

14

Collection of Non-Blood Specimens

essential terms

- | | |
|--------------------------------|----------------------|
| catheter | nasopharyngeal swabs |
| clean-catch midstream specimen | semen |
| continence | sputum |
| diabetes mellitus | stool specimens |
| expectorate | suprapubic puncture |
| first morning void | throat swabs |
| legal specimens | 24-hour collection |
| nasal swabs | |



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Learning Outcomes

- 14.1** Distinguish among the procedures for collecting various types of swab specimens.
- 14.2** Explain the procedure for collecting a sputum specimen.
- 14.3** Describe the special handling and media that may be needed for stool specimens.
- 14.4** List patient instructions for providing a semen specimen.
- 14.5** Differentiate among the procedures for collecting various types of urine specimens.
- 14.6** List examples of other non-blood specimens and their uses.

Related NAACLS Competencies

- 4.1** Demonstrate understanding of the importance of specimen collection in the overall patient care system.
- 4.3** Describe the types of patient specimens that are analyzed in the clinical laboratory.
- 4.4** Define the phlebotomist's role in collecting and/or transporting these specimens to the laboratory.
- 4.6** Explain the importance of timed, fasting, and stat specimens, as related to specimen integrity and patient care.
- 5.5** Describe substances that can interfere in clinical analysis of blood constituents and ways in which the phlebotomist can help to avoid these occurrences.

7.1 Demonstrate understanding of requisitioning, specimen transport, and specimen processing.

7.3 Instruct patients in the proper collection and preservation for non-blood specimens.

7.6 Identify and report potential pre-analytical errors that may occur during specimen collection, labeling, transporting, and processing.

Introduction

Although phlebotomists primarily collect blood specimens, they may also be required to collect non-blood specimens or to instruct patients on how to collect these specimens. This chapter focuses on throat swabs, sputum specimens, stool specimens, semen specimens, and urine specimens, and also lists other, less commonly collected non-blood specimens.

14.1 Swab Specimens

Sterile swabs (Figure 14-1) are used for collection of many types of non-blood specimens requiring a culture or rapid methods of detecting the presence of microorganisms. Swabs are composed of synthetic materials such as calcium alginate, Dacron™, or rayon. Cotton swabs are not used. The type of swab used varies depending on the specific area being cultured. The site of the specimen must be included on the label. Always refer to your facility's protocol when selecting swabs for specimen collection. Before beginning any procedure, check the expiration dates on the swab container. An expired swab may no longer be sterile or the transport medium present with some swabs may no longer be effective.

Throat Swabs

Throat swabs are samples taken from the back of the throat. These samples are collected for use in screening tests for Group A *Streptococcus*, the microorganism that causes strep throat. In addition, throat swabs are used for growing cultures of throat microorganisms to identify other pathogens that may be



Figure 14-1 Disposable sterile swabs come in sterile plastic containers that have a transport medium to help keep microorganisms viable (alive).

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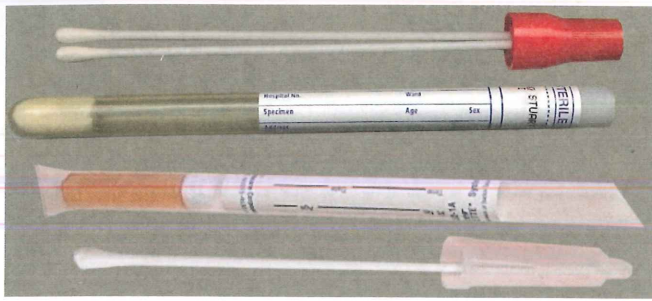


Figure 14-2 Swabs for throat culture may be single swabs or double swabs. Double swabs are used to collect two specimens simultaneously. One specimen is cultured, and the other is used for rapid testing.

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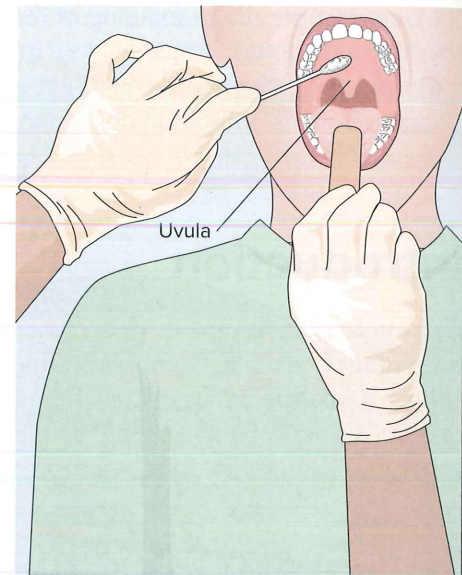


Figure 14-3 Collecting and processing a throat culture. Swab the throat area and any white patches on the tonsils. Do not touch the uvula.

present, such as *Haemophilus influenzae* and *Neisseria meningitidis*.

Sterile swabs with spongelike tips made of Dacron™ or calcium alginate are used for collecting throat culture specimens (see Figure 14-2). A culture swab has growth medium located at the bottom of the swab container. If the medium is contained in an ampule, it must be crushed to release the medium after the swab has been reinserted into the container. Keeping the swab in contact with the medium ensures that any microorganisms present remain viable (alive). Do not use cotton-tipped swabs for throat cultures because the cotton may inhibit bacterial growth.

Throat Swab Collection Procedure

Ensure that the room in which throat swab collection will occur has sufficient lighting and all equipment needed. Standard precautions are required when handling all swab specimens. If collecting a specimen for SARS-CoV-2 or other contagious respiratory infections wear an N95 mask, eye protection, gloves, and gown. Use Learn How 14-1 and the competency checklist *Throat Swab Collection* at the end of this chapter to review and practice the procedure.

Learn How 14-1

Throat Swab Collection

1. Identify the patient.
2. Explain the procedure. Determine if the patient has used an antiseptic mouthwash to gargle recently or is taking antibiotics. These actions could affect the results of the test.
3. Put on PPE including gloves, mask, and eye protection.
4. Obtain a tongue depressor.
5. Remove the sterile swab from its container (do not set it down).
6. Have the patient tilt the head back and stick out the tongue.
7. Ask the patient to say “ahhh” with an open mouth and hold down the tongue with the tongue depressor.
8. Rub the back of the throat and each tonsil with the swab using a rolling action (see Figure 14-3). To minimize the gag reflex, avoid touching the uvula (the tissue that hangs between the oral cavity and the throat). Do not touch the sides of the mouth or teeth because these contain bacteria normally present and can make interpreting culture results confusing.

