ASSISTING IN UROLOGY AND MALE REPRODUCTION

SCENARIO

Sara Ricci, a CMA (AAMA) with 10 years’ experience, works for Dr. Samuel Fineman, a urologist who also manages male reproductive disorders. Dr. Fineman relies on Sara to handle telephone calls from patients, to have a clear understanding of the anatomy and physiology of the renal system, and to assist him in the clinical area of the practice. Although Sara has worked for Dr. Fineman for almost 2 years, occasionally problems still arise that she is not sure how to manage. Sara attends workshops and conferences to earn continuing education units to maintain her CMA credential and tries to choose topics that focus on urologic issues. In addition, she keeps up to date on new diagnostic procedures and treatments for sexually transmitted diseases (STDs), including human immunodeficiency virus (HIV) infection and acquired immunodeficiency syndrome (AIDS). Sara helps train other medical assistants in the practice and makes sure adequate patient education supplies are available for self-testicular examination.

While studying this chapter, think about the following questions:

- What is the basic anatomy and physiology of the renal and male reproductive systems?
- What should Sara know about common adult and pediatric urologic disorders so that she is able both to assist the physician in the practice and to answer patients’ questions?
- What are some of the genital pathologic conditions seen in men?
- What are the typical signs, symptoms, and treatments for sexually transmitted diseases in men?
- How can Sara provide patient education and support for individuals with renal and male reproductive system disorders?

LEARNING OBJECTIVES

1. Define, spell, and pronounce the terms listed in the vocabulary.
2. Apply critical thinking skills in performing the patient assessment and patient care.
3. Describe the organs of the urinary system and their functions.
4. Explain the susceptibility of the urinary system to diseases and disorders.
5. Identify the primary signs and symptoms of urinary problems.
6. Detail common diagnostic procedures of the urinary system.
7. Compare and contrast infections and inflammations of the urinary system.
8. Describe urinary tract disorders and cancers.
9. Distinguish between the two methods of treating renal failure.
10. Summarize the typical pediatric urologic disorders.
11. Identify the male organs of reproduction.
12. Determine the causes and effects of prostate disorders.
13. Outline common types of genital pathologic conditions in men.
15. Analyze the effects of sexually transmitted diseases in men.
16. Summarize the characteristics of HIV infection and the diagnostic criteria and treatment protocols.
17. Describe the medical assistant’s role in urologic and male reproductive examinations.
VOCABULARY


**azotemia** (a-zo-teh-meh-uh) The retention of excessive amounts of nitrogenous wastes in the blood.

**casts** Fibrous or protein material molded to the shape of the part in which it has accumulated and thrown off into the urine in kidney disease.

**copulation** Sexual intercourse.

**creatinine** (kreuh-tuh-ihn-uh) Nitrogenous waste from muscle metabolism that is excreted in urine.

**erythropoietin** (eh-ruh-throh-poi-eht-in) A substance released by the kidneys and liver that promotes red blood cell formation.

**Kaposi’s sarcoma** A malignant tumor of endothelial cells that begins as brown or purple papules on the feet and slowly spreads in the skin.

**renin** An enzyme produced and stored in the glomerulus; it is released by a homeostatic response to raise the blood pressure when needed.

**urgency** A sudden, compelling desire to urinate and the inability to control the release of urine.

**wasting syndrome** Physical deterioration resulting in profound weight loss, fatigue, anorexia, and mental confusion.

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Urology is the study of the urinary tract in both male and female patients. A physician who specializes in the diseases and disorders of the urinary system is a urologist. Urologists also specialize in conditions associated with the male reproductive system.

**ANATOMY AND PHYSIOLOGY OF THE URINARY SYSTEM**

The urinary tract consists of bilateral kidneys and ureters, the urinary bladder, and the urethra (Figure 40-1). The main function of the urinary system is to remove waste products from the body. Waste materials are byproducts of the body’s metabolic processes, and if left to accumulate in the bloodstream, they can become toxic. The urinary system removes salts and nitrogenous wastes (nitrogen is the product of protein metabolism) from the blood, forming urea, which is excreted. Besides excreting waste material, the urinary system performs other functions; such as:

- Helping to maintain homeostasis by regulating water, electrolyte, and acid-base levels

- Activating vitamin D, which is needed for calcium absorption

- Producing erythropoietin, which helps control the rate of red blood cell formation

- Helping to maintain blood pressure by secreting the enzyme renin

The kidneys are red-brown, bean-shaped glandular organs. They are located posterior to the peritoneum (retroperitoneal) and against the muscles of the back, roughly between the T12 and L3 vertebrae. The left kidney is situated about 1 inch (2 cm) higher than the right because of the location of the liver.

The kidneys remove unwanted substances from the blood and form urine for excretion. For this crucial function, a great deal of blood circulates through the kidneys—approximately 15% to 30% of the total cardiac output. The blood is delivered to the two kidneys by the renal artery and is distributed through the kidneys by a highway of smaller arteries. The blood then is returned through a pathway of veins, including the renal vein, which flows into the inferior vena cava in the abdominal cavity.

The outer layer of the kidney, the cortex, contains the functional unit of the kidney, the nephron, where urine is formed as fluid and dissolved substances move between its vascular and tubular structures. Three processes are involved in urine formation: filtration, reabsorption, and excretion. The nephron consists of the glomerulus, a cluster of capillaries extending from the distal renal artery that is partly surrounded by Bowman’s capsule. Fluid and dissolved substances move from the glomerulus to Bowman’s capsule and then into the proximal convoluted tubules, where most of the fluid is reabsorbed by venules and arterioles surrounding the tubules and sent back into the general circulation. Based on the homeostatic needs of the body, the kidneys determine the type and quantity of substances that are reabsorbed. Finally, the remaining substances are passed through the distal convoluted tubules to the collecting tubules and then on to the medulla of the kidney. The medulla contains the renal pelvis, where the urine is deposited before passing down the ureters. The distal collection area of the renal pelvis is made up of fingerlike projections, called the calyces, where urine is first deposited when it leaves the nephron units of the renal cortex (Figure 40-2).
DISORDERS OF THE URINARY SYSTEM

The urinary tract is made up of a continuous mucosal lining that gives organisms entering the urethra a direct pathway through the system. Of the wide range of symptoms that occur in patients with disorders of the renal system, the most common symptoms involve changes in the frequency of urination. Dysuria (difficult or painful urination), urgency, retention, and incontinence all are common symptoms. Abnormal functions of any part of the urinary tract often can be determined with urinalysis, blood urea nitrogen (BUN) levels, and analysis of creatinine clearance. (Urine analysis is discussed in Chapter 52.) Radiologic and endoscopic studies also are important in detecting urinary tract diseases. Table 40-1 summarizes common diagnostic tests of the urinary system.

Urinary Incontinence

Urinary incontinence, which is a temporary or chronic loss of urinary control, can be the result of many conditions, including urinary tract infections, brain disorders, and tissue damage. This disorder also can be caused by straining or coughing in postsurgical patients and in patients with weak pelvic musculature; in such situations, the condition is called stress incontinence.

The treatment of incontinence depends on the causative factor. Behavioral approaches include bladder or habit training that teaches the patient to urinate according to an established schedule rather than when he or she has the urge to void. This is helpful for patients who are incontinent as a result of strokes, Parkinson’s disease, Alzheimer’s disease, central nervous system lesions, or cystitis. Pelvic muscle exercises (Kegel exercises) that strengthen the muscles of the pelvic floor are helpful for patients with stress incontinence. Patients are trained to simulate stopping the flow of urine and holding that contraction for 10 seconds, in sets of 20, three times a day.

Patients with neurogenic bladders, who have lost control of urination because of central nervous system trauma or disease, may have to be catheterized to remove urine from the bladder. Intermittent catheterization to empty the bladder is preferable to indwelling catheters, which often lead to infection. External (condom) catheters can be used for male patients, but they also are associated with an increased incidence of urinary tract infections (UTIs). If possible, the patient should be taught to perform routine catheterization throughout the day, or a family member may be involved in care.

