed through the nephroscope.

On rare occasions, surgical intervention is necessary to remove a calculus in the renal pelvis or ureter. *Ureterolithotomy* is incision in the affected ureter to remove a calculus. *Pyelolithotomy* is incision into and removal of a stone from the kidney pelvis. A staghorn calculus that invades the calyces and renal parenchyma may require a *nephrolithotomy* for removal. See Chapter 4 ∞ for care of the surgical client.

Bladder stones may be removed using an instrument passed through a cystoscope to crush the stones. The remaining stone fragments are then irrigated out of the bladder using an acid solution to counteract the alkalinity that precipitated stone formation.

NURSING CARE

Nursing care for the client with urolithiasis is directed at providing for comfort during acute renal colic, assisting with diagnostic procedures, ensuring adequate urinary output, and teaching the client information necessary to prevent future stone formation.

Health Promotion

Discuss the importance of maintaining an adequate fluid intake with all clients. Stress the need to increase fluid intake during warm weather and strenuous exercise or physical labor. Discuss the relationship between weight-bearing activity and retention of calcium in the bones. Encourage all clients to remain as physically active as possible to prevent bone resorption (loss) and possible hypercalciuria.

Instruct clients with known gout to maintain a generous fluid intake so as to produce at least 2 L of urine every day. Discuss the risk of lithiasis with clients who have frequent UTIs, and teach measures to reduce the incidence of UTI and the risk for lithiasis.

Assessment

Obtain subjective and objective assessment data specific to urolithiasis:

- *Health history:* Complaints of flank, back, or abdominal pain, radiation, characteristics and timing, aggravating or relieving factors; other symptoms such as nausea and vomiting; possible contributing factors such as dehydration; previous or family history of kidney stones; current or previous treatment measures.
- *Physical examination:* General appearance including position, vital signs; skin color, temperature, moisture, turgor; abdominal, flank, or costovertebral tenderness; amount, color, and characteristics of urine (presence of hematuria, bacteria, pyuria, pH).

Nursing Diagnoses and Interventions

See the Nursing Care Plan that follows this section for additional nursing diagnoses and interventions.

Acute Pain

Pain is the primary outward manifestation of urolithiasis, particularly when a stone lodges within a ureter, causing acute obstruction and distention. Invasive and noninvasive procedures to remove or crush stones also may be painful. Clients undergoing surgery also experience incisional pain.

PRACTICE ALERT

The intensity of renal colic pain can cause a vasovagal response with resulting hypotension and syncope. Always provide for the client's safety.

- Assess pain using a standard pain scale and its characteristics. Administer analgesia as ordered and monitor its effectiveness. *The intensity, type of pain, and its responsiveness to analgesia provide valuable clues as to its cause. Regular administration of prescribed analgesics controls pain more effectively than waiting until pain becomes intolerable. Administering an ordered NSAID on a routine schedule may significantly reduce the need for narcotic analgesia in clients with renal colic.*
- Unless contraindicated, encourage fluid intake and ambulation in the client with renal colic. *Increased fluids and ambulation increase urinary output, facilitating movement of the calculus through the ureter and decreasing pain.*
- Use nonpharmacologic measures such as positioning, moist heat, relaxation techniques, guided imagery, and diversion as adjunctive therapy for pain relief. *Adjunctive pain relief measures can enhance the effectiveness of analgesics and other prescribed treatment.*
- If surgery has been performed, monitor urinary output, catheters, incision, and wound drainage. *Pain may be a symptom of proximal distention due to a blocked catheter. Infection or hematoma at the surgical site can significantly increase perceived pain.*

Impaired Urinary Elimination

Obstruction of the urinary tract is the primary problem associated with urolithiasis. Obstruction can ultimately lead to stasis, infection, or irreversible renal damage.

- Monitor amount and character of urine output. If catheterized, measure output hourly. Document any hematuria, dysuria, frequency, urgency, and pyuria. Strain all urine for stones, saving any recovered stones for laboratory analysis. *The amount of urine output helps determine possible urinary tract obstruction and adequacy of hydration. Hematuria, gross or microscopic, is often associated with calculi and with procedures used to remove stones, such as cystoscopy or lithotripsy. A change in the amount of hematuria may indicate stone passage or a complication. Dysuria, frequency, urgency, and cloudy urine are symptoms of UTI, often associated with urolithiasis. Antibiotic therapy may be required. Analysis of stones recovered from the urine can direct measures to prevent further lithiasis.*

PRACTICE ALERT

A stone that completely obstructs the ureter can lead to hydronephrosis and kidney damage on the affected side. Report symptoms of hydronephrosis such as dull flank pain or aching and changes in renal function studies (BUN and serum creatinine). Because the other kidney continues to function, urine output may not fall significantly with obstruction of one ureter. A rising BUN and serum creatinine may be early signs of renal failure.

- Maintain patency and integrity of all catheter systems. Secure catheters well, label as indicated, and use sterile technique for all ordered irrigations or other procedures. *A kinked or plugged catheter, particularly a ureteral catheter or nephrostomy tube, may damage the urinary system. Labeling catheters can prevent mistakes, such as inappropriate irrigation or clamping. Any catheter increases the risk of infection; aseptic technique in all procedures reduces this risk.*

Deficient Knowledge

The client with urolithiasis has multiple learning needs. These include information about the disease and its possible consequences, any diagnostic or therapeutic procedures performed, and strategies to prevent future lithiasis.

- Assess understanding and previous learning. *Relating information to previously learned material enhances retention and understanding.*
- Present all material in a manner appropriate to knowledge base, developmental and educational level, and current needs. *Learning is an active process that requires the client's participation. Tailoring teaching to the individual increases involvement.*
- Teach about all diagnostic and treatment procedures. *Knowing what to expect reduces anxiety, enhances compliance, and hastens recovery.*
- If the client will be managed in the community, teach to:
  a. Collect and strain all urine, saving any stones.
  b. Report stone passage to the physician and bring the stone in for analysis.
  c. Report any changes in the amount or character of urine output to physician.

  When pain can be managed with oral analgesics, urinary stones are managed in the community. The client needs to know how and why to collect the calculus and indicators of

NURSING CARE PLAN A Client with Urinary Calculi

Richard Leton, age 44, owns a small business. He is admitted to the medical unit from the emergency department after awakening at 4:00 A.M. with severe right-sided pain. His CBC is normal, and urinalysis reveals microscopic hematuria, but no protein or bacteria. A renal ultrasound shows a 4- to 5-mm stone partially obstructing the right ureter.

Stephen Phillips, Mr. Leton's admitting nurse, notes that he is pale, diaphoretic, and very anxious. He complains of nausea and asks for an emesis basin. Mr. Leton received 4 mg of intravenous morphine sulphate shortly after admission to the ED, approximately 2.5 hours ago. He denies pain at this time, but says, "I'm scared to death that it'll come back—I couldn't even move, it hurt so bad."

ASSESSMENT

Mr. Leton's history reveals no previous episodes of renal calculi. He felt well until the pain awakened him during the night. He admits that he has been working under a deadline to complete a construction project and that he probably has not been drinking enough fluids "considering how hot it's been." Physical assessment findings include T 100.4°F (38.0°C) PO, P 98, R 24, and BP 160/86. Color is pale to ashen, skin cool and moist. Abdomen firm with moderate tenderness in the right upper outer quadrant. The ED physician orders an IV of 5% dextrose in 1/2 normal saline at 200 mL/h until nausea relieved, then PO fluids of at least 3000 mL/24 h; morphine sulfate (MS) 2 to 10 mg IV prn severe pain; indomethacin (Indocin) 50 mg per rectal suppository q8h; promethazine (Phenergan) 25 mg PO or per suppository q6h prn nausea; activity to tolerance; and strain all urine, sending recovered stones for analysis.

DIAGNOSES

- *Anxiety* related to anticipation of recurrent severe pain
- *Risk for Imbalanced Nutrition: Less than Body Requirements* related to nausea
- *Acute Pain* related to partial obstruction of right ureter by calculus
- *Impaired Urinary Elimination* related to partial obstruction of ureter by calculus
- *Deficient Knowledge* related to lack of information about disease process, contributing factors, and management

EXPECTED OUTCOMES

- Demonstrate reduced anxiety by relaxed facial expression, vital signs within his normal range, and ability to rest when not disturbed.
- Consume at least 50% of diet and 100% of ordered fluids without nausea or vomiting.
- Request analgesia as needed at onset of pain; report effective pain relief.
- Maintain urine output of 2500 mL/24 h with no signs of infection or obstruction (such as increased pain, dysuria, pyuria, or hematuria).
- Relate an understanding of the process of urolithiasis and contributing factors.
- Verbalize dietary, fluid intake, and other measures to reduce risk of future stone formation.

PLANNING AND IMPLEMENTATION

- Reassure that measures to prevent further episodes of renal colic are being implemented, and that medication is available to relieve pain promptly.
- Assess the effectiveness of analgesia and its adverse effects, especially nausea.
- Maintain IV as ordered until oral fluid intake exceeds 200 mL of fluid per hour while awake.
- Measure and strain all urine. Assess urine for color, clarity, and odor.
- Teach about urolithiasis and its risk factors, especially as they relate to Mr. Leton.
- Teach the importance of maintaining a high fluid intake, especially when working outdoors in hot weather; recommended dietary modifications and their rationale; ordered medications and their effects; how to identify and prevent UTI; and symptoms that should be reported to the physician.

EVALUATION

Mr. Leton passed the obstructing stone the evening after admission and is discharged the following day. On discharge, he denies pain or nausea, his urine is clear and pale yellow, and urinalysis is normal. Laboratory analysis shows that the calculus was calcium. Mr. Leton is able to state the importance of continuing a high fluid intake. He verbalizes that he will reduce his intake of calcium-rich foods, such as milk and milk products, and that he will increase his intake of foods to acidify his urine. He is able to list foods to include in his diet. He states, "You'd better believe I'll follow my diet, drink my water, and make sure I don't get an infection. I hope to never feel pain like that again!"

CRITICAL THINKING IN THE NURSING PROCESS

1. What factors contributed to the onset and timing of Mr. Leton's ureteral colic?
2. What is the rationale for administering indomethacin, an NSAID, to a client with ureteral colic?
3. Why did Mr. Phillips include a nursing intervention to assess for a relationship between Mr. Leton's nausea, his pain, and the ordered analgesic agent?

See Evaluating Your Response in Appendix C.

complications, such as reduced urine output and cloudy or bloody urine.

- Teach measures to prevent further urolithiasis:
  a. Increase fluid intake to 2500 to 3500 mL per day.
  b. Follow recommended dietary guidelines.
  c. Maintain activity level to prevent urinary stasis and bone resorption.
  d. Take medications as prescribed.

The risk of recurrent lithiasis is approximately 50%; however, this risk can be reduced by measures to prevent conditions favoring stone formation.

- Teach about the relationship between urinary calculi and UTI, emphasizing preventive measures and the importance of prompt treatment. *Urinary tract infection promotes urolithiasis and thus requires prompt treatment to reduce this risk.*

Community-Based Care

The client with urinary calculi needs to know how to manage existing stones and what to do to reduce the risk of future stone formation. Discuss the following topics to prepare the client and family for home care:

- Importance of maintaining a fluid intake adequate to produce 2.0 to 2.5 quarts of urine per day
- Prescribed medications, their management, and potential adverse effects
- Dietary recommendations
- Prevention, recognition, and management of UTI
- Any further diagnostic or treatment measures planned.

When the client is to be discharged with dressings, a nephrostomy tube, or a catheter, teach the client and family about the following:

- How to change dressings, maintaining aseptic technique
- Assessment of the wound and skin for healing and possible complications such as infection or skin breakdown
- How to manage drainage systems and maintain their patency
- Emptying drainage bags and assessing urine output
- When to contact the physician and recommendations for follow-up care.

THE CLIENT WITH A URINARY TRACT TUMOR

A malignancy can develop in any part of the urinary tract; however, 90% develop in the bladder, about 8% develop in the renal pelvis, and only 2% in the ureter or urethra (Kasper et al., 2005). When diagnosed early, the 5-year survival rate for bladder cancer is 94% (American Cancer Society [ACS], 2005).

Incidence and Risk Factors

An estimated 63,210 new cases of bladder cancer were diagnosed in the United States in 2005, and 13,180 people died as a result of the disease. The incidence of bladder cancer is about 4 times higher in men than it is in women, and about twice as high in whites as it is in blacks (ACS, 2005). Most people who develop bladder cancer are over age 60.

