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 200 multiple choice questions and you will have 3 hours and 30 minutes 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. Please bring a picture ID with you. A valid driver’s license, county ID, and passport are all acceptable forms of ID.
2. Please bring a #2 pencil with you.
3. Fill out all registration and test answer sheets in their entirety. Your full name as you would like it to appear on your certification card, your complete SSN and mailing address are necessary. Failure to provide this information, will delay the processing of your exam.
4. **DO NOT WRITE IN THE TEST BOOKLET!** All of your answers must be recorded on the answer sheet.
5. Cheating of any kind will not be tolerated. If someone is suspected of cheating, they will be removed from the classroom. They will forfeit their right to retake the exam.
6. In order to be successful on the exam, you must achieve a 70% or better on the exam.
7. Once the exam begins, you will not be allowed to access your cell phone or any other electronic device. Please turn them to silent prior to entering the classroom.
8. Once the exam begins, you will not be allowed to use the restroom. Please use the restroom before the exam begins
Special Accommodations

AMCA and the American School of Business pledge to comply with the provisions of the Americans with Disabilities Act, as amended (42 USCG 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!
Introduction

A certified Clinical Medical Assistant participates in both front and back office activities. A CMAA may perform some or all of the following duties. However, they are not limited to just these responsibilities:

- Answer phones and schedule appointments
- Prepare statements for billing
- Communicate with patients
- Chart a patient's history
- Take a patient's vital signs
- Perform phlebotomy
- Prepare a patient for an EKG

It is your responsibility to know the laws concerning a medical assistant’s scope of practice in the state in which they work.

Practice Settings

Clinical Medical Assistants 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

Clinical Medical Assistant

Your role as a medical assistant 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. Clinical medical assistants perform routine tasks in a wide variety of locations such as hospitals, medical offices, and clinics. The medical assistant should only perform the range of activities that is within their scope of practice. They should not be confused with physician assistants, who examine, diagnose, and treat patients under the direct supervision of a physician.

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Administrative duties include telephone coverage, scheduling, maintenance of medical records, and the management of all correspondences.

Clinical duties vary according to State law and include taking medical histories and recording vital signs, explaining treatment procedures to patients, preparing patients for examination, and assisting the physician during the examination. Medical assistants collect and prepare laboratory specimens or perform basic laboratory tests on the premises, dispose of contaminated supplies, and sterilize medical instruments. They instruct patients about medications and special diets, prepare and administer medications as directed by a physician, authorize drug refills as directed, telephone prescriptions to a pharmacy, draw blood, prepare patients for x rays, take electrocardiograms, remove sutures, and change dressings. In the case of intravenous drugs, most cases require a licensed individual to administer this type of therapy. A medical assistant can assist by laying out supplies and equipment necessary for the infusion or injection being administered.

**Medical Administrative Assistant**
The duties of a medical administrative assistant are decided on the basis of type of facility, size of practice and state of working. Some of the main duties of a medical administrative assistant are:

- Registration and filing medical records of new patients.
- Communication and correspondence with patients, equipment suppliers, laboratories, insurance companies and other groups.
- Bookkeeping and answering the phone calls.
- Some states allow the medical assistant to help the doctors examine the patients. This includes measuring and recording weight, heath and vital signs of the patients. The medical administrative assistant should perform duties only within their scope of practice.

**Ethics and Patient Rights**
Ethics has been a part of medicine since ancient times. These ethics serve as principals in which to guide your career in the medical field. Ethics are based on integrity, responsibility to service and community, respect, self discipline and intent to further your career.

**Patient Rights**
Patients actively participate in their own health care. The Patient Bill of Rights serves as a guide for both patients and their physicians involved in their care.
Patient's Bill Of Rights
As a patient in XXX Hospital you have the right, consistent with law, to:

- Receive treatment without discrimination as to race, color, religion, gender, national origin, disability, or source of payment.
- Be informed of the name and position of the doctor who will be in charge of your care in the hospital.
- Receive all the information that you need to give informed consent for any proposed procedure or treatment. This information shall include the possible risks and benefits of the procedure or treatment.
- Receive all the information you need to give informed consent for an order not to resuscitate. You also have the right to designate an individual to give this consent for you if you are too ill to do so. If you would like additional information, please ask.
- Refuse treatment, examination, or observation, if retired or a family member, and be told what effect this may have on your health.
- Privacy while in the hospital and confidentiality of all information and records regarding your care.
- Review your medical record without charge. Obtain a copy of your medical record for which the hospital can charge a reasonable fee. You cannot be denied a copy solely because you cannot afford to pay.
- Complain without fears of reprisals about the care and services you are receiving and to have the hospital respond to you; and if requested, a written response. If you are not satisfied with the hospital's response, you can complain to the Patient Representative Office located here in the hospital.
- Receive information about pain and pain relief measures, be involved in pain management plan, and receive a quick response to reports of pain.
- The right to request information about advance directives regarding your decisions about medical care.
- Make known your wishes in regard to anatomical gifts. Your may document your wishes in your health care proxy or on a donor card, available from the hospital.

