URINARY TRACT INFECTIONS

INTRODUCTION

Urinary tract infections are a very common medical problem. The term urinary tract infection is frequently used to refer to an infection of the bladder. However, although infections in the urinary bladder are the most common infection of the urinary tract, infections can happen in other parts of the urinary tract. The correct term for a urinary tract infection of the bladder is cystitis.

The elderly and women are particularly susceptible to urinary tract infections Urinary tract infections are also a very common problem for people who have an in-dwelling urinary catheter and for people who are hospitalized. They do occur in men and in infants and children, but not as often. In young, healthy adults an infection of the urinary tract is uncomfortable, but it is a problem that responds very well to treatment. But a urinary tract infection in an older person or someone who is immunocompromised can lead to serious complications.

This module will focus on cystitis. It is one of the most common infections of the urinary tract and in your career as a certified nursing assistant (CNA) you will care for many patients who have this problem. Infections of the kidneys and infections of the urethra - pyleonephritis and uretheritis, respectively - will not be discussed in this module.

Learning Break: In this module, the terms cystitis and urinary tract infection will be used interchangeably and the other types of urinary tract infections will be discussed using their proper names.

OBJECTIVES

After completing this module the learner will be able to:

1. Identify populations at a high risk for urinary tract infections.
2. Identify the signs and symptoms of a urinary tract infection.
3. Identify the risks and complications of a urinary tract infection.
4. Identify the therapies used to treat urinary tract infections.
5. Identify methods use to prevent urinary tract infections.

THE URINARY TRACT AND THE RENAL SYSTEM: ANATOMY AND PHYSIOLOGY

The urinary tract and the renal system are, in a sense, one and the same. The urinary tract and the renal system are both composed of the kidneys, the ureters, the urinary bladder, and the urethra. But the urinary tract has some relatively simple functions: forming, storing, and excreting urine. However, when these same organs and body structures are working as the renal system they perform some very complex tasks, and the renal system is one of the most important organ systems. The renal system helps maintain...
the proper internal environment of the body, the optimal conditions under which the brain, heart, lungs and other organs functions best. The renal system does this by:

- Eliminating potentially toxic wastes
- Helping to regulate blood pressure
- Assisting in maintaining the normal acid-base level in the body
- Controlling the blood volume and fluid volume
- Assisting in the formation of red blood cells
- Helping to control the blood level of electrolytes such as calcium, potassium, and sodium

Each of these functions of the renal system is critically important. If the renal system is severely damaged and cannot eliminate toxic wastes, survival for any appreciable length of time is impossible. If the renal system cannot help maintain the normal acid-base balance, the cardiovascular system and the neurological system, and the renal system itself cannot function properly. And people with an impaired renal system cannot form a sufficient amount of red blood cells and consequently, they suffer from anemia. A normally functioning renal system is essential: we cannot survive without it. And a normally functioning urinary tract is essential, as well. Although the urinary tract is much simpler in what it does when compared to the renal system, if the kidneys, bladder, etc. are not able to form, store, and excrete urine, we cannot survive.

At first this separation of the renal system and the urinary tract may seem a bit artificial and confusing, but as you read the descriptions of the organs and structures of the renal system/urinary tract, the issue should become clear.

The Kidneys

There are two kidneys. They are located in the abdominal cavity, below the lower edge of the rib cage and slightly above the hip bones, one on the right side and one on the left. The kidneys are supplied with blood by several large arteries and although the kidneys are not very large in comparison to some other organs, they receive over 20% of the blood that is pumped from the heart. The kidneys receive such a high percentage of the cardiac output because they are very metabolically active, and because they are so metabolically active they need a lot of blood and oxygen to function. Because of this the kidneys are very sensitive to any decrease in their blood supply. (More on this point later)

