Chapter 15

Specimen Collection and Diagnostic Testing

Diagnostic Examination

- It may be performed by a health care provider at the patient’s bedside or in a specially equipped room for therapeutic or diagnostic purposes
- The nurse’s knowledge and organization of the diagnostic procedure can be the keys to success
- Fundamental requirement to protect patient’s rights: informed consent

Diagnostic Examination (Cont.)

- Nurse’s responsibilities
- Reinforce provider’s explanation of the procedure; confirm that the patient comprehends it; and verify that written consent is not always necessary for an individual test; informed verbal consent may be adequate
- Anticipate the needs of the provider and have proper supplies ready
- Keep the patient adequately informed of procedural details that could cause discomfort
- Assist the patient throughout the procedure
- Determine if the patient is allergic to iodine
Diagnostic Examination (Cont.)

- Preparing the patient for diagnostic examinations
- The nurse must be prepared to answer questions for which the patient may need clarification
- The patient needs to know if
  - Nothing can be taken by mouth (NPO) after midnight
  - Breakfast will be held until the examination is complete
  - A special room or piece of equipment is required for the test
  - Medication is needed before or during the test

Specimen Collection

- All patients admitted to a health care facility have at least one laboratory specimen collected during hospitalization
- Laboratory examination of specimens of urine, stool, sputum, blood, and wound drainage provides important information about body functioning and contributes to the assessment of health status
- Laboratory tests can facilitate the diagnosis of health care problems, provide information about the stage and activity of a disease process, and measure the response to therapy.

Specimen Collection (Cont.)

- Guidelines for specimen collection
  - Consider the patient’s need and ability to participate in specimen collection procedures
  - Recognize that the collection of a specimen may provoke anxiety, embarrassment, or discomfort
  - Provide support for patients who are fearful about the results of a specimen examination
  - Recognize that children require clear explanation of procedures and that they need the support of their parents or a family member
  - Obtain specimen in accordance with specific prerequisites as required
Specimen Collection (Cont.)

- Guidelines for specimen collection
  - Wear gloves when collecting specimens of blood or other body fluids
  - Wash hands and other skin surfaces immediately and thoroughly if contaminated with blood or body fluids; wash hands immediately after removing gloves
  - Collect specimens in appropriate containers, at the correct time, and in the appropriate amount
  - Properly label all specimens with the patient’s identification; complete laboratory requisition form as necessary

Specimen Collection (Cont.)

- Guidelines for specimen collection
  - Most specimens are transported to the laboratory in a separate outer plastic bag
  - Deliver specimens to the laboratory within the recommended time or ensure that they are stored properly for later transport
  - Use aseptic technique in all collections to prevent contamination, which can cause inaccurate test results
  - Transport specimens under special conditions as required

Specimen Collection (Cont.)

- Rationales for specimen collection (see Nursing Process 3)
Specimen Collection (Cont.)

- Properly label all specimens with the patient’s identification; complete laboratory requisition form as necessary.
- Label should include the following:
  - Patient’s name, date of collection, time of collection, initials of person who collected the specimen.

Specimen Collection (Cont.)

- Collecting a midstream urine specimen:
  - Urine is collected after voiding is initiated (midstream) and before voiding is completed.
  - This is the cleanest part of the voided specimen.
  - Nurse’s responsibilities:
    - Collect and label the urine sample
    - Ensure safe delivery to the laboratory
    - Assess the results

Specimen Collection (Cont.)

- Collecting a sterile urine specimen:
  - Two methods:
    - Insert a straight catheter into the urinary bladder and remove urine
    - Obtain a specimen from the port of an indwelling catheter using sterile technique.
  - Residual urine:
    - This is urine left in the bladder after voiding.
    - The patient voids, and catheterization is performed within 10 minutes.
    - Residual urine is more than 50 mL of urine remaining in the bladder.
Specimen Collection (Cont.)

- Collecting a 24-hour urine specimen
  - This is required for tests of renal function and urine composition
  - The entire volume of urine from a 24-hour period is collected
  - If urine is accidentally discarded or contaminated or the patient is incontinent, restart the time period

Specimen Collection (Cont.)