Understand and use these rights. If for any reason you do not understand or you need help, the hospital will attempt to provide assistance, including an interpreter.

A patient’s medical history is generally taken before admission to the hospital; it may be taken at the doctor’s office or in the admitting office of the hospital.

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.

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
- 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.

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.

- Listening
- Good listeners apply the following skills:
  o Face the person
  o Have good eye contact
  o Lean toward the person
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)

**Phone Etiquette**

When speaking on the phone always identify yourself to the caller. Convey to the person your undivided attention and willingness to help. Listen without interrupting, provide reasonable alternatives for the caller and take a clear concise message in order for the call to be returned.

The following steps will ensure proper telephone etiquette:

- Answer the telephone promptly and kindly.
- Never allow an angry or aggressive caller to upset you; remain calm and composed.
- Speak clearly and concisely.
- Be sure to ask the caller’s permission before placing them on hold.

Understanding a patient’s feeling is important. They may be anxious, nervous or even frightened. Empathy, having an understanding and compassion for what they may be experiencing, is a good characteristic to have in order to relate to your patients.

**E-mail** is a quick and easy way to communicate. Keep these handy tips in mind when using email to communicate:

- Use a personal name if your system allows it.
- Fill in the subject line to identify your message.
- Do not write a message with upper case as this may be perceived as expressing anger.
- **ALWAYS CHECK WHO THE RECEIVER OF THE EMAIL IS BEFORE YOU CLICK SEND.** This can be quite embarrassing if the email goes to the wrong recipient.
- Use “please” and “thank you”.
- Remember, email could be used as a legal document. Never threaten or intimidate someone; even in jest.

**Forms of Charting**

Narrative – written description of patient’s visits in chronological order

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SOAP Note Charting – method that tracks subjective, objective, assessment and plan for a patient’s visit.

- Subjective – patient’s statements (chief complaint)
- Objective – observations made by the medical assistant, examination findings and vital signs
- Assessment – doctor’s diagnosis
- Plan – health care providers prescribed plan of action

POMR Problem-Oriented Medical Record Charting – tracks a patient’s problems throughout medical care. Each problem is assigned a number and the number is referenced when the patient comes in for care.

Flow Charts – visual tools that help track certain information in patient’s medical records like an infant’s/child’s growth.

Progress Notes – daily chart notes made during patient’s visits to document patient progress with certain conditions.

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
- 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.

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

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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

Fowler’s Position - In this position the patient is lying, on his/back, on the bed. This position is considered, by many to be the most comfortable. It is ideal for many treatments and is also comfortable for watching TV feeding and is comfortable for patients who have difficulty breathing. Modern beds allow the head of the bed to be elevated at different comfort levels. It is ideal to have two to three pillows under the back and shoulders. The patient’s hips should be at the place where the bend bends when the bed head is rolled up. Place the head of the bed at 30° for semi-Fowler’s, 45° to 60° for Fowler’s, and 90° for high Fowler’s. Flex elbows and place a pillow under each arm to prevent pull on the shoulders.

Prone Position
Used to examine spine and back. Patient lies on abdomen with head turned to one side for comfort. Arms may be above head or alongside body. Cover with sheet or bath blanket.
Sims Position
A position in which the patient lies on one side with the under arm behind the back and the upper thigh flexed, used to facilitate rectal and vaginal examinations, and also for the administration of enemas and treatments. Also called lateral recumbent position. This position is a variation of lateral position with the patient on the left side, left leg extended and right leg flexed.

TRENDELENBURG POSITION
The patient is supine on a surface inclined 45 degrees, head at the lower end and legs flexed over the upper end.

DORSAL RECUMBENT POSITION
The Dorsal Recumbent Position is when the patient is on his/her back with knees flexed and soles of the feet flat on the bed. The MA will need to fold a sheet once across the chest and fold a second sheet crosswise over the thighs and legs so that genital area is easily exposed.