Each kidney is compromised of an outer layer called the cortex and an inner layer called the medulla. The basic functional unit of the kidney is called the nephron, and the nephrons are located in the both the cortex and the medulla. Blood from the body flows into the kidneys and through the nephrons, and each nephron has a filtering unit - the glomerulus - and a system of tubules. As blood flows through the nephron, the glomerulus, and the tubules, fluid is reabsorbed back into the blood as needed and what is not reabsorbed is excreted as the urine. The nephrons, glomerulus, and tubules are also where electrolytes, acids, bases, and other substances can be reabsorbed or excreted as needed. The urine that is formed in the nephrons moves into a collecting area in the center of the kidney called the renal pelvis and from there it flows into the bladder.
The kidneys are highly complex organs and as mentioned before, they are very metabolically active and they need a lot of blood and oxygen. The primary functions of the kidneys are:

- **Eliminating toxic wastes:** Normal metabolism produces compounds and by-products that are inherently toxic and must be eliminated, and this is one of the primary functions of the kidneys. Blood from the body enters the kidneys and into the nephrons. The nephrons filter and remove toxic wastes from the blood and these are then excreted in the urine. The two most important toxic products eliminated by the kidneys are blood **urea nitrogen**, commonly called BUN, and **creatinine**. BUN and creatinine are by-products of metabolism and of the breakdown of protein. BUN and creatinine must be removed from the blood and excreted in the urine as high levels of these compounds can be very harmful. The importance of BUN and creatinine will be discussed in more detail later in the module.

- **Regulating blood pressure:** The kidneys help to regulate blood pressure in two ways. The first is by controlling blood volume. If the blood pressure is too high or too low they can increase or decrease the amount of urine that is formed as blood flows into the kidneys, thus eliminating or conserving body fluid. The second is by a system of blood pressure sensors in the kidneys. These sensors respond to the level of blood pressure - too high or too low - by releasing an enzyme called renin that helps control blood pressure.

- **Maintaining acid-base balance:** Acids and bases are produced by metabolism, and the correct balance between the two must be maintained - and maintained within very narrow parameters. If the balance between the two swings too far in one direction or the other (too many acids or too few bases, for example), many of our organ systems cannot function properly. The kidneys help maintain a normal acid-base balance by excreting or reabsorbing acids, excreting or reabsorbing bicarbonate (the most important base) or by producing new bicarbonate.

- **Red blood cell formation:** Red blood cells contain a compound called hemoglobin. Hemoglobin is the carrier molecule for oxygen. When we inhale, the oxygen in the air we breath moves into the blood circulating through the lungs and attaches to the hemoglobin in the red blood cells. As blood circulates through the body, oxygen detaches from hemoglobin and is delivered to the organs and tissues. The kidneys produce a hormone called erythropoietin that stimulates the bone marrow to produce red blood cells. Without a sufficient supply of erythropoietin, someone will develop anemia.

- **Electrolytes:** There are many electrolytes in the blood, e.g., calcium, potassium, and sodium. The kidneys help maintain the optimal concentration of electrolytes in the blood by reabsorbing them or excreting them in the urine as needed.
• Regulating blood and fluid volume: This function of the kidney was discussed above, but in the context of blood pressure control. The amount of blood and fluid in the body is also important for normal organ and tissue functions. For example, if the amount of body fluid and blood is decreased - dehydration - the heart and the lungs will have to work harder to circulate blood and deliver oxygen, and organs and tissues may not be adequately perfused.

The kidneys are enormously important organs, and they are very metabolically active. If the supply of blood and oxygen is significantly decreased by hemorrhage, hypotension, toxins, or any other factor, the kidneys can suffer irreversible damage and this can have serious implications.

The Ureters

The ureters are short, muscular tubes that carry the urine from the renal pelvis to the bladder. The ureters are a common site for kidney stones to become lodged.