Two major factors are implicated in the development of bladder cancer: the presence of carcinogens in the urine and chronic inflammation or infection of bladder mucosa. Cigarette smoking is the primary risk factor for bladder cancer. The risk in smokers is twice that of nonsmokers (ACS, 2005). The chemicals and dyes used in the plastics, rubber, and cable industries; substances in the work environment of textile workers, leather finishers, spray painters, and petroleum workers; and the chronic use of phenacetin-containing analgesic agents also are associated with a higher risk. Additional risk factors for bladder cancer include residence in an urban area, chronic UTIs, and bladder calculi. The parasite *Schistosoma haematobium,* endemic to Egypt and the Sudan, also increases the risk for bladder cancer (Porth, 2005). The risk for bladder cancer appears to be reduced by increasing the intake of fluids and vegetables (ACS, 2005).

FAST FACTS

The major risk factors for bladder cancer are:

- Male gender, age >60, residence in urban area
- Cigarette smoking
- Occupational exposure to dyes or solvents
- Chronic phenacetin ingestion
- Chronic UTI or bladder calculi.

Pathophysiology

Most urinary tract malignancies arise from epithelial tissue. Transitional epithelium lines the entire tract from the renal pelvis through the urethra. Carcinogenic breakdown products of certain chemicals and from cigarette smoke are excreted in the urine and stored in the bladder, possibly causing a local influence on abnormal cell development. Squamous cell carcinoma of the urinary tract occurs less frequently than transitional epithelial cell tumors.

Urinary tract tumors begin as nonspecific cellular alterations that develop into either flat or papillary lesions. These lesions may be either superficial or invasive. About 75% of bladder tumors are papillary lesions (*papillomas*), a polyp-like structure attached by a stalk to the bladder mucosa (Figure 28–6 ■). Papillomas are generally superficial, noninvasive tumors that bleed easily and frequently recur (Kasper et al., 2005). They rarely progress to become invasive, and the prognosis for recovery is good.

Carcinoma *in situ* (CIS), which occurs less frequently, is a poorly differentiated flat tumor that invades directly and is associated with a poorer prognosis. Bladder tumors are rated by their cell type and grade. Grade I tumors are highly differentiated and

Figure 28–6 ■ Papillary transitional cell carcinoma of the urinary bladder.

Source: Custom Medical Stock Photo, Inc.

rarely progress to become invasive, whereas grade III tumors are poorly differentiated and usually progress (Kasper et al., 2005). The staging of bladder tumors is outlined in Table 28–4. See Chapter 14 for more information about tumor grading and staging. When metastasis occurs, the pelvic lymph nodes, lungs, bones, and liver are most commonly involved.

Manifestations

Painless hematuria is the presenting sign in 75% of urinary tract tumors. Hematuria may be gross or microscopic and is often intermittent, causing delay in seeking treatment (Porth, 2005). Inflammation surrounding the tumor occasionally causes manifestations of a urinary tract infection, including frequency, urgency, and dysuria. Ureteral tumors may cause colicky pain from obstruction. Tumors of the urinary tract typically cause few outward signs and may not be discovered until obstructed urine flow causes flank pain or renal failure.

PRACTICE ALERT

Intermittent painless hematuria is the most common presenting symptom of bladder cancer. Instruct all clients with painless hematuria to contact their physician for follow-up testing.

INTERDISCIPLINARY CARE

Treatment of the client with a tumor of the urinary tract focuses on removing or destroying the cancerous tissue, preventing further invasion or metastasis, and maintaining renal and urinary function.

Diagnosis

When a urinary tract tumor is suspected, the following diagnostic tests may be ordered:

- *Urinalysis* is done to evaluate for hematuria. Gross or microscopic hematuria is often the first indicator of a neoplasm in the urinary tract.
- *Urine cytology,* microscopic examination of cells in the urine, is performed to identify abnormal cells (tumor or pretumor cells). Periodic urine cytology is recommended for clients at high risk for bladder cancer or its recurrence due to carcinogen exposure.
- *Ultrasound of the bladder* is a noninvasive test to detect bladder tumors. No dye is required, and the client is not exposed to radiation.
- *Intravenous pyelography* is used to evaluate the structure and function of the kidneys, ureters, and bladder. IVP may reveal a rigid deformity of the bladder wall, obstruction of urine flow at the point of the tumor, or bladder filling or emptying defects.
- *Cystoscopy* and *ureteroscopy* allow direct visualization, assessment, and biopsy of lesions of the urethra, bladder, or ureters using a lighted scope inserted through the urethra. Cystoscopy or ureteroscopy with biopsy allows definitive diagnosis of urinary tract tumors.
- *CT scan* or *MRI* is primarily used to evaluate tumor invasion or metastasis.

See Chapter 27 for nursing care related to these diagnostic tests.

Medications

Immunologic or chemotherapeutic agents administered by intravesical instillation (into the bladder) may be used either as the primary treatment for bladder cancer when multiple early lesions are present or to prevent recurrence following endoscopic tumor removal. Bacille Calmette-Guérin (BCG; BCGLive, TheraCys) is a suspension of attenuated *Mycobacterium bovis* used to treat CIS and recurrent bladder tumors. Instillation into the bladder causes a local inflammatory reaction that eliminates or reduces superficial tumors. Systemic mycobacterial infection is a rare complication of intravesical BCG therapy that may require antituberculin treatment (Tierney et al., 2005). Other chemotherapeutic agents also may be administered intravesically, including doxorubicin, mitomycin C, and interferon. Bladder irritation, frequency, dysuria, and contact dermatitis are possible adverse reactions to intravesical chemotherapy. Suppression of bone marrow function also can occur as a result of intravesical treatment.

Radiation Therapy

Radiation is another adjunctive therapy used in the treatment of urinary tumors. Although radiation alone is not curative, it can reduce tumor size prior to surgery and is used as palliative treatment for inoperable tumors and clients who cannot tolerate surgery. Radiation therapy also is used in combination with systemic chemotherapy to improve local and distant relapse rates (Tierney et al., 2005) (see Chapter 14).

TABLE 28–4 **Bladder Tumor Staging**

DEPTH OF INVOLVEMENT	TNM (TUMOR, NODE, METASTASIS) STAGE	TUMOR INVOLVEMENT
Superficial	T_a	Limited to the bladder mucosa
	T_1	Involvement of the bladder mucosa and submucosal layers
Invasive	T_2	Invasion of superficial muscle of bladder wall
	T_{3a}	Deep muscle invasion
	T_{3b}	Involvement of perivesicular fat
	$T_{3–4}N_+$	Regional (pelvic) lymph node involvement
	$T_{3–4}M_1$	Metastasis to distant lymph nodes or organs

TABLE 28–5 **Surgical Procedures to Treat Bladder Tumors**

PROCEDURE	INDICATIONS	NURSING IMPLICATIONS
Transurethral resection of bladder tumor	Diagnose and treat superficial bladder tumors having low rate of recurrence; control bleeding	Maintain continuous bladder irrigation postoperatively; monitor for excessive bleeding; ensure catheter patency. Increase fluids to 2500–3000 mL/day. Give stool softeners to prevent straining.
Partial cystectomy	Resect solitary, isolated tumor at stage T_2 or T_3 not involving trigone	Maintain patency of urethral and/or suprapubic catheter to make sure suture lines are free of pressure; monitor for excess bleeding.
Complete or radical cystectomy	Remove large, invasive tumors; involvement of trigone	Permanent urinary diversion is required. Maintain patency and position of stents; urethral catheter may be in place to drain pelvic cavity.

Surgery

A number of surgical procedures, ranging from simple resection of noninvasive tumors to removal of the bladder and surrounding structures, are used to treat urinary tract tumors. Indications for each procedure and specific nursing implications are outlined in Table 28–5.

Transurethral tumor resection may be performed by excision, *fulguration* (destruction of tissue using electric sparks generated by high-frequency current), or *laser photocoagulation* (use of light energy to destroy abnormal tissue). Laser surgery carries the lowest risk of bleeding and perforation of the bladder wall. Following cystoscopic tumor resection, clients are followed at 3-month intervals for tumor recurrence. Recurrences may develop anywhere in the urinary tract, including the renal pelvis, ureter, or urethra (Kasper et al., 2005).

Cystectomy, surgical removal of the bladder, is necessary to treat invasive cancers. Partial cystectomy may be done to remove a solitary lesion; however, radical cystectomy is the standard treatment for invasive tumors. The bladder and adjacent muscles and tissues are removed. In men, the prostate and seminal vessels are also removed, resulting in impotence. In women, a total hysterectomy and bilateral salpingo-oophorectomy (removal of the uterus, fallopian tubes, and ovaries) accompanies the procedure, causing sterility. At the time of surgery, a **urinary diversion** is created to provide for urine collection and drainage. Either an *ileal conduit* (Figure 28–7A ■) or a *continent urinary diversion* (Figure 28–7B) is created to collect and drain urine. Table 28–6 describes the most frequently used urinary diversion techniques.

Surgical procedures to remove tumors involving other portions of the urinary tract vary according to the site and stage of the tumor. When the distal ureter is involved, the tumor may be resected and the ureter implanted into the opposite ureter to provide for drainage. A proximal ureteral tumor necessitates removal of the ureter and kidney on the affected side.

See the box on page 866 for nursing care of the client undergoing tumor resection and a urinary diversion.

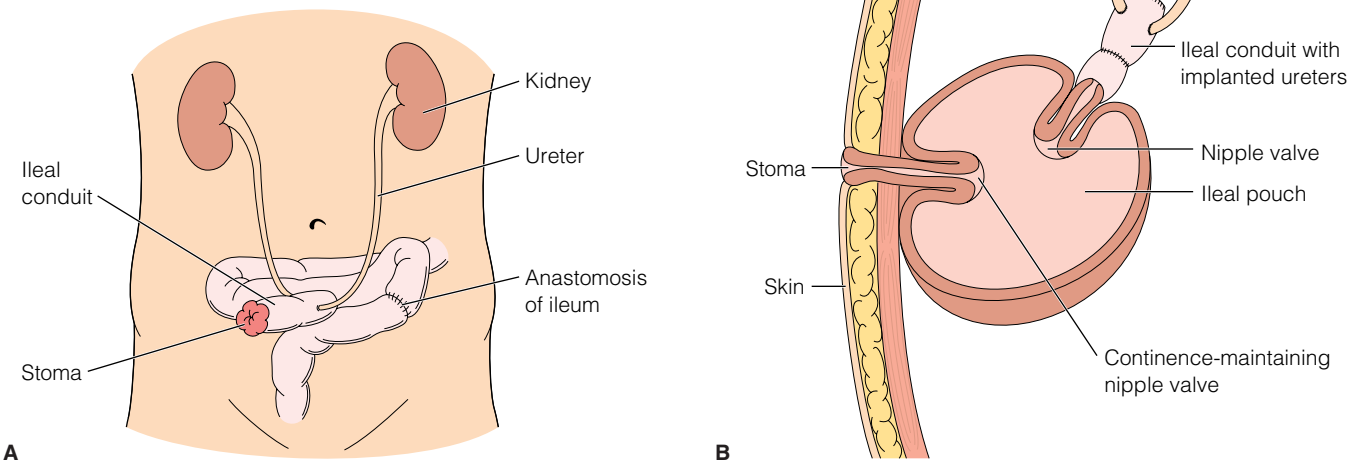
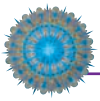


Figure 28–7 ■ Common urinary diversion procedures. *A,* Ileal conduit. A segment of ileum is separated from the small intestine and formed into a tubular pouch with the open end brought to the skin surface to form a stoma. The ureters are connected to the pouch. *B,* A continent urinary diversion. A segment of ileum is separated from the small intestine and formed into a pouch. Nipple valves are formed at each end of the pouch by intussuscepting tissue backward into the reservoir to prevent leakage.

TABLE 28–6 **Urinary Diversion Procedures**

PROCEDURE	DESCRIPTION	NURSING CONSIDERATIONS
Ileal conduit	Portion of ileum is isolated from small intestine, leaving vascular, lymphatic, and neural connections intact; ileum is formed into pouch with open end brought to surface to form a stoma; ureters are inserted into pouch.	Most common urinary diversion. Continuous urine drainage necessitates appliance. Postoperative edema may interfere with urine output. Risk of infection is less than for cutaneous ureterostomy, but potential for reflux is high. Good skin care vital because of constant contact with urine.
Continent internal ileal reservoir or continent ileal bladder conduit (Kock pouch)	Pouch is created as for ileal conduit but nipple valves are formed by intussuscepting tissue backward into a reservoir to connect pouch to the skin and the ureters to the pouch; filling pressure closes valves, preventing leakage and reflux.	Drainage collection device not necessary. Client must be willing and able to perform clean intermittent self-catheterization every 2 to 4 hours. Continence valve mechanism may fail, requiring surgery for revision.
Indiana continent urinary reservoir	A portion of the terminal ileum, ascending colon, and cecum is isolated from the bowel with vascular and neural connections intact. Reservoir is formed from colon and cecum; portion of the ileum is brought to the surface to form nipple valve and stoma or is attached to urethral stump.	As for Kock pouch. Client must be able and motivated to manage self-catheterization. Reservoir may absorb urea and electrolytes, resulting in imbalances. Significant portion of bowel is required to form pouch and stoma.
Ileocystoplasty or Camey procedure	Section of the ileum is isolated and formed into U shape. Ureters are implanted in upper portion of the U. Urethra is anastomosed to central section.	Appropriate for men only because urethra is removed with cystectomy in women. Allows client to void by relaxing pelvic muscles and using Valsalva maneuver.



