


**CHAPTER 19**  
**Specimen Collection and**  
**Diagnostic Examination**



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**112 yrs old Worlds Oldest Male**  
**Born Sept. 18, 1895**



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**Diagnostic Examination**

- Performed by a physician at the patient's bedside or in a specially equipped room for therapeutic or diagnostic purposes.
- 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.

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## Preparing the Patient for Diagnostic



- Examinations
  - **The PT 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

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## Specimen Collection



- All patients admitted to a health care facility have at least one laboratory specimen collected during hospitalization.
- What are some laboratory tests that might be ordered?
- Urine, stool, sputum, blood, and wound drainage  
What type of information would these tests reveal?
- 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.

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## Guidelines for Specimen Collection



- Consider the patient's need and ability to participate in specimen collection procedures.
  - May provoke anxiety, embarrassment, or discomfort.
  - Provide support for patients who are fearful about the results of a specimen examination.
  - Obtain specimen in accordance with Nursing Policy and Procedure manual

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● Guidelines for Specimen Collection (continued)

- Wear gloves when collecting specimens of blood or other body fluids.
- Wash hands immediately after removing gloves.
- Use appropriate containers, at the correct time, and in the appropriate amount.
- Properly label all specimens with the patient's identification; fill out a laboratory requisition form for specific test ordered.



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● 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.



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**Figure 19-1**



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

Enclose specimen in a plastic bag.

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## 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.
- What are your responsibilities?
  - Collect and label the urine sample.
  - Ensure safe delivery to the laboratory.
  - Assess the results.

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## Skill 19-2: Step 2



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

Collecting a midstream urine specimen.

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## Skill 19-3: Step 7a



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

Collecting a midstream urine specimen.

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### 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.

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### Collecting a 24-Hour Urine Specimen



- This is required for test 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 patient is incontinent, restart time period.
- The starting time begins after the patient voids first.

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### Measuring Blood Glucose Levels



- The use of a meter to measure blood glucose
- A skin puncture can be easily performed by the patient at home

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## Skill 19-5: Step 2



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

Measuring blood glucose levels.

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## Skill 19-5: Step 14



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

Measuring blood glucose levels.

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## Skill 19-5: Step 16



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

Measuring blood glucose levels.

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## Skill 19-5: Step 17a



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

Measuring blood glucose levels.

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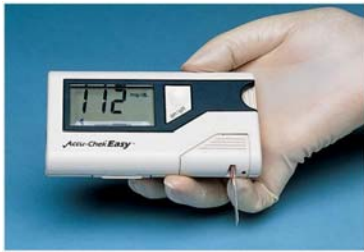
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## Skill 19-5: Step 17b



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

Measuring blood glucose levels.

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## 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

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Slide 23

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- Collecting a Stool Specimen (continued)

- The PT 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.



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### Skill 19-6: Step 8



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

Collecting a stool specimen.

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### Skill 19-6: Step 9



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

Collecting a stool specimen.

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Slide 26

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### 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.
  - Hemocult test detects occult blood in feces.

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Slide 27

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### Skill 19-7: Step 8a



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

Determining the presence of occult blood in stool.

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Slide 28

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### 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.

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Slide 29

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## Skill 19-9: Step 14



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

Collecting a sputum specimen by suction.

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## Skill 19-9: Step 18



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

Collecting a sputum specimen by suction.

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Slide 31

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## Skill 19-10: Step 8



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

Collecting a sputum specimen by expectoration.

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Slide 32

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**Many tests can be performed on sputum.**

- Can you name them?
  - Culture
    - Cultivation of microorganisms or cells
  - Sensitivity
    - Determining the effectiveness of antibiotics
  - Cytology
    - Study of cells
  - Acid-fast bacillus
    - Organism responsible for \_\_\_\_\_-?



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Slide 33

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**Obtaining a Wound Culture**

- **Aerobic organisms**
  - Grow in superficial wounds exposed to the air
  - What do you use to culture this wound?
  - 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.



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Slide 34

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**Figure 19-3**



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

Wound culture tube.

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Slide 36

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**Figure 19-4**



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

Aerobic culture tube.

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Slide 37

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**Obtaining a Wound Culture (continued)**

- **Anaerobic organisms**
  - Grow within body cavities
  - How do you collect an anaerobic specimen
  - 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**

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Slide 38

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**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.

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**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**

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### Collecting a Blood Specimen (Venipuncture)



- Veins are a major source of blood for laboratory testing
- The PT is required by the Board to take a board approved phlebotomy course.
- What type of tests can be ordered?
- Blood tests can yield valuable information about nutritional, hematological, metabolic, immune, and biochemical status.

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Slide 42

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### 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 PT 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.

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Slide 43

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### Figure 19-6



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

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

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



- What are some risks to consider before performing 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.

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### 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

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Slide 46

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- 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.

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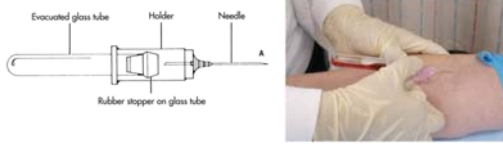
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## Figure 19-7



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

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

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Slide 48

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## Skill 19-13: Step 17b(6)



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

Performing the venipuncture.

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Slide 49

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### ● 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.

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Slide 50

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## Figure 19-9



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

Labeling the blood tube.

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Slide 51

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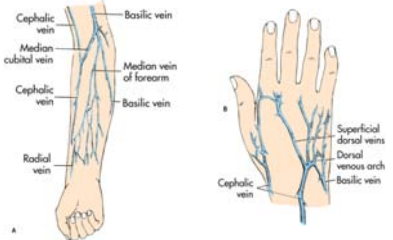
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## Figure 19-10



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

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

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Slide 52

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



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

Performing the venipuncture.

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Slide 53

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## 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.

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Slide 54

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## Skill 19-14: Step 10b



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

Performing an electrocardiogram (ECG).

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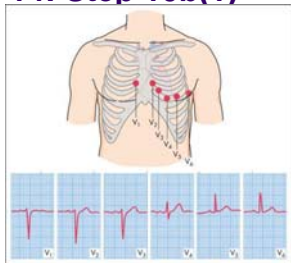
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## Skill 19-14: Step 10b(1)



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

Performing an electrocardiogram (ECG).

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Slide 56

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