URINARY CATHETER CARE

INTRODUCTION

Urinary catheter care is a very important skill, and it is a one that all certified nursing assistants (CNAs) should be familiar with. Competence at providing urinary catheter care requires the CNA to understand and apply the following: 1) Basic information about the anatomy and physiology of the urinary tract and urinary system; 2) Understanding and application of sterile technique, and; 3) Understanding and application of infection control techniques, and; 4) Understanding and applications of specific techniques that are used to care for the patient who has a urinary catheter.

The word catheter is a medical term that refers to a tube that can be inserted into a body cavity, a body duct, or a blood vessel. There are several types of catheters that can used to drain urine from the bladder: in-dwelling catheters, sheath catheters (a.k.a. condom or Texas catheters), and catheters that are inserted to obtain a urine specimen and then removed (these are commonly called straight catheters).

This module will discuss in-dwelling catheters. These catheters are inserted into the bladder and left in place; the duration of how long they remain in the bladder depends on several factors. Some in-dwelling urinary catheters (suprapubic catheters) are inserted into the bladder through a small incision that is made in the abdominal wall, but most are inserted into the bladder through the urethra; this module will focus on this type of in-dwelling urinary catheter. These catheters are commonly referred to as Foley catheters, or a Foley: Foley was the physician who first designed the type of urinary catheter that is in common use today.

Learning Break: Some patients who do not have voluntary control of urinary function and need a urinary catheter may be managed using intermittent catheterization. This procedure is often called a straight catheterization. Straight catheterization is also performed is a sterile urine specimen need to be obtained.

OBJECTIVES

After completing this module, the learner will be able to:

1. Identify the components of the urinary system and the urinary tract.
2. Identify the primary function of the urinary system.
3. Identify the primary function of the components of the urinary system/urinary tract.
4. Identify how the urinary system maintains a healthy internal environment.
5. Identify two tests used to evaluate kidney and urinary tract functioning.
6. Identify the basic components of the in-dwelling urinary catheter system.
7. Identify the two basic reasons for insertion of an in-dwelling urinary catheter.
8. Identify the risks of urinary incontinence.
9. Identify complications associated with in-dwelling catheters.
10. Identify CNA responsibilities of in-dwelling urinary catheter care.
ANATOMY AND PHYSIOLOGY OF THE URINARY TRACT AND THE URINARY SYSTEM

The urinary system forms urine, and the urinary tract stores, transports, and excretes urine. The urinary tract and the urinary system are comprised of these organs and structures:

- Kidneys: There are two kidneys. They are located on the right and left sides of the abdominal cavity, and they are approximately at the level of the navel. The kidneys perform several important functions, but their primary role is the production of urine.

- Ureters: The ureters are short, narrow tubes that originate at the bottom of the kidneys. Each kidney is supplied with one ureter and the function of the ureters is to carry urine from each kidney to the bladder.

- Bladder: The bladder is a thin-walled, hollow organ that is similar in shape and size to a small balloon. It is located in the abdominal cavity above the pubic area and below the navel. The function of the bladder is to collect and store the urine that is produced by the kidneys. The bladder can stretch quite a bit, and it can store approximately 700-800 mL of urine (This is approximately 23-26 ounces). The bladder walls have three layers of smooth muscle. (The importance of these muscles will be discussed later)

- Urethra: The urethra is a small diameter tube that begins at the bottom of the bladder. The purpose of the urethra is to carry the urine from the bladder to external environment. The end of the urethra is called the urethral meatus. In women the urethral meatus is located above the opening of the vagina. In men the urethra travels through the penis and the urethral meatus is located at the tip of the penis.

The primary functions of the urinary system are to form, store, transport, and excrete urine, and the formation and excretion of urine is one of the ways that the body maintains a healthy internal environment.

Example: Excess acids and other waste products that are produced by metabolism are excreted in the urine. Blood urea nitrogen (BUN) and creatinine are waste products that are made when our bodies process proteins and by the normal metabolism of the muscles. BUN and creatinine are filtered out of the blood by the kidneys and eliminated by the urine. Blood urea nitrogen and creatinine are produced in very large amounts, and they can be toxic if their levels in the blood get too high. Blood levels of BUN and creatinine are common laboratory tests that are used to evaluate how well the kidneys and the urinary system are functioning.

Example: Depending on whether the body needs more or less fluid to function properly, the kidneys will produce more or less urine - we will urinate more or less often. This
process can also be manipulated by giving drugs such as diuretics that increase the amount of urine that is produced. This is helpful for people who have medical conditions such as congestive heart failure and/or hypertension.