Throat Swab Collection (Continued)

9. Withdraw the swab, then the tongue depressor.
10. Place the swab back into its sterile container and crush the media ampule, if applicable.
11. Discard the tongue depressor.
12. While the patient is still present, label the specimen with all required patient and collection information, which is the same as for blood specimens.
13. Remove your PPE and wash your hands.
14. Thank the patient.

The Gag Reflex

Some patients may be afraid of having a gag reflex during a throat swab collection. To help prevent this reaction, be sure to instruct patients to breathe through their nose. Breathing through the nose helps minimize movement of the patient's uvula and makes it easier for you to collect the specimen quickly.



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Two Is Better Than One

Often, two throat swabs must be collected. One is used for the strep screen test and the other is sent to the microbiology laboratory for throat culture. Some throat swabs come in pairs and should be used together to collect the specimen.

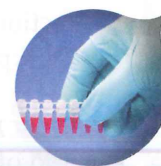
If the order requires two throat swabs to be collected and you have only single swab containers, what should you do?



**Think It
Through**

Throat Swabs and PPE

Gloves must always be worn when performing procedures on patients. Wearing a mask and eye protection when collecting throat cultures is desirable because the patient may cough. Wearing all appropriate PPE is especially important to prevent the spread of pathogens.



**Safety &
Infection
Control**

Nasal Swabs

Nasal swabs are samples taken from the nares (the cavities just inside the nasal openings). These samples are collected for the detection of microorganisms such as *Staphylococcus aureus* (*S. aureus*) and SARS-Cov-2 virus.

Similar to throat culture swabs, nasal swabs have an applicator stick and a rayon tip. The swab container may have a transport medium into which the swab applicator is placed after the specimen is obtained. Microorganisms in the sample are kept moist in the transport medium. Dry swabs, often used for rapid tests, should be placed back into their original sterile wrapper to which a patient label is affixed. Use Learn How 14-2 and the competency checklist *Nasal Swab Collection* at the end of this chapter to review and practice the procedure.

Nasal Swab Collection

1. Identify the patient.
2. Explain the procedure.
3. Put on PPE including gloves, mask, and eye protection.
4. Remove swab from its container (do not set it down).
5. While the patient is seated, have the patient tilt their head back. Support the back of the head by placing the hand without the swab against the back of the patient's head. Patients have a tendency to pull away during this procedure.
6. Insert the swab approximately 2 cm (about $\frac{3}{4}$ inch) into a naris. See Figure 14-4.
7. Rotate the swab against the anterior nasal mucosa for 3 seconds.
8. Using the same swab, repeat for the other naris.
9. Place the swab back into the transport tube and crush the media ampule, if applicable.
10. Before leaving the patient, label the specimen with all required patient and collection information.
11. Remove PPE and wash your hands.
12. Thank the patient.

Nasopharyngeal Swabs

Nasopharyngeal swabs are samples taken from the nasopharynx (the upper part of the throat behind the nose). These samples are collected for the detection of influenza and respiratory virus infections, including SARS-CoV-2. Nasopharyngeal specimens are collected using only Dacron™-tipped swabs on a very thin wire (Figure 14-5A and B). Many rapid test methods use a dry swab for testing, while DNA-based molecular testing requires specimens be transported in a special media (Figure 14-5C). Cotton or calcium alginate swabs are not acceptable because they may introduce residues into the transport medium and cause false results, especially when molecular testing is performed.

Note that some clinical facilities do not allow nasopharyngeal swab collection by non-nursing personnel. Before attempting this procedure in the workplace, check to be sure it is within your scope of practice and that your state and facility allow phlebotomists to perform the procedure. Use Learn How 14-3 and the competency checklist *Nasopharyngeal Swab Collection* at the end of this chapter to review and practice the procedure.

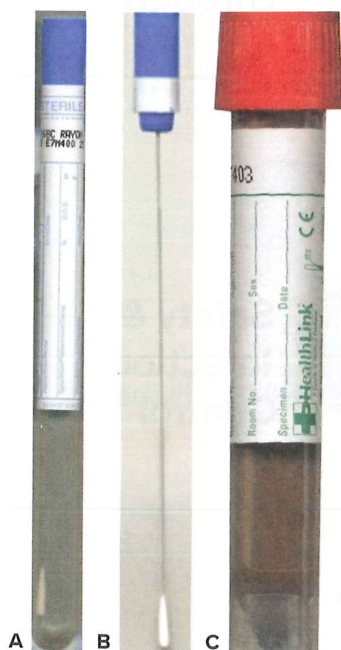


Figure 14-5 Nasopharyngeal swab (A) in original sterile container and (B) removed from sterile container to show Dacron-tipped thin wire. Have a container of (C) viral transport medium available before beginning the nasopharyngeal swab collection procedure.
A–C: ©Lillian Mundt

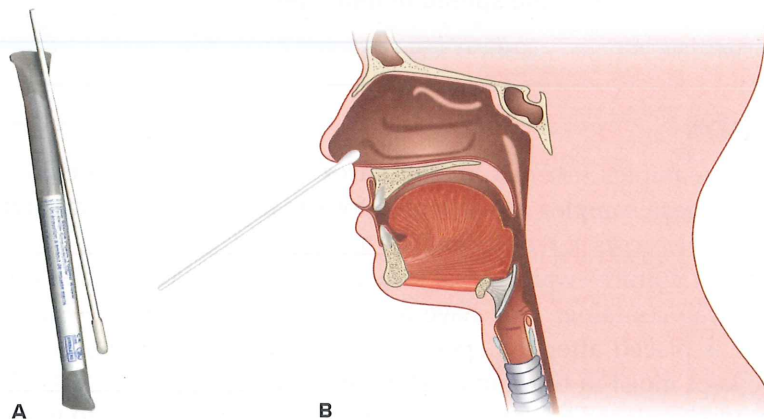


Figure 14-4 (A) A nasal swab is used to collect a specimen (B) from the nares.
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Nasopharyngeal Swab Collection

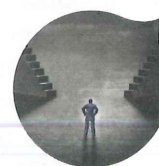
Learn How 14-3

1. Identify the patient.
2. Explain the procedure.
3. Put on PPE including gloves, mask, and eye protection.
4. Obtain nasopharyngeal swab, transport medium, and scissors.
5. Remove swab from its container (do not set it down).
6. While the patient is seated, have the patient tilt their head back 70°. Support the back of the head by placing your hand (not holding the swab) against the back of the patient's head. Patients have a tendency to pull away during this procedure.
7. Insert swab into one nostril straight back (not upward) and continue along the floor of the nasal passage for several centimeters until reaching the nasopharynx (you will feel a resistance). See Figure 14-6. Do not force the swab if you encounter an obstruction before reaching the nasopharynx. Remove the swab and try the other side.
8. Rotate the swab gently for 5 to 10 seconds to loosen cells from the epithelial lining.
9. Remove the swab, open the viral transport medium, and immediately place the swab into the container. Use scissors to cut the wire enough below the swab handle to fit the transport medium container. Reattach the cap securely. See Figure 14-7.
10. Before leaving the patient, label the specimen with all required patient and collection information.
11. Remove PPE and wash your hands.
12. Thank the patient.
13. Transport to the laboratory immediately. If immediate transport is not possible, the specimen must be refrigerated and kept refrigerated during transport.