Patient Care

Pain is unpleasant and an emotional experience. Each person responds differently to pain depending on their threshold. Pain can be categorized as acute or chronic. Acute pain such as surgical pain usually lessens with treatment. Chronic pain, like that associated with arthritis, lasts longer possible for a lifetime.

There are three types of pain. Physical pain – this could be considered like chest pain or a severe stomach ache. This type of pain is usually a sign that something is wrong, psychological
pain, like terror, fear, or grief. This type of pain could lead to disorders such as depression, PTSD, or an anxiety disorder. Phantom pain, this is pain that occurs after an amputation.

Making a Pain Assessment

There are a variety of pain scales s follow the pain scale adopted by your place of work.

Questions to ask when making a pain assessment:
- When did the pain start?
- Where is the pain?
- How often do you feel the pain?
- Does anything you do lessen the pain?
- Describe the pain.

Patient Preparation and Encounters
As a medical assistant you may be responsible for various duties in the office including triage of patients, consent forms, preparing third party information, taking the patient’s vital signs, and updating medical charts.

Implied Consent – agreement implied by the patient for examination and treatment when presenting for a routine visit; also in an emergency consent that is assumed the patient would give if the patient could do so.

Informed Consent – consent that is given by patient after all potential treatment and outcomes have been discussed for a specific medical condition, including risks and possible negative outcomes.

Triage – sorting and setting priorities for treatment for patients who are on the phone or at the reception desk.

Sign – that which can be seen, heard, measured or felt by the examiner.
**Symptom** - a perceptible change in the body related by the patient.

**Safety**

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:

- 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.

**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**  
  Sound the alarm

- **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**

A.) 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

**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

**AHA Chain of Survival**
1.) early access to care
2.) early CPR
3.) early defibrillation
4.) advanced care

**Hazardous Substances**
A hazardous substance is any chemical in the workplace that can cause harm. The Occupational Safety and Health Administration (OSHA) require that health care employees:
Understand the risks when dealing with such substances and 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](image)
![Poison Symbol](image)
![Toxic Symbol](image)

**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** - 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.

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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 nonsocomial infection.

Handwashing
Hand washing is the most important means of preventing the spread of infection. 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.

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.

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

- Contact: direct and indirect
- Droplet - such as a sneeze
- Airborne
- Common vehicle
- Vectorborne- a living organism that carries a disease from one infected person to another — such as a mosquito

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.
- Wash hands with antibacterial agent or use alcohol-based hand-rub after removing gloves. Do not touch potentially contaminated surfaces or items before leaving the room.

**GOWNS AND PROTECTIVE APPAREL**

Wear a clean, non-sterile gown when entering the patient’s room if you anticipate contact with the patient or if the patient is incontinent, has diarrhea, an ileostomy, colostomy or wound drainage not contained by a dressing. Remove gown before leaving room. Do not allow clothing to contact potentially contaminated surfaces or items before leaving the room.

**PATIENT CARE EQUIPMENT**

Reserve non-critical patient care equipment for use with a single patient, if possible. Clean and disinfect any equipment shared among infected and non-infected patient.

**Sanitization, Disinfection and Sterilization**

Sanitization is the scrubbing of instruments with special brushes and detergent to remove blood, mucous, etc. Disinfection is the process that destroys pathogenic micro-organisms. Sterilization is the process of destroying all microbial forms of life—typically an autoclave is used for this along with distilled water.
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. 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 infection.

Medical Asepsis
Asepsis is being free of disease-producing microbes. Microbes are everywhere. Medical asepsis is the practice to remove or destroy pathogens and to prevent pathogens from spreading from one person or place to another.

Surgical Asepsis is the practice that keeps items free of all microbes. Sterilization is the process of destroying all microbes. Contamination is the process of becoming unclean. Disinfection is the process of destroying pathogens. Germicides are disinfectants applied to the skin, tissues and non-living objects.

Vital Signs
Vital signs include the heart beat, breathing rate, temperature, and blood pressure. These signs may be watched, measured, and monitored to check an individual's level of physical functioning.
Normal vital signs change with age, sex, weight, exercise tolerance, and condition.

Normal ranges for the average healthy adult vital signs are:
- Blood Pressure: 120/80 mm/Hg
- Breathing: 12 - 18 breaths per minute
- Pulse: 60 - 80 beats per minute (at rest)
- Temperature: 97.8 - 99.1 degrees Fahrenheit / average 98.6 degrees Fahrenheit
These ranges will vary per individual specifically from child to adult.