Proper functioning of the urinary system is critical. If the kidneys cannot filter out waste products and conserve water or get rid of excess water, and if the urinary tract cannot transport the urine and eliminate it, it is impossible for the brain, the circulation, the heart, and other vital organs to function properly.

Urine formation is done by filtering blood that passes through the kidneys. The kidneys have a large blood supply and while we are at rest our kidneys receive approximately 25% of all the blood that is pumped by the heart. As the blood passes through the circulation of the kidneys, water and metabolic waste products are filtered out from the blood and pass into collecting tubules in the kidneys; these waste products and the water are, essentially, the urine. The urine (1) moves through the collecting tubules in the kidneys; (2) from the kidneys the urine passes through the ureters and into the bladder; (3) and from the bladder the urine passes through the urethra and is eliminated.

Urination is the process of emptying the bladder and eliminating the urine. The bladder can store 700-800 mL of urine, but it rarely will hold that much. Most people feel the urge to urinate when the bladder contains 200-400 mL of urine. When the level of urine in the bladder reaches that amount, the bladder walls are stretched and this stretch sends a nerve impulse to the brain. The brain in turn sends out a message that stimulates the smooth muscles of the bladder wall and a message to muscles that surround the urethra near the urethral meatus. The bladder walls contract, the muscles around the urethra relax, and urine is passed. This process is referred to as the micturition reflex.

Bladder wall stretch → Nerve impulse to brain → Smooth muscles contract → Urethra relaxes → Urine is passed

Quick Review: The urinary system and the urinary tract are comprised of the kidneys, the ureters, the bladder and the urethra. The primary function of the urinary system is to produce urine and the production and elimination of urine is one of the ways the body eliminates harmful wastes and conserves or eliminates water. Urine formation occurs in the kidneys, and urination is the process of elimination of urine.

THE IN-DWELLING URINARY CATHETER SYSTEM

The in-dwelling urinary catheter system is comprised of the catheter, the collecting tubing, and the collecting bag.

In-dwelling urinary catheters are long, narrow tubes made of latex or silicone. The size of urinary catheters is measured using the French system: this is typically abbreviated as Fr. Most in-dwelling urinary catheters are size 14, 16 or 18 French, but larger or smaller ones can be used.

Urinary catheters have two passages called lumens. One lumen is for draining urine and the other is for inflating the balloon that keeps the catheter in place. One end of the catheter tube - the end that inserted into the bladder - has several small openings into the
lumen that drains urine, and below these openings is a small, inflatable balloon. This end of the catheter is inserted into the urethra and advanced until it passes into the bladder. When the catheter is in the bladder and urine begins to flow out, the balloon is inflated and the catheter is gently pulled back until the balloon rests on the bladder wall: this keeps the catheter in the bladder. The openings that are below the balloon drain the urine from the bladder. The other end of the catheter has a large opening that is connected to a collecting tube that is attached to the collecting bag. The collecting bag has a valve at its bottom; the valve can be opened and closed in order to periodically empty the bag.

WHY DO SOME PATIENTS NEED AN IN-DWELLING URINARY CATHETER?

There are many reasons why an in-dwelling urinary catheter would be placed. However, the three most common reasons for insertion of an in-dwelling urinary catheter are: 1) Bladder outlet obstruction; 2) Prevention of skin breakdown, and; 3) Maintaining an accurate record of fluid intake and output. An in-dwelling urinary catheter may also be placed if the patient is in intensive care or for some of these other reasons:

- Obstruction: Urinary tract obstructions are relatively common. Obstructions can happen at any point along the urinary tract. A patient who has a chronic obstruction may be able to pass some urine, but he/she may incompletely empty the bladder, have difficulty starting or stopping the stream, or need to urinate many times during the day. Common causes of urinary obstruction include: 1) Swelling of the prostate gland (in men); 2) Medication side effects; 3) An infection causing damage to the urinary tract; 4) A kidney stone; 5) Reaction to anesthesia used during surgery; 6) A tumor somewhere in the urinary tract, and; 7) Damage to the nervous system, such as a stroke. Obstructions may be acute or chronic.

