



American Medical Certification Association

Phlebotomy Technician Certification

Study Guide

1 AMCA, Phlebotomy Technician National Certification Exam (PTC) Study Guide, 2018

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Dear Student,

This exam prep study guide is intended to be used as reinforcement for what you have already learned. It is not intended to replace classroom learning or notes that you have already taken. Instead, use what you have already learned, and the notes that you have taken and the books that you used could be a great reference while you are studying.

The exam consists of 100 multiple choice questions and you will have two hours in which to complete the exam. When taking the test, always apply these test taking strategies:

- Look for distracters in the question such as the words, **not, always, exactly, first, next,** etc.
- Read all the answers
- Eliminate the ones that you know are incorrect
- Narrow it down to 2 possible answers
- Choose the **BEST** possible answer

ON TEST DAY

1. Candidates will be expected to validate their identity with a current government-issued photo ID. A copy of the ID may be kept. If the photo ID cannot be verified, the test candidate may be denied entrance to the exam, asked to reschedule or provide another form of ID. Test sites are sent exam rosters and if a candidate's name is not on the pre-printed sign-in sheet they may not be allowed to test.
2. Candidates should sign in on the Exam Roster. Once all the candidates are verified and signed in, the Proctor should close the door to prepare the candidates for testing.
3. **DO NOT WRITE IN THE TEST BOOKLET!** All of your answers must be recorded on the answer sheet.
4. Cheating of any kind will not be tolerated. If someone is suspected of cheating, they will be removed from the classroom.
5. In order to be successful on the exam, you must achieve a 69% or better on the exam.
6. Once the exam begins, you will not be allowed to access your cell phone or any other electronic device.
7. Once the exam begins, you will not be allowed to use the restroom. Please use the restroom before the exam begins.
8. The following items are prohibited: food or drink, hats, sunglasses, notes, study materials and all personal items should be stored away and out of site.

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Special Accommodations

AMCA pledges to comply with the provisions of the Americans with Disabilities Act, as amended (42 USC Section 12101, et. seq.), and with Title VII of the Civil Rights Act, as amended (42 U.S.C. 2000e, et seq.), to the best of their ability.

If you need special accommodations because of a disabling condition, you may ask for special testing services. This request must be submitted in writing and included with your registration. All requests are handled on an individual basis.

If you are requesting special accommodations you must submit a letter (IEP) from an appropriate healthcare professional that is licensed to evaluate the disability. The letter must be written on the healthcare professional's letterhead and include the professional's title, address and telephone number and date. The letter must also include a diagnosis of the disabling condition and explain why special testing accommodations are necessary. The letter must have an original signature from the professional and be dated no more than 2 years prior to registration of the exam

Exam Challenges

If you have a question or believe any part of the exam was unfair or misleading, you can email customer service and your concerns will be forwarded to the appropriate department. When emailing, please include "Exam Challenge" in the subject line and email to: AMCA@amcaexams.com.

Good luck on your exam!

AMCA Phlebotomy Review

The History of Phlebotomy

Hippocrates (the father of modern medicine) thought that disease was excess fluid in the body. Bloodletting became a common practice in his time. Barber surgeons were allowed to do certain practices such as bloodletting, leaching, cupping, shaving and enemas. **The Greek term for phlebotomy literally translates into *phlebos*, meaning vein, and *tome*, meaning an incision.**

Phlebotomy Today

Phlebotomy is now practiced to:

- Obtain blood for patient monitoring, and diagnostic purposes
- Remove blood from patients for blood banking and transfusion purposes
- Remove blood for therapeutic purposes

Practice Settings

Phlebotomists can perform a wide-variety of functions as well as work in a multitude of settings. The following are settings in which they work:

- Doctor's office
- Surgical Center
- Clinic
- Nursing home
- Long-Term care facility
- Acute care facility
- Ambulatory clinics
- Rehabilitation facilities

The Phlebotomists Role

Your role as a phlebotomist is vital to today's allied health care field. You will be entering a field that has a great need for trained professionals. You will also meet many obstacles and challenges both mentally and physically. Maintaining a good sense of ethics is extremely important in the medical field. Phlebotomists perform routine tasks in a wide variety of locations such as hospitals, medical offices, and clinics. The Phlebotomist should only perform the range of activities that is within their scope of practice. Some of those tasks include:

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patient identification, patient preparation, blood collection, patient assessment after the phlebotomy procedure. They should not be confused with medical laboratory clinicians who typically have a degree in a biological science.

Clinical duties vary according to State law and the phlebotomist should only perform those tasks which are in their identified scope of practice.

Law and Ethics

Ethics is the knowledge of what is right conduct versus what is wrong conduct. There are also choices involved in ethics which may have more to do with morals. Ethical behavior is never prejudiced or biased. For example, you may have to make a choice regarding a co-worker or even a patient.

- A co-worker of yours is consistently late. She often asks you to cover for her when she is late. She asks you not to tell and she will return the favor if you are ever going to be late. What would you do?
- You suspect a patient is being abused. He/She has bruises all over their body. The explanation given regarding those bruises is weak. What should you do?

It is your ethical duty to provide emotional support. If you suspect any type of abuse, share/report your concerns to the RN immediately and privately.

Laws are rules of conduct made by a government body. Criminal laws are concerned with offenses against the public and civil laws are concerned with relationships between people.

Tort is a wrong committed against a person or the person's property. Torts may be intentional or unintentional.

- Negligence is an unintentional wrong.
- Malpractice is negligence by a professional person (unintentional)

Intentional torts are acts that are meant to be harmful.

- Defamation is injuring a person's name and reputation by making false statements to a third person
- Libel is making false statements in print, writing or through pictures
- Slander is making false statements orally
- Invasion of privacy is violating a person's right not to have his or her private affairs exposed

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- Fraud is saying or doing something to trick, fool or deceive a person.
- Assault is intentionally *attempting* to touch or threaten a person's body without their consent
- Battery *is touching* a person's body without their consent.
- Informed Consent is when the person clearly understands what is going to be done.
- Implied Consent occurs when the patient's nonverbal behavior indicates agreement
- Abandonment is when a provider withdraws from the care of a patient without reasonable notice of discharge
- Two types of civil actions – lack of informed consent and violation of standard of care

Standard of Care is a standard, set by statutes, representing the conduct of the average health care worker in the community.

