Chapter 13: Nonblood Specimens and Tests

Objectives
1. Define the key terms and abbreviations listed at the beginning of the chapter.
2. Describe nonblood specimen labeling and handling.
3. Name and describe the various urine tests, specimen types, and collection and handling methods.
4. Identify and describe the types of nonblood specimens other than urine and explain why these specimens are tested.

Objectives (cont’d)
5. Describe collection and handling procedures for nonblood specimens other than urine.
6. Identify tests performed on various nonblood specimens other than urine.

Nonblood Specimen Labeling and Handling
- Should be labeled with same ID info. as blood specimens
- Labeling should include type &/or source of specimen
- Label should be applied to container, not lid, as lid is removed for testing
- Familiarity w. handling requirements is needed to protect integrity of specimen & ensure accurate test results
- All body substances are potentially infectious
- Standard precautions must be observed in handling them
Nonblood Body-Fluid Specimens: liquid or semi-liquid substances

- **Urine**
  - Most frequently analyzed nonblood body fluid
  - Readily available, easy to collect, & inexpensive to test
  - **Its analysis can aid in:**
    - Providing info. on many of body’s major metabolic functions
    - Monitoring wellness
    - Diagnosis & treatment of urinary tract infections
    - Detection & monitoring of metabolic disease
    - Determining effectiveness or complications of therapy

---

Accurate results depend on:
- Collection method
- Container used (some are sterile)
- Specimen transportation & handling
- Timeliness of testing

- **Roles in collection**
  - Inpatient collection typically handled by nurses
  - Outpatient collection often handled by phlebotomists
  - Must explain procedure w/o embarrassing patient

---

**Common Urine Tests**
- **Routine urinalysis (UA)**
  - Most commonly requested urine test
  - Screens for urinary & systemic disorders
  - Ordered as part of a physical or during hospitalization
  - Includes physical, chemical, & microscopic analysis
  - Avoid contamination by using midstream collection
  - Collect in clear, dry, chemically clean containers
  - May be kept at room temp. for up to 2 hrs or refrigerated

- **Culture & sensitivity**
  - Ordered for patients w. symptoms of urinary tract infection
  - Place measured portion of urine on special nutrient medium that encourages growth of microorganisms
  - Incubate for 18 to 24 hrs
  - Check it for growth
  - Identify any microorganisms that grow
  - If microorganism is identified, sensitivity test is performed to determine which antibiotics will be effective
  - Requires midstream clean-catch collection in sterile container
Nonblood Body-Fluid Specimens (cont’d)

- Urine specimens collected in sterile containers for C&S testing

Nonblood Body-Fluid Specimens (cont’d)

- Common Urine Tests
  - Urine cytology studies
    - For detecting cancer, cytomegalovirus, & other diseases
    - Cells from lining of urinary tract are shed into urine
    - A smear containing these cells is prepared from urinary sediment or filtrate
    - Smear is stained by PAP method & examined under microscope for abnormal cells
    - Fresh clean-catch specimen is required
    - Examine specimen ASAP after collection or preserve in alcohol

Nonblood Body-Fluid Specimens (cont’d)

- Common Urine Tests
  - Urine drug screening
    - Performed to detect:
      - Illicit use of recreational drugs
      - Use of anabolic steroids to enhance performance in sports
      - Unwarranted use of prescription drugs
    - Used to monitor therapeutic drug use to minimize withdrawal symptoms & confirm a diagnosis of drug overdose
    - Tests are performed in groups based on drug classifications
    - Random sample in chemically clean, covered container

Nonblood Body-Fluid Specimens (cont’d)

- Common Urine Tests
  - Urine glucose & ketone testing
    - To screen for diabetes & monitor glucose & ketone levels in diabetics
  - Urine pregnancy testing
    - Tests for HCG, a hormone appearing in urine after conception
    - First morning specimen is preferred due to higher concentration
  - Other urine tests
    - Electrophoresis, heavy metals (copper & lead), myoglobin clearance, creatinine clearance, & porphyrins
Nonblood Body-Fluid Specimens (cont’d)