Nasal Discharge

A patient needing collection of a nasal swab or nasopharyngeal swab may have nasal discharge. Provide the patient with an unscented tissue and ask them to attempt to clear the discharge by blowing the nose into the tissue. Children may need assistance with this.

Why are tissues, rather than swabs, used to help clear nasal discharge?



**Think It
Through**

Other Swabs

Other types of swabs are used for collection of specimens that the phlebotomist normally does not collect. However, you may be asked to provide a nursing unit with a swab from laboratory stock or handle the specimen after collection. Specimens such as wound cultures, vaginal cultures, and urethral cultures require specific swabs and may also have special transport and handling requirements. Follow the protocols at your facility and stay within your scope of practice.

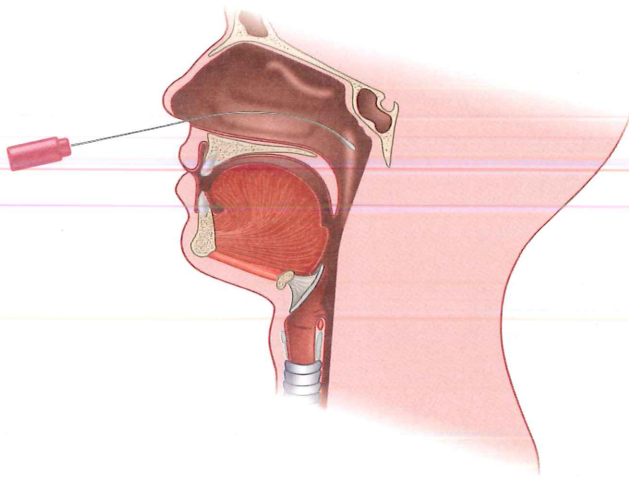


Figure 14-6 A nasopharyngeal swab is used to collect specimens from the nasopharynx.



Figure 14-7 Nasopharyngeal swab in viral transport medium. Remember to cut off the swab handle before capping the container.

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Checkpoint Questions 14.1

1. Why should the sides of the mouth not be touched during collection of a swab for throat culture?
2. What type of swab is used to obtain a nasopharyngeal specimen? Why?

14.2 Sputum Specimens

Sputum is mucus that collects in the air passages of the respiratory system. Sputum specimens are used in diagnosing various disorders of the respiratory tract as well as for sputum culture to identify pathogenic microorganisms. Have patients rinse their mouth with water before collecting the specimen and give the patient a tissue to cover their mouth when coughing. This will minimize contamination by bacteria. Then instruct patients to **expectorate** (generate a cough from deep within the lungs and bronchi) sputum and spit it into a sterile container. Label the container with patient and collection information and then deliver it to the microbiology laboratory for testing. The laboratory will examine the specimen for squamous epithelial cells (SECs) and white blood cells (WBCs) to determine whether the specimen is acceptable. If the specimen is to be sent to a reference laboratory, follow the specific preservation and transport requirements for that facility.

Checkpoint Question 14.2

1. Why should patients be asked to rinse their mouth with water before you collect a sputum specimen?

14.3 Stool Specimens

Stool specimens are used in diagnosing various disorders of the digestive tract. Examples of tests include stool culture, fecal fat analysis, fecal hemoglobin screening, identification of pathogenic bacteria by DNA methods, and ova and parasite identification. The phlebotomist may need to instruct patients on how to collect this specimen. Containers may be provided as part of a collection kit, but these need to be clean, dry, sealable, and leakproof. Container type and size depend on the ordered tests (see Figure 14-8). In addition, patients may need to be instructed in how to transfer a specimen to another container.

Stool specimens for the detection of pathogenic microorganisms must be transferred immediately to special vials containing a medium to preserve them (Figure 14-9). Specimens for immunochemical fecal occult blood may also need to be transferred by the patient, a nurse, or the laboratory staff to special vials used for this test (Figure 14-10). The specimen and any samples taken from it must be labeled with all patient and specimen collection information.



Figure 14-8 Some stool specimen containers are designed to fit over toilet seat openings.

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Figure 14-9 (A) A “scoop” attached to each container lid is used to scoop up a portion of the stool specimen and place it directly into the appropriate container, (B) clean vial for various tests, (C) vial with special medium to preserve bacteria for culture and microbial sensitivity testing, and (D & E) vials with special fixative for detecting ova and parasites.

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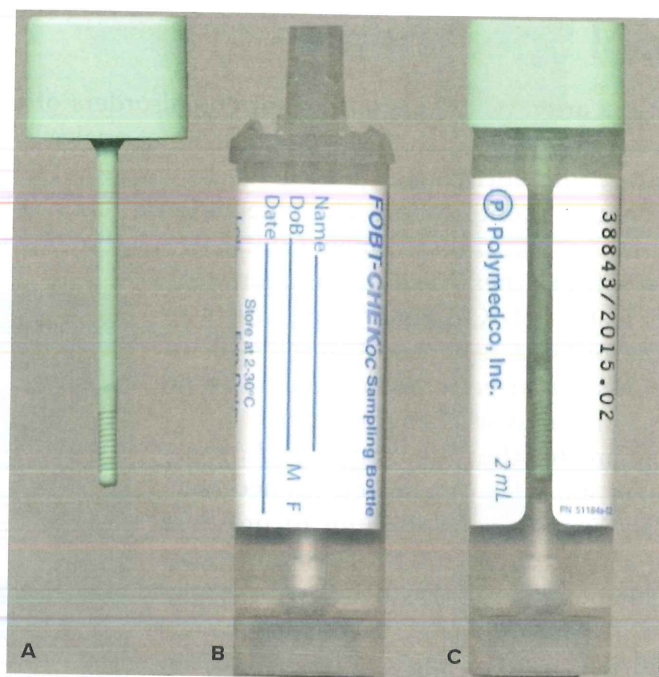


Figure 14-10 Stool samples for some brands of immunochemical fecal occult blood tests (iFOBT) are collected by “poking” the (A) applicator stick, which is attached to the container cap, into the stool specimen and then inserting it into (B) a special container. (C) Shown is a properly filled and capped iFOBT container.
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Communicate & Connect



Stool Collection

The phlebotomist must instruct the patient not to contaminate the stool specimen with urine or water. Urine can destroy some parasites, and toilet water often contains strong cleaners that interfere with laboratory testing. If a special diet is prescribed, not adhering to it can affect the stool sample and alter laboratory test results. Enemas or barium sulfate for radiologic examinations can also affect stool samples and laboratory tests by altering the morphology of parasites or by interfering with the stain used for identifying parasites. If any of these conditions are present, be sure to note it in the documentation that accompanies the specimen to the lab. Recording this additional information is critical for correct interpretation of stool specimen laboratory test results.