HIPPA

- A.) Patients must have written consent to have information to be disclosed to another party.
- B.) All information will be kept confidential
- C.) Informed Consent
 - 1.) Voluntary consent by patient for health care provider to examine or perform procedures.
 - 2.) Patient must be informed about procedures and given option to have procedure done.
 - 3.) Patient will usually sign a consent form.
 - 4.) Some agencies require special chain-of-custody forms for specific tests, etc. Drug screens, workplace drug tests, legal (forensic) samples, etc.

CLIA

- A.) Agency that provides regulations to ensure the accuracy and quality of lab testing.
- B.) Requires laboratory certifications by the federal government
- C.) Blood collection procedures inspected regularly due to improper techniques causing false test results.

Medical Records

Medical Records are a written account of a person's condition and response to treatment and care. There are many parts to a medical record including:

- Admission sheet
- Nursing history
- Graphic sheet

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- Progress notes
- Flow sheets

Reporting is the oral account of care and **recording** is the written account of care and observations.

Assessment involves collecting information about the person and observation is using the sense of sight, hearing, touch and smell to collect information.

Objective Data: is information that is heard, felt or smelled. **Subjective data** are things a person tells you about that you cannot observe through your senses.

Communication Methods

How you communicate is just as important as what you communicate. Written communication must always be professional. Charting, a form of communication, should be as accurate as possible. Medical charts are legal documents.

Clarifying – lets you make sure that you understand the message.

Silence – sometimes nothing needs to be said. Silence is a powerful message.

Nonverbal Communication

- 1.) **Kinesics** – the study of nonverbal communication
 - a.) kinesic slip – where verbal and nonverbal messages do not match
- 2.) **Zones of comfort**
 - intimate space (18 inches or closer)
 - personal space (18 in. to 4 ft)
 - social space (4 ft to 12 ft)
 - public space (12 ft or more)

Listening

Good listeners apply the following skills:

- Face the person
- Have good eye contact
- Lean toward the person
- Respond to the person

Paraphrasing – restate the person’s message in your own words. An excellent way to show you are listening.

Medical Terminology

A.) Word Elements

- 1.) Prefix – comes before the root word
- 2.) Root word - relating to specific body parts
- 3.) Suffix – comes after the root word
- 4.) Combining vowel- makes the word easier to say

B.) Body Direction Terms

- 1.) Ventral – front part of body
- 2.) Dorsal – back part of body
- 3.) Anterior – in front of
- 4.) Posterior – toward the back part of body
- 5.) Medial – towards the midline of the body
- 6.) Lateral – towards the side of the body
- 7.) Proximal – closest to the point of origin
- 8.) Distal – away from the point of origin
- 9.) Frontal plane – divides the body into front and back portions
- 10.) Transverse plane - divides the body into upper and lower portions

D) Body Positions

1. Normal anatomic position – standing with arms lank and palms forward
2. Supine position – lying on back
3. Prone position – lying on stomach
4. Lateral recumbent position – lying on the side

Anatomy and Physiology

Anatomy is the study of the bodies physical structure and physiology is the study of its’ functional processes.

Survival is the most important function of the human body and in order for that to happen, many complex processes work together to achieve this function.

Body Structure and Function

The Integumentary system, or skin, is the largest system. It has epithelial, connective and nerve tissue. It has oil and sweat glands. Its primary goal is to provide protection.

The Musculoskeletal system provides the framework for the body. It lets the body move and also protects and gives the body shape.

The Nervous system controls, directs, and coordinates body functions. Its two main divisions are the central nervous system and the peripheral nervous system.

The Circulatory System is made up of the blood, heart, and blood vessels.

The Respiratory System is responsible for bringing oxygen to the lungs and removing carbon dioxide from them.

The Digestive System breaks down food physically and chemically so it can be absorbed for use by the cells.

The Urinary System rids the body of waste and helps produce urine.

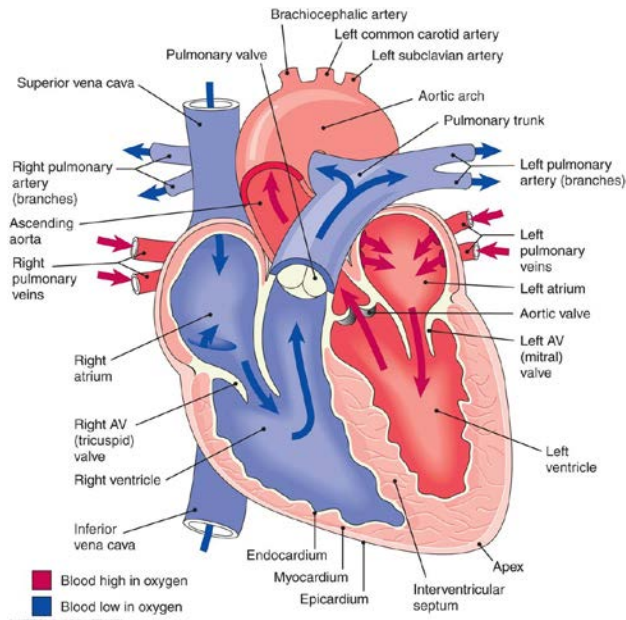
The Reproductive System allows for the reproduction.

The Endocrine System is made up of glands called the endocrine glands. The endocrine glands secrete chemical substances called hormones into the bloodstream.

The Immune System gives the body immunity. Immunity means that person has protection against a disease or condition.