NURSING CARE

The client who undergoes treatment for a tumor of the urinary tract has many nursing care needs because of alterations in the functional health patterns of elimination, health perception-health management, cognitive-perceptual, self-perception-self-concept, role-relationships, and coping-stress-tolerance.

Health Promotion

Encourage all clients not to smoke. Provide referral to smoking cessation programs or clinics for clients who wish to quit smoking. Encourage clients at high risk for developing bladder cancer (see page 862) to have periodic examinations, including urinalysis and possible urine cytology.

Assessment

Nursing assessment related to urinary tract cancer includes both subjective and objective information:

- *Health history:* Risk factors; history of hematuria or manifestations of UTI (dysuria, frequency, urgency, pyuria); lower abdominal discomfort or flank pain.
- *Physical examination:* General health; abdominal tenderness; urine for analysis.

Nursing Diagnoses and Interventions

Maintaining urinary output is the priority nursing care focus for the client with a bladder tumor. For additional potential nursing diagnoses and interventions for the client with a bladder tumor, see the Nursing Care Plan that follows.

Impaired Urinary Elimination

Whether the client has undergone transurethral resection of a bladder tumor or radical cystectomy with urinary diversion, urinary elimination is altered at least temporarily.

- Monitor urine output from all catheters, stents, and tubes for amount, color, and clarity hourly for the first 24 hours postoperatively, then every 4 to 8 hours. *Decreased urine output may indicate impaired catheter or drainage system patency. Prompt intervention is necessary to prevent hydronephrosis. A change in color or clarity may indicate a complication such as hemorrhage or infection.*

PRACTICE ALERT

Promptly report urine output of less than 30 mL per hour, which may indicate low vascular volume or renal insufficiency. Prompt intervention is vital to restore cardiac output and prevent acute renal failure.

- Label all catheters, stents, and their drainage containers. Maintain separate closed gravity drainage systems for each. *Clear identification of each tube can prevent errors in irrigating and calculating outputs. Separate closed systems minimize the risk and extent of potential bacterial contamination and resultant infection.*

PRACTICE ALERT

Use aseptic techniques and strictly follow guidelines for irrigating catheters. Catheters placed in the kidney pelvis are irrigated using gentle pressure and small amounts of fluid (10 to 15 mL) to avoid damaging renal tissues.

NURSING CARE OF THE CLIENT HAVING A Cystectomy and Urinary Diversion

PREOPERATIVE CARE

- Provide routine preoperative care as outlined in Chapter 4 ∞.
- Assess knowledge of the proposed surgery and its long-term implications, clarifying misunderstandings and discussing concerns. *Clients having surgery for cancer of the urinary tract are trying to cope with diagnosis of cancer and may not fully understand the surgery and its potential effects. Open discussion can facilitate postoperative recovery and adjustment.*
- Begin teaching about postoperative tubes and drains, self-care of stoma, and control of drainage and odor. *Postoperative physiologic and psychologic stressors may interfere with learning. A basic understanding of what to expect in the way of tubes, drains, and procedures reduces stress in the immediate postoperative period. Preoperative teaching can enhance recall and postoperative learning.*
- Assist in identifying stoma site, avoiding folds of skin, bones, scar tissue, and the waistline or belt area. Be sure to consider the client's occupation and style of clothing. The site should be visible to the client and accessible for manipulation. *Stoma placement is a vital component of adjustment and self-care. Care is taken to place the stoma away from areas of constant irritation by clothing or movement. It should be located so that the client can cover and disguise the collecting device, maintain the seal to prevent leakage, and effectively cleanse and maintain the site.*
- Perform bowel-preparation activities as ordered. *Bowel preparation is done to prevent fecal contamination of the peritoneal cavity and to decompress the bowel during surgery.*

POSTOPERATIVE CARE

- Provide routine postoperative care (See Chapter 4 ∞).
- Monitor intake and output carefully, assessing urine output every hour for the first 24 hours, then every 4 hours or as ordered. Call the physician if urine output is less than 30 mL per hour. *Tissue edema and bleeding may interfere with urinary output from stoma, catheters, or drains. Maintenance of urine outflow is vital to prevent hydronephrosis and possible renal damage. A urine output of at least 30 mL per hour is necessary for effective renal function.*
- Assess color and consistency of urine. Expect pink or bright red urine fading to pink and then clearing by the third postoperative day. Urine may be cloudy due to mucous production by bowel mucosa. *Bright red blood in the urine from a urinary diversion may indicate hemorrhage, necessitating further surgery. Excessive cloudiness or malodorous urine may indicate infection.*
- Assess size, color, and condition of the stoma and surrounding skin every 2 hours for the first 24 hours, then every 4 hours for 48 to 72 hours. Expect the stoma to appear bright red and slightly edematous initially. Slight bleeding during cleansing is normal. *Compromised circulation causes the stoma to appear pale, gray, or cyanotic or blanch when touched. Other complications, such as infection or impaired healing, may be evidenced by a change in the appearance of the stoma or incision.*
- Irrigate the ileal diversion catheter with 30 to 60 mL of normal saline every 4 hours or as ordered. *Mucus produced by the bowel wall may accumulate in the newly devised reservoir or obstruct catheters.*
- Monitor serum electrolyte values, acid–base balance, and renal function tests such as BUN and serum creatinine. *Reabsorption of electrolytes from reservoirs created by portions of bowel may result in electrolyte imbalance and metabolic acidosis. Optimal renal function is necessary to maintain a normal state of homeostasis.*
- Teach the client and family about stoma and urinary diversion care, including odor management, skin care, increased fluid intake, pouch application and leakage prevention, self-catheterization for clients with continent reservoirs, and signs of infection and other complications. *The ability to provide self-care is a significant factor in the adjustment to a changed body image. Teaching family members facilitates acceptance and adjustment. The family also needs this knowledge in case illness or disability interferes with the self-care capacity.*

- Secure ureteral catheters and stents with tape; prevent kinking or occlusion; and maintain gravity flow by keeping drainage bag below level of kidneys. *Impaired urine flow can lead to urinary retention and distention of the bladder, a newly created reservoir, or the renal pelvis (hydronephrosis).*
- Encourage fluid intake of 3000 mL per day. *Increased fluid intake maintains a high urinary output, reducing the risk of infection. Dilute urine is less irritating to the skin surrounding the stoma site. Electrolyte reabsorption from reservoirs may increase risk of calculi; high fluid intake and urine output reduce this risk.*

PRACTICE ALERT

Monitor urine output closely for first 24 hours after stents or ureteral catheters are removed. Edema or stricture of ureters may impede output, leading to hydronephrosis and kidney damage.

- Encourage activity to tolerance. *Ambulation promotes drainage of urine from reservoirs and helps prevent calcium loss from bones, which could precipitate calculus formation.*

Risk for Impaired Skin Integrity

The skin surrounding the stoma site of an ileal conduit is at risk for irritation and breakdown. Because urine is acidic and contains high concentrations of electrolytes, it has a corrosive effect on skin. In addition, adhesives and sealants used to prevent pouch leakage may irritate the skin.

- Assess peristomal skin for redness, excoriation, or signs of breakdown. Assess for urine leakage from catheters, stents, or drains. Keep the skin clean and dry. Change wet dressings. *Intact skin is the first line of defense against infection. Impaired skin integrity may lead to local or systemic infection and impaired healing.*

NURSING CARE PLAN A Client with a Bladder Tumor

Ben Hussain is a 61-year-old automobile salesman. He is married and has five children, all of whom are grown and living away from home. One week ago, Mr. Hussain became alarmed when his urine became bright red. Even though he had no other symptoms, he called his physician. The physician ordered a urinalysis and urine cytology, revealing gross hematuria and poorly differentiated abnormal cells. Cystoscopy and tissue biopsy confirm a stage C tumor involving the bladder trigone. Mr. Hussain is admitted for a radical cystectomy and continent urinary diversion.

ASSESSMENT

Mr. Hussain's admission history, obtained by Tara Mills, RN, his primary nurse, indicates that he has lost 10 to 15 pounds during the last few months. He smoked two to three packs of cigarettes per day for 40 years, but cut back to a pack a day about a year ago. He says he could not quit smoking entirely. He drinks five to six cups of coffee daily and consumes a moderate amount of alcohol, averaging three to four drinks a day. Mr. Hussain says that he is "a little nervous about surgery and what they're going to find." Ms. Mills notes that he fidgets and talks rapidly throughout their interview. He also expresses concern about how he will handle the pain after surgery, because he has never been hospitalized before his cystoscopy. Physical assessment findings include T 98.2°F (36.7°C) PO, P 84, R 18, and BP 154/86. Examinations of the skin, neuromuscular, and cardiac systems are within normal limits. Scattered expiratory crackles are noted on auscultation of lung fields. Bowel sounds are very active; Mr. Hussain explains that he began taking his bowel-preparation laxative the day before admission. Slight tenderness is noted in the suprapubic region. Mr. Hussain's urine is clear and bright pink. CBC and chemistry screening results are within normal limits. Surgery is planned for 9:00 A.M. the following day.

DIAGNOSES

- *Anxiety* related to undetermined extent of disease and fear of pain
- *Deficient Knowledge* related to care and management of continent urinary diversion
- *Impaired Urinary Elimination* related to cystectomy and urinary diversion
- *Risk for Impaired Gas Exchange* related to smoking history and effects of anesthesia

EXPECTED OUTCOMES

- Verbalize decreased feelings of anxiety.
- Demonstrate appropriate postoperative pain relief through subjective reports of pain severity and objective findings.
- Be able to care for urinary diversion and surrounding skin, prior to discharge.
- Demonstrate self-catheterization of stoma using appropriate technique prior to discharge.
- Maintain normal urine output with acceptable color and clarity and no signs of infection.
- Maintain adequate gas exchange as evidenced by good skin color, O_2 saturation greater than 95%, and clear lung sounds on auscultation.

PLANNING AND IMPLEMENTATION

- Spend as much time as possible with Mr. Hussain and his family preoperatively, answering questions fully and encouraging expression of fears.
- Provide written and verbal explanations when feasible.
- Administer analgesia on a regular basis for the first 48 to 72 hours. Monitor for objective signs of unrelieved pain.
- Explain all procedures related to stoma and diversion care as they are being performed.
- Encourage Mr. Hussain to look at stoma and touch it when ready.
- Teach stoma and skin care, as well as self-catheterization, emphasizing measures to prevent skin irritation and urinary tract infection.
- Monitor urine output, color, clarity, and consistency every hour for first 24 hours, then every 4 hours for 24 hours, then every 8 hours. Report output of less than 30 mL per hour, bright bleeding, excessively cloudy or malodorous urine.
- Assist with use of incentive spirometer every hour while awake. Ambulate as soon as possible. Assess lung sounds every 4 hours, reporting increased crackles or diminished breath sounds.
- Refer Mr. and Mrs. Hussain to local stoma group on discharge.

EVALUATION

On discharge, Mr. Hussain has performed self-catheterization and stoma and skin care several times. His wife also is able to catheterize the stoma and demonstrate skin care. His urine is pale yellow and slightly cloudy. Mr. Hussain is ambulating independently and using oxycodone (Percocet) twice a day for pain relief. His lungs are clear, and he is very proud of having "survived" 7 days without a cigarette. He says, "Now I'm going to shoot for 7 weeks, then 7 months, then 7 years without a smoke!" A home health referral is made to continue teaching Mr. Hussain to care for his diversion and appliance.

CRITICAL THINKING IN THE NURSING PROCESS

1. How does cigarette smoking contribute to the increased risk of urinary tract tumors?
2. Suppose Mr. Hussain had become confused, disoriented, and tremorous and had begun to experience visual hallucinations 2 to 3 days postoperatively. What would you suspect the cause to be? What would be the appropriate response?
3. Develop a care plan for Mr. Hussain for the nursing diagnosis *Risk for Sexual Dysfunction.*

See Evaluating Your Response in Appendix C.