Checkpoint Questions 14.3

1. List four types of testing that are commonly done on stool specimens.
2. Why is it important to instruct patients not to allow urine to contaminate a stool specimen?

14.4 Semen Specimens

Semen is produced by males and contains sperm and some substances necessary for fertilization to occur, such as fructose and acids. Semen may be analyzed to evaluate infertility problems or to verify that a vasectomy is successful. A vasectomy is a surgical procedure done as a method of male birth control. The vas deferens is clipped, preventing sperm from being released into semen. A semen specimen is checked for sperm after this procedure. Although the

patient receives written instructions for providing a semen specimen, phlebotomists may be required to instruct patients in this process.

Semen for testing is best obtained by masturbation and must include the entire ejaculate. The most accurate results are obtained on specimens collected after a 48- to 72-hour **continence** (abstinence from sexual activity). Most facilities provide patients with a private, comfortable room in which to collect the specimen to allow for quick delivery to the laboratory. If the specimen is collected at home or at a facility that is not close to the laboratory, it should be kept near body temperature and delivered within 30 minutes of collection, or as soon as possible. Semen analysis test results can be affected by delayed delivery.

Specimen collection containers for semen should be clean, wide-mouthed glass or plastic jars with secure lids. Specimens must be labeled with all patient and collection information.

Semen Collection

Patients should be informed not to use a condom for semen collection, as many condoms contain spermicidal (sperm-killing) compounds. They may also contain lubricants that can interfere with laboratory tests.



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1. What two laboratory tests are commonly performed on semen?

**Checkpoint
Question 14.4**

14.5 Urine Specimens

Urine is a convenient body fluid to collect and can be used for many types of laboratory analysis, such as screening for glucose, drugs, alcohol, and general well-being. It can also be used to measure the total amount of substances, such as urine protein, excreted in a 24-hour period. Additionally, urine specimens can be used to assess the urinary system's status and to screen for metabolic diseases such as diabetes mellitus (a carbohydrate metabolism disorder), amino acid overflow, and proteinuria (the leakage of glucose, amino acids, and protein into the urine). Table 14-1 summarizes the types of urine specimen collection.

TABLE 14-1 Types of Urine Specimen Collection

First morning void	Best specimen to use for general health assessment, hormone levels such as hCG testing, and other chemicals such as glucose and protein
Random void	Specimen of convenience; acceptable for routine assessment
Clean-catch midstream	Required for urine culture specimens
24-hour collection	Used for quantitation of proteins and other substances
Legal specimens	Drug screening to be used in a court of law
Catheterization	Used for urine collection on patients unable to void
Suprapubic puncture	Performed by physicians to collect urine directly from the bladder

A **first morning void** is the best specimen for routine testing and evaluation of general well-being because it is the most concentrated, containing the highest levels of the chemicals present in the urine. However, a specimen collected at a *random* time may be acceptable. Another type of specimen is the **clean-catch midstream specimen**, which is used for urine culture collection. It requires skin cleansing and collection of the mid-portion of the urine stream. A **24-hour collection** is required for analysis of the total amount of a substance excreted in a day. Nursing staff may collect urine from a **catheter** (tube inserted into the bladder), or a physician may perform a **suprapubic puncture** or **aspirate** (rarely performed insertion of a needle directly into the bladder). Catheterization and suprapubic puncture collections may be used to collect urine on patients who cannot void urine normally. Urine may also be collected from a catheter if a sterile specimen is needed for culture or to determine if blood cells are present as a result of bleeding into the kidneys or bladder instead of from urethral or vaginal bleeding. In addition, urine specimens may need to be collected for testing submitted as evidence in a court of law (**legal specimens**). The chain-of-custody requirements, as explained in the chapter *Blood Specimen Handling*, apply to all specimens collected for legal reasons, including urine.

If the urine cannot be tested within 1 hour after it has been collected, it must be refrigerated. Keeping urine at room temperature for more than 1 hour can alter the test results of the chemical and microscopic components. Changes that occur to urine specimens left at room temperature over time include

- changes in urine color and clarity
- bacterial growth
- increase in pH and nitrites (due to bacterial growth)
- decomposition of casts and cellular elements
- decrease in several substances, if initially present (such as glucose, bilirubin, ketones, and urobilinogen)

Depending on the policies at your facility, the urine may be sent to the laboratory in the initial container or may need to be transferred to the appropriate tube for testing. Routine urine tests are performed on specimens in the initial container (see Figure 14-11A) or those stored in urine analysis tubes, whereas urine for culture requires collection into sterile cups and may need to be transferred to a tube containing a preservative (see Figure 14-11B).

Think It Through



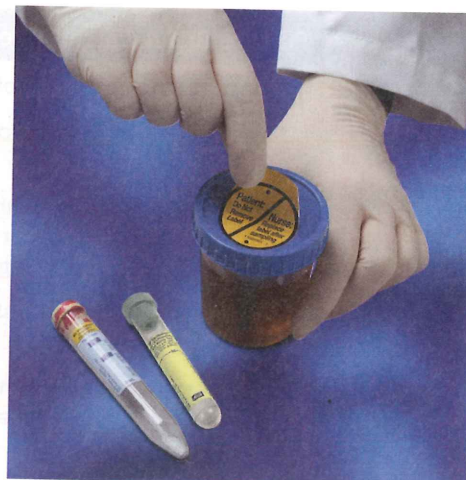
Urine Collection Tubes

Phlebotomists must be aware that evacuated tubes, similar to those used for blood specimen collection, are used as urine preservative tubes. Yellow-and-red-topped urine preservative tubes contain the chemicals chlorhexidine, ethyl paraben, and sodium propionate to preserve urine for testing. Gray-topped urine culture tubes contain sodium formate, sodium borate, and boric acid, which maintain the quality of the specimen for urine cultures.

Why must care be taken not to confuse these urine tubes with the similar-looking evacuated tubes for blood specimen collection?



