



Chapter 19

Specimen Collection and Diagnostic Examination



Diagnostic Examination

- It may be performed by a physician 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:** The patient must fully understand what will be done during a test, surgery, or any medical procedure and must understand the risks and implications before he or she can legally consent to it.



Diagnostic Examination

- Nurse's Responsibilities
 - Reinforce physician'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 physician 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

- 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 test 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

- 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 family member.
 - Obtain specimen in accordance with specific prerequisite conditions as required.



Specimen Collection

- Guidelines for Specimen Collection (continued)
 - 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

- Guidelines for Specimen Collection (continued)
 - 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

- Collecting a Midstream Urine Specimen
 - 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.
 - Several tests can be ordered on one sample of urine: pH, protein, glucose, ketones, blood, and specific gravity.
 - Nurse's responsibilities
 - Collect and label the urine sample.
 - Ensure safe delivery to the laboratory.
 - Assess the results.



Skill 19-2: Step 2



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Collecting a midstream urine specimen.



Skill 19-3: Step 7a



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Collecting a midstream urine specimen.



Specimen Collection

- 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

- 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

- 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.



Measuring Blood Glucose Levels



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Measuring blood glucose levels.



Skill 19-5: Step 14



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Measuring blood glucose levels.



Skill 19-5: Step 16



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Measuring blood glucose levels.



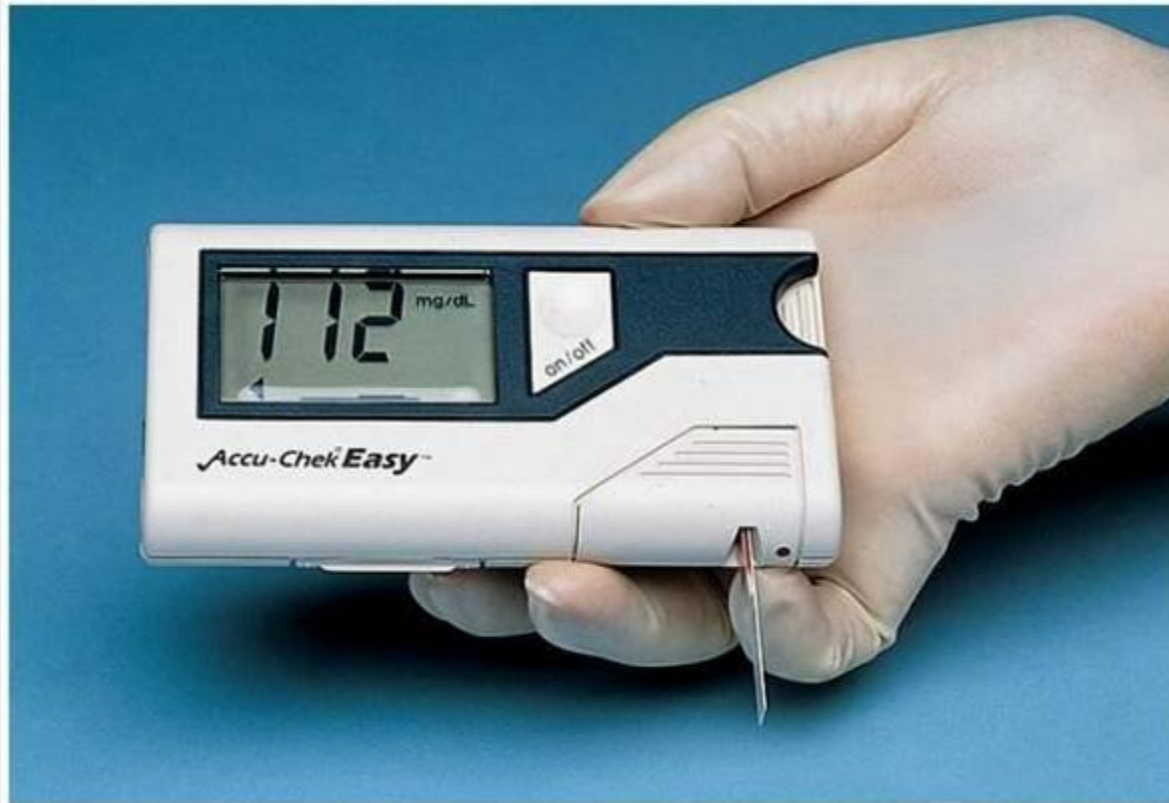
Measuring Blood Glucose Levels



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Measuring blood glucose levels.