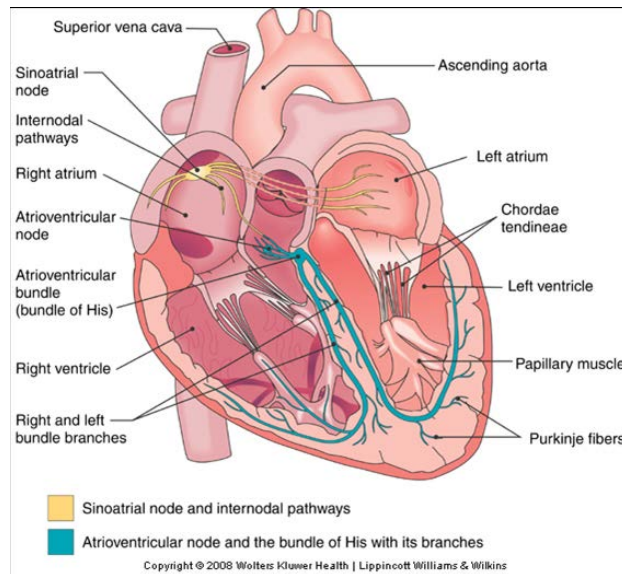
The Cardiovascular System

The cardiovascular system is comprised of three primary components – the heart, the circulating blood and blood vessels. The blood vessel that only carries blood away from the heart is the artery.



The heart is the muscle responsible for the process by which blood is pumped throughout the body. The journey begins through two large veins, the inferior and superior vena cava which returns deoxygenated blood to the heart. Deoxygenated blood arrives at the right atrium, also known as the upper right chamber of the heart. The blood then continues on its way through the tricuspid valve which leads to the Right Ventricle. Once the right ventricle contracts the blood then flows towards the pulmonary valve, and finally the pulmonary arteries. The deoxygenated blood is then transported to the lungs, where the carbon dioxide is removed from the blood and replaced with oxygen via the pulmonary alveolar capillary network. After this exchange, the blood travels back through the pulmonary veins towards the left atrium, the upper chamber of the heart. After passing through the bicuspid or mitral valve, the blood enters the Left Ventricle. Once the Left Ventricle contracts the blood flows through the aortic valve exiting to the aorta where it is transported throughout the various arteries of the circulatory system. After this process the blood returns to the heart through various peripheral veins that lead back to the Superior and Inferior Vena Cava starting the process over.

Conduction System of the Heart



The heart consists of three layers: the pericardium, the layer or sac that surrounds the heart; the myocardium; the middle layer; the endocardium, the innermost layer and the epicardium which is the top layer. Located within the myocardium is the electrical conduction system. This is the system responsible for the regulation of the pumping action of the heart, as well as the conduction of the electrical impulses that causes the myocardium to contract. Cardiac depolarization and repolarization occur when these electrical impulses develop and spread through the myocardium. The rate and rhythm of the heart are controlled by pacemaker cells, an essential part of the conduction system. These cells, also known as cardiac muscle cells, can be characterized by any of the following terms: excitability, conductivity, contractility, and automaticity.

The conduction system begins in the sinoatrial (SA) node, or the pacemaker. Here, the impulse is initiated, and then travels through the intermodal pathway, passing through several passages such as the interatrial and interventricular septums, finally ending in the Purkinje fibers in the ventricular myocardium. Depolarization and repolarization both occur as the impulse travels through the conduction system, followed by the contraction, or systole; and relaxation, or diastole of the myocardium.

The Human Body

Homeostasis – the human body strives to maintain its internal environment in a state of equilibrium or balance. “Steady State”.

1.) Blood

- a.) Blood is composed of water, solutes, and cells.
- b.) Adult humans contain 5 liters of blood.
- c.) Also referred to as the “river of life”
- d.) Fluid portion of blood is called plasma (55%) and the cellular portion is called formed elements (45%).

2.) Formed Elements (Cells)

- a) Erythrocyte – red blood cell (RBC)
- b) Leukocyte – white blood cell (WBC)
- c) Thrombocyte - also called platelets – primary function is to help in the clotting process

3.) Plasma (anticoagulated)

- a) Plasma is the portion of blood
- b) Blood cells surrounded and encased by plasma
- c) Plasma is composed of 10% dissolved solutes, and 90% water
- d) Clear, to pale yellow colored fluid
- e) Contains fibrinogen

4.) Serum (clotted)

- a) When a specimen is allowed to clot the blood cells mesh together in a fibrous substance.
- b) Has the same chemical composition as plasma except does not contain fibrinogen
- c) Blood cells contained within the fibrin clot.
- d) Serum can be separated from the blood clot by centrifugation.
- e) Clear, to pale yellow fluid

Safety and Infection Control

Incident Reports: An incident is an event that does not normally occur within the regular health care facility routine and may involve patients, visitors, physicians, hospital staff or students. The following incidents require written reports:

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- ❖ Accidents
- ❖ Thefts from person on hospital property.
- ❖ Errors of omission of patient treatment or errors in administration of patient treatment including medication.
- ❖ Exposure to blood and body fluids, as may be caused by a needle stick.
- ❖ Slips or falls that occur on the facility property

Fire In the event of a fire, the HUC may be responsible to assist in the evacuation of the patients who are endangered by the fire. If the fire is elsewhere, the HUC is expected to assist the nursing personnel in closing the doors to the patient rooms. Fire doors must be closed also. It is important to remember the RACE system which is implemented my many hospitals:

- R Rescue individuals in danger**
- A Alert**
- C Confine the fire by closing all doors and windows**
- E Extinguish the fire with the nearest suitable fire extinguisher**

Electrical Safety

A.) Using Electrical Equipment

- 1.) avoid using damaged power chords
- 2.) avoid using any extension chords
- 3.) avoid any electrical equipment while collecting blood
- 4.) when available, try and use three pronged plugs

Radiation Safety

A.) Amount of radiation is determined by:

- 1.) time: exposed to source
- 2.) shielding: if anything is between you and the source of radiation
- 3.) distance: how far person of object is away from source

First Aid

External Hemorrhage

- 1.) apply direct pressure to wound until bleeding stops or EMS arrives
- 2.) if bleeding continues, keep applying cloth or gauze over the ones already on the wound