Types of Urine Specimens
- Random: collected at any time
- First morning/8-hour: collected on waking after 8 hrs sleep
- Fasting: second specimen voided after fasting (glucose monitoring)
- Timed: collected at specific times
  - Tolerance test (glucose)
  - 2-hour postprandial (2 hrs after meal)
  - 24-hour (collection & pooling of all urine voided in 24 hrs)
  - Double-voided (empty bladder, wait specified time, then collect specimen)

24-Hour Urine Collection Procedure
1. Void into toilet as usual on waking
2. Note time & date on label, place on container, begin timing
3. Collect all urine voided for next 24 hrs
4. Refrigerate specimen throughout collection period (if required)
5. Collect urine before anticipated bowel movement, not after
6. Drink normal amount of fluid unless instructed otherwise
7. Void one last time at end of 24 hrs. Keep last void
8. Seal container, place in cooler, transport to lab ASAP

Urine Collection Methods
- Regular voided: patient voids into clean container
- Midstream: patient voids into toilet first, then container
- Midstream clean-catch: requires special cleaning of genital area before collection. Used to detect UTI
- Catheterized: collected from sterile catheter inserted through urethra into bladder
- Suprapubic aspiration: collected by inserting needle directly into bladder & aspirating
- Pediatric: collected in plastic bag, for children not potty trained

Amniotic Fluid
- Clear fluid that fills membrane surrounding & cushioning fetus
- Collected after 15 weeks gestation
- Obtained by physician in transabdominal amniocentesis
- Needle is inserted into mother’s abdominal wall into uterus
- About 10 mL of fluid from amniotic sac is aspirated
- Analyzed to detect genetic disorders & problems in fetal development
- Must be collected in sterile container, protected from light, & delivered to lab ASAP
Nonblood Body-Fluid Specimens (cont’d)

• Cerebrospinal Fluid
  - Clear, colorless liquid that surrounds brain & spinal cord
  - Specimens are obtained by physician via lumbar puncture
  - **Used to diagnose:**
    - Meningitis
    - Brain abscess
    - CNS cancer
    - Multiple sclerosis
  - **Routine tests:** cell counts, chloride, glucose, & total protein

Nonblood Body-Fluid Specimens (cont’d)

• Gastric Fluid/Gastric Analysis
  - Examines stomach contents for abnormal substances
  - Measures gastric acid concentration to evaluate production
  - **Basal gastric analysis** (phlebotomist only assists)
    - Tube is passed through mouth & throat (or nose & throat) into stomach after fasting
    - Sample of gastric fluid is aspirated
    - Sample is tested to determine acidity prior to stimulation
    - Stimulant is administered by IV
    - Several more samples are collected at timed intervals

Nonblood Body-Fluid Specimens (cont’d)

• Nasopharyngeal Secretions
  - From nasal cavity & pharynx
  - Cultured to detect presence of microorganisms causing:
    - Diphtheria
    - Meningitis
    - Pertussis (whooping cough)
    - Pneumonia
  - Collected using sterile Dacron or cotton-tipped flexible wire swab
  - Swab is inserted into nose & passed into nasopharynx
  - It is rotated, removed, placed in sterile container, labeled, sent

Nonblood Body-Fluid Specimens (cont’d)

• Saliva
  - Fluid secreted by glands in mouth
  - Used to monitor hormone levels & detect alcohol & drug abuse
  - Can be collected quickly & easily in a noninvasive manner
  - **Semen**
  - **Most commonly used for post-vasectomy patients**
    - Sperm-containing fluid discharged during male ejaculation
    - Analyzed to assess fertility or effectiveness of sterilization
    - Examined for forensic reasons in criminal sexual investigations
    - Collected in sterile containers, kept warm, & protected from light
Nonblood Body-Fluid Specimens (cont’d)

- **Serous Fluid**
  - Found between double-layered membranes enclosing pleural, pericardial, & peritoneal cavities
  - Allows membranes to slide past one another with minimal friction
  - Can be aspirated for testing purposes by physician
  - *Types of serous fluid should be indicated on label:
    - Pleural fluid (lungs)
    - Peritoneal fluid (abdominal cavity)
    - Pericardial fluid (heart)

- **Sputum**
  - Mucous or phlegm ejected from trachea, bronchi, & lungs
  - Collected for diagnosis or monitoring of lower respiratory tract infections (tuberculosis)
  - First morning specimens are preferred (larger volume)
  - Collect at least 1 hr after a meal to avoid gagging or vomiting
  - Patient removes dentures & gargles with water
  - Patient takes 3 or 4 deep breaths & then coughs forcefully, expelling sputum into container