Measuring Blood Glucose Levels



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Measuring blood glucose levels.



Specimen Collection

- 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

- Collecting a Stool Specimen (continued)
 - The nurse collects the feces, 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.



Skill 19-6: Step 8

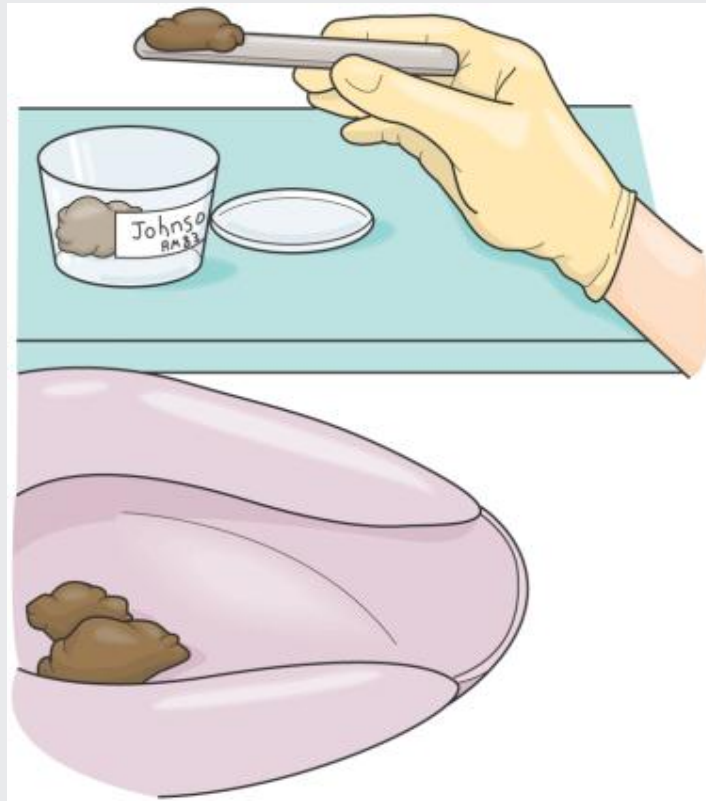


(From Sorrentino, S.A. [2004]. *Mosby's textbook for nursing assistants*. [6th ed.]. St. Louis: Mosby.)

Collecting a stool specimen.



Skill 19-6: Step 9



(From Sorrentino, S.A. [2004]. *Mosby's textbook for nursing assistants*. [6th ed.]. St. Louis: Mosby.)

Collecting a stool specimen.



Specimen Collection

- Determining the Presence of Occult Blood in Stool (Guaiac)
 - The presence of blood in body waste is abnormal.
 - **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.



Skill 19-7: Step 8a



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Determining the presence of occult blood in stool.



Specimen Collection

- 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.



Skill 19-9: Step 14



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Collecting a sputum specimen by suction.



Skill 19-9: Step 18



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Collecting a sputum specimen by suction.



Skill 19-10: Step 8



(Grimes, D. [1991]. *Infectious diseases, Mosby's clinical nursing series*. St. Louis: Mosby.)

Collecting a sputum specimen by expectoration.



Specimen Collection

- Many tests can be performed on sputum.
 - Culture
 - Cultivation of microorganisms or cells
 - Sensitivity
 - Determining the effectiveness of antibiotics
 - Cytology
 - Study of cells
 - Acid-fast bacillus
 - Organism responsible for tuberculosis



Specimen Collection

- 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.