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Shock

- 1.) common symptoms:
 - a.) clammy, pale, cold skin
 - b.) rapid weak pulse
 - c.) shallow or increased breathing rate
 - d.) staring eyes and expressionless face
- 2.) first aid for shock:
 - a.) maintain open airway
 - b.) call for assistance
 - c.) keep patient lying down with head lower than the rest of body
 - d.) attempt to control bleeding or other cause of shock if known
 - e.) keep patient warm until help arrives

Hazardous Substances

A hazardous substance is any chemical in the workplace that can cause harm. The Occupational Safety and Health Administration (OSHA) is the government agency responsible for regulating the safety and health of workers. OSHA requires that health care employees are made aware of a written plan regarding blood borne pathogen exposure control as well as:

- Understand the risks when dealing with such substances
- Know how to handle them safely

Labeling is extremely important when handling any substance in the hazardous material area. Bags, barrels, cans, cylinders, drums and storage tanks all need labels identifying handling instructions. Every hazardous substance has a material safety data sheet. It provides detailed information about the substance. The following are symbols that will be familiar in a health care facility.



Biohazard Symbol



Poison Symbol



Toxic Symbol

Preventing Infection

Infection is a major threat and health hazard in all of our health care facilities. Everyone is at risk and prevention of that risk is an important part of everyone's job description.

AIDS stands for acquired immunodeficiency syndrome, and is caused by a virus called human immunodeficiency virus. AIDS is transmitted by blood, vaginal fluids, and semen and is not spread through casual contact. AIDS also may be transmitted through the blood of an infected person that enters another person's bloodstream through a cut, an open sore, or blood that is splashed into the mouth or the eye. Thus, appropriate personal protective equipment must be worn when one is coming into contact with body fluids from all patients.

Hepatitis B This disease is caused by an inflammation of the liver that is caused by the hepatitis b virus, also known as HBV. Since health care providers are at risk for exposure, it is essential for standard blood and body fluid precautions to be practiced. The Occupational and Safety Health Administration states that employers must provide the hepatitis B vaccine for all employees who have an occupational employer risk.

Tuberculosis This disease is caused by Mycobacterium tuberculosis, an airborne pathogen. Health care workers that come into contact with patients who have tuberculosis must wear personal protective equipment, such as special fitted masks.

Nosocomial infections

Any infection that first occurs during a patient's stay at a health-care facility, regardless of whether it is detected during the stay or after, is known as a nosocomial infection. These infections are usually transmitted to the patient by a health care worker. Proper hand washing techniques are the best method of preventing the spread of nosocomial infection.

Handwashing

Hand washing is the most important means of preventing the spread of infection in addition to the prevention of micro-organisms from one patient to another. A routine hand wash procedure uses plain soap to remove soil and transient bacteria. Hand antisepsis requires the use of antimicrobial soap to remove, kill or inhibit transient microorganisms. It is important that all healthcare personnel learn proper hand washing procedures. Washing hands for 1 to 2 minutes is the proper amount of time.

Aseptic Techniques for proper blood collection include:

- Frequent hand hygiene (handwashing)
- Use of barrier garments and PPE
- Waste management of contaminated materials
- Use of proper cleaning solutions
- Following standard precautions
- Using sterile procedures when necessary

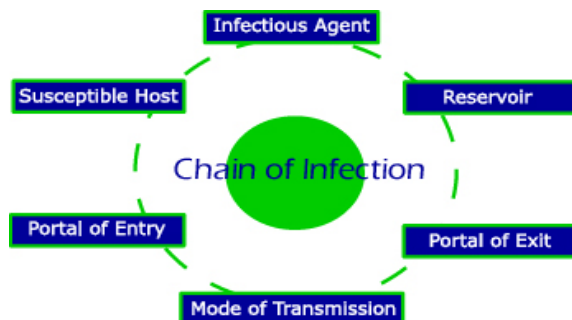
Barrier Protection

Protective clothing provides a barrier against infection. Used properly, it will provide protection to the person wearing it; disposed of properly it will assist in the spread of infection. Learning how to put on and remove protective clothing is vital to insure the health and wellness of the person wearing the PPE. PPE's or personal protective equipment include:

- Masks
- Goggles
- Face Shields
- Respirator

Infection Control/Chain of Infection

This consists of links, each of which is necessary for the infectious disease to spread. Infection control is based on the fact that the transmission of infectious diseases will be prevented or stopped when any level in the chain is broken or interrupted.



Agents– are infectious microorganisms that can be classified into groups namely: viruses, bacteria, fungi, and parasites. It is these agents that cause disease.

Portal of exit –the method by which an infectious agent leaves its reservoir. The nose, hands, or sneezing could be considered portals of exit.

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Mode of transmission – method of transfer. There are five main types of mode of transmission:

- Contact: direct and indirect
- Droplet
- Airborne
- Common vehicle
- Vectorborne

Portal of entry An opening allowing the microorganism to enter the host. Portals include body orifices, mucus membranes, or breaks in the skin. Portals also result from tubes placed in body cavities, such as urinary catheters, or from punctures produced by invasive procedures such as intravenous fluid replacement

Susceptible host A person who cannot resist a microorganism invading the body, multiplying, and resulting in infection. The host is susceptible to the disease, lacking immunity or physical resistance to overcome the invasion by the pathogenic microorganism.

Isolation Precautions

The CDC recommended universal precautions, which is a method of infection control that assumed that all human blood and body fluids were potentially infectious. The CDC issued a revised guidelines consisting of two tiers or levels of precautions: Standard Precautions and Transmission-Based Precautions. These are outlined below.

Standard Precautions

Standard precautions are a set of infection control practices used to prevent transmission of diseases that can be acquired by contact with blood, body fluids, non-intact skin (including rashes), and mucous membranes. These measures are to be used when providing care to all individuals, whether or not they appear infectious or symptomatic.

The standard precautions are:

- Consider every person (patient or staff) as potentially infectious and susceptible to infection.
- Wash hands—the most important procedure for preventing cross-contamination (person to person or contaminated object to person).
- Wear gloves (both hands) before touching anything wet—broken skin, mucous membranes, blood or other body fluids, or soiled instruments and contaminated waste materials—or before performing invasive procedures.