Chronic incontinence can be treated pharmacologically with antispasmodic preparations, including tolterodine (Detrol), oxybutynin chloride (Ditropan), solifenacin (Vesicare), or darifenacin (Enablex). When all other treatments have failed, surgical intervention may be the answer. Several different suburethral sling procedures have proved successful in treating female incontinence. The surgeon uses either a piece of abdominal tissue or a strip of synthetic material to compress the urethra so that urine does not leak during a stressful event, such as jumping or coughing. An artificial urinary sphincter is helpful for men with incontinence. A device shaped like a doughnut is implanted around the neck of the bladder; it keeps the urinary sphincter closed until the patient presses a valve implanted under the skin. This deflates the ring and releases urine from the bladder.
<table>
<thead>
<tr>
<th>TEST</th>
<th>DESCRIPTION</th>
<th>PATIENT PREPARATION</th>
</tr>
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<tbody>
<tr>
<td>Kidney-ureter-bladder (KUB) X-ray</td>
<td>Flat plate films of the abdomen; show the size, shape, location, and any malformations of the kidneys and bladder, used to visualize calculi.</td>
<td>No specific patient preparation; contraindicated in pregnancy.</td>
</tr>
<tr>
<td>Renal scanning</td>
<td>Nuclear scans to determine the size, shape, and function of the kidney or to diagnose obstruction or hypertension; radioisotope is administered intravenously, and images are taken to show distribution.</td>
<td>Patient should void before the procedure; no sedation or fasting required; patient drinks two or three glasses of water before scanning; contraindicated in pregnancy.</td>
</tr>
<tr>
<td>Cystography and Voiding</td>
<td>X-ray evaluation with contrast dye to study bladder structure or function.</td>
<td>Clear liquids for breakfast; Foley catheter cystourethrogram inserted; may take X-ray films while patient is voiding (voiding cystourethrogram); after procedure, patient forces fluids to eliminate dye and prevent infection.</td>
</tr>
<tr>
<td>Intravenous pyelography (IVP); may be called intravenous urography (IVU)</td>
<td>Intravenous injection of dye, then X-ray films taken at intervals to show passage through kidneys and ureters into bladder, used to diagnose tumors, calculi, obstructions, and congenital renal problems.</td>
<td>Contraindicated in pregnancy and with iodine allergies; laxative evening before; liquid diet 8 hours before; adequate fluids after; may have enema morning of the study.</td>
</tr>
<tr>
<td>Arteriography (angiography)</td>
<td>Injection of dye into the renal artery. Computerized fluoroscopy permits visualization of the blood flow of the kidneys, and serial X-ray films are taken. Used to diagnose stenosis of the renal artery and highly vascular renal cancer.</td>
<td>Nothing by mouth (NPO) 2 to 8 hours before procedure; administer preprocedural medications as ordered; void before the study; warm flush may occur when dye is injected; check for allergies to iodine and shellfish.</td>
</tr>
<tr>
<td>Renal computed tomography (CT)</td>
<td>Can be done with or without contrast dye; transverse views of the kidney are taken by CT to detect tumors, abscesses, cysts, and hydronephrosis.</td>
<td>If contrast medium is used, fast 4 hours before procedure; scanner may make loud clicking sounds as it rotates; dye may cause flushing, metallic taste, and headache; check for allergies to iodine and shellfish; remove all metal objects.</td>
</tr>
<tr>
<td>Renal ultrasonography</td>
<td>High-frequency sound waves are transmitted through the kidneys to detect abnormalities; used to determine kidney size and diagnose hydronephrosis, polycystic kidneys, and obstructions of ureters and bladder.</td>
<td>No food or fluid restrictions; noninvasive and painless.</td>
</tr>
<tr>
<td>Cystoscopy</td>
<td>Endoscopic view of urethra and bladder for biopsy; used to measure bladder capacity, to find or remove calculus, for dilation of urethra and ureters, and for placement of ureteral stents.</td>
<td>Enemas to clear bowel; force fluids before procedure if local anesthesia is used; for general anesthesia, NPO after midnight; preprocedural sedative to reduce bladder spasms; aftercare: monitor urinary output for 24 hours.</td>
</tr>
<tr>
<td>Retrograde pyelography</td>
<td>Injection of dye into the bladder, ureters, and kidneys through a cystoscope to detect stones and other obstructions; can replace an IVP for patients with renal failure, obstructions, or allergies to IV dye.</td>
<td>Same as cystoscopy; check for iodine and shellfish allergies.</td>
</tr>
</tbody>
</table>

**CRITICAL THINKING APPLICATION 40-2**

Sara is responsible for scheduling and providing patient preparation instructions for diagnostic radiologic and endoscopic procedures. With Dr. Finkman’s approval, she has prepared patient handouts that summarize the correct procedures to follow when scheduled for specific urologic tests. Today she has a patient who needs to be scheduled for both a cystogram and an intravenous pyelogram (IVP). How should the patient prepare for both of these examinations?

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**Urinary Tract Infections and Inflammations**

UTIs occur frequently because the urinary system has a direct opening to the outside, and urine is an excellent medium for bacterial growth. Most UTIs are ascending; that is, they start with pathogen exposure in the perineal area, infecting the continuous mucosa of the urinary system, which in turn allows the pathogen to travel up through the urethra, bladder, and ureters to the kidneys. Infection and inflammation of the urethra is called urethritis, and that of the bladder is cystitis. The resident flora of the colon, *Escherichia coli*, is the usual causative agent.
Women are more susceptible than men to UTIs because of the female anatomy (i.e., a short urethra and the proximity of the anus) and as a result of irritation caused by tampon use, the ingredients of bubble bath formulas, and sexual activity. Older men with prostatic hypertrophy and resultant urinary retention also are at risk for frequent urinary infections.

### GENERAL SIGNS AND SYMPTOMS OF URINARY TRACT INFECTION
- Overwhelming urge to urinate (urgency)
- Burning on urination (dysuria)
- Urgency with frequent, small amounts of urine
- Blood in the urine (hematuria) or cloudy, dark, foul-smelling urine

### Urethritis
Urethritis, or inflammation of the urethra, is more common in men. It typically is caused by chlamydia or gonorrhea bacteria. The symptoms include the discharge of pus, an itching sensation at the opening of the urethra, and burning on urination. Infectious urethritis can cause cystitis in women, so sexual partners also should be treated. Urinalysis may show hematuria as well as pyuria (pus in the urine).

### Cystitis
Cystitis, an infection of the urinary bladder, causes inflammation of the bladder wall and urinary urgency. Symptoms vary from very mild to acute discomfort in the lower abdomen, urinary frequency, and painful urination (dysuria). The patient may have signs of a systemic infection, including fever, general malaise, and leukocytosis. A positive diagnostic urinalysis shows more than 100,000 bacteria per milliliter of urine, pyuria, and hematuria. An infection of the urinary bladder is especially difficult to eliminate because of the bladder's overlapping rugae walls. It is very important that patients understand that, to prevent recurrence of the infection, they must complete the entire antibiotic prescription to destroy all the bacteria in the folds of tissue.

### Pyelonephritis
Pyelonephritis, an inflammation of the renal pelvis and kidney, is the most common type of renal disease. It is caused by bacteria that ascend from the lower urinary tract and is associated with conditions such as urinary retention or obstruction that promotes urinary stasis and the growth of bacteria. It frequently is preceded by urethritis and cystitis. With pyelonephritis, pus collects in the renal pelvis, and abscesses form. Symptoms include fever, chills, nausea, vomiting, and flank (lateral lumbar) pain. The patient reports foul-smelling, dark urine with frequency and urgency.

Diagnostic studies include urinalysis of a clean-catch urine sample. It reveals hematuria, pyuria, increased white and red blood cells, albuminuria, casts, and bacteria. Urine cultures usually are done to determine the causative agent.

### Treatment of Urinary Tract Infections
UTIs are treated with antibiotics, such as amoxicillin (Amoxil, Trimox), ciprofloxacin (Cipro), nitrofurantoin (Macrodantin, Furadantin), sulfamethoxazole (Bactrim, Septra) and levofloxacin (Levaquin). Patients may also be prescribed a urinary tract analgesic, such as phenazopyridine hydrochloride (Pyridium), which is rapidly excreted in the urine and has a topical analgesic effect that helps relieve pain, burning, urgency, and frequency. However, Pyridium gives the urine an orange to red color and initially may be misinterpreted as hematuria. Patients diagnosed with UTIs are encouraged to force fluids to dilute the urine and flush the urinary tract. A follow-up urinalysis should be run to confirm the effectiveness of antibiotic therapy in curing the infection. UTIs tend to recur unless the cause of the infection is removed.

The medical assistant should instruct the patient to finish the entire antibiotic prescription as ordered, to maintain proper hygiene, to empty the bladder completely when the urge to void arises, and for female patients, to wipe the top from front to back to discourage the spread of E. coli in the urethral region. Cranberry juice may be recommended as a prophylactic measure, because it contains substances that discourage E. coli growth and help maintain the acidity of urine.

### CRITICAL THINKING APPLICATION 40-3
Tabitha Allison, a 22-year-old patient of Dr. Fineman, was diagnosed today with another UTI in as many months. Patient education on the prevention and treatment of UTIs is needed. What should Sara tell her?

### Glomerulonephritis
Acute glomerulonephritis, or degenerative inflammation of the glomeruli, usually develops in children and adolescents about 2 weeks after a streptococcal infection, such as strep throat or scarlet fever. Its symptoms include low-grade fever, anorexia, general malaise, and flank pain. Hypertension and edema may occur because of reduced renal function. Urinalysis shows hematuria and proteinuria. Diuretics, such as triamterene and hydrochlorothiazide (Dyazide) or furosemide (Lasix), may be given to control hypertension and reduce edema. The prognosis usually is good; most patients recover spontaneously, but in some patients the condition progresses to a chronic state.

Chronic glomerulonephritis may also be called nephritis or nephrotic syndrome. It typically develops over many years and may be associated with chronic diseases that affect the blood vessels, such as systemic lupus erythematosus (SLE) and diabetes mellitus. Chronic glomerulonephritis causes progressive, irreversible nephron damage that frequently results in renal failure. At first the patient is asymptomatic, but as the disease progresses and more glomerular damage occurs, the patient develops anorexia, fatigue, hypertension, hematuria, proteinuria, oliguria (scanty urination), and edema. The cause of chronic glomerulonephritis is unknown, but it may be associated with an antigen-antibody reaction in the glomerular capsule that ultimately destroys the nephron units. Treatment is supportive and involves an attempt to control symptoms by administering antihypertensives and diuretics, as well as prescription of a diet low in protein with limited sodium and potassium to slow the progression of the disease. Glomerulonephritis is a leading cause of kidney failure; ultimately, many patients require kidney dialysis. The only cure for the disease is a kidney transplant.
Urinary Tract Disorders and Cancers

Renal Calculi
Renal calculi, or kidney stones, are created when crystals in the urine (e.g., calcium, oxalate, and uric acid) collect in the kidney, or when fluid intake is low, creating a highly concentrated filtrate. The tendency to develop kidney stones runs in families, and patients with a history of renal calculi are at increased risk for developing more in the future. Small stones usually do not cause any difficulty until they grow large enough to lodge in the ureters or renal pelvis. If a stone blocks the flow of urine, infection can develop from the resultant stasis. This blockage also can result in hydrenephrosis, a backup of urine that causes dilation of the ureters and calyces and increases pressure on the nephron units. Other signs and symptoms include hematuria; cloudy, foul-smelling urine; nausea and vomiting; a persistent urge to urinate; and fever and chills if an infection is present.