A



B

Figure 14-11 (A) Examples of routine urine collection cups. (B) Sterile urine collection containers may have an opening on their lids through which urine can be transferred into specialized tubes, such as a urine preservative tube (yellow-and-red-topped) or a urine culture tube (gray-topped).

A: ©Cliff Moore B: Source: Becton Dickinson

Obtaining Urine Specimens

A random void is a urine specimen that is collected at any time of the day. However, the best urine specimen for routine testing is the first morning void, which is the most concentrated. Patients collect urine directly into a container, which should then be labeled immediately with the required information.

The clean-catch midstream procedure for collecting urine is required for urine culture specimens. Special instructions for collecting urine for culture must be explained to the patient in order to obtain a quality specimen. Urine that has been contaminated by normal flora (bacteria) of the skin may produce false results. A special sterile kit, as shown in Figure 14-12, is used during the clean-catch procedure. The procedures for obtaining a clean-catch specimen from a female or male patient are shown in Learn How 14-4 and Learn How 14-5, respectively.



Figure 14-12 A special kit for urine collection for culture includes a sterile container and three cleansing towelettes.

©Cliff Moore

Female Clean-Catch Urine Specimen Collection

1. Instruct the patient to follow these steps to clean the perineum.
 - a. Separate the skin folds (labia) and keep them separated throughout the cleaning and collection process. With one antiseptic towelette, wipe from front to back down one side of the skin folds and then discard the towelette.
 - b. With a second towelette, wipe down the other side of the skin folds from front to back; discard the towelette.
 - c. With a third towelette, wipe down the middle of the labia front to back and discard the towelette while keeping the skin folds open with the other hand.

(continued)

Learn How 14-4

Female Clean-Catch Urine Specimen Collection (Continued)

2. Instruct the patient to follow these steps to obtain the specimen.
 - a. Keeping the skin folds spread apart to avoid contamination, start to urinate into the toilet.
 - b. Place the cup under the flow of urine after it has begun and remove the cup before it has finished. *Do not* collect the first or last part of the stream of urine. Instead, collect the urine at midstream; this is why the phrase “clean-catch midstream” is used.
3. Once the patient is finished, place the lid on the cup. Ideally, the cup should be about three-fourths full.
4. Label the specimen on the side of the cup (name, date of collection). Remember, your facility might require other identification on the specimen, so check with your supervisor.

Learn How 14-5

Male Clean-Catch Urine Specimen Collection

1. Instruct the patient to follow these steps to clean the penis.
 - a. If the patient is uncircumcised, retract the foreskin before cleaning the penis. Use an antiseptic towelette to clean the head of the penis.
 - b. Take a second towelette and wipe across the head of the penis.
2. Instruct the patient to follow these steps to obtain the specimen.
 - a. If uncircumcised, keep the foreskin retracted and urinate into the toilet. Place the cup under the flow of urine after it has begun and remove the cup before it has finished. Do not collect the first or last part of the stream of urine. Instead, collect the urine at midstream.
3. Once the patient is finished, place the lid on the cup. Ideally, the cup should be about three-fourths full.
4. Label the specimen on the side of the cup (name, date of collection). Remember, your facility might require other identification on the specimen, so check with your supervisor or procedure manual for further instructions.

Life Span Considerations



Infant Specimens

Special equipment is used when collecting urine from an infant or a small child (see Figure 14-13). This equipment consists of a sterile plastic bag that has an opening to fit around genitalia and is secured with an adhesive backing. In some cases, the best option is to guide the parent or guardian to place the collection bag on the child. The diaper is placed over the bag during collection. Once collected, the specimen may be transferred to a urine collection cup or tube. However, if the specimen is for urine culture, it may be better to leave it in the collection bag and transport it to the laboratory immediately. Always use the established procedure at your facility.

24-Hour Urine Collection

A 24-hour collection of urine is required to measure the total amount of substances, such as protein, sodium, and hormones, that are excreted in the urine over a 24-hour time period. When tests such as total aldosterone, cortisol, creatinine, potassium, protein, sodium, or urea nitrogen are ordered, a phlebotomist may need to prepare specimen collection containers (see Figure 14-14) and instruct patients in the correct method of collecting the 24-hour specimen. Not all 24-urine collections require preservatives, but for those that do,

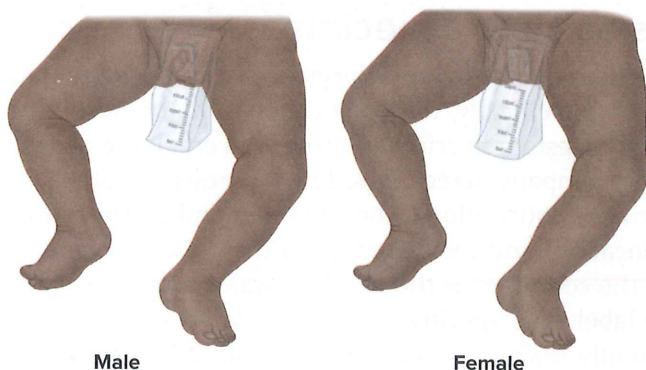


Figure 14-13 A pediatric collection unit consists of a clear, sterile plastic bag with adhesive for attaching to the child.

care must be taken when adding preservatives to containers. Wear appropriate PPE (gloves, goggles or face shield, rubber apron) and use a chemical fume hood, as described in the chapter *Safety and Preparedness*. Preservatives may include acids or chloroform. Add acids slowly, and if diluting with water is required, add the acid to the water. The container must have a lid that closes tightly and should be labeled with caution information. Also note that 24-hour urine specimens may require refrigeration or need to be placed on ice during the time of collection.



Figure 14-14 A container for 24-hour urine collection may require the addition of a preservative.

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Patient Safety and 24-Hour Urine Collection

Patients should be made aware of the hazardous chemicals used as urine preservatives in 24-hour urine collection containers. Make sure patients understand the risks associated with these chemicals and that they should add urine to the container slowly, close the container, and mix gently but thoroughly. Patients must also be informed about the need to refrigerate the container, if required.



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The 24-hour urine collection procedure begins and ends with an empty bladder. Follow the directions in Learn How 14-6 to properly obtain this type of specimen.

24-Hour Urine Specimen Collection

1. Upon waking the morning of the collection, empty the bladder. Do not collect this urine. Record the time at which this urination occurs.
2. Collect all urine voided throughout the next 24 hours directly into the preservative container or into a urine collection cup and add to the container.
3. Use caution when adding the urine to the container because the container may contain an acid that may splash.
4. Be sure to add all urine into the container, without spilling any. Do not allow anything except the urine to touch the inside of the container, because doing so may contaminate the specimen.
5. Refrigerate the container, or keep it on ice, for the entire time of collection, if required.
6. On the second morning, at exactly the same time as the previous day, collect a final void and add it to the container. Record this time.
7. Keep the specimen refrigerated or on ice, if necessary, until transported to the laboratory.