Transmission- Based Precautions

The second tier of precautions and are to be used when the patient is known or suspected of being infected with contagious disease. They are to be used in addition to standard precautions. In all situations, whether used alone or in combination, using the utmost care with regard to patient and employee is crucial.

Contact precautions

Infectious agent (bacteria, virus or parasite) transmitted directly or indirectly from one infected or colonized person to a susceptible host (patient), often on the contaminated hands of a health worker. The following precautions should be taken - Wear clean, non-sterile examination gloves when entering room. Change gloves after contact with infective material (e.g., fecal materials or wound drainage). Remove gloves before leaving patient room.

Airborne precautions

These precautions are designed to reduce the nosocomial transmission of particles 0.001mm or less in size that can remain in the air for several hours and be widely dispersed. Special air handling and ventilation are required to prevent airborne transmission.

Droplet precautions

These precautions reduce the risks for nosocomial transmission of pathogens spread wholly or partly by droplets larger than 0.001 mm in size. Pathogens are microbes that can cause disease. Droplet precautions are simpler than airborne precautions because the particles only remain in the air for a short time and travel only a few feet; therefore, contact with the source must be close for a susceptible host to become infected. It is recommended to wear a mask when interacting with patients to reduce the incidence of infections.

Blood Collection Equipment

A tourniquet is a device used to make the veins easier to find for venipuncture. These latex bands usually measure 1 to ½ inches wide and 15 inches long. When using a tourniquet for a venipuncture procedure, do not leave it on for an extended period of time. The recommended amount of time is approximately 1 minute.

Vacutainer tubes, the most commonly used tubes for laboratory blood collection, are color coded based on the presence of any additives within the tube. Anticoagulants, clot activators, and preservatives are a few of the additives that may be present in the tubes.

Test Tubes, Additives and Tests

Color of Stopper	Description and Use
Yellow	Blood culture and sterile specimens, ACD solution – additive used is sodium polyanetholesulfonate
Blue	Additive used is sodium citrate. Additive prevents coagulation by binding calcium. It is advised to draw 2 to 3 ml of blood in a tube without additives before drawing this tube Commonly used for coagulation tests (PT, PTT, fibrinogen)
Red	No additive required. Commonly used for serum determinations in the following: <ul style="list-style-type: none"> • Chemistry testing • Blood bank testing • Thixotropic gel can be added (this is an inert (nonreacting) synthetic substance contained in or near the bottom of certain blood collection tubes)
Green	Additive used is sodium heparin and lithium heparin natural anticoagulant that inhibits thrombin. Commonly used for routine chemistry testing.
Lavender	Additive used is ethylenediaminetetraacetic acid (EDTA). Additive binds the calcium needed for clot formation. Commonly used for hematology testing (CBC, reticulocyte count, erythrocyte sedimentation)
Gray	Additives used are sodium fluoride, a preservative that inhibits glycolic action and potassium oxalate, an anticoagulant that binds calcium. Commonly used for glucose tolerance and lactic acid measurement.
Royal Blue and Tan	Used to collect samples for nutritional studies, therapeutic drug monitoring and toxicology. Also used for testing aluminum, copper, arsenic, calcium, etc. Tan topped is used for lead testing and contains EDTA.

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Phlebotomy

Site Selection

The best site for venipuncture is the antecubital fossa of the upper extremities. The vein should be large enough to receive the shaft of the needle, and it should be visible or palpable after tourniquet placement. When possible, have the patient sit with their arm in a straight line from shoulder to wrist.

The three major veins located in the antecubital fossa are the median cubital vein, the first vein of choice because it is large and rarely moves during needle insertion. The cephalic vein, a more difficult vein to locate, is the only vein that can be palpated in an obese patient. The basilic vein, located near the brachial vein, is the least firmly anchored and may be punctured if the needle is inserted too deep.

It is not encouraged to attempt to draw from sclerosed veins, which feel hard or cordlike. The clinical medical assistant should also avoid tortuous veins (veins that are winding or crooked) or from an arm with IV fluids running into it. Collection from either of these sites may produce inaccurate test results.

Gauge number indicates the diameter of the needle, the smaller the number the larger the needle diameter and higher the flow rate. Smaller needles are for certain lab tests and typically for use on children. The butterfly needle (winged infusion set) is commonly used for IV insertion.

It is very important that a Procedure Manual, found in the workplace, be followed regarding specimen collection.

Venipuncture

When preparing to draw blood from a patient, after patient ID* is confirmed, it is a good idea to determine if the patient has ever had their blood drawn before and what experience they had prior to you beginning. If this is the first time for the patient, have him/her sit on a chair with arm support in order to make the patient comfortable. * If blood is being drawn in a hospital setting, the phlebotomist should check the patient's armband for acceptable identifiers.

In order to perform venipuncture, it is essential to have the following supplies on hand:

- Phlebotomy tray containing antiseptic, vacutainers, holder and needle
- Tourniquet

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- Accurate specimen labels
- Disposable gloves
- Sharps container

The following procedure should be used when performing a venipuncture:

1. Review the physician's order in order to ensure that it contains all the necessary information. If any part of the order is unclear, contact the appropriate person for confirmation.
2. Prepare the laboratory requisition.
3. Make sure all the appropriate supplies are available for the procedure.
4. Identify the patient, introduce yourself, and then escort them to the appropriate area.
5. Verify that the patient is prepared for the procedure.
6. Position the patient; try to be reassuring if they appear to be nervous.
7. Wash your hands carefully and put on gloves.
8. Gather and prepare the necessary equipment.
9. Apply the tourniquet; it should be applied 3-4 inches above the site where the venipuncture will be made.
10. Ask the patient to make a fist or open and close his/her hand.
11. Palpate the antecubital area with your index finger in order to determine the exact vein location and site of entry.
12. Clean the antecubital area in a circular motion.
13. Allow the site to air-dry.
14. Assemble the needle and tube holder.
15. Place the patient's arm in a downward position. Grasp the patient's arm firmly while drawing the patient's skin tautly. Apply the needle, bevel up at a 15-30 degree angle.
16. Firmly hold the needle then push the tube toward the holder until the stopper is punctured.
17. Release the tourniquet as soon as the blood is flowing freely.
18. Politely ask the patient to release his or her fist.
19. Fill the tubes in the correct order of draw:
 1. Blood Cultures
 2. Light Blue top-tubes
 3. Red or Speckled tubes
 4. Green top tubes
 5. Lavender top tubes
 6. Gray top tubes
20. Remove the last tube from holder then withdraw the needle from the patient's arm.
21. Place folded gauze over the venipuncture site and withdraw the needle. Apply pressure until the bleeding stops.
22. Discard needles properly.