If stones are located in the kidney or bladder, the patient often is asymptomatic, and frequent infections are the only presenting problem. If the calculi begin to move or are lodged in the ureters, the patient experiences renal colic, which is severe pain in the flank region that fluctuates in intensity over periods of 5 to 15 minutes. As the calculi progress down the ureter, the pain radiates to the lower abdomen, groin, and genital areas on the affected side. If the stone stops moving, the pain stops until it starts to move again. This pattern continues until either the stone is passed or it is treated medically. The patient may be able to pass small stones by drinking large amounts of fluid (2 to 3 quarts of water a day). However, larger stones or calculi that cause bleeding, kidney damage, or persistent infection require medical intervention.

The physician may perform a cystoscopic examination to visualize the urethra and bladder and to remove any stones found (Figure 40-3). The most common procedure for treating calculi is extracorporeal shock wave lithotripsy (ESWL), which uses vibrations of powerful sound waves to break the stones into fragmented pieces that can be passed through the renal system. Diagnostic studies are performed to identify the exact location of the calculi, and either x-rays or ultrasound is used during the procedure to keep track of the calculi and treatment progress. The patient may be immersed in water during the procedure or may lie on a water-filled cushion as high-energy sound waves are passed through the body toward the exact location of the calculi (Figure 40-4). The procedure causes moderate pain, so the patient usually is administered a light anesthetic. The patient wears earphones during the treatment because of the loud noise created each time a shock wave is generated. Side effects of the treatment include flank tenderness, hemATOMA formation across the treatment site, and hematuria. Measures for preventing recurrence include drinking 3 to 4 quarts of fluid a day, preferably water, and following a diet that is low in sodium and animal protein.

Hydrenephrosis
Hydrenephrosis, or swelling of the kidney caused by inability of urine to drain from the renal pelvis, usually results from blockage caused by renal calculi, but it may also be caused by an enlarged prostate or a tumor. Hydrenephrosis can occur bilaterally or unilaterally. The condition frequently is asymptomatic, or patients may complain of mild flank pain as the renal capsule is distended. Urine testing detects hematuria and, if infection develops from stagnant urine, pyuria. It is important to treat hydrenephrosis aggressively, because continued pressure from blocked urine flow can cause tissue necrosis and ultimately lead to irreversible kidney damage. Removing the blockage corrects the condition (Figure 40-5).

Polycystic Kidneys
Polycystic kidney disease typically is an autosomal dominant genetic disorder, which means that one parent has the disease and
CHAPTER 40  Assisting in Urology and Male Reproduction

FIGURE 40-5  Hydronephrosis.


FIGURE 40-7  Neoplasms of the urinary tract. (From Damjanov I: Pathology for the health-related professions, ed 3, Philadelphia, 2006, Saunders.)

Each child has a 50% chance of inheriting it. No indications of the disease occur in children, but as time goes on, normal renal tissue in both kidneys is replaced by multiple, benign, fluid-filled cysts (Figure 40-6). The nephrons and collecting tubules become dilated, fused, and infected. As the cysts enlarge, they compress the surrounding tissue, causing necrosis, uremia, and renal failure. Symptoms do not usually become apparent until the individual reaches adolescence or adulthood. Patients with polycystic disease have a family history of kidney disease or renal failure, flank pain, hematuria, and hypertension. They also are more likely to develop UTIs and renal calculi. Because cyst formation is progressive, these patients eventually require either renal dialysis or kidney transplantation.

Bladder Cancer
The most common cancer of the urinary tract affects the bladder (Figure 40-7) and is two to three times more common in men than in women. Bladder cancer is characterized by one or more tumors that can metastasize through the blood or surrounding pelvic lymph nodes. Because 50% to 90% of patients experience a recurrence of bladder tumors, follow-up testing that can identify recurrence is extremely important. NMP22 is a urine test that screens for recurrence of the disease. It identifies a protein in bladder cells that are either precancerous or cancerous. Ninety
percent of bladder cancers are attributed to these particular cells, which are called transitional cells because they are cuboidal when the bladder is empty and flat when it is full. The test can be performed in the physician’s office, and the results are available in 1 hour. If the NMP22 test result is positive, cystoscopy is performed to confirm the presence of abnormal cells.

Smoking is the greatest single risk factor for the development of bladder cancer. The carcinogens from tobacco become concentrated in the bladder and eventually cause cellular changes in the walls of the organ. Other risk factors include occupational exposure to chemical carcinogens (e.g., oil, rubber, and dyes); drinking pesticide-contaminated water; treatment with certain anticancer drugs; and recurrent parasitic infections of the bladder. If the cancerous cells are confined to the inner lining of the bladder, a transurethral resection of the bladder tumor (TURBT) is performed. The physician passes a wire loop through the urethra and uses either an electrical current or a laser to burn away the cancer cells. The procedure may cause dysuria or hematuria for a few days. If the tumor has invaded the walls of the bladder, treatment may require a partial or complete cystectomy (removal of the bladder), chemotherapy, and the use of interferon to boost the patient’s immune system. The current treatment of choice is implantation of radioactive seeds in the bladder to destroy the affected tissue.

**Renal Carcinoma**

Adenocarcinoma of the kidney, or renal cell cancer, is a primary tumor that can be cured if it is diagnosed and treated in the early stages. However, affected patients frequently are asymptomatic, which gives the tumor the opportunity to metastasize to the lungs, liver, male urogenital system, bone, or brain before it is diagnosed. Renal cell carcinoma typically occurs in patients over age 50 and is seen more often in men and in smokers. Signs and symptoms of the disease include flank pain, anorexia, anemia, hematuria, and an increased white blood cell count. Surgical nephrectomy is the treatment of choice. Although the prognosis for patients with the tumor has improved, the 5-year survival rate is still only approximately 40%.

**Wilms’ Tumor**

Wilms’ tumor, or nephroblastoma, is cancer of the kidney in children. Although the condition appears to be caused by a genetic defect, very few of the children diagnosed with Wilms’ tumor have a family history of the disease. It usually occurs unilaterally, is diagnosed most frequently at age 3, and rarely occurs after age 8. The tumor may be noticed by parents as a mass in the child’s abdomen or by a physician during a routine physical examination. The preferred treatment is a partial or complete nephrectomy combined with chemotherapy. The survival rate for children diagnosed and treated for Wilms’ tumor is greater than 90%.

**Renal Failure**

Acute renal failure has a sudden, severe onset caused by exposure to toxic chemicals; circulatory collapse from serious burns or heart disease; acute bilateral kidney infection or inflammation; occlusion of the renal arteries; or complications from surgery. Blood tests show high BUN and creatinine levels, and the patient experiences acute onset of oliguria. The primary problem must be resolved as quickly as possible to prevent necrosis and permanent kidney failure.

Chronic renal failure is a slowly progressive process caused by gradual destruction of the kidneys’ ability to filter waste materials. Diabetes mellitus is the leading cause of chronic renal failure in the United States, but it also may be caused by hypertension; glomerulonephritis; polycystic kidneys; long-term hydropnephrosis resulting from urinary obstruction; lead poisoning; or renal artery stenosis. Symptoms of the condition may not be evident until as much as 75% of the kidney is no longer functioning.

Patients with chronic renal failure pass through several stages, starting with an early stage of decreased reserve in which no clinical signs are apparent but serum creatinine levels are consistently higher than average. The middle stage of renal insufficiency is marked by hypertension, elevated BUN and creatinine levels, and a low urine specific gravity. End-stage renal failure (uremia) is marked by oliguria that progresses to anuria (no urine output), edema, hypertension, acidosis, and azotemia. The end result is that the kidneys can no longer remove waste products from the blood, and toxicity develops. To survive, the patient must be placed on dialysis or receive a kidney transplant.

**Treatment**

Dialysis, or cleansing of the blood, is used to treat acute renal failure until the problem is reversed or, for patients in end-stage renal disease, until they receive a transplant. The two forms of dialysis are hemodialysis and peritoneal dialysis. Hemodialysis usually is done in an outpatient clinic or hospital. The process uses a machine known as an artificial kidney or dialyzer, to filter waste products from the blood and return the cleansed blood to the body (Figure 40-8). A cannula or shunt is surgically placed that creates an internal fistula between an artery and a vein. During the procedure, approximately 1 cup of blood at a time passes from the shunt through a tube to the semipermeable membrane of the dialysis machine. The membrane filters the waste out of the blood, which then is returned to the patient’s vein. Patients on hemodialysis require anticoagulant therapy to prevent clots from forming during the blood transfer process.
Hemodialysis usually is needed three times a week; the procedure takes approximately 3 to 4 hours each time.