Temperature
Thermometers are used to measure temperature using the Fahrenheit and Centigrade or Celsius scale. Temperature sites are the following: mouth, rectum, ear (tympanic membrane), and the axilla (underarm). The normal ranges for each site are:

<table>
<thead>
<tr>
<th>Site</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal</td>
<td>98.6F to 100.6F (37.0C to 38.1C)</td>
</tr>
<tr>
<td>Oral</td>
<td>97.6F to 99.6F (36.5C to 37.5C)</td>
</tr>
<tr>
<td>Axillary</td>
<td>96.6F to 98.6F (35.9C to 37.0C)</td>
</tr>
</tbody>
</table>

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Tympanic Membrane

Additional terminologies for temperatures/fevers are:
Febrile – presence of fever
Afebrile – absence of fever
- Fever – elevated body temperature beyond normal range. Types of fever are:
  - Intermittent: fluctuating fever that returns to or below baseline then rises again.
  - Remittent: fluctuating fever that remains elevated; it does not return to baseline temperature.
  - Continuous: a fever that remains constant above the baseline; it does not fluctuate.

Oral temperature is the most common method of measurement; however, it is not taken from the following patients:
- infants and children less than six years old
- patients who has had surgery or facial, neck, nose, or mouth injury
- those receiving oxygen
- those with nasogastric tubes
- patients with convulsive seizure
- hemiplegic patients
- patients with altered mental status

Wait for 30 minutes to take the oral temperature in patients who have just finished eating, drinking, or smoking. When taking the temperature, leave the thermometer in the patient’s mouth for 3-5 minutes or as required by agency policy.

Rectal temperature, the most accurate, is taken when oral temperature is not feasible. However, it is not taken from the following patients:
- patients with heart disease
- patients with rectal disease or disorder or has had rectal surgery
- patients with diarrhea

It is taken with the patient in a side-lying position and the thermometer and the patient’s hip is held throughout the procedure so the thermometer is not lost in the rectum or broken. Axillary temperature is the least accurate and is taken only when no other temperature site can be used. The axilla, (the underarm) should be clean and dry and the thermometer should be held in place for 5-10 minutes or as required by the facility policy.

Tympanic temperature is useful for children and confused patients because of the speed of operation of the tympanic thermometer. A covered probe is gently inserted into the ear canal and temperature is measured within seconds (1–3 seconds). It is not used if the patient has an ear disorder or ear drainage.

Pulse
The normal adult pulse rate ranges between 60 and 100 beats per minute. The site most commonly used for taking pulse is the radial artery found in the wrist on the same side as the thumb. It is felt with the first two or three fingers (never with the thumb) and usually taken for 30 seconds multiplied by two to get the rate per minute. If the rate is unusually fast or slow, however, count it for 60 seconds. The apical pulse is a more accurate measurement of the heart rate and it is taken over the apex of the heart by auscultation using the stethoscope. It is used for patients with irregular heart rate and for infants and small children.

**Respiration**

When measuring respiration, respiratory characteristics such as rate, rhythm, and depth are taken into account. Rate is the number of respirations per minute. The normal range for adults is 12 to 18 per minute. One inspiration (inhale) and one expiration (exhale) counts as one respiration. It is counted for 30 seconds multiplied by two or for a full minute.

Some rate abnormalities are the following:
- **Apnea** – this is a temporary complete absence of breathing which may be a result of a reduction in the stimuli to the respiratory centers of the brain.
- **Tachypnea** – this is a respiration rate of greater than 40/min. It is transient in the newborn and maybe caused by the hysteria in the adult.
- **Bradypnea** – decrease in numbers of respirations. This occurs during sleep. It may also be due to certain diseases.

**Blood Pressure**

This is the measurement of the amount of force exerted by the blood on the peripheral arterial walls and is expressed in millimeters (mm) of mercury (Hg). The measurement consist of two components: the highest (systole) and lowest (diastole) amount of pressure exerted during the cardiac cycle.

A stethoscope and sphygmomanometer of either aneroid or mercury type are used. The size of the cuff of the sphygmomanometer will depend on the circumference of the limb and not the age of the patient. The width of the inflatable bag within the cuff should be about 40% of this circumference – 12 cm to 14 cm in an average adult. The length of the bag should be about 80% of this circumference – almost long enough to encircle the arm. Cuffs that are too short or narrow may give falsely high readings, e.g. a regular cuff on an obese arm may lead to a false diagnosis of hypertension.

The inflatable bag is centered over the brachial artery with the lower border about 2.5cm above the antecubital crease. The cuff is positioned at heart level. If the brachial artery is far below the heart level the blood pressure will appear falsely high. If the brachial artery is far above heart level, blood pressure will appear falsely low.