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23. Accurately label each collected specimen, noting the patient's name and ID number, the time and date of collection, and your initials.
24. Check the venipuncture site to see whether the bleeding has stopped, then bandage the area.
25. Remove gloves, dispose properly then wash your hands.

Dermal Puncture

At often times, there may be certain situations where only a small amount of blood is required for testing, blood is being drawn from an infant or small child, or from an adult whose veins are difficult to find. If either of these situations should arise, it is advisable to perform a dermal puncture, or microcapillary collection on the patient. The preferred sites for obtaining a capillary blood specimen are the fleshy, central palmar surface of the third middle finger or fourth finger of the non-dominant hand.

The following procedure should be used when performing a dermal puncture:

1. Review the physician's order in order to ensure that it contains all the necessary information. If any part of the order is unclear, contact the appropriate person for confirmation.
2. Identify the patient, introduce yourself, and then escort them to the appropriate area (if necessary).
3. Verify that the patient is prepared for the procedure.
4. Assemble the necessary equipment.
5. Wash your hands.
6. Select an appropriate dermal puncture site depending on the age of the patient.
7. Warm the site with either a warm cloth or warming device. This practice can increase the blood flow up to seven times the normal amount.
8. Clean the site using 70% isopropyl alcohol. Allow the site to thoroughly air-dry for maximum antiseptic action.
9. Prepare the puncture device
10. Perform the dermal puncture

Sharps/Needlestick Injury Prevention

Injuries can be caused by the following:

- Failure to activate the safety device after using a needle
- Attempting to re-cap a needle
- Transferring blood specimens from a syringe into collection tubes
- Use of needles without safety devices

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- Over – filling the biohazard sharps container
- Use of non-retractable puncture devices for fingersticks
- Needles should be disposed of properly (Sharps container) after use

Analytic Errors

The assistant should aim to be accurate and efficient at all times. This section will identify the measures to take in order to avoid analytical errors that may occur before, during, and after collection. Quality control is very important in phlebotomy – a prime example of a good quality control is checking the expiration date of evacuated tubes before collection

Before collection, be sure to use the following steps to avoid analytical errors:

- Ensure proper coordination of patients
- Verify time of specimen collection
- Verify usage of proper tubes
- Verify that patient is prepared (fasting, medication, etc.) The basal state is usually early morning after the last ingestion of food – approximately 12 hours. If a patient’s specimen is lipemic, this is usually an indicator that the patient is not fasting.

During collection, be aware of the possibility of the following analytical errors

- Wrong order of draw
- Extended tourniquet time
- Hemolysis
- Failure to invert tubes

The following analytical errors may occur after the specimen has been collected:

- Improper storage of specimens
- Improper usage of serum separator tubes
- Turbid serum appears cloudy or “milky” and results from bacterial contamination or high lipid levels in the blood

Possible Complications Occurring with Specimen Collection

- **Syncope** – sudden fainting- can occur therefore communication is essential between the phlebotomist and the patient. Drawing blood in a recumbent position. Do not turn your back on the patient and stay with the patient at least 15 minutes after the blood collection to assure the patient’s safety.
- **Hematoma** – when blood is leaking into the surrounding tissues
- **Petechiae** – small, red, smooth, hemorrhagic spots appearing on a patient’s skin which indicates that minute amounts of blood have leaked in the skin epithelium.
- **Excessive bleeding** – coagulation times may vary if the patient is on a blood thinner

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- **Hemoconcentration** – is a decrease in the plasma volume with an increased concentration of cells and molecules. May be caused by prolonged tourniquet application, massaging or squeezing or probing a site.
- **Hemolysis** – happens when RBC's are lysed, hemoglobin is released and serum which is normally straw colored becomes tinged with pink or red.
- **IV Patients** – when there is a request to draw blood from a patient with an IV, it is best to draw the specimen from below the IV
- **Drawing blood too quickly** – may cause the vein to collapse

Clinical Laboratory Sections

The medical laboratory is an area in a healthcare facility where inpatient and outpatient diagnostic testing is conducted. Certain areas of the medical laboratory are designated for clinical analysis, while others are for surgical and anatomical pathology analysis. The medical assistant should be familiar with the following clinical sections:

Hematology Section

This department deals with the handling of various blood specimens. Tests performed in this department include WBC counts, RBC counts, CBC, hemoglobin, hematocrit (Hct), RBC indices, and platelet counts. The results of these tests indicate conditions such as dehydration, anemia, leukemia and a wide variety of other diseases.

Chemistry Section

The most commonly performed tests within this department include those for blood glucose levels, electrolytes (sodium, potassium, and chloride), total protein etc. Serum Separator tubes (SST) are commonly delivered to the Chemistry department of the laboratory. The results of these tests can range from the confirmation of pregnancy to the presence of a liver disorder.