Figure 19-2

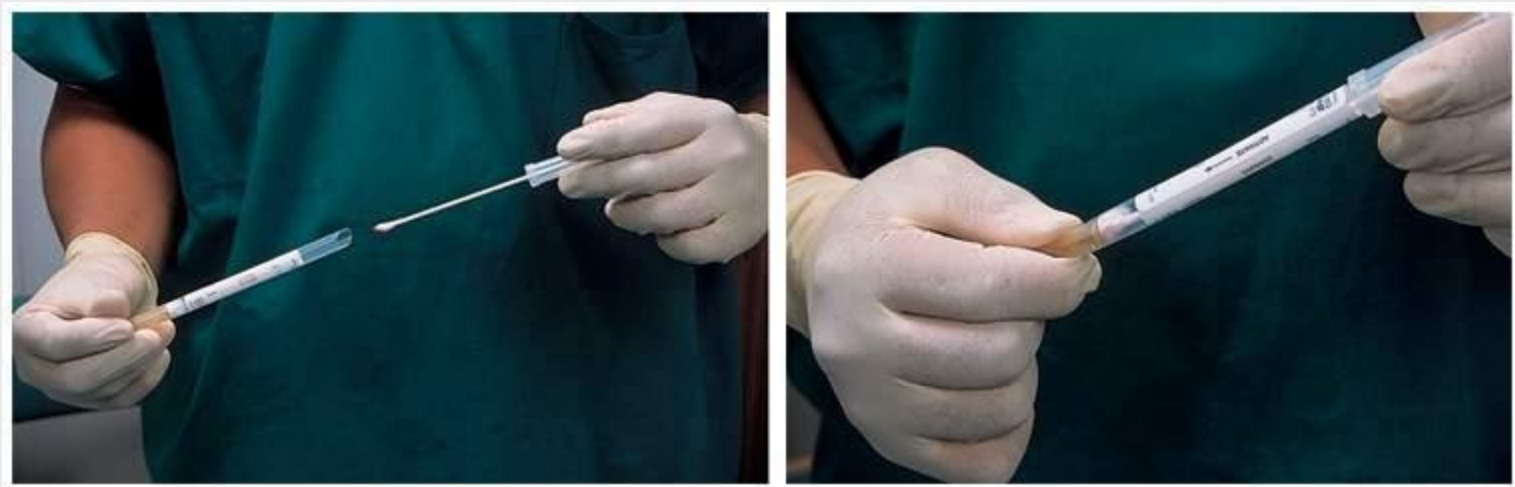


(From Potter, P.A., Perry, A.G. [2005]. *Fundamentals of nursing*. [6th ed.]. St. Louis: Mosby.)

Wound culture tube.



Figure 19-3



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. [3rd ed.]. St. Louis: Mosby.)

Aerobic culture tube.



Specimen Collection

- Obtaining a Wound Culture (continued)
 - 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

- 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

- Obtaining a Throat Culture (continued)
 - 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 the following:
 - Time, type of specimen, sent to laboratory with requisition slip, patient response, patient teaching



Specimen Collection

- Collecting a Blood Specimen (Venipuncture)
 - 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, hematological, 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

- Collecting a Blood Specimen (Venipuncture)
(continued)
 - 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.

Needle and Syringe Method



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. [3rd ed.]. St. Louis: Mosby.)

Needle and syringe method. Blood collects in the barrel as the plunger is pulled back.



Specimen Collection

- Collecting a Blood Specimen (Venipuncture) (continued)
 - 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 abilities, medications, and compromised circulation can further impair blood flow.