Blood pressure is taken by determining first the palpatory systolic pressure over the brachial artery. Then with the bell of the stethoscope over the brachial artery, the cuff is inflated again.
to about 30 mm Hg above the palpatory systolic pressure and deflated slowly, allowing the pressure to drop at a rate of about 2 to 3 mmHg per second. Note the level at which you hear the sounds of at least two consecutive beats. This is the systolic pressure. Continue to lower the pressure slowly until the sounds become muffled and then disappear. Then deflate the cuff rapidly to zero. The disappearance point, which is usually only a few mmHg below the muffling point, marks the generally accepted diastolic pressure. Both the systolic and diastolic pressure levels are read the nearest 2 mmHg.

**Parts of a Prescription/Pharmacology**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.a.</td>
<td>Of each</td>
</tr>
<tr>
<td>a.c.</td>
<td>Before meals</td>
</tr>
<tr>
<td>b.i.d.</td>
<td>Twice a day</td>
</tr>
<tr>
<td>t.i.d.</td>
<td>Three times a day</td>
</tr>
<tr>
<td>q.i.d.</td>
<td>Four times a day</td>
</tr>
<tr>
<td>q.h.</td>
<td>Every hour</td>
</tr>
<tr>
<td>q.4.h.</td>
<td>Every four hours</td>
</tr>
<tr>
<td>q.8.h</td>
<td>Every eight hours</td>
</tr>
<tr>
<td>Sig</td>
<td>Take</td>
</tr>
<tr>
<td>p.c.</td>
<td>After meals</td>
</tr>
<tr>
<td>p.r.n.</td>
<td>When necessary or as needed</td>
</tr>
</tbody>
</table>

**Routes of Administration**

Buccal administration is between the cheek and gum and sublingual administration is placed under the tongue until the drug dissolves. Transdermal route is typically in patch form. Intradermal is placed between the upper layers of the skin, subcutaneous is injected into the subcutaneous layer of the skin, and intramuscular is injected into the muscle.
**Drug Names and Categories**

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

**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

**EKG Section**

The Heart
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 though 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.

**Myocardial Ischemia and Infarction, Arrhythmia**

Myocardial infarction, commonly known as a heart attack, is a term that refers to an obstruction to the myocardial tissue. This obstruction causes an interruption of the blood supply to part of the heart which causes the heart cells to die. Myocardial ischemia, also known as angina, is a condition caused by a lack of oxygen-rich blood in the heart.

Arrhythmia is a term used to refer to any disorder of your heart rate or rhythm.

**Fundamentals of the Electrocardiogram**

An electrocardiogram, also known as the ECG or EKG, is a tool used to record the electrical activity of the heart. An electrocardiograph is a device that amplifies low-voltage electric impulses detected on the skin and produces a printed record of that electrical activity. These electrical impulses show up on a cardiac monitor known as the oscilloscope. In order to perform an electrocardiogram, it is necessary to place electrodes, adhesive pads containing a conductive gel, on the patient’s skin. These electrodes are attached to leads, color-coded wires that connect to the electrocardiograph.
### ECG LEADS

<table>
<thead>
<tr>
<th>Limb Leads</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead I: Records electrical activity from right arm to left arm</td>
<td></td>
</tr>
<tr>
<td>Lead II: Records electrical activity from right arm to left leg</td>
<td></td>
</tr>
<tr>
<td>Lead III: Records electrical activity from left arm to left leg</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Augmented Leads</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>aVR: Records electrical activity away from midpoint between left arm and left leg to left arm (across heart to right shoulder)</td>
<td></td>
</tr>
<tr>
<td>aVL: Records electrical activity from midpoint between right arm and left leg to left arm (across heart to left shoulder)</td>
<td></td>
</tr>
<tr>
<td>aVF: Records electrical activity from midpoint between right arm and left arm to left leg (across heart toward feet)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chest or Precordial Leads</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>V1: Records electrical activity between center of heart and the chest wall where V1 electrode is placed</td>
<td></td>
</tr>
<tr>
<td>V2: Records electrical activity between center of heart and the chest wall where V2 electrode is placed</td>
<td></td>
</tr>
<tr>
<td>V3: Records electrical activity between center of heart and the chest wall where V3 electrode is placed</td>
<td></td>
</tr>
<tr>
<td>V4: Records electrical activity between center of heart and the chest wall where V4 electrode is placed</td>
<td></td>
</tr>
<tr>
<td>V5: Records electrical activity between center of heart and the chest wall where V5 electrode is placed</td>
<td></td>
</tr>
<tr>
<td>V6: Records electrical activity between center of heart and the chest wall where V6 electrode is placed</td>
<td></td>
</tr>
</tbody>
</table>