Peritoneal dialysis uses the capillaries in the peritoneal cavity to filter the blood by infusing the patient’s abdomen with a dialyzing fluid through a surgically implanted catheter. The highly concentrated dialyzing fluid attracts and absorbs waste products from the blood vessels and then is drained from the abdominal cavity by gravity into a container. This procedure can be done at home in two different ways. With continuous ambulatory peritoneal dialysis (CAPD), the patient exchanges the dialysis solution in the abdomen four times a day, 7 days a week. Continuous cycling peritoneal dialysis (CCPD) uses a cycler machine at night to automatically infuse the dialysis solution into and out of the peritoneal cavity. This process takes 10 to 12 hours but can be done while the patient is sleeping.

Although successful kidney transplantation is curative for end-stage renal failure, finding the right donor can be a problem. Donors are matched by blood type, cell surface proteins, and antibodies. Siblings are the best donors, but other blood relatives may also match. If no blood relative donors are available, an adult donor who matches the patient's criteria is the next best fit.

CRITICAL THINKING APPLICATION 40-4
Aloysius Gonzales, a 59-year-old patient, is in chronic renal failure. His family is trying to decide whether his father should be brought to the dialysis clinic for hemodialysis or whether they should try to keep him at home and assist with peritoneal dialysis. Sara explains the mechanism of each procedure to the family. What should she include in her description?

PEDIATRIC UROLOGIC DISORDERS
Early detection and treatment of urologic disorders in children can drastically reduce permanent physical damage to the urinary system.

Nocturnal Enuresis
One of the most common reasons parents bring a child to a pediatric urologist is enuresis, or bed-wetting. Enuresis is the lack of voluntary control of urination at night or during the day by a child considered to be beyond the age when control should have been acquired (usually after age 6). This problem has a familial tendency and is more common in boys than in girls. The urologist first determines whether the problem is physical or psychological. With primary enuresis, bladder control was never established in the child. It may be caused by a physiologic problem with bladder control, such as an immature bladder with small capacity, a neurologic deficit, diabetes mellitus or insipidus, a UTI, or sleep apnea, or it may be a result of stressful events. Secondary enuresis, in which loss of bladder control occurs in a child who has been consistently dry for at least 6 months, can develop because of stressful events, UTIs, diabetes, or sexual abuse.

A physical and neurologic examination and urinalysis with a urine culture help determine whether any physical abnormality or disease process is causing the problem. If a psychological problem is suspected, help from a pediatric mental health professional may be needed. If no known causative factors are present, medications that relax the bladder muscles or that reduce urine production at night may be useful. Unfortunately, these may have side effects, so parents may refuse drug therapy. Parents should positively reinforce dryness and should not punish or embarrass the child. A moisture alarm can be used to help train the child to get up at night to go to the bathroom. This is a small, battery-operated device that connects to a moisture-sensitive pad placed in the pajamas or on the bed that beeps when the pad becomes wet. The goal is to wake the child just as he or she starts to urinate so that the child can stop urinating and get to a toilet. The success rate is high (80%), but the device must be used for at least 2 weeks before any change occurs and for up to 12 weeks to stop accidents.

Urinary Reflux Disorder
Urinary reflux disorder may be another reason for pediatric urology referrals. Reflux nephropathy occurs if the kidneys are damaged by a backward flow of urine. Each ureter has a one-way valve where it enters the bladder that is designed to prevent urine from flowing backward. Reflux may be caused by faulty formation or damage to the valves, or it may be associated with cystitis, neurogenic bladder, or bladder overfilling because of an obstruction. It may be detected with ultrasonography, a computed tomography (CT) scan of the kidneys, or a voiding cystourethrogram (VCUG) (Figure 40-9). A VCUG is performed by placing a urinary catheter in the bladder and injecting a contrast medium that helps visualize the bladder and the flow of urine. X-ray films are taken in several positions; the catheter is removed, and the child is asked to void. X-ray films are taken while the bladder empties to determine whether urinary reflux is present. Although a VCUG is an uncomfortable procedure, the benefit of early

detection and reduced damage to the kidneys makes the screening worthwhile. Untreated reflux nephropathy can lead to renal failure.

The treatment for urinary reflux usually is determined by grading its severity on a scale of 1 to 5, with 5 being the most severe. Prophylactic antibiotics may be given daily in low doses to prevent damaging kidney infections, which can cause low-grade reflux. However, with higher grade reflux that persists after 4 or 5 years of age or for patients who have breakthrough infections despite the antibiotics, surgical repair of the valves of the ureters is necessary. Parents and physicians also may opt for surgery because the procedure has a 95% success rate and poses little risk.

**Cryptorchidism**

Cryptorchidism, or undescended testicles, is fairly common in premature infants and occurs in about 4% of full-term infants (Figure 40-10). The testes develop in the abdominal cavity of the fetus and descend into the scrotum near the end of the pregnancy. If an infant is born with an undescended testicle, the testicle usually drops without treatment by 9 months of age. However, persistent cryptorchidism should be treated, because infertility may result from exposure of the sperm to the slightly warmer temperature in the abdominal cavity. In addition, it increases the risk of testicular cancer in adolescence. The current recommendation is that surgical attachment of the testicle should be done by 1 year of age to reduce the chance of permanent testicular damage. Parents need to recognize that this child is considered at increased risk for testicular carcinoma even after treatment and should be taught testicular examination procedures.

The outpatient surgical procedure, known as orchiectomy, involves suturing the undescended testicle in the scrotum. If the testicle is impalpable (cannot be felt), laparoscopic surgery is necessary to locate it. The laparoscope is inserted into the abdomen through a small incision near the navel, and the testicle is either moved into proper position or removed.
the bladder. The prostate gland is about the size of a pea at birth but grows rapidly at puberty to its full size by age 20. The central part of the gland may start to grow again after age 45. The primary function of the prostate gland is to secrete a thin fluid with an alkaline pH that neutralizes vaginal secretions to provide the optimum pH for fertilization. Secretions from the prostate gland, vas deferens, seminal vesicles, and bulbourethral glands combine with sperm cells to form semen. The volume of semen in one ejaculate ranges from (2 to 6 mL) and averages roughly 100 million to 200 million sperm cells.

**Penis**

The organ of male copulation is the penis. It is a cylindrical organ consisting of an elongated body with a slightly enlarged end, called the glans penis. Around the glans penis is a fold of skin that begins just behind the glans and extends forward to cover it like a sheath. This is called the prepuce, or foreskin, which sometimes is removed in a surgical procedure known as circumcision. The penis carries both urine and semen through the urethra and outside the body. When transmitting semen to the female tract, the penis must enlarge and stiffen for insertion. This occurs when three columns of erectile tissue in the penis become stimulated. The arteries in the penis dilate, and the veins compress; this compression reduces blood flow away from the penis, causing it to swell. Motor impulses are stimulated by the swelling of the urethra as a result of semen collection, and contraction of the urethra causes ejaculation of the semen through the penis.

**Hormone Production**

Hormone production is also an important aspect of the male reproductive system. As a group, the male sex hormones are called androgens. Testosterone is the primary male hormone. During pubescence, when the male becomes reproductively functional, the anterior pituitary gland produces gonadotrophic hor-

**DISORDERS OF THE MALE REPRODUCTIVE TRACT**

There are many diseases and disorders of the male reproductive tract. The most common of these involve enlargement or inflammation of certain organs and malignant tumors. The prostate is the most widely affected organ.

**Diseases of the Prostate**

**Prostatitis**

The cause of inflammation of the prostate is not always known, but it usually develops in the presence of infection. Bacterial causes may be *E. coli* or, in patients with gonorrhea, gonococci. Infection or inflammation of the prostate gland puts pressure on the urethra, causing dysuria, tenderness, and secretion of pus from the tip of the penis. The condition usually is treated with an antibiotic, such as penicillin. Chronic prostatitis may develop as a result of repeated UTIs, urethral obstruction, or urinary retention.

**Benign Prostatic Hyperplasia**

As men age, the cells of the prostate gland that surround the urethra can start to reproduce more rapidly, causing the organ to enlarge (hypertrrophy). This nonmalignant process, also known as benign prostatic hyperplasia (BPH), is seen in about half of men in their 60s and more than 90% of men in their 70s and 80s. Enlargement of the prostate gland partly blocks the flow of urine, creating a medium for bacterial infection that can lead to cystitis. Signs and symptoms include urinary urgency and frequency; difficulty starting urination; hematuria; and repeated UTIs. The diagnosis is made from the patient's complaints and a digital rectal examination (DRE), during which the physician can palpate the enlarged gland (Figure 40-13).

Treatment includes the use of alpha-adrenergic blockers, such as doxazosin mesylate (Cardura) or tamsulosin (Flomax), which relax the smooth muscles of the bladder, making it easier to urinate. Finasteride (Proscar) or dutasteride (Avodart) may also be prescribed to reduce the size of the prostate, increasing urine flow and providing symptomatic relief. Nonsurgical therapies include laser treatment or placement of a prostatic stent to keep the urethra open. Because enlargement of the gland can be a sign of prostate cancer, it is important that the prostate be biopsied to rule out possible cancerous cells. If drug therapy and alternative treatments are not successful in relieving the patient's prostate enlargement, surgery is recommended. Transurethral resection of the prostate (TURP), the most common surgical treatment, involves threading a small instrument (a resectoscope) through the urethra to the prostate and scraping away the excess tissue.

**Prostate Cancer**

Cancer of the prostate is common in men over age 50 and ranks as the second highest cause of cancer deaths in men, behind lung
cancer. The patient is asymptomatic in the early stages and may not become symptomatic until the cancer has spread outside the prostate gland. Once symptoms develop, they include urinary obstruction with difficulty urinating; frequent UTIs and nocturia (the need to void at night); hematuria; and generalized pain in the pelvic region. Prostate cancer spreads locally to the bladder, rectum, and lymph nodes of the pelvis, causing metastasis to the bones, lungs, and brain. The prognosis is poor unless the tumor is discovered in its early stages of development, when it is still confined to the prostate gland.