The Bladder

The bladder collects and stores urine. The capacity of the bladder is approximately 300-350 mL, although it can hold more. The walls of the bladder have several layers, and one of these layers is the detrusor muscle. As urine accumulates in the bladder, the bladder walls are stretched and nerves endings in the bladder wall are stimulated. Stimulation of these nerve endings sends a signal to the detrusor muscle to contract, and the bladder is emptied.

The Urethra

Urine exits the bladder via the urethra. The urethra is a narrow tube that starts at the bottom of the bladder and ends in an opening called the meatus. In males the urethra is part of the renal system and the reproductive system.

URINARY TRACT INFECTIONS: CYSTITIS

As was mentioned earlier, the term urinary tract infection is commonly used to refer to an infection in the urinary bladder, but the correct term for this infection is cystitis. Although cystitis is the most common infection of the urinary tract, urinary tract infections can also occur in the kidneys and in the urethra.

Cystitis: Basic Statistics and Populations at Risk

Cystitis is a very common infection. Approximately 25-40% of all women in the United States have had cystitis at one point in their lives, and some authorities feel that the life time incidence of cystitis in women is much higher - up to 50%. In addition, many women have cystitis that can be easily treated but the infection keeps returning - a condition called recurrent urinary tract infection. Cystitis is the most common infection
seen in the out-patient setting, e.g., primary care physicians’ offices, out-patient clinics, etc.

Cystitis is also very common in the elderly, in hospitalized patients, and it is especially common in hospitalized patients who have an in-dwelling urinary catheter. Urinary tract infections account for approximately 40% of all hospital-acquired infections, and approximately 80% of those infections occur in patients who have an in-dwelling urinary catheter. Having an in-dwelling urinary catheter in place or longer than seven days increases by a factor of seven the risk for developing cystitis, and if the catheter is in place for 30 days or longer cystitis is almost ensured.

Cystitis does occur in men, but it is rare for a man who is less than 50 years old to develop this type of urinary tract infection. Males 50 years of age and younger are approximately 30 times less likely to develop cystitis than are women, and the incidence of cystitis in men only equals that of women after age 60. After age 50, the incidence of cystitis in males begins to increase, mainly due to specifics of the male anatomy, i.e., enlarged prostate, and to the development of infections related to male anatomy such as epididymitis, prostatitis, and orchitis.

**Cystitis and Women**

There are many reasons why women develop cystitis far more often than do men. Although some women have specific risk factors that account for the development of cystitis and make them more likely to develop this infection, most cases of cystitis happen in healthy women who have structurally normal urinary tracts.

The basic reason why cystitis occurs in men and women is that bacteria from the perineal region enter the urethra and travel up the urinary tract to the bladder. This puts women at a high risk for the development of cystitis because:

- The female urethra is much shorter than the male urethra, and the bacteria have less distance to travel to reach the bladder.
- The female perineal area has more bacteria than the male, and the urethra is closer to the rectum.
- Sexual intercourse allows bacteria to enter the urethra
- The use of spermicidal jellies and/or diaphragms increases the risk of bacteria being introduced into the urethra.

Recurrent urinary tract infection is a persistent problem for many women. If a woman has more than two episodes of cystitis in six months or more than three in one year, she is considered to have recurrent urinary tract infections. Recurrent urinary tract infections are a common problem. For any woman who develops cystitis there is a 25% chance she will have a recurrence within six months and a 46% chance she will have another episode of cystitis within a year.

It is not known why some women develop recurrent urinary tract infections. It may simply be that these women are exposed to a higher level and frequency of risk factors such as frequent sexual intercourse or the use of a diaphragm and/or contraceptive jelly. There is also the possibility that even after successful treatment with antibiotics, a small amount of bacteria remain in the wall of the bladder. The natural immunity and defensive
mechanisms of the body may keep the bacteria at a low level, too low to cause cystitis, but if the immune system is slightly depressed or more bacteria enter the bladder then a urinary tract infection could occur.