Specimen Collection

- Collecting a Blood Specimen (Venipuncture) (continued)
 - 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

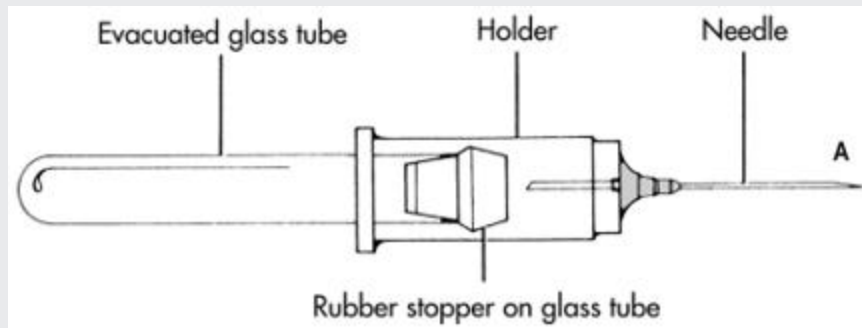


Specimen Collection

- Collecting a Blood Specimen (Venipuncture) (continued)
 - 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.



Figure 19-5

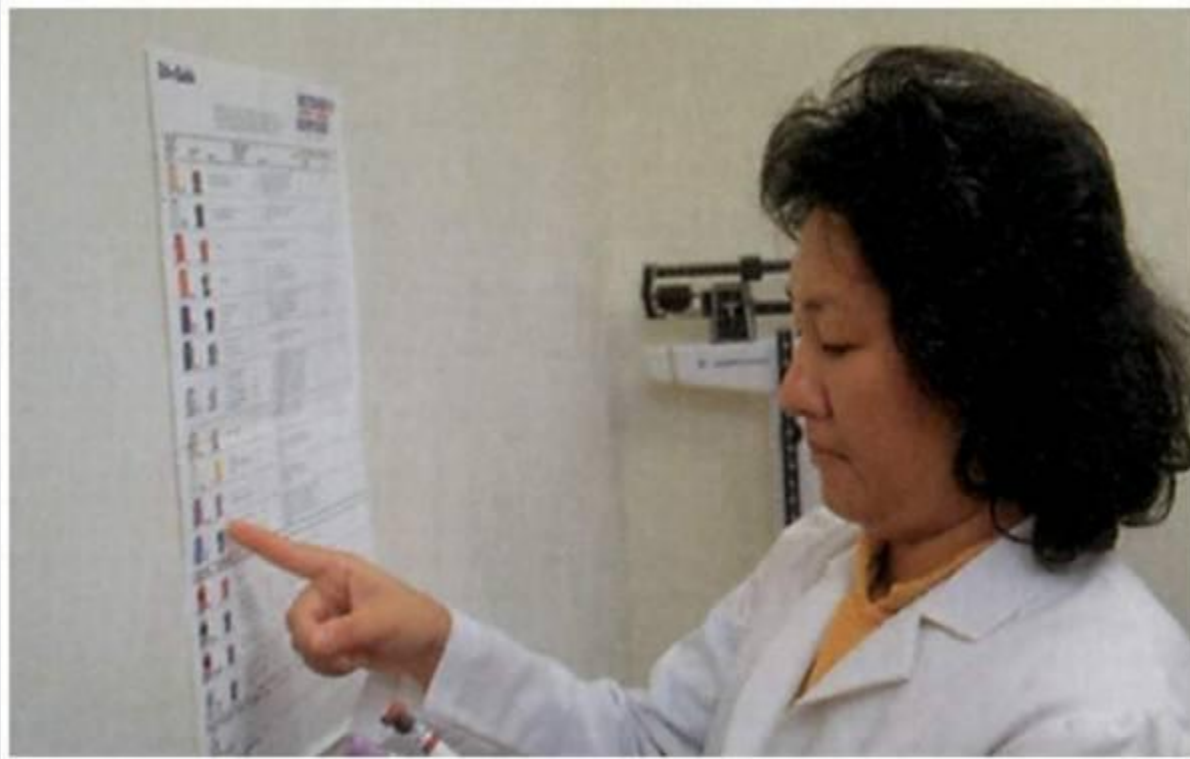


(A, from Zakus, S.M. [1995]. *Clinical procedures for medical assistants*. [3rd ed.]. St. Louis: Mosby. B, from Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. [3rd ed.]. St. Louis: Mosby.)