- Ensure gravity drainage of urine collection device or empty bag every 2 hours. *Overfilling of the collection bag may damage the seal, allowing leakage and contact of urine with skin.*
- Change urine collection appliance as needed, removing any mucus from stoma. See Box 28–2 for care of a urinary drainage stoma. *Meticulous care and protection of skin surrounding stoma can maintain integrity and prevent breakdown.*

BOX 28–2 Urinary Stoma Care

- Gather all supplies: a clean, disposable pouch; liquid skin barrier or barrier ring; 4-by-4 gauze squares; stoma guide; adhesive solvent; clean gloves; and a clean washcloth.
- Assess knowledge, learning needs, and ability and willingness to assist with procedure. Explain the procedure as needed.
- Use standard precautions.
- Remove old pouch, pulling gently away from skin. Warm water or adhesive solvent may be used to loosen the seal if necessary.
- Assess stoma. Normally the stoma is bright red and appears moist. Report a dark purple, black, or very pale stoma to the physician. Slight bleeding with cleansing is normal, especially in the immediate postoperative period.
- Prevent urine flow during cleaning by placing a rolled gauze square or tampon over the stoma opening.
- Cleanse skin around the stoma with soap and water, rinse, and pat or air dry.
- Use the stoma guide to determine correct size for the bag opening and/or protective ring seal. Trim the bag or seal as needed.
- Apply skin barrier; allow to dry.
- Apply the bag with an opening no more than 1 to 2 mm wider than outside of stoma. Allow no wrinkles or creases where the bag contacts the skin.
- Connect bag to the urine-collection device. Dispose of old pouch, used supplies, and gloves appropriately. Wash hands.
- Chart procedure, including stoma appearance and response of the client.

Disturbed Body Image

A radical cystectomy and urinary diversion affect the client's body image. In most cases, an abdominal stoma is created, requiring either a drainage appliance or regular catheterization of the stoma to drain urine. Removal of the prostate and seminal vesicles or the uterus and ovaries leaves the client sterile. If radiation or chemotherapy is planned as adjunctive therapy, the client may experience hair loss, stomatitis, nausea and vomiting, or other disturbing side effects of therapy.

- Use therapeutic communication techniques, actively listening and responding to the client's and family's concerns. *Clients must know their feelings and concerns are respected and valued. Denial, anger, guilt, bargaining, or depression are common during grieving and normal for a client undergoing a significant change in body image.*
- Recognize and accept behaviors that indicate use of coping mechanisms, encouraging adaptive mechanisms. *The client may initially use defensive coping mechanisms such as denial, minimization, and dissociation from the immediate situation to reduce anxiety and maintain psychologic integrity. Adaptive mechanisms include learning as much as possible about the surgery and its effects, practicing procedures, setting realistic goals, and rehearsing various alternative outcomes.*
- Encourage looking at, touching, and caring for the stoma and appliance as soon as possible. Allow the client to proceed gradually, providing support and encouragement. *Accepting the stoma as part of the self is vital to adapting to the changed body image and is indicated by a willingness to provide self-care.*
- Discuss concerns about returning to usual activities, perceived relationship changes, and resumption of sexual relations. Provide referral to support group or provide for contact with someone who has successfully adjusted to a urinary diversion. *Clients and families may be reluctant to discuss topics of concern. An atmosphere of openness and acceptance facilitates expression of concerns and anxieties related to the changed body image.*

Risk for Infection

Diagnostic instrumentation procedures, surgical manipulation, and disruption of normal urinary tract defense mechanisms increase the risk of ascending urinary tract infection. When an ileal conduit or artificial bladder is created using bowel tissue, the normal bacteriostatic activity of bladder mucosa is lost. In addition, the peristaltic action of the ureters may be disrupted, and the vesicoureteral junction no longer prevents urine reflux. Adjunctive chemotherapy or radiation treatments may impair normal immune function and further increase the risk of infection.

- Maintain separate closed drainage systems, keeping drainage bags lower than the kidney, and prevent loops or kinks in drainage tubing, which impede urine flow. *Although urine is sterile when it leaves the kidney, bacteria grow rapidly in urine. Prevention of urine reflux is essential to preventing UTI.*
- Monitor for signs of infection: elevated temperature, cloudy or foul-smelling urine, hematuria, general malaise, back or abdominal pain, and nausea and vomiting. *Infection undermines the healing process. Early detection and treatment help prevent long-term consequences such as chronic pyelonephritis.*

PRACTICE ALERT

Impaired immune function (due to aging or the effects of chemotherapy) and urine cloudiness (related to the effects of urine on ileal mucosa) can mask usual signs of UTI such as fever and altered urine clarity. Be alert for more generalized manifestations such as increased fatigue and malaise.

- Teach signs and symptoms of infection and self-care measures to prevent UTI. *The client with a cystectomy and ileal diversion, urostomy, or continent reservoir is at risk of UTI for life because of impaired urinary defense mechanisms. Using clean or aseptic technique in providing care, increasing fluid intake, and using measures to acidify urine minimize this risk to a certain degree but do not eliminate it.*

Community-Based Care

The need for individual and family teaching for the client who has had surgery to treat a urinary tract tumor is significant. For many clients, surgery means a lifelong change in urinary elimination. Even the client who has undergone transurethral excision of bladder tumors requires follow-up cystoscopy on a regular basis and needs to be alert for signs of tumor recurrence.

The client who has had a urinary diversion needs teaching about care of the stoma and surrounding skin, prevention of urine

reflux and infection, signs and symptoms of UTI and renal calculi, and, in some cases, self-catheterization using clean technique.

THE CLIENT WITH URINARY RETENTION

Urinary retention, incomplete emptying of the bladder, can lead to overdistention of the bladder, poor detrusor muscle contractility, and inability to urinate. If the problem persists, hydroureter and hydronephrosis can result.

Physiology Review

Normally, bladder emptying is controlled by the interaction of muscle tone and the autonomic nervous system. The sympathetic nervous system (SNS) relaxes the detrusor muscle, allowing the bladder to fill with urine. The internal sphincter, a continuation of the detrusor muscle, remains closed during filling. Pressures within the bladder remain low during filling, in contrast to high sphincter and urethral pressures. Voluntary muscles of the external sphincter and pelvic floor help maintain these high pressures. When the bladder contains 150 to 300 mL of urine, signals from stretch receptors in the bladder wall are transmitted to the spinal cord and cerebral cortex. Reflexive bladder emptying can be consciously inhibited. During *micturition* (bladder emptying), parasympathetic stimulation causes the detrusor muscle of the bladder fundus to contract, opening the internal sphincter. The external sphincter then relaxes, allowing urine to flow out.

Pathophysiology

Either mechanical obstruction of the bladder outlet or a functional problem can cause urinary retention. *Benign prostatic hypertrophy (BPH)* is a common cause; difficulty initiating and maintaining urine flow is often the presenting complaint in men with BPH. Acute inflammation associated with infection or trauma of the bladder, urethra, or perineal tissues may also interfere with micturition. Scarring due to repeated urinary tract infection can lead to urethral stricture and a mechanical obstruction. Bladder calculi may also obstruct the urethral opening from the bladder.

Surgery, particularly abdominal or pelvic surgery, may disrupt detrusor muscle function, leading to urine retention. Drugs also may interfere with its function. Anticholinergic medications such as atropine, glycopyrrolate (Robinul), propantheline bromide (Pro-Banthine), scopolamine hydrochloride (Transderm-Scop), and others can lead to acute urinary retention and bladder distention. Many other drug groups have anticholinergic side effects and may cause urinary retention. Among these are antianxiety agents such as diazepam (Valium), antidepressant and tricyclic drugs such as imipramine (Tofranil), antiparkinsonian drugs, antipsychotic agents, and some sedative/hypnotic drugs. In addition, antihistamines common in over-the-counter cough, cold, allergy, and sleep-promoting drugs have anticholinergic effects and may interfere with bladder emptying. Diphenhydramine (Benadryl) is an example of a nonprescription antihistamine.

Voluntary urinary retention (particularly common among nurses!) may lead to overfilling of the bladder and a loss of detrusor muscle tone.

Manifestations

The client with urinary retention is unable to empty the bladder completely. Overflow voiding or incontinence may occur, with 25 to 50 mL of urine eliminated at frequent intervals. Assessment reveals a firm, distended bladder that may be displaced to one side of midline. Percussion of the lower abdomen reveals a dull tone, reflective of fluid in the bladder.

Severe urinary retention with resulting bladder distention impairs the ability of the vesicoureteral junction to prevent backflow of urine into the ureters (see Figure 28–1 on page 847). Reflux of urine from the distended bladder distends the ureters (hydroureter) and kidneys (hydronephrosis). Hydronephrosis impairs renal function, and acute renal failure can result. See Chapter 29 for more information about acute renal failure.

INTERDISCIPLINARY CARE

Urinary retention is confirmed using a bladder scan or by inserting a urinary catheter (if possible) and measuring the urine output. Use of a bladder scan is preferred to reduce the risk of UTI (Teng et al., 2005).

An indwelling urinary catheter or intermittent straight catheterization can prevent urinary retention and overdistention of the bladder. Cholinergic medications such as bethanechol chloride (Urecholine), which promote detrusor muscle contraction and bladder emptying, may be used. A medication with no anticholinergic side effects may be substituted when urinary retention is related to drug therapy.

Mechanical obstructions are treated by removing or repairing the obstruction when possible. Resection of the prostate gland may be done for urinary retention related to BPH. Bladder calculi are removed, and measures to prevent their formation are instituted.

NURSING CARE

Health promotion measures to prevent urinary retention include monitoring urine output in at-risk clients and evaluating drug regimens for medications known to interfere with detrusor muscle function. Pay particular attention to elimination when these drugs are ordered for (or used by) a client with BPH or other mechanical obstruction of urine flow.

Impaired Urinary Elimination

Nursing measures to promote urination include placing the client in normal voiding position and providing for privacy. Additional measures include running water, placing the client's hands in warm water, pouring warm water over the perineum, or taking a warm sitz bath.

In acute urinary retention, catheterization may be necessary to relieve bladder distention and prevent hydronephrosis. Use a relatively small catheter (16 Fr. for a man, 14 Fr. for a woman). A coudé-tipped catheter is passed more easily in the older man with an enlarged prostate. Using 2% lidocaine gel (10 mL injected into the male urethra or 6 mL injected into the female urethra) reduces discomfort during catheterization and the risk

of catheter-associated infection and promotes pelvic muscle relaxation (Bardsley, 2005). Carefully observe the client as the distended bladder drains.

PRACTICE ALERT

Some clients may experience a vasovagal response, becoming pale, sweaty, and hypotensive if the bladder is rapidly drained. Draining urine in 500-mL increments and clamping the catheter for 5 to 10 minutes between increments may prevent this response. Hematuria also may occur with rapid bladder decompression. Promptly notify the physician if hematuria develops.

Home care for the client with urinary retention varies, depending on the cause. Some clients may be taught intermittent self-catheterization. Instruct all clients who have experienced urinary retention to avoid over-the-counter drugs that affect micturition, especially those with an anticholinergic effect (allergy and cold medications, many nonprescription sleep aids). Other home care measures include double-voiding (urinate, remain on the toilet for 2 to 5 minutes, then urinate again), scheduled voiding, or, when other measures fail, an indwelling catheter. When an indwelling catheter is necessary, teach the client and family to use clean technique when changing from overnight bag to leg bag, and to promptly report signs of UTI to the primary care provider.

THE CLIENT WITH NEUROGENIC BLADDER

The neurologic connections influencing bladder filling, the perception of fullness and the need to void, and bladder emptying are complex. Disruption of the central or peripheral nervous systems may interfere with normal mechanisms, causing **neurogenic bladder**.

Pathophysiology

As noted in the physiology section on urinary retention, bladder filling and emptying are controlled by the central nervous system (CNS). This neurologic control can be disrupted at any level: the cerebral cortex (voluntary impulses), the micturition center of the midbrain, the spinal cord tracts, or the peripheral nerves of the bladder itself.

Spastic Bladder Dysfunction

A simple reflex arc exists between the bladder and the spinal cord at levels S_2 through S_4. The stimulus of more than 400 mL of urine in the bladder causes reflex contraction of the detrusor muscle and bladder emptying unless voluntary control (cerebral input) is used to suppress it. Disruption of CNS transmission above the sacral spinal cord segment typically leads to *spastic neurogenic bladder.* Both sensory and voluntary control of urination are interrupted partially or totally, while the sacral reflex arc remains intact. The stimuli generated by bladder filling cause frequent spontaneous detrusor muscle contraction and involuntary bladder emptying. Spinal cord injury above the sacral segment is the most common cause of a spastic bladder. Other causes include stroke, multiple sclerosis, and other CNS lesions (Porth, 2005).

Flaccid Bladder Dysfunction

Damage to the sacral spinal cord at the level of the reflex arc, the cauda equina, or the sacral nerve roots causes loss of detrusor muscle tone and a *flaccid neurogenic bladder.* The perception of bladder fullness is lost, and the bladder becomes overdistended, with weak and ineffective detrusor muscle contractions. Flaccid neurogenic bladder is seen with myelomeningocele and during the spinal shock phase of a spinal cord injury above the sacral region. During the spinal shock phase, all reflex activity below the level of spinal cord injury is suppressed.