**Cystitis and Urinary Catheters**

The presence of an in-dwelling urinary catheter is a very big risk factor for the development of cystitis. It was mentioned earlier that if an in-dwelling urinary catheter is in place for 30 days or longer, a urinary tract infection is almost inevitable. There are several reasons why in-dwelling urinary catheters are such a huge source of urinary tract infections.

The first reason is the presence of the catheter itself. Having a urinary catheter in place disrupts the integrity of the urinary tract. It also removes one of the body’s defense mechanism against cystitis. Bacteria can enter into the urethra, but urination will often physically flush them out before they can reach the bladder and this is not possible if a catheter is in place.

Poor placement technique is another reason why urinary catheter-associated infections are common. Placing an in-dwelling urinary catheter must be done using sterile technique, and studies have shown that many catheterizations are performed using sub-standard sterile technique.

The next reason is improper use. There are specific circumstances in which an in-dwelling urinary catheter should used. Examples of these are: 1) during prolonged surgery; 2) in critically ill patients who need very accurate measurement of intake and output, and; 3) acute urinary retention due to obstruction. There are other situations in which an in-dwelling catheter is an important and necessary intervention, but the important point is that patients should only be catheterized when there is an appropriate need and unfortunately that is not always the case. It has been estimated that up to 55% of all urinary catheter placements are inappropriate - there is no approved need - and decreasing the number of catheterizations will obviously decrease the number of urinary tract infections. When you consider that many people who are catheterized may have risk factors such as advanced age, diabetes, or a depressed immune system, it is very clear that an in-dwelling catheter must only be placed when it an absolute necessity.

Finally, poor catheter care is responsible for a large number of urinary tract infections. Good urinary catheter care begins with record keeping, and this means that the date and time of the insertion should be documented. This would seem to be a simple idea. But numerous studies have shown many hospitals and health care facilities do a poor job in recording the date and time of catheter insertion. Considering that the risk of developing a urinary tract infection increases with the duration of placement, it is clearly very important to know how long a urinary catheter has been in place. Poor adherence to good standards of urinary catheter care can also lead to urinary tract infection. These standards include proper bag and catheter positioning; cleaning the insertion site, and; maintaining the sterility of the system. Unfortunately, breaches of these standards are relatively common and often result in a urinary tract infection. (Note: The proper care of an in-dwelling urinary catheter will be discussed later in the module)
**Learning Break:** The presence of a urinary catheter is itself a risk for developing cystitis. However, approximately 15% of all urinary catheter-associated infections that occur in a health care facility are caused by bacteria that have come from another patient, and there is only one reason why this happens - poor hand washing technique by the staff. It has been estimated that almost 69% of all catheter-associated urinary tract infections are preventable.

**Cystitis and Men**

Up until age 50, cystitis is rare in healthy men. The urethra is much longer in men (8 inches/20 centimeters) than in women (1.5 inches/4 centimeters). Prostatic fluid contains zinc, and zinc has the ability to kill bacteria that can cause cystitis. Also, the opening of the urethra is not as close to the rectum as it is in a woman. If a man under the age of 50 develops cystitis, there is a good chance that he has a structural abnormality of the urinary tract or a kidney stone.

After age 50, the incidence of cystitis in men increases. This is due somewhat to an increase in risk factors common to men and women, medical conditions such as diabetes, neurological conditions such as Alzheimer’s or dementia that affect personal hygiene, or immobility. It can also be due to the development of an enlarged prostate gland or caused by infections that are specific to men. These infections are: epididymitis, orchitis, and prostatitis. Cystitis is more common in men who are uncircumcised.

**General Risk Factors for Cystitis**

Regardless of age or gender there are risk factors that increase the chances of developing cystitis.

- Diabetes
- Dehydration
- Immobility
- Previous urinary tract infections
- Fecal and/or urinary incontinence.
- Conditions such as Alzheimer’s or dementia that affect personal hygiene
- Kidney stones: The medical term for kidney stones is nephrolithiasis

**WHAT ARE THE SIGNS AND SYMPTOMS OF CYSTITIS?**

In most people, the signs and symptoms of cystitis are obvious and unmistakable.