*Source Used: Clinical Medical Assisting, Foundations and Practice. Prentice Hall 2008*

Each lead is marked with a different color and lead number. The right arm lead is white and marked RA, the left arm lead is black and marked LA, the right leg lead is green and marked RL, and the left leg is red and marked LL. Limb leads are usually placed over parts of the arms and legs that are especially fleshy. Chest leads, which are usually brown, are placed as follows:

V1: fourth intercostal space, right of sternum
V2: fourth intercostal space, left of sternum
V3: midway over fourth and fifth intercostal space, halfway between base and sternum
V4: fifth intercostal space, in line with nipple
V5: midway between the nipple and midpoint of axilla
V6: over intercostal space at axilla midpoint

**Interpreting Waveforms**

The results of the electrocardiogram are printed on a special graph paper which travels through the electrocardiogram at a rate of about 25 millimeters per second. The graph paper has both horizontal and vertical lines which serve to divide the paper into squares that are 5 millimeters.
in width and height. The horizontal line measures time, while the vertical line measures amplitude or voltage. The isoelectric line is a term used to describe a straight line on the ECG strip with illustrates the resting state of the myocardial cells. The isoelectric line represents the beginning and ending point of the five major waves of the cardiac cycle.

The cardiac cycle begins with the firing of the SA node, which is represented by a P wave on the ECG. The p wave, which represents the depolarization of both the right and left atria, can be characterized as a smooth, upward deflection which is approximately 0.10 second in length. The PR interval represents the time during which the impulse travels from the SA node through the atria to the ventricles. The next portion of the waveform is known as the QRS complex, each wave represents the conduction of the impulse from the bundle of HIS through the ventricles. The Q wave deflects down from the baseline as the R wave follows with an upward deflection and depicts the patient's heart rate. The next downward deflection is characterized as the S wave. The QRS complex, which is measured from the beginning of the Q wave to the point where the S wave meets the baseline, measures less than 0.12 seconds. The next portion of the waveform is known as the ST segment, where the ventricles are depolarized and repolarization begins. Finally, the T wave, a slightly asymmetrical rounded wave, indicates the repolarization or recovery phase of the ventricles. The T wave is known as the resting phase of the cardiac cycle.

Reading an ECG
The ECG technician should read and ECG in a systematic manner. Always remember to compare your ECG findings to the patient: some dysrhythmias can be life threatening and some can be no problem to the patient.

The five steps in analyzing an ECG are: heart rate, regularity, P-waves, QRS complex, and P-R interval. Heart rate- normal rate for an adult is between 60-100 bpm. Heart rates above 100 are called Tachycardia, heart rates below 60 are called bradycardia. There are four methods for obtaining a heart rate: 6-second interval X 10 method- involves counting the number of QRS complexes on a 6 second rhythm and multiplying that number by 10, this is the only method that can be used on an irregular rhythm. The 300,150,100,75,60,50 method- involves locating an R-wave on a bold line on the ECG paper then finding the next consecutive R wave and counting down from 300 on the subsequent bold lines to determine the rate. 1500 method- you count number of small squares between two consecutive R-waves and divide that number by 1500, it is the most accurate method of obtaining the heart rate but can only be used on regular rhythms. Rate calculators are devices that you use to measure between R-waves and it gives you the rate. You count the QRS complexes to get the Ventricular rate and count the P-waves to determine the atrial rate.

Regularity is the second step in analyzing and ECG. To find this you measure the distance between all the R-R waves on the strip and if they are all the same the rhythm is called regular if not the rhythm is called irregular and irregular rhythms are considered abnormal. You can also measure the P-waves and this is called the P-P interval to see if they are regular.
Methods used to measure these intervals are calipers- which involves using a device called a caliper to measure the intervals, which is the quickest and easiest method. Paper and pen method- which involves using a piece of paper and marking an R-wave then marking the next R-wave and using that to judge the R-waves of the rest of the rhythm. The last method is to count the small squares between each R-R interval and see if they are all the same, this method takes longer but does not require any equipment to use.

Types of irregularities that you may find are irregularly (totally) irregular- which means there is no consistency to the rhythm such as atrial fibrillation, patterned irregularity- is where the irregularity repeats over and over such as AV-heart blocks, slightly irregular- is where there is an abnormality that does not occur very often such as one PVC in a rhythm strip, and very irregular rhythms-which means there are multiple occurrences of an abnormality such as a PVC or PAC in one rhythm strip.