Peripheral neuropathies may also cause bladder atony and overfilling. Either sensory or motor pathways (or both) may be disrupted, leading to incomplete bladder emptying and large residual volumes after voiding (Porth, 2005). Diabetes mellitus is the most common cause of peripheral bladder neuropathy. Other causes include multiple sclerosis, chronic alcoholism, and prolonged overdistention of the bladder.

INTERDISCIPLINARY CARE

Management of neurogenic bladder focuses on maintaining continence and avoiding complications associated with overfilling or incomplete emptying of the bladder. Because self-care is the goal, teaching is a primary intervention for the healthcare team.

Diagnosis

The following diagnostic tests may be ordered for the client with a neurogenic bladder:

- *Urine culture* to detect possible urinary tract infection related to impaired bladder function.
- *Urinalysis* and *serum creatinine* and *BUN* to evaluate renal function. See the diagnotic tests table on page 835 for normal BUN and creatinine levels. Ascending infection or hydronephrosis resulting from bladder overfilling and vesicoureteral reflux can damage the kidneys. Impaired renal function may lead to blood cells or protein in the urine, and elevated BUN and creatinine levels.
- *Postvoid catheterization* to measure residual urine. Amounts greater than 50 mL may indicate ineffective detrusor muscle contractions, common in neurogenic bladder.
- *Cystometrography* to evaluate bladder filling and the detrusor muscle tone and function. See page 836 for nursing care of the client undergoing cystometrography.

Medications

Medications may be prescribed to increase or decrease the contractility of the detrusor muscle, to increase or decrease the tone of the internal sphincter, or to relax the external urethral sphincter.

Bethanechol, a cholinergic drug, stimulates detrusor muscle contraction in flaccid neurogenic bladder. It is generally used to manage short-term urinary retention (e.g., following surgery or childbirth). It may used in combination with bladder-training techniques to promote complete emptying of a neurogenic bladder. Anticholinesterase drugs such as neostigmine (Prostigmin) and pyridostigmine (Mestinon) also may be used to increase detrusor muscle tone.

Anticholinergic drugs (parasympathetic blockers) relax the detrusor muscle and contract the internal sphincter, increasing bladder capacity in clients with spastic bladder dysfunction. Oxybutynin (Ditropan) and tolterodine (Detrol) inhibit the muscarinic effects of acetylcholine on smooth muscle, reducing detrusor muscle spasticity and promoting bladder filling. Other anticholinergic drugs also may be used, including propantheline (Pro-Banthine) or flavoxate (Urispas). Dry mouth, blurred vision, and constipation are potential adverse effects of anticholinergic medications. See the Medication Administration box below for drugs used to modify detrusor muscle activity.

Nutrition

Dietary measures to reduce the risk for UTI and urinary calculi may be suggested for the client with neurogenic bladder. A moderate to high fluid intake and a diet that acidifies the urine are helpful. Cranberry juice is recommended to maintain urine acidity. See Table 28–3 for additional foods to include or avoid in the diet to help prevent UTI and urolithiasis. The timing of fluid intake may be regulated to promote continence.

Bladder Retraining

Clients with spastic neurogenic bladder may use measures to stimulate reflex voiding, allowing scheduled toileting. Techniques include using trigger points, for example, stroking or pinching the abdomen, inner thigh, or glans penis. Pulling pubic hairs, tapping the suprapubic region, or inserting a gloved finger into the rectum and gently stretching the anal sphincter can also stimulate urination.

The *Credé's method* (applying pressure to the suprapubic region with the fingers of one or both hands), manual pressure on the abdomen, and the Valsalva maneuver (bearing down while holding one's breath) promote bladder emptying for the client with a spastic or flaccid bladder.

PRACTICE ALERT

Increasing lower abdominal and bladder pressure with the Credé's method can stimulate autonomic dysreflexia in some clients with spinal cord injuries. Autonomic dysreflexia is a medical emergency in which the blood pressure rises rapidly due to SNS stimulation.

See Chapter 45 ∞ for a discussion of autonomic dysreflexia.

MEDICATION ADMINISTRATION **The Client with Neurogenic Bladder**

ANTICHOLINERGIC DRUGS TO TREAT SPASTIC BLADDER

Oxybutynin (Ditropan, Ditropan XL)
Tolterodine (Detrol, Detrol LA)
Propantheline bromide (Pro-Banthine)
Flavoxate hydrochloride (Urispas)

Anticholinergic drugs inhibit the response to acetylcholine, relaxing the detrusor muscle and increasing internal sphincter tone. The combination of detrusor relaxation and internal sphincter contraction increases the bladder capacity of clients with spastic or hyperreflexive neurogenic bladder. Of these medications, tolterodine has the most specific effects on the detrusor muscle with fewer anticholinergic side effects.

Nursing Responsibilities

- Assess for contraindications, such as glaucoma, gastrointestinal or urinary tract obstruction, severe ulcerative colitis or toxic megacolon, unstable cardiovascular status, or myasthenia gravis.
- Observe for the desired effect of increased bladder capacity with decreased incontinence and spasm.
- Monitor for possible interaction with other drugs such as narcotic analgesics, antidysrhythmic medications, antihistamines, antidepressants, or psychoactive drugs.
- Monitor heart rate and blood pressure, especially when given to clients with known cardiovascular disease.
- Assess for adverse effects such as urinary hesitancy or retention, dysrhythmias, mental status changes, and gastrointestinal disturbances.

Health Education for the Client and Family

- Promptly report eye pain, rapid heart beat, difficulty breathing, rash or hives, or changes in mental function to your primary care provider.
- These drugs may cause drowsiness or blurred vision. Use caution when driving, operating machinery, or performing other tasks requiring mental acuity.
- Hard candies help relieve dry mouth associated with these drugs.
- Do not use alcohol or nonprescription antihistamines while taking these drugs.

CHOLINERGIC DRUGS TO STIMULATE MICTURITION

Bethanechol chloride (Urecholine)

Bethanechol stimulates the parasympathetic nervous system, increasing detrusor muscle tone and producing a contraction strong enough to initiate micturition. It is used primarily to treat acute postoperative and postpartum urinary retention.

Nursing Responsibilities

- Assess for contraindications, including hypersensitivity, hyperthyroidism, peptic ulcer disease, asthma, significant bradycardia or hypotension, coronary heart disease, epilepsy, and parkinsonism.
- Do not give to clients who have had recent gastrointestinal or bladder surgery or those with possible gastrointestinal or urinary tract obstruction.
- Give oral forms on an empty stomach to reduce the risk of nausea and vomiting.
- Administer parenteral bethanechol subcutaneously. Keep atropine, the antidote for bethanechol overdose or toxicity, available.
- Observe for desired effect within 30 to 60 minutes after oral administration, 5 to 15 minutes after injection.
- Assess for adverse effects such as malaise, headache, abdominal cramping, nausea, hypotension with reflex tachycardia, wheezing, and dyspnea.

Health Education for the Client and Family

- Take the medication 1 hour before or 2 hours after meals.
- Use caution when rising from a recumbent or sitting position; you may feel dizzy or light-headed.

The client with a flaccid bladder may require catheterization to completely empty the bladder. An indwelling catheter may be used initially, but intermittent catheterization is preferred. Clean intermittent self-catheterization is performed every 3 to 4 hours to prevent overdistention of the bladder (see Procedure 45–1 ∞).

Surgery

Surgery may be required when urination cannot be effectively managed using more conservative measures. *Rhizotomy,* or destruction of the nerve supply to the detrusor muscle or the external sphincter, may be used for clients with hyperreflexia or spasticity. Urinary diversion is another surgical technique used when conservative management fails. Implantation of an artificial sphincter may be useful for some clients with neurogenic bladder. See Table 28–6 for urinary diversion techniques and page 866 for nursing care of the client undergoing a urinary diversion.

NURSING CARE

Nursing care of the client with a neurogenic bladder is directed toward promoting urinary drainage and continence, preventing complications, and teaching the client and family self-care techniques.

Assessment

Nursing assessment for neurogenic bladder includes obtaining a complete nursing history, focusing on information related to CNS or spinal cord injury or disease, as well as disorders that affect the peripheral nervous system (e.g., diabetes). Ask about measures used to stimulate or control urination. Inspect and palpate the lower abdomen and suprapubic region for tenderness or bladder distention. Percuss the suprapubic region for a dull percussion tone indicative of a full bladder. Dullness up to the level of the umbilicus indicates at least 500 mL of urine in the bladder (Gray, 2000). Assess urine for color, clarity, and odor. Collect a specimen for analysis as indicated.

Nursing Diagnoses and Interventions

Although each client has individual nursing care needs, examples of nursing diagnoses appropriate for the client with a neurogenic bladder include the following:

- *Impaired Urinary Elimination* related to impaired bladder innervation
- *Self-Care Deficit: Toileting* related to neurologic injury
- *Risk for Impaired Skin Integrity* related to urinary incontinence
- *Risk for Infection* related to impaired urination reflex.

Community-Based Care

Include the following in teaching for the client with neurogenic bladder and family members:

- Measures to stimulate reflex voiding and promote bladder emptying
- Use of prescribed medications, including desired and adverse effects, and interactions with other drugs
- Manifestations of UTI or urolithiasis, and measures to reduce the risk of these complications.

THE CLIENT WITH URINARY INCONTINENCE

The most common manifestation of impaired bladder control is **urinary incontinence (UI)**, or involuntary urination. UI can have a significant impact on clients, leading to physical problems such as skin breakdown, infection, and rashes. Psychosocial consequences include embarrassment, isolation and withdrawal, feelings of worthlessness and helplessness, and depression.

Incidence and Prevalence

Approximately 17 million people in the United States have some degree of urinary incontinence (Mason et al., 2003). The estimated cost of managing UI is $10 billion yearly. UI is especially common among older clients (see the box on the following page). An estimated 30% or more of older women living in the community experience UI. In long-term care, foster care, and homebound populations, the incidence is about 50% (Mason et al., 2003; Tierney et al., 2005). The actual prevalence of urinary incontinence is nearly impossible to determine. Embarrassment and the availability of products to protect clothing and prevent detection contribute to clients' not seeking evaluation of and treatment for incontinence.

FAST FACTS

- UI is especially common among older clients. Although the prevalence of urinary incontinence increases in older adults, it is *not* a normal consequence of aging and it *can* be treated.
- An estimated 30% or more of older women living in the community experience UI.
- In long-term care, foster care, and homebound populations, the incidence is about 50% (Mason et al., 2003; Tierney et al., 2005).

Pathophysiology

Urinary continence requires a bladder able to expand and contract and sphincters that can maintain a urethral pressure higher than that in the bladder. Incontinence results when the pressure within the urinary bladder exceeds urethral resistance, allowing urine to escape. Any condition causing higher than normal bladder pressures or reduced urethral resistance can potentially result in incontinence. Relaxation of the pelvic musculature, disruption of cerebral and nervous system control, and disturbances of the bladder and its musculature are common contributing factors.

Incontinence may be an acute, self-limited disorder, or it may be chronic. The causes may be congenital or acquired, reversible or irreversible. Congenital disorders associated with incontinence include *epispadias* (absence of the upper wall of the urethra), and *meningomyelocele* (a neural tube defect in which a portion of the spinal cord and its surrounding meninges protrude through the vertebral column). CNS or spinal cord trauma, stroke, and chronic neurologic disorders such as multiple sclerosis and Parkinson's disease are examples of acquired, irreversible causes of incontinence. Reversible causes

NURSING CARE OF THE OLDER ADULT — Minimizing the Risk for UTI and UI

Older adults have a higher incidence of two common urinary tract disorders: urinary tract infection and urinary incontinence.

Urinary Tract Infection

Aging affects normal protective mechanisms to prevent UTI. The pH of urine increases with aging, allowing bacteria to grow and multiply more readily. Glucosuria, more common in older adults due to the higher incidence of diabetes, facilitates bacterial growth. Incomplete bladder emptying and urinary retention are more common due to problems such as prostatic hypertrophy in men, bladder prolapse in women, and neurogenic bladder in both sexes. Changes in vaginal pH in women and decreased prostatic secretions in men may also contribute to an increased incidence of UTI.

While many UTIs in older adults are asymptomatic and self-limited, infections can lead to bacteremia, sepsis, and shock. Manifestations of UTI in the elderly include dysuria, urgency, frequency, incontinence, occasional hematuria, and confusion. Symptoms such as fever, chills, and flank pain and tenderness may be absent. Dementia may make diagnosis more difficult.

Urinary Incontinence

Urinary incontinence, the involuntary loss of urine, is a common problem in older adults. While incontinence should never be considered a *normal* consequence of aging, age-related changes contribute to its development. Bladder capacity tends to decline with age and involuntary bladder muscle contractions are more common. In women, decreased estrogen levels and pelvic muscle relaxation decrease bladder outlet and urethral resistance pressures. Decreased estrogen also causes atrophic vaginitis and urethritis, with manifestations of dysuria and urgency. Other risk factors for UI in older adults include impaired mobility and chronic degenerative diseases, impaired cognition, medications, low fluid intake, diabetes, and stroke.