- Measuring blood glucose levels
  - The use of a meter to measure blood glucose is a more meaningful test for use by persons with diabetes than testing urine for the presence of glucose
  - A skin puncture can be easily performed by the patient at home and provides more accurate information than does the urine glucose/acetone determination test

Specimen Collection (Cont.)

- Collecting a stool specimen
  - Stool specimens are collected and examined for a variety of reasons
    - Determine the presence of infection, bleeding, or hemorrhage
    - Observe the amount, color, consistency, and presence of fats
    - Identify parasites, ova, and bacteria
Specimen Collection (Cont.)

- Collecting a stool specimen
  - The nurse collects the stools, labels the specimen appropriately, and sends the specimen and laboratory request to the laboratory.
  - Stool to be examined for parasites must be taken to the laboratory immediately in order for the parasites to be examined under the microscope while still alive.
  - Stool specimen for ova and parasite (O&P) examination must be collected in an appropriate container with a special solution.

- Determining the presence of occult blood in stool (guaiac)
  - Bright red blood indicates the blood is fresh and that the site of bleeding is in the lower gastrointestinal tract.
  - Black, tarry feces indicates the presence of old blood and that the site of bleeding is higher in the GI tract.
  - Occult indicates blood is present in the stool but cannot be seen without a microscope.
    - Hemoccult test detects occult blood in feces.

- Collecting a sputum specimen
  - Sputum is secretions from the lungs.
  - It contains mucus, cellular debris, and microorganisms and may contain blood or pus.
  - It must come from deep in the bronchial tree.
  - Early morning is the best time to collect a specimen, because the patient has not yet cleared the respiratory passages.
Specimen Collection (Cont.)

- Many tests can be performed on sputum
  - Culture
  - Sensitivity
  - Cytology
  - Acid-fast bacillus

Specimen Collection (Cont.)

- Obtaining a wound culture
  - Aerobic organisms
    - Grow in superficial wounds exposed to the air
    - Specimen collected by inserting a sterile swab from the Culturette tube into wound secretions, returning the swab to the Culturette tube, capping the tube, and crushing the inner ampule so that the medium coats the swab tip

Specimen Collection (Cont.)

- Obtaining a wound culture
  - Anaerobic organisms
    - Grow within body cavities
    - Specimen collected by using a sterile syringe tip to aspirate visible drainage from the inner wound, expelling any air from the syringe, and injecting the syringe contents into a special vacuum container with culture medium
Specimen Collection (Cont.)

- Obtaining a throat culture
  - Instruct the patient to tilt head backward
  - Ask patient to open mouth and say "ah"
  - If pharynx is not visualized, depress tongue with tongue blade and note inflamed area of pharynx and tonsils
  - Insert swab without touching lips, teeth, tongue, or cheeks
  - Gently but quickly swab tonsillar area side to side, making contact with inflamed or purulent sites

Specimen Collection (Cont.)

- Carefully withdraw swab without striking oral structures; immediately place swab in culture tube and crush ampule at bottom of tube
- Securely attach properly completed label and requisition slip to side of specimen container
- Enclose in a plastic bag
- Send specimen immediately to laboratory or refrigerate
- Complete procedure by documenting time, type of specimen, sent to laboratory with requisition slip, patient response, patient teaching

Specimen Collection (Cont.)

- Collecting a blood specimen
  - Veins are a major source of blood for laboratory testing, as well as routes for IV fluids or blood replacement
  - The nurse should be skilled in venipuncture to avoid unnecessary injury to veins
  - Blood tests can yield valuable information about nutritional, hematologic, metabolic, immune, and biochemical status
  - The nurse is often responsible for collecting blood specimens; however, many institutions have specially trained technicians to draw blood
Specimen Collection (Cont.)

- Collecting a blood specimen (venipuncture)
  - Venipuncture
    - Venipuncture involves inserting a hollow-bore needle into the lumen of a large vein to obtain a specimen
    - The nurse may use a needle and syringe or a special vacuum tube that allows the drawing of multiple blood samples
    - Assess for any special conditions that must be met before specimen collection if patient is to be NPO

Specimen Collection (Cont.)