- Potential for skin breakdown: Patients who have lost bladder control cannot voluntarily determine when they will urinate. The inability to control urinary function is called incontinence. Having urine in constant contact with the skin is unpleasant, but the consequences of urinary incontinence are far more serious than discomfort. If a patient is incontinent of urine and his/her skin has prolonged contact with urine, skin breakdown, rashes, pressure ulcers, and other dermatologic problems can occur. Some of these can seriously impact a patient’s health. Patients who have chronic urinary incontinence that is caused by a medical condition that cannot be corrected, e.g., paralysis from a stroke or an accident, or an obstruction that cannot be medically or surgically corrected may need a permanent in-dwelling urinary catheter to prevent skin breakdown.

- Chemical paralysis or sedation: Some patients need to be chemically paralyzed or heavily sedated, e.g., patients who are mechanically ventilated need to be sedated for management issues. In these situations, an in-dwelling urinary catheter is appropriate.
• Fluid monitoring: In certain clinical situations monitoring a patient’s intake and output can be critically important. Examples of these situations would include patients with severe, extensive burns, or patients with serious cardiac problems such as a myocardial infarction or pulmonary edema.

• Surgical considerations: There many reasons why a patient who is having surgery may need an in-dwelling urinary catheter. Some patients may be in the operating room for a long time, or they may be undergoing a urologic procedure. The patient may need large amounts of fluids or diuretics during the procedure. There may be a need for precise recording of intake and output.

• Diagnostic/therapeutic procedures: An in-dwelling urinary catheter may be inserted to deliver medication to the urinary system. One may also be inserted so that radio-opaque dyes can be given as part of a diagnostic test.

• Significant pelvic injury

• Hospice care and the need for comfort

There are many good reasons for inserting an in-dwelling urinary catheter, But the decision to place an in-dwelling catheter should be considered very seriously, and they should never be placed if there is a reasonable alternative or simply as a convenience for the nursing staff.

**URINARY CATHETER INSERTION**

In some states and in some facilities CNAs are allowed, after the proper education and supervision, to perform intermittent catheterization and insertion of an in-dwelling urinary catheter. The two procedures will be briefly reviewed here, but the primary focus of this module is providing care to a patient who has a urinary catheter already in place.

Reading and understanding the information provided here about intermittent catheterization and insertion of an in-dwelling urinary catheter should not be considered sufficient preparation for performing these procedures. However, a basic understanding is useful for anyone who is caring for a patient who has a catheter in place or who needs intermittent catheterization. The basics of the procedure are simple, but doing it quickly and efficiently does require some coordination, planning, and practice.

Proficiency with catheter insertion does not take long to acquire. However, you should remember that catheterization is an invasive procedure, and it is uncomfortable and possibly embarrassing for the patient. In order to complete the procedure correctly and safely, remember these points.

• Make sure that you have explained the procedure to the patient before you begin - why the catheterization is needed and what you are going to do. Maintain the patient’s privacy at all times.

• Allow plenty of time, and do not rush.
• It is normal for the patient to feel pressure, discomfort, and a mild degree of pain or irritation when the catheter is being inserted.

• It is also normal to need to apply a slight degree of pressure to move the catheter through the urethra.

• If the patient is having significant pain or you find that you need a lot of pressure to advance the catheter, stop the procedure and inform your supervisor. Continuing in those circumstances can easily cause trauma to the urethra.

**Intermittent Catheterization**

Intermittent catheterization is typically used for people who have a neurogenic bladder. A neurogenic bladder is a bladder that has stopped functioning normally. The most common cause of a neurogenic bladder is a stroke. The stroke causes damage to the part of the brain that controls the muscles and nerves of the bladder and the process of urination cannot longer be voluntarily controlled.

Intermittent catheterization has many advantages for people who have a neurogenic bladder. It can be performed by a family member or by the person who needs it. It avoids the risks and complications of having an in-dwelling catheter and it helps preserve normal kidney function. Intermittent catheterization also gives the person who has a neurogenic bladder a greater sense of independence.

The procedure of intermittent catheterization can be done in two ways: clean or sterile. Insertion of a urinary catheter has traditionally been considered to be a procedure that required sterile technique. However, at this time there is no evidence that sterile technique is superior to clean technique for performing intermittent catheterization.

Sterile technique is still the mandatory technique for inserting an in-dwelling urinary catheter. The in-dwelling catheter will typically be in place for several days at least. Because of that it is compromise in the patient’s defenses against infection and a possible entry point for microorganisms so sterile technique should be used.