![ECG Image]

Upright, round P waves occurring at regular intervals at a rate of 60 to 100 beats per minute
PR interval of normal duration (0.12 to 0.20 seconds) followed by a QRS complex of normal upright contour, duration (0.06 to 0.12 seconds) and configuration
Flat ST segment followed by an upright, slightly asymmetrical T wave

**P- waves**

A normal P-wave is upright and rounded in Leads I,II, avf, and V2 thru V6, they should have a duration of .06 to .10 sec. and an amplitude of .5 to 2.5mm. P-waves signify the pulse initiating at the SA node and depolarizing the atria. Abnormal P-waves are called P prime waves (P’) and may come from an irritated part of the atria and have a different morphology from normal P-waves.

You can separate the P-wave into two parts the first half of the P-wave is the depolarization of the right atrium and the second half is the depolarization to the left atrium. If there is a dilation of the right atrium then the P-wave will have higher amplitude and be tall and rounded, if there is a dilation of the left atrium then the P-wave will be notched or elongated.

Inverted P-waves indicate that the impulse started in or around the AV node. If you have more P-waves than ORS complexes then the impulse was blocked at the AV junction and you have an AV heart block.
QRS complexes
Normal QRS complexes should be .06 to .12 sec. in duration and 5mm to 30mm in amplitude. A normal QRS complex indicates the impulse originated above the ventricles and traveled through the ventricles in a normal fashion. Normal QRS complexes are those that are upright and narrow.
The Q-wave is the first negative deflection from the base line after the P-wave. The R-wave is the first positive deflection from the base line after the P-wave. The S-wave is the first negative deflection that extends below the base line after the R-wave. These definitions are literal and if one wave is missing then you drop that wave from the complex name (i.e. no negative deflection before the R-wave then you have an RS complex).
Abnormal QRS complexes are produced by abnormal depolarization of the ventricles. The duration of abnormal complexes is usually greater than .12 sec. abnormal QRS complex varies widely and can have strange, wide, and bizarre shapes. Very tall QRS complexes are usually caused by hypertrophy of one or both ventricles. Abnormally small or low-voltage complexes are seen in obese patients, hyper-thyroid patients, and pleural effusion.

P-R intervals
The P-R interval is the distance from the beginning of the P-wave to the beginning of the Q-wave or R-wave. It signifies the depolarization of the heart from the SA node through the atria and AV node. The duration of the P-R interval should be .12 to .20sec.
P-R intervals are considered abnormal if they are shorter, longer, or absent. Shorter P-R intervals indicate the impulse originated in or around the AV node. Longer P-R intervals indicate the impulse was slowed down more than it should have been usually in the AV node. The PR intervals get progressively longer in a 2nd degree heart block, Type 1. Absent P-R intervals indicate that there are too many impulses in the atria to signify a P-R interval (i.e. atrial fibrillation or flutter).

Sinus Dysrhythmia
Sinus dysrhythmias originate from the SA node with that being the case there are only four dysrhythmias that are associated with the SA node: Tachycardia (heart rate over 100bpm), Bradycardia (heart rate under 60bpm), sinus arrest (the total absence of the p-wave, QRS-complex, and T-wave), sinus dysrhythmia (is the same as sinus rhythm except there is the presence of a patterned irregularity that can be described as slowing the speeding up then slowing again) this will usually happen with the inspiration and exhalation cycle(normal finding in children, athletes, and older patients)

American Medical Certification Association, Clinical Medical Assistant Certification (CMAC), 08/2013
Atrial Dysrhythmia
Atrial dysrhythmias originate outside the SA node in the atrial tissue or in the intermodal pathways. The three mechanisms responsible for atrial dysrhythmias are:

- Increased automaticity - the atrial cells spontaneously depolarize and initiate impulses before the SA node can generate its pulse.
- Triggered activity - injured cells sometimes only partially repolarize and this can sometimes lead to repetitive ectopic firing that may lead to atrial or ventricular tachycardia.
- Reentry - occurs when an impulse is delayed along a slow conduction pathway and the impulse is able to remain active long enough to produce another impulse during myocardial repolarization.
- Key characteristics of atrial dysrhythmia are shortened or prolonged P-R intervals p-waves that differ in appearance from normal p-waves, and normal QRS-complexes.