The first indication of a problem may come with a routine DRE, when the physician notices a firm or irregular area in the prostate. The primary screening tool for cancer of the prostate is the prostate-specific antigen (PSA) blood test. Blood levels of PSA, a protein produced by the prostate, are elevated with prostatitis, BPH, and cancer of the prostate. The higher the PSA level, the more likely it is the patient has prostate cancer. However, because the PSA level can be elevated with other disorders, one abnormal screening value is not enough to diagnose cancer. The test should be repeated over time, and if levels continue to rise, further diagnostic studies should be done. If tests indicate cancer, the physician may order a transrectal ultrasound, which involves inserting a small transducer into the rectum to bounce sound waves off the prostate, creating a picture. The ultrasound pictures are used to help pinpoint areas of concern during a tissue biopsy. If the transrectal ultrasound does not indicate any suspicious areas, the physician takes multiple biopsies (usually eight) from different sections of the prostate gland. Tissue samples are sent to the pathologist for analysis and diagnosis.

The American Cancer Society recommends that the PSA test be used in conjunction with a DRE annually for all men over age 50. In addition, PSA screenings should be performed yearly in men over age 40 who have a family history of the disease and in African-American men over age 45 because they are at increased risk for developing the disease.

The treatment for prostate cancer depends on its stage of spread. Radiation may be delivered directly to the cancer cells through external beam radiation therapy (EBRT), which uses high-powered x-rays to kill the cancer cells. An alternative procedure is implantation of radioactive seeds, a variant of radiation therapy. In this procedure, 40 to 100 rice-sized radioactive seeds are implanted directly into the prostate gland through a precisely placed hollow needle. The radiation is quite strong but has a very short range; this allows it to destroy the tumor but minimizes damage to surrounding tissue. Testosterone can stimulate growth of the tumor, so hormone therapy is prescribed to block the action of testosterone or to stop its production. Surgical treatment options include removal of the prostate gland by transurethral resection; orchietomy, in which the testosterone-producing testicles are removed; or radical prostatectomy, in which the prostate and local lymph nodes are removed. These are debilitating surgical procedures that have serious side effects, including urinary incontinence and erectile dysfunction; therefore, they are typically used as a last measure. As with all cancers, chemotherapy may be prescribed for advanced cases or for recurrence.

**IMPORTANT INFORMATION ABOUT PROSTATE-SPECIFIC ANTIGEN (PSA) STUDIES**

- Most men have a PSA level below 4; a level between 4 and 10 indicates a 25% chance of prostate cancer; a level higher than 10 increases the chance to 50%.
- Because an elevated PSA level can have many possible causes, if no other indicators of cancer are present, the physician may recommend
that the digital rectal examination (DRE) and PSA test be repeated to determine whether the level increases over time.
- If the PSA level increases with repeated testing or the DRE reveals an abnormal prostate, additional diagnostic studies should be done.
- If cancer is suspected, biopsies (typically needle aspiration) are performed.
- Part of the controversy with PSA testing is that it may diagnose a slow-growing tumor that is not life threatening, which can result in aggressive and life-changing surgery.
- The PSA test has a significant false-positive outcome (patients who do not have cancer are told that they do). False-positive results lead to further diagnostic testing that is both expensive and stressful for the patient and his ‘family. Only 25% to 30% of biopsies done because of elevated PSA levels actually reveal cancer.
- At this point it is not clear whether PSA screening saves lives or if the benefits of screening outweigh the risks of follow-up diagnostic studies and cancer treatment for potentially slow-growing tumors that are not life-threatening.
- The most common complications of prostate surgery are erectile dysfunction and urinary incontinence.

**CRITICAL THINKING APPLICATION 40-5**

Dr. Fineman frequently sees patients for prostate-related conditions. Sara decides to review the information on the disorders that affect the prostate gland so that she is better able to assist the physician and answer patients’ questions. What are the important details of prostate disease that Sara should remember?

**Pathologic Conditions of the Genital Organs**

**Epididymitis**

Epididymitis is an inflammation of the tubular epididymis. It most often is attributed to a UTI in men over age 40; in younger men, the most common cause is a sexually transmitted disease (STD). Patients experience severe low abdominal and testicular pain, as well as swelling and tenderness of the scrotum. If abscesses form and produce scar tissue, sterility can occur. Antibiotics are prescribed for treatment, including ceftriaxone (Cefin), ciprofloxacin (Cipro), doxycycline (Vibramycin), and azithromycin (Zithromax).

**Balanitis**

Inflammation of the glans penis and the mucous membrane beneath it is known as balanitis. It occurs most often in uncircumcised patients with narrow foreskins that do not retract easily and in men with diabetes. It has many causes, including an allergic reaction to certain chemicals (e.g., contraceptive foam); poor personal hygiene that results in a buildup of skin secretions (smegma) around the glans penis; and urinary tract and yeast infections. The treatment depends on the cause of the problem; antibiotics are used for infections, and cleansing is used for smegma buildup; also, avoiding chemicals that cause reactions can help prevent the problem.

**Hydrocele**

During the descent of the testes, a small canal develops for them to pass through. If the canal does not close after birth, fluid from the peritoneal cavity may pass through and collect in the scrotum. This is called a congenital hydrocele, which must be corrected surgically (Figure 40-14). Acquired hydroceles usually occur after middle age because of a scrotal injury or tumor and can form in men who sit for extended periods (e.g., aging men in long-term care facilities), causing painful scrotal swelling.

**Testicular Cancer**

Testicular carcinoma is the most common cancer in Caucasian men ages 15 to 34. The cause is unknown, but the primary predisposing factor is cryptorchidism. The patient complains of a mass in either testicle; a heavy sensation in the scrotum accompanied by a sudden collection of fluid; pain in a testicle or in the scrotum, abdomen, or groin; and unexplained fatigue. Testicular cancer can be treated successfully if diagnosed early; the survival rate for stage I testicular cancer is approximately 95%. Unfortunately, because young men may hesitate to go to the physician to report a mass in the testicle, the cancer may have reached an advanced stage before it is diagnosed. In advanced stages, treatment usually involves a combination of orchectomy, radiation therapy, and chemotherapy. Testicular cancer can be detected early with monthly self-examination. Men should be taught to do this 3-minute examination beginning in puberty or by age 15 (Procedure 40-1).

The physician may provide pamphlets or a shower card showing the steps of testicular self-examination (Figure 40-15). The medical assistant can approach this teaching intervention in two ways. One way is to take the information to the patient, tell him to follow the pictures, and if he has any questions, to call for clarification. Will he call? Would you? The second way is to go over the instructions with the patient. Demonstrate the procedure on a model, if one is available, or a male medical assistant could observe the patient doing the examination for the first time and provide feedback to answer any questions.

**Erectile Dysfunction**

The inability to achieve and maintain an erection sufficient for sexual intercourse is a condition known as erectile dysfunction (ED). It has many causes, both psychological and physiologic.
Instruct Patients According to Their Needs to Promote Health Maintenance and Disease Prevention:
Teach Testicular Self-Examination

**GOAL:** To instruct the patient in the steps of testicular self-examination.

**EQUIPMENT and SUPPLIES**
- Self-examination pamphlet and shower card
- Demonstration model
- Nonsterile gloves
- Patient’s record

**PROCEDURAL STEPS**

1. Sanitize your hands and collect the required supplies.  
   **PURPOSE:** To ensure infection control.
2. Explain to the patient what you are going to do.  
   **PURPOSE:** Understanding helps with cooperation.
3. Begin by explaining to the patient that testicular cancer may cause no symptoms in the early stages, so it is important to examine the testes once a month for abnormal changes and early detection of the disease. This should begin at puberty, or approximately 15 years of age. It is best to do the examination in the shower or in a warm bath. The total examination takes about 3 minutes.  
   **PURPOSE:** Heat causes the scrotal skin to relax, making the examination easier.
4. **Examination of the testes:** Using the demonstration model, start by holding the scrotum in the palms of the hands. Then feel one testicle.  
   Apply a small amount of pressure. Slowly roll it between the thumb and fingers and feel for any hard, painless lumps (Figure 1).  
5. **Examination of the epididymis:** This comma-shaped cord is found on top of and behind the testes. Its job is to store and transport sperm. Tender when touched, it is the location of most noncancerous problems. Check for hard spots and lumps (Figure 2).

6. **Examination of the vas deferens:** Continue by examining the sperm-carrying tube that runs up the epididymis. Normally the vas feels like a firm, movable, smooth tube (Figure 3).  
7. Now repeat the entire examination on the other testis.
8. After completing the examination on the model, ask the patient to do a return examination using the model. A male assistant can have the patient do a self-testicular examination.
9. Give the pamphlet to the patient, along with the shower card, with instructions to hang it in the shower as a monthly reminder and guide.
10. Record the instructional interaction in the patient’s medical record.  
    **PURPOSE:** If it is not recorded, it was not done.