A, Parts of the Vacutainer. **B**, Blood collects in a Vacutainer tube.



Figure 19-6



(From Zakus, S.M. [1995]. *Clinical procedures for medical assistants*. [3rd ed.]. St. Louis: Mosby.)

Vacutainer tube guide.



Skill 19-13: Step 17b(6)



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Performing the venipuncture.



Specimen Collection

- Collecting a Blood Specimen (Venipuncture) (continued)
 - 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.



Figure 19-7



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. [3rd ed.]. St. Louis: Mosby.)

Labeling the blood tube.

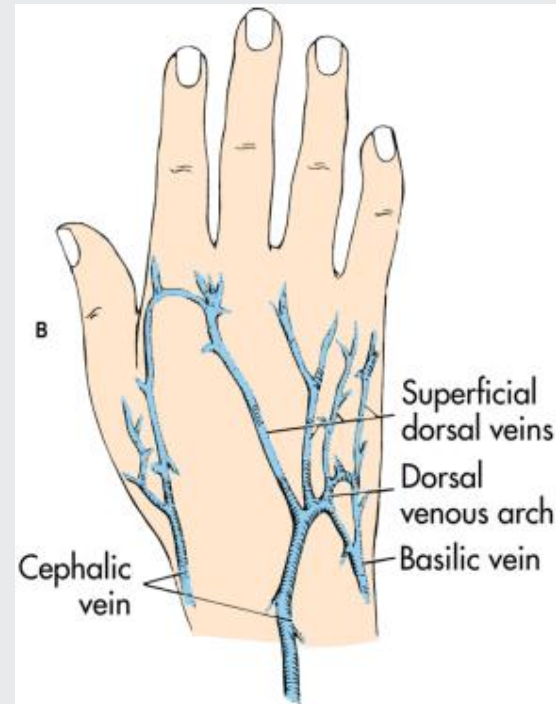
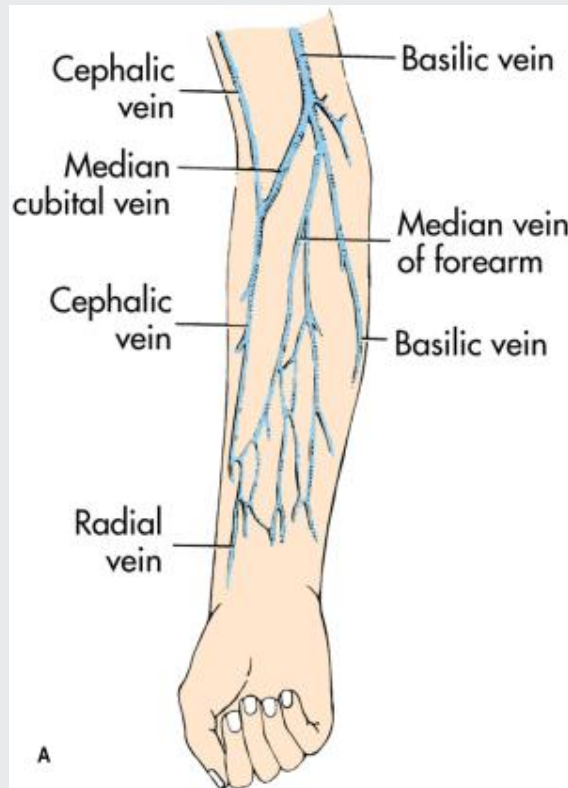


Specimen Collection

- Collecting a Blood Specimen (Venipuncture) (continued)
 - 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 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 a paralysis.
 - If the patient has IV access, do not use that arm.
 - Do not use the arm with an access site for hemodialysis.



Figure 19-8



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. [3rd ed.]. St. Louis: Mosby.)