- **Dysuria:** Dysuria is the medical term for pain while urinating. The pain is caused by bacteria in the urine irritating the urethra.
- **Frequency:** People who have a urinary tract infection have a persistent need to urinate, and they must urinate many times during the day. Even after the bladder has been emptied, someone who has cystitis will feel the urge to urinate a short time later.
Urgency: Cystitis produces a sensation of urgency - the need to urinate happens very quickly and cannot be ignored. Someone who has cystitis will feel as if she/he has to urinate now: they cannot wait.

Hematuria: Hematuria is the medical term for blood in the urine.

Pain in the area of the bladder or pain in the lower abdomen.

Foul smelling urine.

The signs and symptoms of cystitis can be very uncomfortable and very inconvenient. However, if someone has a simple case of cystitis, she/he will not be terribly sick and should be able to perform most of their normal activities, albeit with some interruptions. But if someone has the typical signs of cystitis and feels too sick to work and/or has symptoms such as chills, a high fever, or severe pain, these are indications that the infection may be more than a simple case of cystitis.

Cystitis can happen to people who are unable to tell you about the symptoms. If this is the case, patients who are susceptible to cystitis need careful observation of their voiding patterns and general health.

Cystitis happens quite frequently to patients who have an in-dwelling urinary catheter, but because of the presence of the catheter, dysuria, frequency, and urgency cannot be used as diagnostic signs. In that case, determining the presence of a catheter-associated urinary tract infection can be difficult. But remember: these infections are more likely to happen to certain people (e.g., the elderly, people who have diabetes, people who have had the catheter in place for seven days or longer), so close observation of at-risk populations can be helpful in detecting a catheter-associated urinary tract infection. Also, if the urine of a patient who has an in-dwelling urinary catheter is bloody, cloudy, or foul smelling, or if the patient has a fever, a catheter-associated urinary tract infection should be suspected.

HOW IS CYSTITIS DIAGNOSED?

Most of the time diagnosing cystitis is simple, and it is done by using: 1) the patient’s signs and symptoms, and; 2) an examination of the urine. The patient who has cystitis will have many of the signs and symptoms listed in the previous section, and these are strongly suggestive of cystitis. A urine sample will be examined and if the patient has cystitis, there will be bacteria, blood, and white blood cells in the urine. The urine sample may also be sent to the laboratory for a test called a urine culture and sensitivity. The urine is placed in special medium and after a period of time it is examined to see what bacteria are present (the culture) and what antibiotics the bacteria are susceptible to - the culture.

If the patient has an in-dwelling urinary catheter, the urine sample can be collected by aspirating urine from the collection port on the catheter tubing. If the patient does not have an in-dwelling urinary catheter, he/she will need to provide what is called a mid-stream, clean catch urine sample. The procedure for obtaining a mid-stream, clean catch urine sample is as follows:

- Instruct the patient to wash his/her hands.
• The patient is provided with antiseptic towelettes.
• Male patients are instructed to wipe the end of the penis in a single motion – do not clean in a back and forth motion. Repeat the cleaning with the second towelette.
• Female patients are instructed to separate the labia and then wipe from to back, using a single motion, using both towelettes.
• The patient should begin to urinate into the toilet. Once the urinary stream is established, stop the stream and then urinate into the specimen cup.
• Make sure to tell the patient that the inside of the cup and the inside of the lid are sterile and should not be touched.

If the patient does not have an in-dwelling urinary catheter and she/he is not able to provide a mid-stream, clean catch urine sample, it may be necessary to temporarily insert a catheter into the bladder to obtain a specimen. This is commonly called straight catheterization.