8/19/XX 11:12 AM Pt shown and successfully demonstrated testicular self-exam on model; no questions. Pt given pamphlet and shower card for home use. Dorothy Gaston, CMA (AAMA)

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Stress, anxiety, fear of unsatisfactory performance, and physical diseases that affect the vascular system, including arteriosclerosis, alcoholism, and diabetes mellitus, all can lead to ED. Changes in erectile function are normal as men age. Also, impotency is a side effect of certain medications, such as some hypertensive drugs. ED can be treated pharmaceutically with sildenafil (Viagra), tadalafil (Cialis), or vardenafil (Levitra). However, these medications are contraindicated in patients with a history of uncontrolled hypertension, myocardial infarction (heart attack), a cerebrovascular accident (stroke), or a life-threatening arrhythm-
Infertility

Fertility peaks in men at age 25. Infertility can be caused by a problem in the man, a problem in the woman, or a combination of the two. About 10% to 20% of male infertility cases have no known cause. For the remaining cases, many causative factors may be involved. Cryptorchidism, stricture, and varicoceles (dilated spermatic cord veins); a low sperm count and poor motility; obstruction of the vas deferens; and hormonal imbalances all are factors in infertility.

Examination of semen specimens is helpful in making a diagnosis of infertility. These tests determine the presence of sperm, the number of sperm in an ejaculation, and the health and motility of the sperm. Ultrasonography also is helpful for detecting blockage of the vas deferens.

Sexually Transmitted Diseases

Diseases of the male reproductive system can be acquired during sexual intercourse (Table 40-2). No one is immune to these diseases, and an individual can be infected with more than one at a time. No cure is available for viral STDs, such as human
TABLE 40-2 Sexually Transmitted Diseases in Men

<table>
<thead>
<tr>
<th>DISEASE (CAUSATIVE ORGANISM)</th>
<th>SIGNS AND SYMPTOMS</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlamydia (Chlamydia trachomatis) — bacterial</td>
<td>May be asymptomatic; dysuria; itching and white discharge from penis; testicular pain.</td>
<td>Curable with antibiotic therapy: single dose of Zithromax or 1 week of doxycycline (Vibramycin).</td>
</tr>
<tr>
<td>Genital herpes simplex virus (herpes simplex virus type 2)</td>
<td>Painful genital vesicles and ulcers; erythema and pruritus; tingling or shooting pain 1 to 2 days before cycle through episodes. Viral shedding may occur during asymptomatic periods.</td>
<td>No cure, but antiviral therapy during episodes shortens duration of lesions: acyclovir (Zovirax), famciclovir (Famvir), or valacyclovir (Valtrex).</td>
</tr>
<tr>
<td>Genital warts (human papilloma virus [HPV])</td>
<td>Most prevalent sexually transmitted disease; period of communicability is unknown; pinhead lesions may or may not be visible; warts tend to recur.</td>
<td>Goal of treatment is to remove symptomatic warts; cryotherapy for lesions; podofilox (Condylox) solution or imiquimod (Aldara) cream for lesions.</td>
</tr>
<tr>
<td>Gonorrhea (Neisseria gonorrhoeae) — bacterial</td>
<td>Dysuria and urinary frequency; thick, cloudy, or bloody discharge from penis.</td>
<td>Curable with antibiotic therapy: cefixime (Suprax), azithromycin, doxycycline.</td>
</tr>
<tr>
<td>Syphilis (Treponema pallidum) — spirochete bacteria</td>
<td>Six stages that can affect multiple body systems; 10- to 90-day incubation; initial sign is a painless lesion, or chancre, at the exposure site (penis); serious discharge from chancre; lymphadenopathy; if left untreated, advances to later stages.</td>
<td>Penicillin G (Vicilllin); if patient is allergic to penicillin, doxycycline or tetracycline.</td>
</tr>
<tr>
<td>Trichomoniasis (Trichomonas vaginalis) — protozoa</td>
<td>Asymptomatic in men.</td>
<td>Single oral dose of metronidazole (Flagyl).</td>
</tr>
</tbody>
</table>

immunodeficiency virus (HIV) infection, herpes, and venereal warts. Bacterial infections are increasingly becoming resistant to antibiotic therapy. STDs frequently are asymptomatic in men, although they can cause serious health problems and are infectious regardless of whether symptoms are present (see Chapter 41 for pathologic conditions of the female reproductive tract).

**Bacterial Sexually Transmitted Diseases**

STDs caused by bacterial infections include chlamydia, gonorrhea, and syphilis. Gonorrhea and chlamydia organisms tend to coexist, so a patient who has tested positive for one of the organisms typically is treated for both. The symptoms are similar to those for urethritis and epididymitis, such as painful and frequent urination, discharge from the penis, and lower abdominal pain. Chlamydia is resistant to penicillin; therefore, a regimen of antibiotics other than penicillin (e.g., Zithromax, doxycycline, or erythromycin) is prescribed if the patient has both conditions. Sexual partners must also be treated, or the infection will continue to be transmitted back and forth.

A syphilitic lesion, called a chancre, develops on the male genitalia, usually the penis, a few days to a few weeks after exposure (Figure 40-16). Syphilis initially is diagnosed through either the Venereal Disease Research Laboratory (VDRL) or rapid plasma reagin (RPR) antibody blood test. If the results of these are positive, the diagnosis is confirmed with a fluorescent Treponema absorption (FTA) test, which is specific for antibodies to the Treponema microorganism. Syphilis can be treated successfully with penicillin but may go unnoticed or unreported. Without treatment, it advances to a secondary phase, which is marked by a low-grade fever, headache, and sore throat, as well as a rash that does not itch but that can affect any part of the body. In the secondary phase, the disease is highly contagious but still can be treated with penicillin. The more advanced stages of the disease can remain undetected or dormant for years. Symptoms that appear years after the primary infection show multisystem involvement, including neurologic and cardiovascular complications.

**Viral Sexually Transmitted Diseases**

Viral STDs include hepatitis B, C, and D (see Chapter 39), genital herpes, genital warts (caused by the human papilloma virus [HPV]), and HIV infection. With genital herpes, the herpes simplex virus (HSV) enters the body through small breaks in the skin or mucous membranes. Most individuals with HSV are asymptomatic, or signs and symptoms are so mild they go unnoticed. If symptoms are experienced, the first episode typically is the worst, with the formation of a blistered, inflamed, painful rash on the penis, scrotum, and urethra. After several days, the vesicles rupture, resulting in painful, ulcerated areas. The lesions heal in 3 to 4 weeks, but the herpes virus then migrates to a nerve
Acquired Immunodeficiency Syndrome
AIDS is the most deadly STD. It is caused by the human immunodeficiency virus. The virus invades CD4 T lymphocytes, destroying their ability to fight infection on the cellular level. Individuals may be asymptomatic when first exposed to HIV. Those who do develop symptoms may complain of a fever, arthralgia (joint pain), myalgia (muscle pain), lymphadenopathy, rash, night sweats, and malaise approximately 2 to 6 weeks after exposure to the virus.

The goal of treatment of HIV infection is to reduce the amount of virus in the body with antiretroviral drugs, thereby slowing the destruction of the immune system. It is unclear how many years (perhaps as long as 17 years) individuals with an early diagnosis and consistent, appropriate medical treatment with advanced drug therapy can remain HIV positive before developing AIDS. AIDS is diagnosed when evidence appears of a wide range of opportunistic infections that develop because of depressed T-cell counts. These include Pneumocystis carinii pneumonia (PCP), candidiasis (yeast infection), Kaposi’s sarcoma, dementia, and wasting syndrome. A patient is considered to be HIV positive when antibodies to the virus are detected; however, the diagnosis of AIDS is not made until the CD4 T-cell count drops below 200 mm$^3$ (the normal count is 600 to 1,000 mm$^3$) and/or opportunistic infections have been diagnosed. Current HIV management includes monitoring of CD4 T-cell counts at diagnosis and every 3 to 6 months thereafter.

HIV is transmitted when infected blood or blood products, semen, or vaginal secretions come in contact with the mucous membranes or broken skin of an uninfected person. It also can be passed in utero from an infected mother to her fetus, during delivery, or by breast-feeding. Intravenous drug users who share needles and anyone who has unprotected sex of any kind are at increased risk for contracting HIV. Healthcare workers are also at risk for accidental exposure in the workplace and should consistently follow Standard Precautions to protect themselves and their patients from this deadly disease. HIV is a fragile virus; it cannot survive outside the body, and it is easily destroyed by chemical disinfectants such as household bleach.

All HIV tests screen for antibodies to the virus, and any positive result, regardless of the type of test used, is followed up with the more definitive Western Blot test before a positive diagnosis is made. The most widely used screening test for HIV infection is the enzyme immunoassay (EIA; also called the enzyme-linked immunosorbent assay [ELISA]), which typically is performed on a venous blood sample. EIA tests also can be done on other body fluids, including oral fluid and urine, although urine screening is not as accurate or as sensitive to antibody levels.

Newer developments in rapid HIV screening use either blood or oral fluid (not the same as saliva) and can produce results within 20 to 60 minutes with accuracy rates similar to those of traditional EIA screening tests. The U.S. Food and Drug Administration (FDA) has approved the OraQuick Advance HIV1/2 Antibody Test for use on both oral fluid and plasma specimens. To perform the oral test, a single gentle swab is done around both upper and lower outer gums, the swabbing device is inserted into a vial containing a developer solution, and the result is positive if two reddish purple lines appear in a small window after 20 minutes. This test is not designed for home screening, because it is restricted to use by trained individuals, such as medical assistants. However, an FDA-approved home test called the Home Access HIV-1 Test System is available at most drug stores. The kit provides the materials for collection of a specimen at home rather than in a healthcare facility. To perform the test, the individual pricks a finger, places a blood drop on a specially treated card, and then mails the card to a licensed laboratory for testing. The individual uses an identification number provided with the kit to call the laboratory for results. As with all other HIV screening tools, a positive result must be followed by a Western Blot test to confirm the diagnosis.