- **Sputum specimen container**

- **Sweat (not done in all hospitals)**
  - Analyzed for chloride content in diagnosis of cystic fibrosis
  - Sweat chloride test
    - Pilocarpine (sweat-stimulating drug) is transported into skin by electrical stimulation (iontophoresis)
    - Sweat is collected, weighed, & analyzed for chloride content
  - Also used to detect illicit drug use; collected via skin patches
Nonblood Body-Fluid Specimens (cont’d)

- Synovial Fluid
  - Clear, pale-yellow, viscous fluid that lubricates movable joints
  - Normally occurs in small amounts
  - Increases when inflammation is present
  - Can be tested to identify or differentiate arthritis, gout, & other inflammatory conditions
  - Typically collected in 3 tubes:
    - EDTA/heparin: for cell counts, ID of crystals, smear prep.
    - Sterile: culture & sensitivity
    - Nonadditive: macroscopic appearance, chemistry, & immunology tests & to observe clot formation

Other Nonblood Specimens

- *Buccal (Cheek) Swabs
  - Less invasive, painless alternative to blood collection for obtaining cells for DNA analysis
  - Phlebotomist gently massages mouth on inside of cheek w. swab
  - DNA is extracted from cells on swab

- Bone Marrow
  - Aspirated & examined to detect & identify blood diseases
  - Physician inserts large-gauge needle into bone marrow in hip bone or sternum
  - 1.0 to 1.5 mL of specimen is aspirated using syringe

Other Nonblood Specimens (cont’d)

- *Breath Samples
  - C-urea breath test
    - Used to detect H. pylori (bacteria that damages stomach lining)
  - Hydrogen breath test
    - Helps identify problems w. digestion of lactose & fructose
    - Thought to be most accurate lactose tolerance test
    - Also used to detect bacterial overgrowth in small intestine

Other Nonblood Specimens (cont’d)

- Feces (Stool)
  - Clostridium Difficile (C Diff): frequently found in hospitalized patients and is implicated as a causative agent in hospital acquired diarrhea. Extremely contagious.
  - Occult blood can not be seen by the naked eye
    - Useful in evaluation of gastrointestinal disorders
    - Stool specimens can be:
      - Evaluated for presence of intestinal parasites & their eggs
      - Checked for fat & urobilinogen content
      - Cultured to detect presence of pathogenic bacteria & viruses
      - Tested for presence of occult blood using stool test
Other Nonblood Specimens (cont’d)

- Hair
  - Collected for trace & heavy metal analysis & detection of drugs
  - Easy to obtain & cannot easily be altered or tampered with
  - Shows evidence of chronic rather than recent drug use
- Throat Swabs
  - Collected to aid in diagnosis of strep infections
  - Nurses collect from inpatients, phlebotomists from outpatients
  - Collected with sterile polyester-tipped swab in covered transport tube containing transport medium

Other Nonblood Specimens (cont’d)

- Throat Culture Specimen Collection
  1. Wash hands & don gloves (may wear mask & goggles)
  2. Open container & remove swab
  3. Stand back or to side of patient
  4. Instruct patient to tilt head back & open mouth wide
  5. Direct light onto back of throat (flashlight)
  6. Depress tongue w. tongue depressor, have patient say “ah”
  7. Swab tonsils, back of throat, inflamed areas; avoid lips, tongue
  8. Maintain tongue depressor position while removing swab

Other Nonblood Specimens (cont’d)

- A throat swab and transport tube

Other Nonblood Specimens (cont’d)

- Throat Culture Specimen Collection
  9. Place swab in transport tube, embed in medium, secure cover
  10. Label specimen
  11. Remove gloves & sanitize hands
  12. Arrange transport or deliver to lab ASAP
Other Nonblood Specimens (cont’d)

- Tissue Specimens
  - **Biopsy**: removal of tissue sample for examination
  - Most arrive at lab in formalin or other solution & only need to be accessioned & sent to proper department
  - Some, however, may not be in proper solution
  - Phlebotomist should check procedure manual to determine proper handling for any unfamiliar specimen
  - Improper handling can ruin a specimen

- Chapter 13 & 14 information at the end of Chap 14 slides