A urine sample and a urine culture are typically the only tests that are used to diagnose cystitis. If it suspected that the infection may have moved from the bladder into the kidney or that the cystitis is being caused by a physical abnormality in the urinary tract or a kidney stone, the physician may order: 1) a renal ultrasound; 2) an intravenous pyelogram (a contrast study), or; 3) insert a cystoscope into the urinary tract to visually examine the urethra and the bladder.

HOW IS CYSTITIS TREATED?

Cystitis is treated with antibiotics. Most cases are treated with Bactrim®, Macrobid®, or Keflex®: the generic names for these drugs are, respectively, trimethoprim/sulfamethoxazole, nitrofurantoin, and cephalexin. Cipro® (ciprofloxacin) and Levaquin® (levofloxacin) may also be used. The usual course of therapy is about seven days, and many people have significant relief from the symptoms in a day or two. Some physicians will also prescribe Pyridium® (phenazopyridine) for patients who have cystitis. This medication is not a cure for cystitis, but it is very effective at decreasing the symptoms of burning, frequency, and urgency. Patients who have cystitis should be instructed to drink lots of fluid, to complete the full course of the antibiotics, and to call the physician if the signs and symptom do not improve or worsen, or if they develop chills, fever, or other signs of a serious infection.

CAN CYSTITIS BE DANGEROUS? WHAT ARE THE COMPLICATIONS?

Most cases of cystitis in young, healthy adults can be easily treated with antibiotics. But cystitis can spread to other parts of the urinary tract, and if this happens the patient will have signs and symptoms such as: 1) chills and shaking; 2) confusion or drowsiness; 3) fatigue; 4) fever; 5) nausea and/or vomiting; 6) severe pain, or; 7) pain in the lower back.

Cystitis can also be the source of a very serious medical condition called sepsis. Sepsis happens when an infection in one part of the body such as the lungs or the urinary tract spreads to the blood stream. The presence of the bacteria in the blood causes a severe,
generalized inflammation, and this in turn causes a very high fever, hypotension, mental status changes, and other significant clinical signs. Urinary tract infections account for approximately 25% of all cases of sepsis, and the elderly are particularly vulnerable.

Recurrent cases of cystitis can cause pyelonephritis and renal scarring, and urinary tract infections that progress to kidney infections in pregnant women can cause premature labor.

**CAN CYSTITIS BE PREVENTED?**

**Prevention of Cystitis in People Who Do Not Have an In-Dwelling Urinary Catheter**

Prevention of cystitis in people who do not have an in-dwelling urinary catheter can be difficult. Most of the preventative strategies that have been (and are) recommended are for women, as they are for more susceptible to cystitis. The “traditional” interventions for the prevention of cystitis and the prevention of recurring urinary tract infections include:

1) the use of cranberry juice; 2) staying well hydrated; 3) voiding after intercourse; 4) bathing or douching; 5) urinating frequently; 6) vitamin C supplements; 7) avoiding bubble baths, and; 8) using proper perineal hygiene.

However, the latest research indicates that cranberry juice may have a slight preventative effect, but this has not been proven and the other methods mentioned are not effective at preventing cystitis. Some of the methods of prevention of cystitis for which there is good evidence for effectiveness include:

- Changing the method of contraception: If a sexually active woman is using a diaphragm and contraceptive jelly, changing to a different form of birth control may be helpful.
- Post-coital antibiotics: Woman who suffer from recurrent cystitis can prevent urinary tract infection by taking an antibiotic after intercourse. Women who have more than three episodes of cystitis per year are considered candidates for prophylactic antibiotic therapy to prevent cystitis recurrence.
- Prophylactic antibiotics: Some physicians will prescribe daily doses of antibiotics for the prevention of cystitis, and in certain women this approach is successful.
- Intravaginal estrogen: In post-menopausal women, and intra-vaginal estrogen suppository has been shown to decrease the incidence of cystitis.