Clean technique:

1. Wash your hands.
2. Lubricate the catheter with water-soluble lubricant. Some urinary catheterization kits are supplied with a lubricating gel that contains a local anesthetic, and this can help the patient tolerate the procedure.
3. Wash the area around the meatus with soap and water. Start at the center and move outward, using a circular motion.
4. For men, position the patient on the back and move the penis so that the tip is pointed towards the patient’s head. For women, position the patient on her back and have her legs supported in a comfortable position.
5. Gently insert the catheter and keep advancing it until urine begins to flow.
6. When the desired amount of urine has been drained or the urine stops flowing, slowly remove the catheter.
7. If there is resistance when the catheter is being inserted - you insert the catheter but it does not easily move forward - do not use force. Simply apply a gentle, steady pressure and in most cases the catheter will advance.

Sterile technique:

1. Wash your hands.
2. Lubricate the catheter with a water-soluble lubricant.
3. Put on sterile gloves.
4. Use a sterile wipe to clean the meatus and the area around the meatus.
5. Follow Steps 4-6 from the description of clean technique.

**In-Dwelling Catheter Insertion**

In-dwelling catheter insertion is done using sterile technique. The procedure is done in the same way as intermittent catheterization. The only differences are: 1) The urinary catheter is connected to a drainage bag, and; 2) After the catheter has entered the bladder and urine begins to flow, the catheter balloon is inflated.

**Learning Break:** Urinary catheters are supplied in various sizes. How do you know which French size to use? If you are performing an intermittent catheterization, you would want to use a small French size to avoid pain and trauma. In most cases a 12 French for women and a 14 French for men is the largest size you should use for intermittent catheterization, and smaller is always better. An in-dwelling catheter should usually, but not always, be a little bigger. The physician who ordered the placement of the in-dwelling urinary catheter may order a specific size to be used. If not, someone can contact the doctor and ask for guidance, or you can ask your supervisor which size should be used.

**THE BASICS OF URINARY CATHETER CARE**

If the patient you are caring for has an in-dwelling urinary catheter, you must know: 1) Why the patient has an in-dwelling catheter; 2) Concepts of sterile technique and prevention of infection; 3) The complications associated with an in-dwelling urinary catheter, and; 4) Specific techniques that are used to care for the patient who has a urinary catheter. These techniques may differ depending on where you work, but they all have the same goal: preventing complications and infections. Number 1, the reasons for catheterization, was discussed previously.

**Prevention of Infection and the Concept of Sterility**

Sterile technique refers to specific methods that are used to prevent infection when caring for a patient: the term **sterile** means completely free of microorganisms such as bacteria and viruses. Sterile technique is used in many types of patient care scenarios, but the most common is when the clinical situation or the patient’s condition creates a
potential entry point into the body for microorganisms. For example, when a patient is undergoing a surgical procedure, the surgeon and the operating room staff will use sterile technique: everything that does or could come in contact with the patient during the surgery should not only be clean, but must be sterile because the integrity of the skin is disrupted and the skin is one of the most important barriers against infection. In a patient who has an in-dwelling urinary catheter, the urethra is the entry point for bacteria and viruses. The in-dwelling catheter enlarges the urethral opening and urination - which normally flushes out microorganisms that are in the urethra - has been disrupted. When you are caring for a patient who has an in-dwelling urinary catheter, sterile technique is seldom needed, but you must remember that the in-dwelling catheter is a break in the normal body defenses and certain parts of the system must be considered sterile. (Note: This will be discussed later)

Most aspects of in-dwelling catheter care do not require sterile technique. However, you must always practice good infection control practices: this is no different from providing care for any patient. The presence of the catheter makes these patients vulnerable to infection and many of them, because of their advanced age or their medical condition, have a compromised immune system. It is part of your job to protect them. This module will not provide a detailed discussion of infection control and standard precautions, but you should keep in mind the following points when you are providing in-dwelling urinary catheter care.

- All of us have microorganisms on our skin, we come into contact with microorganisms all the time, and the microorganisms that cause infection can move from one person to another.

- Contact transmission: Contact transmission is the most important way that microorganisms are spread from person to person in the health care setting.

- Hand washing has been recognized by the Centers for Disease Control and Prevention as the most important way to prevent the spread of infection.

- 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; (5) before and after putting on gloves, and; (6) before and after using the bathroom.

- Wear gloves when providing urinary catheter care.

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.

Complications Associated With In-Dwelling Urinary Catheters
The most common complications associated with in-dwelling urinary catheters are: 1) Infection; 2) Obstruction of the catheter, and; 3) Trauma. These will be discussed separately but one can often be the cause of another.