Learn How 14-6

Urine Specimens as Legal Specimens

Legal specimens require chain-of-custody procedures, as discussed in the chapter *Blood Specimen Handling*. Specifically, urine specimens may be needed for anything from drug or alcohol testing in criminal cases or in employee physical examinations to insurance company screenings. Phlebotomists must fill out paperwork showing specific identification, who obtained and processed the specimen, the date, the location, and the signature of the patient documenting that the specimen in the container is the one that was obtained from the person identified on the label. The specimen must be placed in a specimen transfer bag that permanently seals the specimen bag until it is cut open for analysis. The seal ensures that there has been no tampering with the bag's contents prior to reaching the lab for testing.

Checkpoint Questions 14.5

1. List the tests performed on urine collected from a clean-catch midstream specimen and explain why this type of sample is the best for each test.
2. What risks should be explained to patients collecting a 24-hour urine specimen at home?

14.6 Other Non-Blood Specimens

Many other types of specimens are analyzed in the medical laboratory. As a phlebotomist, you usually will not have any role in the collection of these specimens. However, you should be aware of them because you may be involved in processing orders for them or delivering them to the appropriate laboratory section for testing. Keep in mind that many of these specimens are difficult to collect and may not be replaceable, so handle them with extreme caution. Some of these non-blood specimens are described in Table 14-2. It is important to label all non-blood specimens with the specimen type. Some specimen types look alike, and the laboratory needs to know what type of specimen they are examining.

TABLE 14-2 Other Non-Blood Specimens

Specimen Type	How Collected	Reasons for Collection
Amniotic fluid	Amniocentesis (a procedure performed during an ultrasound in which a needle is inserted transabdominally into the amniotic sac and withdrawing a small portion of amniotic fluid).	Detection of fetal distress, genetic studies
Bronchoalveolar lavage (BAL) and bronchial washings	Specimens are collected during bronchoscopy (examination of the tracheobronchial tree). The bronchoscope may have suction catheters, brushes, or biopsy attachments for specimen collection.	Detection of obstructions, pneumonia, carcinoma, hemoptysis, foreign bodies, abscesses, or infectious agents in the lower respiratory tract
Bone marrow	Aspiration and biopsy of marrow, usually from the pelvic bone.	Diagnosis of hematopoietic disorders such as leukemia, lymphoma, and myeloma
Cerebrospinal fluid (CSF)	Lumbar puncture is made into the intervertebral space between L3 and L4 or between L4 and L5. The needle is seated in the dura mater. CSF is collected after checking CSF pressure.	Central nervous system malignancy, demyelinating diseases, meningeal infection, and subarachnoid hemorrhage

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Specimen Type	How Collected	Reasons for Collection
Cervical specimens	The cervix is gently scraped using a broom-like device that is rinsed into a vial of special solution.	Papanicolaou Test (PAP) for cervical cancer; Human papillomavirus (HPV) test
Ear effusion (fluid in the tympanic cavity)	Middle ear effusion specimens are collected using a suction cannula.	Otitis media caused by infections, allergic reactions, and Eustachian tube obstruction
Eye fluid (vitreous)	Vitrectomy, which involves infusing a salt solution while aspirating vitreous fluid from the eye.	Diabetic retinopathy, with retinal detachment, and detection of malignant infiltrates
Gastric fluid	Nasogastric intubation, which involves careful insertion of a tube through the nasal passage, down the esophagus, and into the stomach. Fluid in the stomach is aspirated into a syringe.	Upper gastrointestinal bleeding and assessment of gastric acid output
Oral/buccal swabs	After cleansing of oral cavity with appropriate antiseptic, the inside of the cheeks are vigorously scraped with a swab	DNA testing
Pericardial fluid	Pericardiocentesis, which involves inserting a needle through the chest wall into the sac surrounding the heart, with electrocardiographic monitoring. Excess fluid is aspirated into a syringe.	Pericarditis, malignancy
Peritoneal fluid (ascites)	Abdominal paracentesis, which involves inserting a needle into the abdominal cavity and aspirating excess fluid into a syringe.	Chronic liver disease, cirrhosis, pancreatitis, hypoproteinemia, infections, malignancies, and trauma
Pleural fluid	Thoracentesis, which involves inserting a needle between the ribs into the cavity surrounding the lungs and aspirating excess fluid into a syringe.	Venous obstruction, congestive heart failure, malignancies, pulmonary emboli or infarct, trauma
Saliva	Patient allows saliva to flow into a sterile collection tube.	Drug screening
Semen	Masturbation with ejaculate collected directly into transport container.	Fertility studies
Surgical specimens	Biopsies and excised tissues are removed by surgeons and placed into containers of fixative (preservative).	Tumors and other malignancies
Sweat	Collected with the use of pilocarpine iontophoresis, which induces sweating at the site of electrode placement.	Sweat chloride levels to screen for cystic fibrosis
Synovial fluid	Arthrocentesis, which involves placing a needle into the capsule of an affected joint and aspirating fluid into a syringe.	Various types of arthritis: inflammatory, noninflammatory, hemorrhagic, septic, crystal induced
Vaginal secretions	Secretions are swabbed from the vagina.	Rupture of fetal membranes (ROM) in pregnant women; Bacterial and fungal vaginitis

1. Why is it important for phlebotomists to have a basic awareness of the various types of non-blood specimens that may be collected?
2. Which non-blood specimen may be analyzed if a patient is suspected of having a meningeal infection?