**Learning Break:** Patients should always consult with a physician before using the traditional preventative methods that were listed above; these methods may not always be safe. Example: Cranberry juice can increase the anti-coagulant effects of Coumadin® (generic name warfarin), a very commonly used blood thinner.

**Prevention of Cystitis in People Who Have an In-Dwelling Urinary Catheter**

Preventing a catheter-associated urinary tract infection is challenging, but it can be done. The first step is to understand and use basic methods of infection control, and one
the most important and one of the most effective of these is hand washing. Hand washing has been recognized by the Centers for Disease Control and Prevention as the most important way to prevent the spread of infection. As regards catheter care, hand washing should be done: 1) before you start patient care; 2) when your hands are visibly soiled; 3) after contact with a patient; 4) after contact with any body secretions, and; 5) before and after putting on gloves. Hand washing and barrier protection (gloves) prevent contact transmission of microorganisms from you - or from another patient you have been caring for - to the patient who has an in-dwelling urinary catheter.

Specific methods for preventing catheter-associated urinary tract infections include:

- Using alternatives to in-dwelling urinary catheters, such as condom catheters.
- Appropriate use: An in-dwelling urinary catheter should only be inserted if there a need for one to be used.
- Clear guidelines: There should be clearly documented guidelines that address the issues of insertion and discontinuation of an in-dwelling urinary catheter, as well as guidelines for catheter care.
- Record keeping: The date and the time of insertion should be documented,
- Review: Chart review should be done periodically on patients who have an in-dwelling urinary catheter in order to determine the length of placement
- Cleaning the catheter insertion site: This should be done at least once a day: check the guidelines of your healthcare facility for specific instructions on how often to do this and for any specific way the procedure should be done. The basics of the procedure are: 1) wash your hands before starting; 2) wear gloves, and; 3) clean the area using soap and water. Make sure - especially for female patients - that you clean from the front towards the back to avoid contaminating the catheter insertion site with bacteria from the rectal area. Soap and water alone is sufficient: antibacterial soaps or solutions do not provide any advantage nor do anti-bacterial ointments applied to the area.
- Maintain the sterility of the system: The outside of the in-dwelling catheter system should be clean, but it is not considered sterile. The inside of the catheter, the inside of the drainage bag, and the connection between the catheter and the drainage bag are considered areas that must be kept sterile. The best way to maintain the sterility of the system is to keep the system closed: do not disconnect the catheter from the drainage bag tube.

**Learning Break:** If the catheter is disconnected from the collecting tubing, do not touch the tip of the catheter or the collecting tubing. Put on gloves, reconnect the catheter and the tubing and immediately notify your supervisor.
• Maintain proper position of the catheter, the drainage bag, and the collecting tube: The drainage bag should be below the level of the bladder. This will promote drainage and prevent urine from sitting in the collection tubing or moving back into the bladder. The bag should never touch the floor. The collecting tubing should be positioned so that kinks or loops will not develop; these can allow urine to pool and this will increase the risk of an infection. The catheter should be secured to the patient’s leg or abdomen and it should be secured so that there is no traction or tension on the catheter: remember, tension or traction of an in-dwelling urinary catheter can be painful, and it can cause trauma and/or an infection. Securing the catheter will also prevent it from being accidentally pulled out. The catheter can be secured using commercially available devices or improvised methods, and it should be secured to either the upper thigh or the abdomen. Some authorities recommend that in-dwelling urinary catheters should be secured to the abdomen if the patient is male; check the policy at your workplace. In either case, the catheter attachment and the integrity of the skin where it is attached must be checked at least once every 8 hours.

• Urine collection: The urinary drainage bag should be emptied once every 8 hour shift or when the amount of urine in the bag reaches a certain level that will be specified by your workplace guidelines. Wash your hands, put on gloves, do not touch the drainage bag opening, and drain the urine into a clean container that is used for that patient alone. Take notice of the color of the urine, look for blood and/or excessive amounts of sediment, note the amount of urine that was collected, and document this information.