Assessing for Home Care

Assessment for urinary problems in the older adult focuses on risk factors, the extent and manifestations of the disorder, and contributing factors. Using clear language, ask about problems with urine loss, its frequency, and any contributing factors. Inquire about frequency, urgency, and burning on urination. Identify current medications and the time of day each is taken. Assess patterns of fluid intake and output. Assess the abdomen for evidence of bladder distention or tenderness. Perform a mental status examination if indicated.

Assess the home environment (whether in the community or a residential living facility) for possible barriers to urinary elimination:

- Inadequate lighting, particularly at night
- Narrow doorways that may interfere with access to the toilet
- Inadequate toilet facilities
- The need for mobility aids such as safety bars, a raised toilet seat, or a bedside commode.

Teaching for Home Care

Discuss the following points to help prevent UTI and UI in the older adult:

- Maintain a generous fluid intake. Reduce or eliminate fluid intake after the evening meal to reduce nocturia.
- Wear comfortable clothing that is easy to remove for toileting.
- Maintain good hygiene, but do not bathe more often than necessary; frequent bathing and feminine hygiene sprays or douches may dry perineal tissues, increasing the risk of UTI or UI.
- Perform pelvic muscle exercises (Kegel exercises) several times a day to increase perineal muscle tone.
- Reduce consumption of caffeine-containing beverages (coffee, tea, colas), citrus juices, and artificially sweetened beverages containing Nutra-Sweet.
- Use behavioral techniques such as scheduled toileting, habit training, and bladder training to reduce the frequency of incontinence. *Scheduled toileting* is toileting at regular intervals (e.g., every 2 to 4 hours). *Habit training* is toileting the client on a schedule that corresponds with the normal pattern. *Bladder training* gradually increases the bladder capacity by increasing the intervals between voidings and resisting the urge to void.
- See your primary care provider regularly for a pelvic or prostate exam.
- For women, discuss possible benefits and risks of hormone replacement therapy, physical therapy, or surgery to treat incontinence.
- Report a change in urine color, odor, or clarity or symptoms such as burning, frequency, or urgency to your primary care provider.

Resources for Home Care

National Association for Continence
P.O. Box 1019
Charleston, SC 29402-1019
1-800-BLADDER (252-3357)
Website: www.nafc.org

include acute confusion, medications such as diuretics or sedatives, prostatic enlargement, vaginal and urethral atrophy, UTI, and fecal impaction.

Incontinence is commonly categorized as stress incontinence, urge incontinence (also known as overactive bladder), overflow incontinence, and functional incontinence. Table 28–7 summarizes each type with its physiologic cause and associated factors. *Mixed incontinence,* with elements of both stress and urge incontinence, is common. *Total incontinence* is loss of all voluntary control over urination, with urine loss occurring without stimulus and in all positions.

Incontinence is associated with an increased risk for falls, fractures, pressure ulcers, urinary tract infection, and depression. It contributes to the stress of caregivers, and may be a factor in institutionalizing the client.

INTERDISCIPLINARY CARE

Urinary incontinence management is directed at identifying and correcting the cause if possible. If the underlying disorder cannot be corrected, techniques to manage urine output can often be taught.

TABLE 28–7 Types of Urinary Incontinence

	DESCRIPTION	PATHOPHYSIOLOGY	CONTRIBUTING FACTORS
Stress	Loss of urine associated with increased intra-abdominal pressure during sneezing, coughing, lifting. Quantity of urine lost is usually small	Relaxation of pelvic musculature and weakness of urethra and surrounding muscles and tissues leads to decreased urethral resistance	■ Multiple pregnancies ■ Decreased estrogen levels ■ Short urethra, change in angle between bladder and urethra ■ Abdominal wall weakness ■ Prostate surgery ■ Increased intra-abdominal pressure due to tumor, ascites, obesity
Urge	Involuntary loss of urine associated with a strong urge to void	Hypertonic or overactive detrusor muscle leads to increased pressure within bladder and inability to inhibit voiding	■ Neurologic disorders such as stroke, Parkinson's disease, multiple sclerosis; peripheral nervous system disorders ■ Detrusor muscle overactivity associated with bladder outlet obstruction, aging, or disorders such as diabetes
Overflow	Inability to empty bladder, resulting in overdistention and frequent loss of small amounts of urine	Outlet obstruction or lack of normal detrusor activity leads to overfilling of bladder and increased pressure	■ Spinal cord injuries below S_2 ■ Diabetic neuropathy ■ Prostatic hypertrophy ■ Fecal impaction ■ Drugs, especially those with anticholinergic effect
Functional	Incontinence resulting from physical, environmental, or psychosocial causes	Ability to respond to the need to urinate is impaired	■ Confusion or dementia ■ Physical disability or impaired mobility ■ Diuretic therapy or sedation ■ Depression ■ Regression

Evaluation for incontinence begins with a complete history, including the duration, frequency, volume, and associated circumstances of urine loss. A voiding diary (Figure 28–8 ■) is often used to collect detailed information. The history also includes information about chronic or acute illnesses, previous surgeries, and current medication use, both prescription and over the counter.

Physical assessment includes abdominal, rectal, and pelvic assessment as well as evaluation of mental and neurologic status, mobility, and dexterity. Findings often associated with incontinence in women include weak abdominal and pelvic muscle tone, cystocele or urethrocele, and atrophic vaginitis. In men, an enlarged prostate gland is the physical finding most commonly associated with incontinence.

See the Nursing Research feature on page 876 on evidence-based practice for diagnosing urge incontinence using specific client assessment data.

Diagnosis

- *Urinalysis* and *urine culture* using a clean-catch specimen are done to rule out infection and other acute causes of incontinence.
- *Postvoiding residual (PVR) volume* is measured to determine how completely the bladder empties with voiding. Less than 50 mL PVR is expected; when 100 mL or more is obtained, further testing is indicated.
- *Cystometrography* is used to assess neuromuscular function of the bladder by evaluating detrusor muscle function, pressure within the bladder, and the filling pattern of the bladder. The client describes sensations and any urge to void as sterile water or saline is instilled into the bladder. Normally, the urge to void is perceived at 150 to 450 mL, and the bladder feels full at 300 to 500 mL. Bladder pressure and volume are recorded on a graph. When the bladder is full, the client voids, and intravesical pressure is noted during voiding.
- *Uroflowmetry* is a noninvasive test used to evaluate voiding patterns. The uroflowmeter, contained in a funnel, measures the rate of urine flow, the continuous flow time, and the total voiding time.
- *IVP* may be ordered to evaluate structure and function of the upper and lower urinary tract.
- *Cystoscopy* or *ultrasonography* may be ordered to identify structural disorders contributing to incontinence, such as an enlarged prostate or a tumor.

Nursing implications for the specialized studies for urinary incontinence are outlined in Chapter 27 ∞.

Medications

Both stress and urge incontinence may improve with drug treatment.

Drugs that contract the smooth muscles of the bladder neck may reduce episodes of mild stress incontinence. Phenylpropanolamine (Acutrim, Allerest, Contac, others), a commonly used decongestant and nonprescription diet aid, is an effective preparation. Adverse effects such as hypertension, palpitations, and nervousness may limit its use.

Your Daily Voiding Diary **Date** _____

This diary will help you and your healthcare team identify factors causing bladder control problems. Choose a 24-hour period when you can record your fluid intake (type and amount), urine output and episodes of urine leakage, any strong urge to void just prior to leaking, and your activity when leak episodes occur. The line below illustrates how to use your diary.

Time	Fluid Intake		Urine Output	Leaks	Urge	Activity
	Amount	Type			Yes / No	
7 am	2 cups	coffee	sm (med) lg	(sm) med lg	Yes	walking
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		
			sm med lg	sm med lg		

I used ___ pads today. I used ___ diapers today.

Questions to ask my health care team: _____

_____

_____

Figure 28–8 ■ A sample voiding diary.

Source: Adapted from *Your Daily Bladder Diary,* National Kidney and Urologic Diseases Information Center, National Institute of Diabetes and Digestive and Kidney Disease (NIDDK), National Institutes of Health.

When incontinence is associated with postmenopausal atrophic vaginitis, estrogen therapy may be effective. Both systemic estrogens and local creams are used.

Clients with urge incontinence may be treated with preparations that increase bladder capacity. The primary drugs used to inhibit detrusor muscle contractions and increase bladder capacity include oxybutynin (Ditropan and the extended-release form, Ditropan XL), an anticholinergic drug, and tolterodine (Detrol and its longer acting form, Detrol LA), a more specific antimuscarinic agent. These drugs can be taken once or twice a day, and have fewer side effects than less specific anticholinergic drugs. Drugs with anticholinergic effects are contraindicated for the client with acute glaucoma. Urinary retention is a potential side effect that must be considered when these drugs are used (see the Medication Administration box on page 871).

Surgery

Surgery may be used to treat stress incontinence associated with cystocele or urethrocele and overflow incontinence associated with an enlarged prostate gland.

Suspension of the bladder neck, a technique that brings the angle between the bladder and urethra closer to normal, is effective in treating stress incontinence associated with urethrocele in 80% to 95% of clients. A laparoscopic, vaginal, or abdominal approach may be used to perform this surgery. Care of the client with a bladder neck suspension is outlined on page 876.

Prostatectomy, using either the transurethral or suprapubic approach, is indicated for the client who is experiencing overflow incontinence as a result of an enlarged prostate gland and urethral obstruction. Care of the client with a prostatectomy is outlined in Chapter 50 ∞.

Other surgical procedures of potential benefit in the treatment of incontinence include implantation of an artificial sphincter, formation of a urethral sling to elevate and compress the urethra, and augmentation of the bladder with bowel segments to increase bladder capacity.

Complementary Therapies

Biofeedback and relaxation techniques may help reduce episodes of urinary incontinence. Biofeedback uses electronic monitors to teach conscious control over physiologic responses

NURSING RESEARCH Evidence-Based Practice: Urinary Incontinence

While an accurate diagnosis of stress urinary incontinence often is made based on clinical data, motor urge incontinence has been more difficult to accurately diagnose without urodynamic testing. This presents difficulty for nurses and nurse practitioners planning care for incontinent clients when urologic testing is not feasible or readily available. A model developed by Gray et al., (2001) may be useful to address this problem in cognitively intact adults. By comparing client data with urodynamic testing results, this team of researchers identified factors predictive of motor urge incontinence. These factors included age, gender, and three key symptoms: diurnal frequency (urinating more often than every 2 hours while awake), nocturia (awakening with urge to urinate more than once per night if under age 65, twice per night if over age 65), and urge incontinence (urine loss associated with a strong desire to urinate). The presence of all three symptoms was more than 92% predictive of motor urge incontinence in study participants of all ages (range 18 to 89; median 61) and both genders.

IMPLICATIONS FOR NURSING

Asking specific questions about urinary tract symptoms can facilitate accurate identification of the nursing diagnosis *Urge Urinary Incontinence.* Accurate diagnosis is vital to planning and implementing appropriate care measures, and achieving the desired outcome of continence. Successful treatment promotes self-esteem and provides positive reinforcement for continuing planned strategies.

CRITICAL THINKING IN CLIENT CARE

1. What nursing care measures and client teaching will you provide for the client with stress incontinence that may not be appropriate or necessary for the client with urge incontinence? For the client with urge incontinence but not stress incontinence?
2. Identify circumstances in which it may not be possible or feasible to have the client undergo urodynamic testing to differentiate stress, urge, or mixed (stress and urge) incontinence.
3. The clients in this study lived independently in the community and were cognitively intact. Can the data in this study be generalized to clients residing in a long-term care facility? Can the results be applied to all types of incontinence? Why or why not?

Source: From "A Model for Predicting Motor Urge Urinary Incontinence" by M. Gray et al., 2001, *Nursing Research, 50*(2), p. 116–122.

of which the individual is not normally aware. Developing awareness of perceptible information allows the client to gain voluntary control over urination. Biofeedback is widely used to manage urinary incontinence.

NURSING CARE

Health Promotion

Although urinary incontinence rarely causes serious physical effects, it frequently has significant psychosocial effects, and can lead to lowered self-esteem, social isolation, and even institutionalization (Lauver et al., 2004). Get the word out—inform all clients that UI is not a normal consequence of aging and that treatments are available. To reduce the incidence of UI, teach all women to perform pelvic floor muscle (Kegel) exercises (Box 28–3) to improve perineal muscle tone. Advise women to seek advice from their women's healthcare or primary care practitioner about using topical or systemic hormone therapy during menopause to maintain perineal tissue integrity. Advise older men to have routine prostate examinations to prevent urethral obstruction and overflow incontinence. Pelvic floor muscle exercises also may benefit men who experience UI following prostatectomy, but evidence supporting this is limited (Moore & Gray, 2004).