Blood Bank Section

This is the section of the laboratory where blood is collected, stored and prepared for transfusion. It is essential for all staff members to comply with the standards for patient identification and specimen handling in order to ensure the safety of all the patients. These standards are as follows:

Tests done in the blood bank require a red top (plain) tube or a lavender or pink top tube. Specimens **must** have the following identification information:

- Patient's full name and date of birth
- Patient's hospital identification number (inpatient)
- Outpatient's social security number
- Date and time of collection

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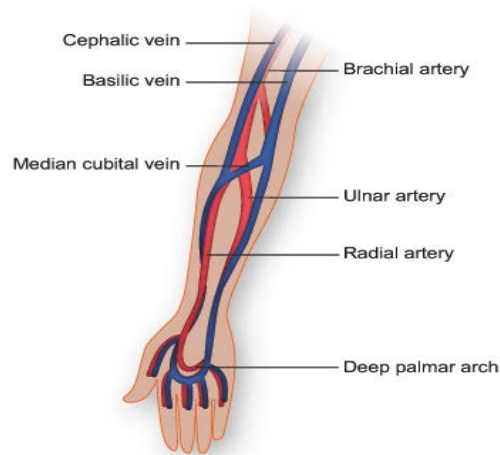
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- Medical assistant's initials

Microbiology Section

This section of the clinical laboratory focuses on the observation of organisms that are not visible to the human eye. The primary sections of this department include parasitology, the study of parasites; virology, the study of viruses and resulting diseases; mycology, the study of fungi; and bacteriology, the study of bacteria.

Veins



Veins of the arm

1. Median cubital is the first vein of choice
2. The cephalic is the second vein of choice. This is the vein used for most obese patients.
3. The Basilic vein is the third vein of choice due to the location of the nerves by the vein.

Capillaries

1. Are microscopic one cell- thick vessels that link arterioles and venules that form a bridge between arteries and veins
2. Only vessels that permit the exchange of CO₂ and O₂ between blood and other tissues
3. Blood in the capillary bed is a mix of arterial and venous blood

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Hemostasis and coagulation

Hemostasis is the maintenance of circulating blood in the liquid state and the retention of blood in the vascular system by preventing blood loss.

Coagulation issues that affect phlebotomy- Drugs like heparin and Coumadin suppress clotting and may result in patient bleeding more than normal. In addition, those patients on an aspirin regimen may also experience excessive bleeding after phlebotomy is performed.

Needles -Parts of a multi-sample needle

- 1.) Bevel
- 2.) Shaft
- 3.) Threaded hub
- 4.) Rubber sleeve over needle

Parts of a syringe system

- 1.) Bevel
- 2.) Shaft
- 3.) Hub
- 4.) Graduated barrel
- 5.) Plunger

VADS and SITES

- A.) Arteriovenous Shunt or Fistula - permanent surgical fusion of an artery and a vein that is typically created to provide access for dialysis
- B.) Heparin or Saline Lock - catheter or cannula connected to a stopcock or cap with a diaphragm that provides access for administering medications.
- C.) Intravenous Sites – When a patient has an IV in one arm, try the other arm. If a patient has an IV in both arms try a capillary puncture if possible. If not possible then specimen may be collected below the IV site.

Puncture sites may require additional pressure to stop bleeding especially if the patient is taking blood thinners or on an aspirin regimen.

Primary hemostasis

- Vasoconstriction - a rapid constriction of the vessel to decrease blood flow to the injured area.
- Platelet plug formation - Platelets degranulate, mesh together, and stick to injured vessel to form a plug and stop bleeding.

Secondary hemostasis

- Fibrin clot formation - coagulation factors are released and interact to form a blood clot. This seals off the damaged portion of the vessel.
- Common pathways:
 - a.) Intrinsic pathway
 - b.) Extrinsic pathway
 - c.) Hemostatic plug
- Fibrinolysis - Final regeneration and repair of injured vessels. The clot slowly begins to dissolve while other cells continue to repair vessel.

Specimen labels and blood collection lists

Regardless of the method for submitting a lab test request the specimen must include:

1. Patient I.D. (name, registration, or I.D. number, location)
2. Name of physician or person ordering the test
3. Tests required
4. Time and date of specimen collection
5. Other pertinent clinical information when appropriate

CLSI Order of Draw

- A.) Sterile tube - Yellow
- B.) Coagulation tube – Light Blue
- C.) Serum Tube - Red
- D.) SST – Red tiger top or gold top
- E.) PST- Light green top – Lithium Heparin
- F.) Green – Dark green top – Sodium Heparin
- G.) EDTA – Lavender
- H.) Glycolytic inhibitor tube – Gray

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Special Procedures/Special testing

- A.) 2- hour Post prenatal Glucose – (PP) means after a meal. Glucose specimen is collected 2 hours after a patient eats a meal

- B.) Glucose Tolerance Test – (GTT) used to diagnose carbohydrate metabolism problems. Patient must eat well balanced meals 3 days prior to test and must fast at least 12 hours before the test. Patients must drink glucose prior to testing and have 5 minutes to finish the drink. Levels will peak within 30 minutes to an hour following glucose ingestion. Once the patient finishes with the glucose ingestion, the time is noted and 30-, 60-, 120-, and 180- minute blood specimens are taken. There is a total of 4 tubes drawn on a 3 hour glucose tolerance test. A normal result for a fasting glucose test is under 100.

- C.) Lactose Tolerance Test - same procedures as GTT but patient must drink lactose rather than glucose

- D.) Bleeding Time Test - (BT) test is performed on the forearm and uses a blood pressure cuff inflated to 40 mm Hg. Phlebotomist will use an automated incision device to puncture skin and will use filter paper to blot the blood drops. This is a timed test and phlebotomist will blot blood every 30 seconds until patient stops bleeding.

- E.) A DNA test is done by swabbing the inside of the cheek –also known as a buccal swab.

Non-blood Specimens and Tests

Urine- collection in temp measured cups. Check for clarity, specific gravity, color and odor. Usually a regular voided specimen is acceptable for a common UA. C&S testing is used for UTI symptoms and must be a mid-stream clean catch specimen. Drug screening is random sample in clean covered container. A major drawback of a 24 hour urine collection is patient cooperation – often patients get tired of participating and the entire test is then null and void. Pregnancy testing is used to identify the presence of HCG usually present in body after 10 days of conception. First morning specimen is preferred.