Checkpoint Questions 14.6

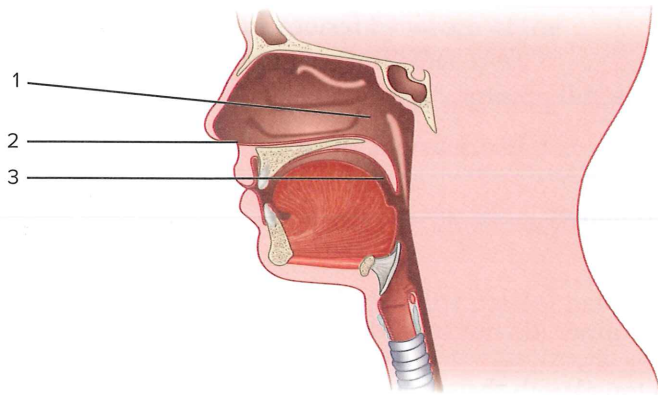
Chapter Summary

Learning Outcome	Key Concepts/Examples	Related NAACLS Competency
14.1 Distinguish among the procedures for collecting various types of swab specimens.	Sterile swabs are used to collect some types of specimens for cultures and for rapid methods of testing for the presence of microorganisms. Phlebotomists may be called upon to collect throat, nasal, and nasopharyngeal specimens in this manner. Swabs are also used to collect specimens for wound cultures, vaginal cultures, and urethral cultures.	4.1, 4.3, 4.4, 5.5, 7.1, 7.6
14.2 Explain the procedure for collecting a sputum specimen.	To collect a sputum specimen, first have the patient rinse the mouth with water. Then ask the patient to expectorate sputum and spit it into a sterile container. Label the container and deliver it to the microbiology laboratory for testing.	4.3, 4.4, 5.5, 7.3
14.3 Describe the special handling and media that may be needed for stool specimens.	The handling and media for stool specimens depends on the ordered test. The phlebotomist must instruct the patient not to allow urine or toilet water to contaminate the specimen. Specimens for detection of pathogenic organisms must be transferred immediately to vials containing a preservative. Specimens for immunochemical fecal occult blood may also need to be transferred to special vials.	4.3, 4.4, 5.5, 7.3
14.4 List patient instructions for providing a semen specimen.	To provide reliable results, patients should be instructed to abstain from sexual activity for 48 to 72 hours and to collect the entire ejaculate into a clean, wide-mouthed glass or plastic jar with a secure lid. If the patient collects the sample at home, he should keep it near body temperature and deliver it to the lab within 30 minutes of collection.	4.3, 4.4, 5.5, 7.3
14.5 Differentiate among the procedures for collecting various types of urine specimens.	Common procedures for urine specimen collection include first morning void, random void, clean-catch midstream specimen collection, and 24-hour collection. Special types of urine specimens are legal specimens and specimens from a catheter or suprapubic puncture. Phlebotomists do not perform these last two procedures.	4.1, 4.3, 4.4, 4.6, 5.5, 7.1, 7.3, 7.6
14.6 List examples of other non-blood specimens and their uses.	Examples of non-blood specimens the phlebotomist may encounter are listed in Table 14-2.	4.3

Chapter Review

A: Labeling

Label the areas of the upper respiratory tract shown. [LO 14.1]



1. [LO 14.4] _____

2. [LO 14.4] _____

3. [LO 14.4] _____

B: Matching

Match each specimen with its use in laboratory testing. [LO 14.1, 14.2, 14.3, 14.4, and 14.5]

- | | |
|----------------------------|--|
| ____ 4. semen specimen | a. fertility status of the male reproductive system |
| ____ 5. sputum expectorant | b. microorganisms of the lower respiratory system |
| ____ 6. stool specimen | c. status of the digestive system |
| ____ 7. throat swab | d. status of the renal system and overall metabolism |
| ____ 8. urine specimen | e. strep infection of the upper respiratory system |

C: Fill in the Blank

Write in the word(s) to complete the statement.

9. [LO 14.1] Throat swabs are used to collect specimens for culture and rapid tests used to detect the microorganism _____.
10. [LO 14.2] In order to collect a sputum specimen, a patient must _____ and spit into a sterile container.
11. [LO 14.4] Semen for testing is best obtained by and must include the entire _____.

D: Short Answer

12. [LO 14.3] Describe the characteristics of containers for the collection of stool specimens.
13. [LO 14.5] Name four types of urine specimen collections.
14. [LO 14.6] Name four types of specimens that phlebotomists should be aware of, even though they are not involved in collecting these specimens.

E: Sequencing

Place the steps of the throat swab collection procedure in the correct order (from 1 to 12).

15. [LO 14.1] _____ Discard tongue depressor.
16. [LO 14.1] _____ Explain the procedure.
17. [LO 14.1] _____ Hold down the tongue with the tongue depressor.
18. [LO 14.1] _____ Identify the patient.
19. [LO 14.1] _____ Label the specimen while the patient is still present.
20. [LO 14.1] _____ Obtain a tongue depressor.
21. [LO 14.1] _____ Place the swab back into its sterile container.
22. [LO 14.1] _____ Put on PPE.
23. [LO 14.1] _____ Remove the sterile swab from the container (do not set it down).
24. [LO 14.1] _____ Rub the back of the throat and each tonsil with the swab.
25. [LO 14.1] _____ Withdraw the swab, then the tongue depressor.
26. [LO 14.1] _____ Remove PPE and wash hands.

F: Case Study/Critical Thinking

27. [LO 14.1] When collecting a throat swab, you find that the patient has a difficult time suppressing the gag reflex. What can you do and have the patient do to help with this collection process?
28. [LO 14.2] A patient must collect a sputum specimen. You have explained the procedure and asked the patient to repeat it back to you. The patient says, "Okay, I spit in the tube." What further instructions should you give the patient?
29. [LO 14.5] A patient must have a urinalysis and urine culture performed. How should the patient be instructed in the collection of this specimen? What must you do with the specimen to prepare it for transport to the laboratory?

G: Exam Prep

Choose the best answer for each question.

30. [LO 14.1] Swabs used in the collection of specimens from the back of the throat should be (Choose all that apply.)
 - a. calcium alginate.
 - b. cotton.
 - c. Dacron.
 - d. sterile.
31. [LO 14.1] When collecting a throat swab, rub the following areas. (Choose all that apply.)
 - a. Back of throat
 - b. Both tonsils
 - c. Sides of mouth
 - d. Uvula
32. [LO 14.1] The mouth and teeth should be avoided when collecting throat cultures because
 - a. touching these areas causes a gag reflex.
 - b. these areas contain normal bacteria.
 - c. these areas do not contain bacteria.
 - d. these areas contain too much saliva.
33. [LO 14.2] A sputum specimen is collected when
 - a. saliva is spit out of the mouth into a sterile cup.
 - b. the mouth is rinsed with water and spit into a sterile cup.
 - c. coughing onto a microbiology culture media plate.
 - d. mucus that is coughed up from deep within the lungs is spit into a sterile cup.