HIV infection can be treated with medications, but it cannot be cured. Once patients begin antiretroviral treatment, they must continue to take these drugs for the rest of their lives. The medications must be taken at the time and frequency prescribed to be effective in controlling the spread of the virus and to prevent drug-resistant strains from developing. The FDA currently has approved 21 medications for the treatment of HIV infection in adults and adolescents. Guidelines recommend a combination of three or more antiretroviral drugs in a regimen called highly active antiretroviral therapy (HAART). Six classes of FDA-approved antiretroviral medications are designed either to prevent HIV replication or to block entry of the virus into the body’s T cells. Examples of these drugs include delavirdine (Rescriptor, DLV), zidovudine (Retrovir, AZT, ZDV), ampranavir (Agenerase, APV), enfuvirtide (Fuzeon, T-20) and raltegravir (Isentress).

Unfortunately, HIV medications can cause multiple side effects, including fever, nausea, fatigue, liver abnormalities, diabetes mellitus, hypercholesterolemia, decreased bone density, skin rash, pancreatitis, and neurologic disorders. Patients must be educated on the importance of strictly following their prescribed treatment regimen and of immediately reporting any side effects to the physician.

The psychosocial needs of a patient diagnosed with HIV infection are far reaching. Treatment is designed to control duplication of the virus in the body, but the patient will always be infectious. Transmission of the disease is prevented by sexual abstinence or consistent use of condoms and precautions with blood spills; these options must be discussed and consistently reinforced with the patient. Community organizations can serve as a source of counseling and support for patients who test HIV positive and their families. As mandated by federal law, the medical assistant must remember that all information regarding a patient’s HIV status must be kept in strict confidence, and no documentation in the medical record can indicate the patient’s HIV or AIDS status.
TRENDS IN REPORTABLE SEXUALLY TRANSMITTED DISEASES

• Chlamydia is the most frequently reported infectious disease in the United States, with an estimated 2.8 million new cases each year; improved testing and treatment among men could help reduce transmission to women. The infection can be diagnosed with a urine test, and complications among men are rare.

• Gonorrhea is the second most commonly reported infectious disease in the United States, with more than 350,000 cases reported in 2004. The Centers for Disease Control and Prevention (CDC) estimates that twice as many new infections occur each year. The number of reported cases in 19 times higher in African-Americans than in Caucasians. Antibiotic resistance (especially to such drugs as ciprofloxacin [Cipro] and Levofloxacin) is a serious concern; if the disease goes untreated, epididymitis and possibly infertility can result.

• Syphilis is highly infectious in the early stages but easily curable; left untreated, it can lead to serious long-term complications, including nerve, cardiovascular, and organ damage and even death. The incidence of syphilis is increasing among homosexual individuals.

• Males typically are asymptomatic or have minimal signs or symptoms of herpes infections. With symptoms, the initial outbreak consists of one or more blisters on or around the genitals that break, leaving tender ulcers that last 2 to 4 weeks. The outbreaks may lessen in severity over time. The virus is present in the body indefinitely, but the frequency of outbreaks declines over time. The virus can be transmitted by an infected partner who does not have a visible sore and who may not know that he or she is infected.

• Herpes simplex virus type 1 (HSV-1) can cause genital herpes, but it more commonly causes oral herpes or cold sores. HSV-1 infection of the genitals can be caused by oral-to-genital contact with a person who has an HSV-1 infection. Condoms do not completely prevent the transmission of genital herpes.

• Most human papillomavirus (HPV) infections are asymptomatic in males; the man may be unaware of the infection but can transmit it to a sexual partner. Genital warts may disappear without treatment. Because no diagnostic test for HPV is available for men, the diagnosis is based on evidence of wart development. Condoms do not completely prevent transmission of HPV.

• The human immunodeficiency virus (HIV) cannot reproduce outside a living host, and no record exists of infection from environmental contact. Also, no evidence indicates that the virus can be transmitted by insects. Latex or polyurethane condoms used consistently and correctly provide a highly effective mechanical barrier to HIV. Currently, the highest incidence of new HIV cases is seen in individuals age 35 to 44; in 2006, 49% of new cases occurred in African-Americans. About 73% of individuals with HIV are male, and 80% of women are infected because of high-risk heterosexual contact.

CRITICAL THINKING APPLICATION

The number of patients seen weekly in Dr. Fineman’s practice who have STDs continues to rise. Sara is responsible for telephone screening as well as clinical medical assisting practices. She is constantly being asked questions about the signs and symptoms of STDs and their treatment. What should Sara know about bacterial and viral STDs and their treatment?

THE MEDICAL ASSISTANT’S ROLE IN UROLOGIC AND MALE REPRODUCTIVE EXAMINATIONS

Much of the diagnosis of urinary dysfunction depends on the patient’s history, which may include frequency or urgency of urination, dysuria, or incontinence. A major part of the urologic examination is urinalysis, and the medical assistant must be able to instruct the patient in how to obtain a clean-catch urine specimen (see Chapter 52). It is best to have the patient collect the specimen during an office visit so that it can be examined immediately. The urologist may need to examine a catheterized specimen, which is collected using sterile technique. This procedure requires advanced training.

Assisting with a Urologic Examination

No special instrument setup is required for a routine urologic examination unless a special procedure is ordered, such as obtaining a catheterized urine specimen or a specimen for culture. Most offices use prepackaged, disposable packs for catheterization and bladder irrigation.

Both male and female patients disrobe and are given a gown. A woman is placed in the dorsal recumbent position, and a man is seated on the examining table. The physician explains what is required to the patient. With female patients and male physicians, a female medical assistant must remain in the room while the patient’s genital area is exposed and examined. The primary responsibility during the examination process is to assist the physician with any supplies and equipment needed and to maintain proper draping of the patient.

Assisting with a Male Reproductive Examination

The medical assistant needs to understand the male reproductive system and to provide patient support throughout the examination. The patient should empty his bladder and disrobe before the physician begins the examination. A drape sheet is placed around the patient’s waist, covering the lower extremities. A female medical assistant assists only if requested by the physician. The physician inspects the foreskin (if the patient has not been circumcised) and the glans penis. The penis and scrotum are palpated for possible masses and tenderness. The patient also is examined for possible inguinal hernias. A DRE completes the physical assessment.

A male medical assistant may assist the physician with the examination and help with patient draping and positioning. The medical assistant should watch the patient for signs of discomfort or anxiety, answer the patient’s questions, and reinforce the physician’s orders as needed.
Vasectomy

A vasectomy is a surgical procedure for sterilizing a male patient (Figure 40-17). It is performed by surgically removing a section of each vas deferens to stop sperm from reaching the prostate and mixing with semen. Sexual function is not affected by the procedure.

The procedure can be performed in a physician’s office using a local anesthetic agent, such as lidocaine (Xylocaine). In the standard procedure, which takes approximately 30 minutes, the physician makes a small incision on both sides of the scrotum with a scalpel, clips both vas deferens, and closes the site by cauterization or with sutures.

The no-scalpel vasectomy is a newer technique that takes approximately 10 minutes. The physician palpates and clamps the vas deferens under the scrotal sac, makes a tiny puncture through the skin, pulls the vas deferens out and cuts it, replaces the tube, and seals the site. The procedure is repeated on the other side. Patients must be informed that sterility is not achieved immediately, because sperm may be present in the ducts; it may take as long as 1 month for the semen to be sperm free. Patients should use a backup method of birth control until two sperm counts 4 to 6 weeks apart show no evidence of sperm.

CRITICAL THINKING APPLICATION 40-7
Sara routinely assists Dr. Fineman with urologic and male reproductive examinations. She is also responsible for orienting new employees and helping them learn the procedures that typically occur in the office. Summarize the role of a medical assistant in helping with these examinations.

CLOSING COMMENTS

Patient Education

Most men under age 50 have not seen a physician in years. Medical studies reveal that attitude, not biology, has a lot to do with the difference between men’s and women’s life spans. Men just do not go to the doctor as often as women and tend to ignore symptoms of disease. The solution to maintaining good health is preventive care, and the first step is establishing a good rapport with a physician of choice. As a general rule, a man in good health should have three checkups in his twenties, three to four checkups in his thirties, and a checkup every other year in his forties. After the age of 50, a yearly checkup is recommended. In addition to testing for conditions such as cancer, heart disease, and diabetes, patient education can help male patients make responsible healthcare decisions.

The American Cancer Society recommends that men age 50 or older have an annual fecal occult stool test and a flexible sigmoidoscopy every 5 years; a double-contrast barium enema every 5 years; and a colonoscopy every 10 years to screen for colorectal cancer. Prostate screening (DRE and PSA blood test) is recommended for all men over age 50, but it also should be done at age 45 in African-Americans and men with a family history of prostate cancer.

The urinary system is a very private, personal part of the patient’s body. Patients often feel embarrassed to ask questions about how to obtain the requested urine or semen sample. The medical assistant can provide this information in a sincere, confidential manner to relieve the patient’s anxiety and worry. Diagrams, models, and handouts help the patient understand disease process and the treatments and also encourages patient compliance.

Legal and Ethical Issues

When working in a urology office, the medical assistant must be very careful to ensure that patients have provided informed consent for ordered procedures. If the patient refuses a procedure, the assistant must have the patient sign the appropriate informed refusal forms, which are then included in the medical record. All patient education should be done after the physician has completed the explanation and has given the assistant instructions to do so. Never diagnose, prescribe, or offer comment about a patient’s condition. Medical assistants who overstep their professional boundaries may place the physician and themselves in legal jeopardy. Remember that the patient who is legally informed and satisfied with the care received is less likely to take legal action.