**Urinary tract infections**

An in-dwelling urinary catheter disrupts one of the patient’s normal defenses against infection, and bacterial growth in the urine is very, very common in these patients. After 30 days almost every patient who has an in-dwelling urinary catheter will have a significant amount of bacteria in the urine. Signs of a urinary tract infection include fever, bloody urine, and cloudy, foul-smelling urine. The patient may also complain of pain or irritation in/around the urethra.

Catheter-associated urinary tract infections are a very common problem. They are the most common hospital-acquired infection, and they cause significant harm to the patients and add a large financial burden to the health care system.

Fortunately, catheter-associated urinary tract infections can be prevented, and this can be done by paying strict attention to: 1) Proper insertion of the catheter; 2) Proper care of the catheter, and; 3) Proper removal of the catheter.

The first step in preventing a catheter-associated urinary tract infection is to question the need for the catheter and avoid placing one if possible. Studies have shown that between 21-55% of patients who had an in-dwelling urinary catheter did not need them; there was no appropriate indication for placement the catheter. So, careful evaluation of the patient’s need for an in-dwelling catheter can significantly reduce the number of catheterizations and the number of catheter-associated infections.

If insertion is necessary, the following these steps will help prevent infection.

1. Strict attention to proper technique will help reduce the risk of infection. Use good hand washing technique before starting the insertion, and use personal protective equipment (PPE) if indicated.
2. Make sure that the drainage system is always closed.
3. Always keep the drainage tubing in the proper position (This will be discussed later in the module) so that urine flow is not obstructed.
4. Keep the drainage bag below the level of the bladder.
5. Remove the catheter as soon as possible. Removing an in-dwelling urinary catheter as soon as possible, preferably within 24-48 hour of insertion, greatly decreases the risk of developing an infection.

**Obstruction of the catheter**

Obstruction of urinary catheters is relatively common, as well. Signs and symptoms of catheter obstruction of a blockage include a decrease in urine output and flow, pain, and leakage of urine around the urethral meatus.

Obstruction can happen if there is are mechanical problems with the drainage system, but these can be easily identified and easily prevented with proper positioning of the tubing and the bag. Obstructions are also caused by dehydration. If the patient’s fluid intake is les than optimal and he/she become dehydrated, the urine becomes concentrated...
and less dilute than it usually would be. When that happens, sediment that is normally present in the urine also becomes concentrated, the sediment can form a plug, and the catheter becomes obstructed. A urinary tract infection and/or the presence of microorganisms in the urine or in the drainage lumen of the catheter can also cause an obstruction. The microorganisms that grow in the urine and in the drainage lumen secrete a sticky film that protects them from antibiotics and from the body’s immune system. Over time, this sticky film can grow, form plugs in the drainage lumen, and cause and obstruction.

**Trauma**

The word trauma usually implies something dramatic like a broken bone or a laceration. But trauma can happen at levels that can’t be easily felt or seen, and that is the case with trauma associated with an in-dwelling urinary catheter. The trauma that affects an in-dwelling urinary catheter happens when tension or traction is inadvertently applied to the catheter or the drainage tubing. These mechanical forces pull the catheter back and forth in the urethra and can damage the tract. Signs of trauma include bleeding from the urethral meatus, pain or irritation, and leakage of urine. Trauma increases the risk of developing a urinary tract infection, so careful attention must be paid to ensure that the catheter and the drainage tubing are correctly positioned.

**Specific Techniques and Responsibilities of Care for the Patient with an In-Dwelling Urinary Catheter**

The following techniques and responsibilities are the basics of care for a patient with an in-dwelling urinary catheter.

- **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 the 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, solutions, or ointments do not provide any advantage, nor do anti-bacterial ointments applied to the area after the cleaning.

- **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 unless it is necessary to do so.
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 as these can allow urine to pool and this will increase the risk of an infection. Studies have shown that kinks or coils in the collection tubing that allow urine to sit in one part of the tubing definitely increase the risk of developing a urinary tract infection. The catheter should be attached 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 on 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 eight 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.

- Intake and output: For some patients who have an in-dwelling urinary catheter, an accurate measurement and recording of intake and output is very important. Urine output is intermittent during the day, but you should know at what point to notify your supervisor, i.e., if the urine output is less than 30 mL an hour, less than 240 mL for an eight hour period, or if the urine output exceeds a certain level.

- Good hydration: Dehydration increases a patient’s risk for developing a urinary tract infection and/or a catheter blockage. Keep close track of the patient’s fluid intake and if it below what the physician has prescribed, notify your supervisor.