34. [LO 14.3] A stool specimen is used to test for
(Choose all that apply.)
- digestive problems.
 - pathogenic bacteria.
 - ova and parasites.
 - gastrointestinal bleeding.
35. [LO 14.3] Errors in test results on stool specimens can be caused by which of the following factors? (Choose all that apply.)
- The presence of urine in the specimen
 - The patient's following a prescribed diet prior to specimen collection
 - The patient's having had an enema before the specimen was collected
 - Specimen collection before the patient has taken barium sulfate
36. [LO 14.5] The best urine specimen to use for general health assessment is the
- 24-hour collection.
 - clean-catch specimen.
 - first morning void.
 - random void.
37. [LO 14.5] During collection of a clean-catch urine specimen, which portion is collected into the sterile container?
- Beginning of the stream
 - Middle of the stream
 - End of the stream
 - All of the urine
38. [LO 14.5] The gray-topped urine collection tube contains (Choose all that apply.)
- sodium borate.
 - sodium fluoride.
 - sodium formate.
 - sodium propionate.
39. [LO 14.5] When adding preservatives to 24-hour urine collection containers, you should (Choose all that apply.)
- wear goggles, gloves, and a chemical apron.
 - add preservatives in a fume hood.
 - label the container with an appropriate caution label.
 - add water to acid, if required to dilute the acid.
40. [LO 14.2] Mucus that collects in the air passages in the respiratory system is called
- saliva.
 - sputum.
 - pleural fluid.
 - peritoneal fluid.
41. [LO 14.4] Semen may be analyzed in order to
- detect genetic abnormalities.
 - diagnose malignancies.
 - verify the results of a vasectomy.
 - perform drug screening.
42. [LO 14.4] For how long prior to a semen analysis should the patient abstain from sexual activity?
- 8 to 12 hours
 - 12 to 24 hours
 - 24 to 36 hours
 - 48 to 72 hours
43. [LO 14.6] Which of the following non-blood specimens is obtained by lumbar puncture?
- Cerebrospinal fluid
 - Pleural fluid
 - Peritoneal fluid
 - Pericardial fluid
44. [LO 14.6] Analysis of which of the following non-blood specimens may be ordered if a patient is suspected of having leukemia?
- Gastric fluid
 - Bone marrow
 - Pleural fluid
 - Synovial fluid
45. [LO 14.1] Which specimen is used in testing for SARS-Cov-2 virus? (Choose all that apply.)
- Nares dry swab for rapid testing.
 - Nasopharyngeal swab in transport media for DNA testing.
 - Sputum in a sterile cup for cultures.
 - Throat swab in transport media for cultures.

NAME: _____ DATE: _____

COMPETENCY CHECKLIST: THROAT SWAB COLLECTION

Procedure Steps	Practice			Performed		
	1	2	3	Yes	No	Master
Preprocedure						
1. Examines the requisition.						
2. Greets the patient; introduces self.						
3. Properly identifies the patient.						
4. Explains the procedure to the patient.						
5. Puts on gloves, mask, and eye protection.						
6. Obtains equipment (sterile tongue depressor and culture swab).						
Procedure						
7. Carefully removes the swab from its container; does not set it down (maintains sterility of the swab).						
8. Asks the patient to tilt his or her head back and stick out the tongue.						
9. Correctly uses the tongue depressor to hold down the tongue.						
10. Rubs the correct areas with the sterile swab (back of throat and each tonsil).						
11. Avoids other oral structures during swab collection.						
12. Withdraws the swab, then the tongue depressor.						
13. Places the swab back into its sterile container and crushes the media ampule when required.						
Postprocedure						
14. Discards the tongue depressor.						
15. Correctly labels the specimen.						
16. Properly removes and discards PPE and washes hands.						
17. Thanks the patient.						

COMMENTS: _____

SIGNED

EVALUATOR: _____

STUDENT: _____

NAME: _____ DATE: _____

COMPETENCY CHECKLIST: NASAL SWAB COLLECTION

Procedure Steps	Practice			Performed		
	1	2	3	Yes	No	Master
Preprocedure						
1. Examines the requisition.						
2. Greets the patient; introduces self.						
3. Properly identifies the patient.						
4. Explains the procedure to the patient.						
5. Puts on gloves, mask, and eye protection.						
6. Obtains equipment (culture swab).						
Procedure						
7. Carefully removes the swab from its container; does not set it down (maintains sterility of the swab).						
8. Asks the patient to tilt head back and supports the back of head with a hand.						
9. Correctly swabs the inside of both nares.						
10. Withdraws the swab.						
11. Slowly releases head-supporting hand.						
12. Places the swab back into its sterile container and crushes the media ampule when required.						
Postprocedure						
13. Properly removes and discards PPE and washes hands.						
14. Correctly labels the specimen.						
15. Thanks the patient.						

COMMENTS: _____

SIGNED

EVALUATOR: _____

STUDENT: _____

COMPETENCY CHECKLIST: NASOPHARYNGEAL SWAB COLLECTION

Procedure Steps	Practice			Performed		Master
	1	2	3	Yes	No	
Preprocedure						
1. Examines the requisition.						
2. Greets the patient; introduces self.						
3. Properly identifies the patient.						
4. Explains the procedure to the patient.						
5. Puts on gloves, mask, and eye protection.						
6. Has the patient clear nasal drainage if present (provides tissue).						
7. Obtains equipment (culture swab, viral transport medium, and scissors).						
Procedure						
8. Loosens cap on viral transport medium container (but does not remove cap).						
9. Carefully removes the swab from its container; does not set it down (maintains sterility of the swab).						
10. Asks the patient to tilt head back and supports the back of the head with a hand.						
11. Inserts the swab through the nasal passage and to the nasopharynx (stops if resistance is met and tries the other nasal passage).						
12. Withdraws the swab.						
13. Slowly releases the head-supporting hand.						
14. Removes the cap from the viral transport medium container (maintains sterility of the cap) and inserts the swab into the medium.						
15. Cuts off the swab handle with scissors and replaces the cap.						
Postprocedure						
16. Properly removes and discards PPE and washes hands.						
17. Correctly labels the specimen.						
18. Thanks the patient.						

COMMENTS: _____

SIGNED

EVALUATOR: _____

STUDENT: _____

NAME: _____ DATE: _____

COMPETENCY CHECKLIST: URINE SPECIMEN COLLECTION

Procedure Steps	Practice			Performed		
	1	2	3	Yes	No	Master
Preprocedure						
1. Examines the requisition.						
2. Greets the patient; introduces self.						
3. Properly identifies the patient.						
4. Obtains urine specimen container.						
5. Labels container with patient information.						
6. Escorts patient to bathroom.						
7. Explains procedure to the patient.						
Procedure						
8. Patient self-collects using provided guidelines.						
9. States female collection technique.						
10. States male collection technique.						
Postprocedure						
11. Retrieves the specimen.						
12. Records collection date and time.						
13. Thanks the patient.						

COMMENTS: _____

SIGNED

EVALUATOR: _____

STUDENT: _____