NURSING CARE OF THE CLIENT HAVING A Bladder Neck Suspension

PREOPERATIVE CARE

- Provide routine preoperative care and teaching as outlined in Chapter 4 ∞.
- Discuss the need to avoid straining and the Valsalva maneuver postoperatively. Suggest measures such as increasing fluid and fiber intake and using a stool softener to prevent postoperative constipation. *Straining and increased abdominal pressure during the Valsalva maneuver may place excessive stress on suture lines and interfere with healing.*

POSTOPERATIVE CARE

- Provide routine postoperative care as outlined in Chapter 4 ∞.
- Monitor urine output, including quantity, color, and clarity. Expect urine to be pink initially, gradually clearing. *Bright red urine, excessive vaginal drainage, or incisional bleeding may indicate hemorrhage. Instrumentation of the urinary tract increases the potential for UTI; cloudy urine may be an early sign.*
- Maintain stability and patency of suprapubic and/or urethral catheters. Secure catheters in position. *Maintaining bladder decompression eliminates pressure on suture lines. Preventing movement or pulling on catheters reduces the risk for resultant pressure on surgical incisions.*
- Carefully monitor urine output after catheter removal. *Difficulty voiding is common following catheter removal. Early intervention to prevent bladder distention is important to prevent pressure on suture lines.*
- If the urethral or suprapubic catheter will remain in place on discharge, teach proper care to the client and family members as needed. *Appropriate self-care and early recognition of problems reduce the risk for significant complications.*

BOX 28–3 Pelvic Floor Muscle (Kegel) Exercises

- Identify the pelvic muscles with these techniques:
  a. Stop the flow of urine during voiding and hold for a few seconds.
  b. Tighten the muscles at the vaginal entrance around a gloved finger or tampon.
  c. Tighten the muscles around the anus as though resisting defecation.
- Perform exercises by tightening pelvic muscles, holding for 10 seconds, and relaxing for 10 to 15 seconds. Continue the sequence (tighten, hold, relax) for 10 repetitions.
- Keep abdominal muscles and breathing relaxed while performing exercises.
- Initially, exercises should be performed twice per day, working up to four times a day.
- Encourage exercising at a specific time each day or in conjunction with another daily activity (such as bathing or watching the news). Establish a routine because these exercises should be continued for life.
- Assistive devices, such as vaginal cones and biofeedback, may be useful for clients who have difficulty identifying appropriate muscle groups.

Assessment

Nursing assessment for the client with urinary incontinence includes both subjective and objective data:

- *Health history:* Voiding diary; frequency of incontinent episodes, amount of urine loss and activities associated with incontinence; methods used to deal with incontinence; use of Kegel exercises or medications; any chronic diseases, related surgeries, etc.; effects of incontinence on usual activities, including social activities.
- *Physical examination:* Physical and mental status, including any physical limitations or impaired cognition; inspect, palpate, and percuss abdomen for bladder distention; inspect perineal tissues for redness, irritation, or tissue breakdown; observe for bulging of bladder into vagina when bearing down; assess pelvic muscle tone as indicated.

Nursing Diagnoses and Interventions

In planning nursing care, consider the client's mental status, mobility, and motivation. Behavioral techniques can be effective, but require long-term commitment and the physical and mental capability to use them.

Nursing care and modification of routines can restore continence fully or partially even in the institutionalized client. Scheduled toileting, bladder training, and prompted voiding combined with positive reinforcement such as praise can reduce the need for diapers, incontinence pads, and indwelling catheters.

See the Nursing Care Plan that follows for additional nursing diagnoses and interventions for the client with urinary incontinence.

Urinary Incontinence: Stress and/or Urge

Exercises to strengthen pelvic floor muscles, dietary modifications, and bladder training programs often are effective to restore and maintain continence.

- Instruct to keep a voiding diary, recording the time and amount of all fluid intake and urinary output, status at the time of voiding (dry or wet) and on arising from sleep, and activities. *Voiding diaries provide valuable information for identifying the type of incontinence and possible measures to reduce or eliminate incontinent episodes.*
- Teach pelvic floor muscle exercises (see Box 28–3). Instruct to consciously tighten pelvic muscles when the need to void is perceived and to relax the abdomen while walking to the bathroom. *Improved pelvic muscle strength helps retain urine and prevent stress incontinence by increasing urethral pressure. Exercises also decrease abnormal detrusor muscle contractions, decreasing pressure within the bladder.*

PRACTICE ALERT

Do not advise clients who have difficulty emptying the bladder completely to stop urine flow while voiding to identify pelvic floor muscles. Repeated interruption of micturition can interfere with complete bladder emptying and increase the risk for UTI.

- Using the client's voiding diary, suggest dietary and fluid intake modifications to reduce stress and urge incontinence. Include limiting caffeine, alcohol, citrus juice, and artificial sweetener consumption; limiting fluid intake to no less than 1.5 to 2.0 L per day; and limiting evening fluid intake. *Caffeine, alcohol, and citrus juices are bladder irritants and tend to promote detrusor instability, increasing the risk of urge incontinence. Artificial sweeteners may also irritate the bladder. Fluid intake of 1.5 to 2.0 L per day is adequate to maintain health for most clients; excess fluid may increase stress incontinence if bathroom facilities are not readily available.*

PRACTICE ALERT

Limiting total fluid intake to less than 1.5 to 2.0 L per day is not recommended for clients with urinary incontinence. Inadequate fluid increases urine concentration, leading to bladder wall irritation and possibly increasing problems of urge incontinence.

Self-Care Deficit: Toileting

Functional incontinence may be the predominant problem in an institutionalized older adult. Limited mobility, impaired vision, dementia, lack of access to facilities and privacy, and tight staffing patterns increase the risk for incontinence in previously continent residents. The primary problem in functional incontinence is an outside factor that interferes with the ability to respond normally to the urge to void. An immobilized client may wet the bed if a call light is not within reach; a client with Alzheimer's disease may perceive the urge to void but be unable to interpret its meaning or respond by seeking a bathroom. For these clients, self-care deficit in toileting is a primary problem.

NURSING CARE PLAN A Client with Urinary Incontinence

Anna Giovanni, a 76-year-old retired teacher, has been widowed for 10 years and lives alone. Mrs. Giovanni's eldest daughter expresses concern that her mother seems increasingly reluctant to leave her apartment to visit friends and family. She reports a strong odor of urine throughout her mother's apartment and that her mother's bed is often wet. She expresses worry about needing to place her mother in a nursing home if she cannot continue to live independently.

ASSESSMENT

Jane Oberle, RN, a nurse practitioner, examines Mrs. Giovanni who admits that she has problems with urine leakage when laughing and coughing, and a strong urge to void on hearing the sound of running water. At night, her urge to void is so strong that she often cannot reach the bathroom in time. Mrs. Giovanni denies a history of UTIs, neurologic disorders, or difficulty with her bowels. She had a hysterectomy at age 52 and was on hormone replacement therapy for about 10 years afterward. She is taking digoxin 0.125 mg daily, furosemide 40 mg twice daily, and potassium chloride 20 mEq three times daily for mild heart failure.

Physical assessment reveals a moderate cystourethrocele and atrophy of vaginal and vulvar tissues. Moderate perineal dermatitis is noted. Pelvic floor strength is weak. Urinalysis is within normal limits, and postvoiding residual urine is 5 mL.

Analysis of Mrs. Giovanni's voiding diary shows moderate consumption of tea and juices throughout the day, nine daytime voidings and four night voidings with an average volume of about 250 mL per void. She notices urine leakage most often in the late afternoon and at night. Ms. Oberle identifies a diagnosis of stress incontinence with an urgency component and decides to try a conservative approach before referring Mrs. Giovanni for further testing and possible cystourethrocele repair. She prescribes estrogen cream, tolterodine (Detrol), and a barrier cream to treat Mrs. Giovanni's vulvitis.

DIAGNOSES

- *Stress Urinary Incontinence* related to weak pelvic floor musculature and tissue atrophy
- *Urge Urinary Incontinence* related to excess intake of caffeine and citrus juices
- *Impaired Skin Integrity* related to constant contact of urine with perineal tissues
- *Ineffective Coping* related to inability to control urine leakage

EXPECTED OUTCOMES

- Remain dry between voidings and at night.
- Demonstrate improved perineal muscle strength.
- Regain and maintain perineal skin integrity.
- Return to her previous level of social activity.

PLANNING AND IMPLEMENTATION

- Teach how to identify pelvic floor muscles and how to perform Kegel exercises.
- Suggest drinking decaffeinated tea and noncitrus fruit juices (grape, apple, and cranberry).
- Encourage to minimize fluid intake after evening meal.
- Change afternoon dose of furosemide from 9:00 P.M. to 3:00 P.M.
- Instruct to void by the clock, gradually increasing intervals from every 45 to 60 minutes to every 2 to 2.5 hours. Advise to maintain shorter voiding intervals for 2 to 3 hours after furosemide doses.
- Teach to cleanse perineal area, wiping front to back, after each voiding or incident of urine leakage.
- Introduce commercial products available for clothing and furniture protection, encouraging experimentation to identify the most helpful product(s).
- Provide a commode for bedside at night and adequate lighting to prevent injury.
- Schedule follow-up visits and evaluations to reinforce teaching.

EVALUATION

Three months after her initial visit, Mrs. Giovanni states that she is doing very well, experiencing only occasional leakage of small amounts of urine, primarily when sneezing, coughing, or laughing. She finds a minipad adequate for protection and is often able to remain dry all day. She has had no further problems with enuresis since changing her evening furosemide dose to late afternoon and limiting her fluids after dinner. She can make it to the bathroom and no longer needs the bedside commode. Her perineal tissue is intact, and she demonstrates improved muscle strength. Anna's daughter says her mother is beginning to resume her normal social activities, and that she is no longer worried about her mother's ability to care for herself independently.

CRITICAL THINKING IN THE NURSING PROCESS

1. What factors in Mrs. Giovanni's past medical history and current medication regimen contributed to her nighttime incontinence?
2. What is the rationale for including an intervention to teach Mrs. Giovanni about perineal cleansing as part of her care plan?
3. Develop a care plan for Mrs. Giovanni for the nursing diagnosis *Situational Low Self-Esteem* related to urinary incontinence.

See Evaluating Your Response in Appendix C.

- Assess physical and mental abilities and limitations, usual voiding pattern, and ability to assist with toileting. *A thorough assessment allows planned interventions to address specific needs and promote independence.*
- Provide assistive devices as needed to facilitate independence, such as raised toilet seats, grab bars, a bedside commode, or night-lights. *Fostering independence in toileting bolsters self-concept and maintains a positive body image.*
- Plan a toileting schedule based on the client's normal elimination patterns to achieve approximately 300 mL of urine output with each voiding. *Allowing the bladder to fill to a point at which the urge to void is experienced and then emptying it completely helps maintain normal bladder capacity and bacteriostatic functions.*
- Position for ease of voiding—sitting for females, standing for males—and provide privacy. *Normal positioning, usual toileting facilities, and privacy enhance the ability to void on schedule and empty the bladder completely.*
- Adjust fluid intake so that the majority of fluids are consumed during times of the day when the client is most able to remain

continent. Unless fluids are restricted, maintain a fluid intake of at least 1.5 to 2.0 L per day. *An adequate fluid intake is vital to promote hydration and urinary function. Overly concentrated urine can irritate the bladder, increasing incontinence.*

- Assist with clothing that is easily removed (e.g., elastic-waist pants or loose dresses). Velcro and zipper fasteners may be easier to use than snaps and buttons. *Clothing that is difficult to remove can increase the risk of incontinence in the client with mobility problems or impaired dexterity.*

Social Isolation

Urinary incontinence increases the risk for social isolation due to embarrassment, fear of not having ready access to a bathroom, body odor, or other factors. Social isolation, in turn, can increase problems of incontinence, because normal cues and relationships are lost, and the need to remain dry is less strongly felt.

- Assess reasons for and extent of social isolation. Verify the degree of social isolation with the client or significant other. *Do not assume that social isolation is only related to urinary incontinence. Other problems frequently associated with aging (such as a hearing deficit) may be primary or contributing factors.*
- Refer client for urologic examination and incontinence evaluation. *Clients who assume that urinary incontinence is a normal part of the aging process may not be aware of treatment options.*
- Explore alternative coping strategies with client, significant other, staff, and other healthcare team members. *Protective pads or shields, good perineal hygiene, scheduled voiding, and clothing that does not interfere with toileting can enhance continence.*

Linking NANDA, NIC, and NOC

Chart 28–1 shows links between NANDA nursing diagnoses, NIC, and NOC when caring for the client with urinary incontinence.