- 1.) regular voided specimen
- 2.) midstream specimen
- 3.) midstream clean catch specimen

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- 4.) catheterized specimen
- 5.) suprapubic specimen

Cerebrospinal Fluid- (CSF) mostly obtained through a lumbar puncture and looks for cell counts, chloride, glucose, and total protein.

Pharmacology and the effects on phlebotomy tests

a.a	Of each
a.c.	Before meals
b.i.d.	Twice a day
t.i.d	Three times a day
q.i.d.	Four times a day
q.h.	Every hour
q.4.h.	Every four hours
q.8.h	Every eight hours
Sig	Take
p.c.	After meals
p.r.n.	When necessary or as needed
Post-prandial	After a meal

Controlled Substances are regulated by the DEA – Drug Enforcement Administration

Analgesics – relieve mild to severe pain – Tylenol, Aspirin, etc.

Anesthetic – prevents sensation of pain – Lidocaine, etc.

Antibiotic – kills bacterial microorganisms – Amoxil, ciproflaxin, zithromax etc.

Anticoagulant – prevent blood from clotting – Lovenox, heparin sodium, warfarin sodium

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Diuretic – reduces blood pressure, increases urine output – various names can be found

Vasoconstrictor – constricts blood vessels, increases blood pressure

Synergist – two drugs working together

Antagonist – one drug decreases the effect of another

Adverse reactions – undesirable effects of a particular drug

Measurements and Dosage

There are three systems of measurement used in the U.S for pharmacology and drug administration – metric, apothecary and household systems. Metric is the most commonly used.

Terminology

- Weight – refers to heaviness
- Volume - refers to the amount of space a drug occupies
- Liters (Metric) are used to measure volumes
- Grams (Metric) are used to measure weight
- Fluid ounces, fluid drams – apothecary measurements

Specimen Transportation

Specimen transportation should occur as soon as possible. Once the specimen is labeled and either placed in a rack or carrier, the specimen should arrive at the lab so processing can begin. Some specimens require chilling – the use of ice slurry, water mixed with ice, is the best way for the specimens to be transported.

AMCA Phlebotomy Exam Review

1) Which of the following is not a phlebotomist's duty?

- A. Collecting blood specimens
- B. Performing laboratory computer operations
- C. Starting intravenous (IV) lines
- D. Transporting specimens to the laboratory

2) A national organization that sets standards for phlebotomy procedures is the:

- A. ASCP
- B. NAACLS
- C. NCA
- D. CLSI

3) Which type of contact infection transmission involves transfer of an infective microbe to the mucous membranes of a susceptible individual by means of a cough or sneeze?

- A. Direct
- B. Droplet
- C. Fomites
- D. Indirect

4) Which of the following is a test of the respiratory system?

- A. ABGs
- B. CSF
- C. TSH
- D. UA

5) The receiving chambers of the heart are the:

- A. Atria
- B. Chordae tendineae
- C. Vena cavae
- D. Ventricles

6) An individual's blood type is determined by the presence or absence of a certain type of:

- A. Antibody present on the red blood cells
- B. Antibody present on the white blood cells
- C. Antigen present on the red blood cells
- D. Antigen present on the white blood cells

7) Which of the following veins is not an antecubital vein?

- A. Basilic
- B. Cephalic
- C. Femoral
- D. Median cubital

8) Which needle gauge has the largest lumen?

- A. 18
- B. 20
- C. 21
- D. 22

9) Which government agency regulates the quality of gloves worn when performing phlebotomy procedures?

- A. CDC/HICPAC
- B. FDA
- C. JCAHO
- D. OSHA

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10) The tests performed in the following department are collected in a tube with a light blue stopper:

- A. Chemistry
- B. Hematology
- C. Coagulation
- D. Microbiology

11) Never leave a tourniquet on for more than:

- A. 30 seconds
- B. 45 seconds
- C. 1 minute
- D. 3 minutes

12) You must draw a protime specimen from a patient with IVs in both arms. Which of the following locations is the best place to draw the specimen?

- A. Above an IV
- B. Below an IV
- C. From an ankle vein
- D. From an IV

13) What is PKU?

- A. A contagious condition caused by lack of phenylalanine
- B. A hereditary inability to metabolize phenylalanine
- C. An acquired condition caused by lack of phenylalanine
- D. An inherited condition caused by lack of thyroid hormone

14) Which test requires strict skin antisepsis procedures before specimen collection?

- A. Blood culture
- B. Blood urea nitrogen
- C. Complete blood count
- D. Type and crossmatch

15) Which of the following tests may require special “chain of custody” documentation when collected?

- A. Blood culture
- B. Crossmatch
- C. Drug screen
- D. TDM

16) The hormone detected in positive urine pregnancy tests is:

- A. ACTH
- B. GH
- C. HCG
- D. TSH

17) A tube containing heparin is collected between:

- A. A blood culture and before a serum tube
- B. A citrate additive tube and a serum tube
- C. An EDTA tube and a glycolytic inhibitor tube
- D. A serum tube and an EDTA tube

18) Which fluid is obtained by lumbar puncture?

- A. Cerebrospinal
- B. Peritoneal
- C. Pleural
- D. Synovial

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19) A urine C & S is typically ordered to detect:

- A. Abnormal urine pH
- B. Glucose spillage into the urine
- C. Kidney damage
- D. Presence of UTI

20) Which statement describes proper centrifuge operation?

- A. Centrifuge serum specimens before they have a chance to clot
- B. Never centrifuge both serum and plasma specimens in the same centrifuge
- C. Place tubes of equal size and volume opposite one another
- D. Remove stoppers before placing tubes in the centrifuge

Answer Key

- | | |
|--------|--------|
| 1.) C | 11.) C |
| 2.) D | 12.) B |
| 3.) B | 13.) B |
| 4.) A | 14.) A |
| 5.) A | 15.) C |
| 6.) C | 16.) C |
| 7.) C | 17.) D |
| 8.) A | 18.) A |
| 9.) B | 19.) D |
| 10.) C | 20.) C |