- Collecting a blood specimen (venipuncture)
  - Possible risks of venipuncture
    - Anticoagulant therapy
    - Low platelet count
    - Bleeding disorders
    - Presence of arteriovenous shunt or fistula
    - After breast or axillary surgery performed on that side
  - Abnormal clotting, medications, and compromised circulation can further impair blood flow

Specimen Collection (Cont.)

- Collecting a blood specimen (venipuncture)
  - Collection methods
    - Syringe with a needle attached
      - The blood is drawn into the barrel by pulling back on the plunger
      - After the blood is collected, it is transferred to a test tube
Specimen Collection (Cont.)

- Collecting a blood specimen (venipuncture)
  - Collection methods
    - Vacutainer system
      - Has a needle, a needle and tube holder, and an evacuated tube with rubber stopper
      - When the vein is punctured, blood flows into the tube
      - This allows the collection of many blood specimens with one venipuncture
      - After a tube fills, it is removed and a new one is attached to the holder

Specimen Collection (Cont.)

- Collecting a blood specimen (venipuncture)
  - Collection tubes
    - Tubes come in different sizes
    - Blood test ordered determines the amount of blood needed
    - Some tests require additives—chemicals that preserve blood until testing
    - Rubber stoppers are color-coded. The color-coding signals the type of additive, the amount of blood to collect, and the recommended tests
    - The collection tube must be labeled with the patient’s identifying information

Specimen Collection (Cont.)

- Collecting a blood specimen (venipuncture)
  - Selecting a venipuncture site
    - The basilic and cephalic veins in the antecubital space are the most common venipuncture sites
    - These veins are large and near the skin’s surface
    - Hand veins are often alternative sites
    - Before selecting the vein, select the arm to be used
    - Avoid the arm on the side of a mastectomy or on the side of paralysis
    - If the patient has IV access, do not use that arm
    - Do not use the arm with an access site for hemodialysis
**Specimen Collection (Cont.)**

- Collecting a blood specimen (venipuncture)
  - Selecting a venipuncture site
    - Applying a tourniquet makes the veins fill with blood and distend, which makes them firmer and easier to see and feel
    - The tourniquet is removed after collection of the blood specimen
    - Avoid veins that are small and narrow, weak, sclerosed, or easy to roll

**Electrocardiogram**

- An electrocardiogram (ECG or EKG) is a graphic representation of electrical impulses generated by the heart during a cardiac cycle
- It identifies abnormalities that interfere with electrical conduction through cardiac tissue
- This procedure is usually done at the patient’s bedside, but it may be done in a specially equipped laboratory

**Electrocardiogram (Cont.)**

- Assess for
  - Knowledge level of procedure
  - Ability to understand and follow directions
  - Ability to assume proper position
  - Vital signs
Question 1

The nurse determines that the teaching about guaiac test of stool is understood when the patient states, "This test can detect the presence of:

1. ova and parasites."
2. hidden blood."
3. bacteria."  
4. bile."

Question 2

A practitioner orders a urine specimen for culture and sensitivity via a straight catheter for a patient. What should the nurse do when collecting the urine specimen?

1. Use a sterile specimen container.  
2. Collect urine from the catheter port.  
3. Inflate the balloon with 10 mL of sterile water.  
4. Have the patient void before collecting the specimen.

Question 3

A nurse is caring for a patient who is having urine collected for a 24-hour urine test. During the afternoon of the testing period, the patient forgets and accidentally voids into the toilet, but tells the nurse right away. What should the nurse do?

1. Start the test again in the morning.  
2. Identify the time and begin a new test.  
3. Add the time since the previous voiding to the end of the test.  
4. Notify the health care provider about the delay of the test.
Question 4
A nurse is caring for a patient who was admitted to the hospital with upper gastrointestinal bleeding. For which clinical indicator associated with gastrointestinal bleeding should the nurse assess the patient?
1. Pale, clay-colored stool
2. Yellow, greenish stool
3. Hard, dry, brown stool
4. Black, tarry stool

Question 5
A nurse is caring for a patient who has an order for a stool specimen. What should the nurse do when collecting the specimen?
1. Wear sterile gloves to maintain sterility of the specimen.
2. Send it to the laboratory promptly to avoid a degraded specimen.
3. Flush the toilet first so that the water is clean and free from debris.
4. Collect several inches of formed feces to ensure an adequate sample.