NANDA, NIC, AND NOC LINKAGES

CHART 28–1 The Client with Urinary Incontinence

NANDA

Stress Urinary Incontinence

↓

NIC

Pelvic Muscle Exercise

Urinary Incontinence Care

Weight Management

↓

NOC

Urinary Continence

Data from *NANDA's Nursing Diagnoses: Definitions & Classification 2005–2006* by NANDA International (2005), Philadelphia; *Nursing Interventions Classification (NIC)* (4th ed.) by J. M. Dochterman & G. M. Bulechek (2004), St. Louis, MO: Mosby; and *Nursing Outcomes Classification (NOC)* (3rd ed.) by S. Moorhead, M. Johnson, and M. Maas (2004), St. Louis, MO: Mosby.

Community-Based Care

Because urinary incontinence is a contributing factor in the institutionalization of many older people, client and family teaching can have a significant impact on maintaining independence and residence in the community. Address possible causes of incontinence and appropriate treatment measures. Refer for urologic examination if not already completed. Discuss fluid intake management, perineal care, and products for clothing protection.

EXPLORE MEDIALINK

DVD-ROM

Audio Glossary
NCLEX-RN® Review

COMPANION WEBSITE www.prenhall.com/lemone

Audio Glossary
NCLEX RN® Review
Care Plan Activity: Urinary Tract Infection
Case Studies
Bladder Cancer
Urinary Tract Infection
Concept Map: Bladder Cancer
MediaLink Applications
Bladder Training
Urinary Tract Disorders
Links to Resources

CHAPTER HIGHLIGHTS

- Urinary tract infections are very common and are a leading complication among hospitalized clients. Short-course antibiotic therapy is appropriate for uncomplicated infections of the lower urinary tract that are not associated with the presence of an indwelling urinary catheter.
- Teach clients about perineal hygiene and the importance of maintaining adequate fluid intake as measures to help prevent UTI.
- Urinary stones (most commonly kidney stones in the United States) can obstruct the urinary tract at any level, and cause significant pain as they move from the kidney through the ureter. Instruct clients who have had a kidney stone to maintain a generous fluid intake, particularly during exercise and warm weather, to reduce the risk of further stone formation.
- The risk for bladder cancer is greater among men than women, and cigarette smoking is the most significant risk factor for bladder cancer. Most tumors can be resected transurethrally if diagnosed early, before spreading to deeper layers of the bladder wall, the lymph nodes, and adjacent tissue.
- When resection of the urinary bladder is necessary, a urinary diversion is created to collect urine. A collection appliance must be worn constantly on an ileal conduit; when a continent urinary diversion is created, the pouch is emptied by intermittent catheterization of the stoma.
- Urinary retention may occur as a result of some medications, neurologic damage or disease, or obstruction (e.g., an enlarged prostate gland). If the underlying condition cannot be treated, medications or intermittent catheterization are used to promote bladder emptying.
- Older adults in particular are at risk for urinary incontinence, a treatable condition. A health history, voiding diary, and diagnostic testing are used to establish the type of urinary incontinence and direct treatments such as surgery, pelvic floor muscle exercises, medications, and scheduled toileting.

TEST YOURSELF NCLEX-RN® REVIEW

1 A 23-year-old woman presents to the urgency clinic with symptoms of a urinary tract infection. The nursing history reveals that the client was treated 3 months previously for a UTI. Additional questions the nurse should ask include:
   1. "Did you complete your antibiotic prescription for your first UTI?"
   2. "What form of birth control are you using?"
   3. "Does your partner have similar symptoms?"
   4. "How much fluid do you drink each day?"

2 A 58-year-old woman presents at her primary care provider's office with symptoms of frequency, urgency, nocturia, dysuria, and cloudy, rust-colored urine for the third time in the past 2 years. The nurse should plan to include which of the following in her teaching for this client? (Select all that apply.)
   1. return to the office in 10 days for follow-up culture
   2. preprocedure instruction for an IVP
   3. the potential benefits of estrogen vaginal cream
   4. recommendations for perineal cleansing
   5. recommendations for screening cystoscopy

3 Recognizing the risk for urolithiasis in the immobilized client, the nurse appropriately plans to:
   1. administer a calcium supplement.
   2. regularly monitor urine pH.
   3. maintain an indwelling urinary catheter.
   4. increase fluid intake to 3000 mL per day.

4 A client admitted with possible kidney stones develops sudden complaints of acute crampy pain on the left side that radiates into the groin. He is nauseated, and vomits clear fluid. On voiding, his urine is pink. The nurse should:
   1. obtain a bladder scan to assess for residual urine.
   2. administer the prescribed narcotic analgesic.
   3. notify the physician.
   4. strain all urine.

5 The nurse teaching a group of community members about wellness and disease prevention includes which of the following as a measure to reduce the risk for bladder cancer?
   1. Do not start smoking; if you smoke, stop.
   2. Avoid using hair dyes and pesticides in the home.
   3. Limit your intake of coffee and other caffeinated beverages.
   4. Empty your bladder every 2 hours.

6 At a local health fair, a man remarks to the nurse that his urine occasionally appears pink. He wonders if this is anything to be concerned about. The nurse should
   1. instruct the man to notify his physician if he develops pain or difficulty voiding.
   2. advise the man to make an appointment to see his physician.
   3. instruct the man to track the relationship between urine color and his activities.
   4. tell the man to increase his fluid intake to 2 1/2 to 3 quarts per day.

7 The nurse evaluates her teaching as effective when the client with a newly created continent ileal diversion is able to:
   1. demonstrate care for the collection device.
   2. state the importance of promptly reporting cloudy urine to the physician.
   3. demonstrate self-catheterization of the stoma.
   4. identify factors contributing to his risk for bladder cancer.

8 The nurse identifies which of the following as a high-priority goal for a client with stress incontinence?
   1. Can identify products for protecting clothing and furniture.
   2. States chronic and benign nature of the disorder.
   3. Performs pelvic floor muscle exercises as taught at least twice a day.
   4. Limits intake of beverages containing artificial sweeteners.

9 A client tells the nurse that she has difficulty getting to the bathroom in time to prevent urine leaks once she feels the need to void. The nurse instructs the client to:

1. limit intake of caffeine-containing beverages, particularly in the evening.
2. establish a voiding schedule, emptying her bladder at least every 2 hours.
3. discuss potential benefits of bladder suspension surgery with her physician.
4. wear clothing that is easily removed for toileting.

10 The nurse caring for a client in the spinal shock phase following spinal cord injury appropriately plans to:

1. insert a Foley catheter to accurately measure output.
2. stimulate voiding using Credé's method.
3. assess for urinary retention following each voiding.
4. catheterize with straight catheter every 3 to 4 hours.

See Test Yourself answers in Appendix C.

BIBLIOGRAPHY

American Cancer Society. (2005). *Cancer facts and figures 2005.* Atlanta: Author.

Bardsley, A. (2005). Use of lubricant gels in urinary catheterization. *Nursing Standard, 20*(8), 41–46.

Baumgartner, R. G., Wells, N., Chang, S. S., Cookson, M. S., & Smith, J. A., Jr. (2002). Causes of increased length of stay following radical cystectomy. *Urology Nursing, 22*(5), 319–323, 339.

Bissett, L. (2004). The control of urinary tract infection in hospitalised older people. *Nursing Times, 100*(8), 54–56.

Blais, D. (2004). Urinary tract infections among the institutionalized older adult. *Perspectives, 28*(2), 23–27, 29–34.

Boyd, L. A. (2003). Intravesical bacillus Calmette-Guérin for treating bladder cancer. *Urology Nursing, 23*(3), 189–191, 199.

Copstead, L. C., & Banasik, J. L. (2005). *Pathophysiology* (3rd ed.). St. Louis, MO: Elsevier/Saunders.

Daneshgari, F., Krugman, M., Bahn, A., & Lee, R. S. (2002). Evidence-based multidisciplinary practice: Improving the safety and standards of male bladder catheterization. *Medsurg Nursing, 11*(5), 236–241, 246.

Engberg, S., Kincade, J., & Thompson, D. (2004). Future directions for incontinence research with frail elders. *Nursing Research, 53*(6S), S22–S29.

Fontaine, K. L. (2005). *Complementary & alternative therapies for nursing practice* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Frerick, J. (2004). Gerontologic nurse practitioner care guidelines: Urinary tract infection. *Geriatric Nursing, 24*(3), 185–187.

Gray, M. (2000). Urinary retention: Management in the acute care setting. *American Journal of Nursing, 100*(7), 40–47.

Gray, M., McClain, R., Peruggia, M., Patrie, J., & Steers, W. D. (2001). A model for predicting motor urge urinary incontinence. *Nursing Research, 50*(2), 116–122.

Kasper, D. L., Braunwald, E., Fauci, A. S., Hauser, S. L., Longo, D. L., & Jameson, J. L. (Eds.). (2005). *Harrison's principles of internal medicine* (16th ed.). New York: McGraw-Hill.

Lauver, D. R., Gross, J., Ruff, C., & Wells, T. J. (2004). Patient-centered interventions: Implications for incontinence. *Nursing Research, 53*(6S), S30–S35.

Maloney, C. (2002). Estrogen & recurrent UTI in postmenopausal women. *American Journal of Nursing, 102*(8), 44–52.

Mason, D.J., Newman, D.K., & Palmer, M. H. (2003). Changing UI practice. *American Journal of Nursing, 103*(3) Supplement, 2–3.

McCance, K. L., & Huether, S. E. (2006). *Pathophysiology: The biologic basis for disease in adults & children* (5th ed.). St. Louis, MO: Mosby.

McLoughlin, C. (2004). Antimuscarinic drugs. *Professional Nurse, 20*(1), 50–51.

Moore, K. N., & Gray, M. (2004). Urinary incontinence in men. *Nursing Research, 53*(6S), S36–S41.

Naish, W. (2003). Intermittent self-catheterisation for managing urinary problems. *Professional Nurse, 18*(10), 585–587.

Newman, D. K., & Palmer, M. H. (Eds.). (2003). The state of the science on urinary incontinence. *American Journal of Nursing, 103*(3 Suppl), 1–58.

Nicolle, L. E. (2001). Urinary tract infections in long-term care facilities. *Infection Control & Hospital Epidemiology, 22*(3), 167–175.

Palmer, M. H., & Newman, D. K. (2004). Bladder matters: Urinary incontinence in nursing homes. *American Journal of Nursing, 104*(11), 57–59.

Pashos, C. L., Botteman, M. F., Laskin, B. L., & Redaelli, A. (2002). Bladder cancer: Epidemiology, diagnosis, and management. *Cancer Practitioner, 10*(6), 311–322.

Porth, C. M. (2005). *Pathophysiology: Concepts of altered health states* (7th ed.). Philadelphia: Lippincott.

Prieto-Fingerhut, T., Banovac, K., & Lynne, C. M. (1997). A study comparing sterile and nonsterile urethral catheterization in patients with spinal cord injury. *Rehabilitation Nursing, 22*(6), 299–302.

Rothrock, J. C. (2003). *Alexander's care of the patient in surgery* (12th ed.). St. Louis, MO: Mosby.

Sampselle, C. M., Palmer, M. H., Boyington, A. R., O'Dell, K. K., & Wooldridge, L. (2004). Prevention of urinary incontinence in adults: Population-based strategies. *Nursing Research, 53*(6S), S61–S67.

Simmons, R. (2005). Conservative and surgical approaches to the treatment of overactive bladder. *Professional Nurse, 20*(6), 31–33.

Spencer, J. W., & Jacobs, J. J. (2003). *Complementary and alternative medicine: An evidence-based approach* (2nd ed.). St. Louis, MO: Mosby.

Suchinski, G. A., Piano, M. R., Rosenberg, N., & Zerwic, J. J. (1999). Treating urinary tract infections in the elderly. *Dimensions of Critical Care Nursing, 18*(1), 21–27.

Teng, C. H., Huang, Y. H., Kuo, B. J., & Bih, L. I. (2005). Application of portable ultrasound scanners in the measurement of post-void residual urine. *Journal of Nursing Research, 13*(3), 216–223.

Tierney, L. M., Jr., McPhee, S. J., & Papadakis, M. A. (Eds.). (2005). *Current medical diagnosis & treatment* (44th ed.). New York: McGraw-Hill.

Uphold, C. R., & Graham, M. V. (2003). *Clinical guidelines in adult health* (3rd ed.). Gainesville, FL: Barmarrae Books.

Vinsnes, A. G., Harkless, G. E., Haltbakk, J., Bohm, J., & Hunskaar, S. (2001). Healthcare personnel's attitudes towards patients with urinary incontinence. *Journal of Clinical Nursing, 10*(4), 455–462.

Wareing, M. (2003). Urinary retention: Issues of management and care. *Emergency Nursing, 11*(8), 24–27.

Way, L. W., & Doherty, G. M. (2003). *Current surgical diagnosis & treatment* (11th ed.). New York: McGraw-Hill.

Wilkinson, J. M. (2005). *Nursing diagnosis handbook* (8th ed.). Upper Saddle River, NJ: Prentice Hall.

Woods, A. (2005). Managing UTIs in older adults. *Nursing, 35*(3), 12.