Selecting a venipuncture site. **A**, Inner arm. **B**, Dorsal surface of hand.



Specimen Collection

- Collecting a Blood Specimen (Venipuncture)
(continued)
 - 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.



Skill 19-13: Step 17a(10) & 17a(11)



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Performing the venipuncture.



Skill 19-13: Step 17b(1)



(From Elkin, M.K., Perry, A.G., Potter, P.A. [2004]. *Nursing interventions and clinical skills*. (3rd ed.). St. Louis: Mosby.)

Performing the venipuncture.



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.



Skill 19-14: Step 10b

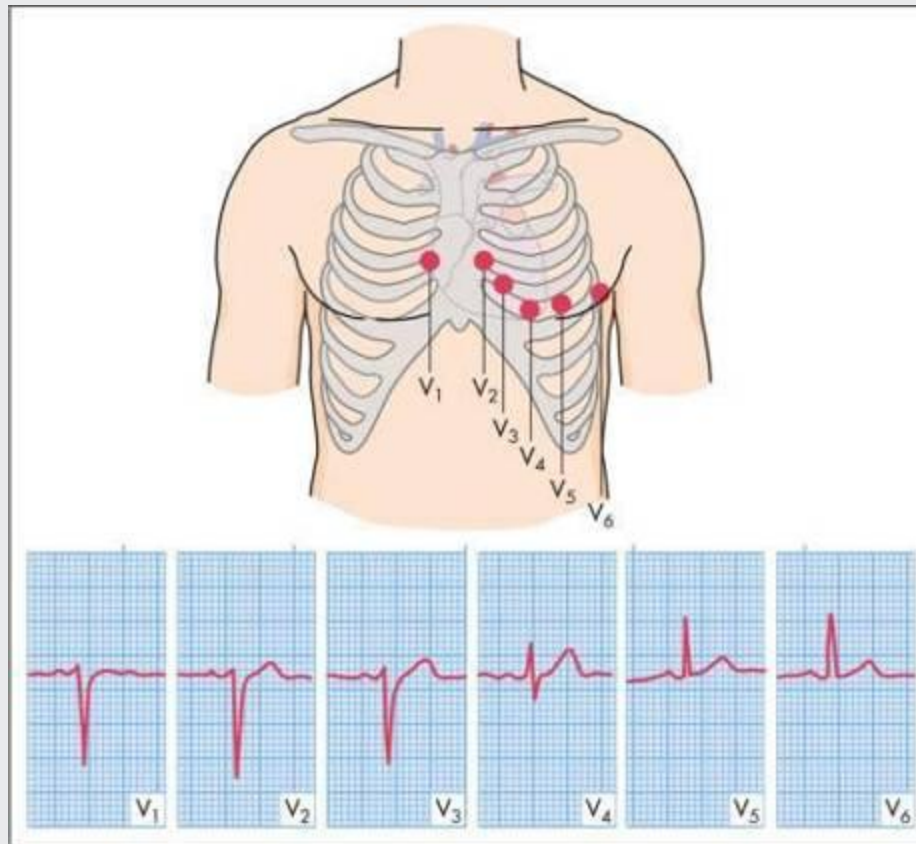


(From Sorrentino, S.A. [2004]. *Assisting with patient care*. [2nd ed.]. St. Louis: Mosby.)

Performing an electrocardiogram (ECG).



Skill 19-14: Step 10b(1)



(From Phipps, W.J., Monahan, F.D., Sands, J.K., Marek, J.F., Neighbors, M. [2003]. *Medical-surgical nursing: health and illness perspectives*. [7th ed.]. St. Louis: Mosby.)

Performing an electrocardiogram (ECG).



Electrocardiogram

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



Nursing Process

- Nursing Diagnoses
 - Anxiety
 - Knowledge, deficient
 - Infection, risk for
 - Pain, acute
 - Gas exchange, impaired
 - Breathing pattern, ineffective
 - Airway clearance, ineffective