A urology practice manages many sensitive patient issues that require strict adherence to confidentiality guidelines. This is especially true for a patient who has a functional disorder with the reproductive system or who has been diagnosed with an STD. In addition, special legal guidelines regarding patients diagnosed with HIV must be strictly followed to prevent litigation. The medical assistant caring for patients with HIV naturally is concerned about possible exposure. Discuss your concerns with your physician employer and remember that Standard Precautions have been developed to prevent the accidental spread of communicable diseases. If you strictly follow the standards established by the Centers for Disease Control Prevention (CDC), you need not fear contamination.

HIPAA Applications

Staying up-to-date on confidentiality restrictions regarding a patient’s HIV status is a major challenge. The Health Insurance
Portability and Accountability Act (HIPAA) provides minimum requirements for protecting personal health information, but state laws can override HIPAA regulations if the state law is considered more stringent. In addition, individual healthcare institutions (hospitals, universities, physicians' practices) may have their own policies and procedures for managing confidential information about HIV and AIDS. For example, if a physician believes that a person who tests HIV positive will not disclose his or her HIV status to significant others, most states permit the physician to act. First, the physician must attempt to notify the patient that the information is going to be disclosed. Then the physician can inform the patient's spouse, sexual partner or partners, child, or needle-sharing partner or partners at risk of being infected with HIV about their risk of exposure. However, the state may limit this disclosure by not permitting the physician to identify the name of the individual who is HIV positive.

- Confidential HIV information includes any records that could reasonably identify the individual as a person who has had an HIV test, is HIV positive, has opportunistic diseases related to HIV, or has AIDS.

- HIPAA protects the patient's confidential information, not just the paper or electronic records of that information. That means verbal disclosure of the individual's HIV and AIDS status is limited to only the personnel who have the right to that information according to individual state laws. For example, if you learn about your neighbor's HIV status at work and you go home and discuss it with your family, your employer is responsible for your disclosure of this information, and both you and your employer may be fined by the state or sued by the patient.

- Disclosure of HIV and AIDS status for treatment, payment, or healthcare operations can be made only with the specific written consent of the patient.

- Depending on state laws, written consent may not be needed to release HIV information if a court order for the information is issued; if the case is being reported to state or local vital statistics or public health agencies; or if the information is to be provided to certain employees of correctional institutions or residential treatment facilities, funeral directors, or emergency personnel.

**SUMMARY OF SCENARIO**

Sara enjoys working with Dr. Fineman and the patients seen in his urology practice. She recognizes the need to stay current with information about disorders of the urinary system and their treatment. Sara continues to learn on the job and through workshops about the urinary system and current therapies. Her expertise is constantly growing, and she uses this knowledge to help with patient education, manage telephone screening, and assist Dr. Fineman with procedures in the office. She also is working on building a database with local resources, support groups, and Internet sites that could be helpful for patients confronted with urologic or male reproductive system problems.

**SUMMARY OF LEARNING OBJECTIVES**

1. Define, spell, and pronounce the terms listed in the vocabulary.
   Spelling and pronouncing medical terms correctly bolster the medical assistant's credibility. Knowing the definition of these terms promotes confidence in communication with patients and co-workers.

2. Apply critical thinking skills in performing the patient assessment and patient care.
   Completing the Critical Thinking Application exercises throughout the chapter can help the student medical assistant become more adept at critical analysis of "real-life" situations.

3. Describe the organs of the urinary system and their functions.
   The urinary system is made up of two kidneys, the ureters, the urinary bladder, and the urethra. The functions of the urinary system include removing waste products; regulating water, electrolyte, and acid-base levels; activating vitamin D; and secreting erythropoietin and renin. The three processes involved in urine formation are filtration, reabsorption, and excretion. The cortex contains the nephron unit where urine is formed, and the medulla is the collection site for urine.

4. Explain the susceptibility of the urinary system to diseases and disorders.
   The urinary tract is made up of a continuous mucosal lining, which gives organisms that enter the urethra a direct pathway through the system.

5. Identify the primary signs and symptoms of urinary problems.
   The most common signs and symptoms of urinary problems include changes in the frequency of urination, dysuria, urgency, retention, and incontinence. Abnormal functions of any part of the urinary tract can be determined with urinalysis, BUN levels, and creatinine clearance.

6. Detail common diagnostic procedures of the urinary system.
   Diagnostic procedures are summarized in Table 40-1.

7. Compare and contrast infections and inflammations of the urinary system.
   Most UTIs are ascending; they start with pathogens in the perineal area and infect the continuous mucosa, up through the urethra, bladder, and ureters to the kidneys. Infections and inflammations include urethritis, cystitis, pyelonephritis, and acute or chronic glomerulonephritis.

8. Describe urinary tract disorders and cancers.
   Renal calculi are created when salts in the urine collect in the kidney or when fluid intake is low. They can block the flow of urine, causing hydronephrosis. Polyuria is kidney disease, a slowly progressive and irreversible genetic disorder, causes the formation of multiple granulite cysts in the kidney. Bladder cancer is invasive and can metastasize through the blood or surrounding pelvic lymph nodes. Adenocarcinoma of the kidney initially is asymptomatic and therefore frequently has
9. **Distinguish between the two methods of treating renal failure.**
   Acute renal failure has a sudden, severe onset caused by exposure to toxic chemicals, severe or prolonged circulatory or cardiac shock, or acute bilateral kidney infection. Chronic renal failure is a slowly progressive process caused by gradual destruction of the kidneys' ability to filter waste materials. Dialysis is used to treat acute renal failure until the problem is reversed or, for those patients in end-stage renal disease, until transplantation can be performed. The two forms of dialysis are hemodialysis and peritoneal dialysis.

10. **Summarize the typical pediatric urologic disorders.**
    Pediatric urologic disorders include anuria, urine reflux disorder, and criptorchidism.

11. **Identify the male organs of reproduction.**
    The male reproductive system is made up of a pair of testes that contain the seminiferous tubule, where spermatozoa are produced and carried to the epididymis for maturation and into the vas deferens for storage. The prostate gland secretes seminal fluid, which is ejaculated with sperm by the penis. Testosterone stimulates the development of secondary male characteristics and matures sperm.

12. **Determine the causes and effects of prostate disorders.**
    Inflammation of the prostate usually develops because of an infection, such as an STD. The common symptoms are dysuria, tenderness, and secretion of pus from the tip of the penis. Benign prostatic hyperplasia partially blocks the flow of urine and is diagnosed by patient complaints and with a DRE. Treatment includes the use of medication or surgery. Cancer of the prostate is common in men older than age 50 and is the second highest cause of male cancer deaths; complaints include urinary obstruction, UTIs, and nocturia. Prostate cancer is diagnosed by a DRE, elevated PSA level, and biopsy; treatment includes radioactive seed implantation, hormone therapy, or prostatectomy.

13. **Outline common types of genital pathologic conditions in men.**
    Male genital pathologic conditions include epididymitis, balanitis, prostatitis, and STDs. Testicular tumors usually occur in young men and generally are malignant. Erectile dysfunction (ED) typically is treated with medication. Male infertility may be caused by cryptorchidism, stricture, varicoceles, low sperm count and motility, and hormonal imbalances.

14. **Perform patient education for the testicular self-examination.**
    Patient education for testicular self-examination is summarized in Procedure 40-1.

15. **Analyze the effects of sexually transmitted diseases in men.**
    Table 40-1 summarizes the signs, symptoms, and treatment of STDs in men. There is no cure for viral STDs, and bacterial causes of infection are becoming increasingly resistant to antibiotic therapy. STDs in male patients frequently are asymptomatic. Bacterial STDs include gonorrhea, chlamydia, and syphilis. Viral infections include hepatitis B, C and D; genital herpes; genital warts; and HIV. Trichomoniasis is a protozoal infection that is asymptomatic.

16. **Summarize the characteristics of HIV infection and the diagnostic criteria and treatment protocols.**
    HIV invades the CD4 T lymphocytes, destroying their ability to fight infection on the cellular level. Initial exposure may cause flu-like symptoms, but after this it could be many years before clinical symptoms of AIDS occur. A patient is considered to be HIV positive when antibodies are detected and to have full-blown AIDS when T-cell counts are below 200 mm$^3$ and/or opportunistic infections are diagnosed. HIV is transmitted when infected blood or other products, semen, or vaginal secretions come in contact with the mucous membranes or broken skin of an uninfected person; it also is transmitted from an infected mother to her fetus in utero, during delivery, or by breast-feeding. Many methods of HIV testing are available, but all must be confirmed with the Western Blot test. A combination of antiviral drugs is used to control the virus, but the disease has no cure.

17. **Describe the medical assistant’s role in urologic and male reproductive examinations.**
    In a urology practice, the medical assistant is responsible for taking a complete patient history that details urinary symptoms; providing patient instruction for diagnostic testing; assisting with a urologic or male reproductive examination, and answering patients’ questions.

**CONNECTIONS**

**Study Guide Connection:** Go to the Chapter 40 Study Guide. Read and complete the activities.

**Evolve Connection:** Go to the Chapter 40 link at evolve.elsevier.com/kimm to complete the Chapter Review and Chapter Quiz. Peruse other resources listed for this chapter to increase your knowledge of Assisting in Urology and Male Reproduction.