Types of atrial dysrhythmias and characteristics:

Premature Atrial Complexes

Rate: Depends on the underlying rhythm
Regularity: depends on the number of PAC’s present
P-waves: may be upright or inverted, will appear different than those of the underlying rhythm
QRS complexes: Normal
PR interval: may be normal, shortened, or prolonged

Atrial tachycardia
Rate: 150-250 beats per minute
Regularity: regular
P-waves: may be upright or inverted will appear different from underlying rhythm
QRS-complex: Normal
PR interval- may be normal, shortened, or prolonged
Wandering Atrial Pacemaker

Rate: Usually between 60-100 bpm
Regularity: Slightly irregular
P-waves: continuously change in appearance
QRS-complex: Normal
PR interval: varies

Atrial flutter

Rate: atrial between 250-350, ventricular rate can vary
Regularity: may be regular or irregular
P-wave: absent (flutter waves)
QRS-complex: normal  PR-interval: absent

Atrial fibrillation

Rate: atrial rate over 350 bpm, ventricular rate can vary
Regularity: irregularly (totally) irregular
P-wave: absent (chaotic baseline)
QRS-complex: normal
PR-interval: absent

**Junctional dysrhythmias**
Junctional dysrhythmias originate in the AV junction around the AV node or Bundle-of-His. Major characteristics of Junctional complex are P-waves that may be inverted, follow the QRS-complex, or absent and PR-intervals that will be shortened or absent. Types of Junctional dysrhythmias:

**Premature Junctional Complex**

Rate: depends on the underlying rhythm
Regularity: occasional or frequently irregular depends on the number of PJCs
ORS-complex: Normal
PR Interval: short or absent

**Junctional Escape Rhythm**

Rate: 40 to 60bpm
Regularity: Regular
P-wave: inverted, absent, or occur after the QRS-complex
QRS-complex: normal
PR-interval: short or absent
Junctional Tachycardia

Rate: 100 to 180bpm
Regularity: regular
P-wave: inverted, absent, or occur after the QRS-complex
PR-interval: short or absent

Ventricular dysrhythmias
Ventricular dysrhythmias originate in the ventricles below the Bundle of His. Some may be benign while some may be life threatening.
Major characteristics of ventricular dysrhythmias are absent P-waves and wide bizarre QRS-complexes.

Types of ventricular dysrhythmias are:
Premature ventricular complexes

Rate: depends on the underlying rhythm
Regularity: occasionally irregular or very irregular depends on the number of PVC’s
P-wave: absent at the PVC
QRS-complex: the PVC will have a wide bizarre looking QRS
PR-interval: absent
Two PVC’s in a row are called a couplet
Three PVC’s in a row are called a salvo, run, or burst and are considered ventricular tachycardia.
PVC’s occurring on or near the previous T wave (R on T) are likely to precipitate ventricular tachycardia or fibrillation.
Idioventricular Rhythm

Rate: 20-40bpm
Regularity: regular
P-wave: absent
QRS-complex: wide and bizarre
PR-interval: absent

Accelerated Idioventricular Rhythm

Rate: 40-100bpm
Regularity: regular
P-wave: absent
QRS-complex: wide and bizarre
PR-interval: absent

Ventricular tachycardia (may have a pulse or may not)

Rate: 100-250bpm
Regularity: regular
P-wave: absent
QRS-complex: wide and bizarre
PR-interval: absent
Polymorphic ventricular tachycardia (Torsades de Pointes) QRS complexes alternate between upright and downward deflections.

**Ventricular fibrillation** (produces no effective cardiac output)

Rate: 200-500bpm  
Regularity: totally chaotic  
P-wave: absent  
QRS-complex: wavy line  
PR-interval: absent  
The only effective treatment for Ventricular fibrillation is defibrillation

Asystole—Total absence of cardiac activity (Flat line)

Pulseless Electrical Activity—organized electrical activity that should result in a pulse but there is no pulse.

**Artifacts**  
Any electric activity on an ECG that is non-cardiac in origin and represents unwanted marks is characterized as an artifact. This unwanted electrical activity, whether it is intentional or unintentional, can be prevented by either changing outlets or moving to a different location.

**Phlebotomy Section**  
All phlebotomy programs are subject to standards which are set by The National Committee for Clinical Laboratory Standards. (NCCLS)

**Anatomy and Physiology**  
The amount of blood within the body of the average human adult is equivalent to a measurement of five or six liters. Plasma, the liquid portion of the blood in its anticoagulated (or unclotted) state, accounts for 55 to 65 percent of the blood volume. Serum is the liquid portion of the blood that remains after the blood has coagulated.
Red blood cells also referred to as RBCs or erythrocytes, are produced in the bone marrow and live approximately 120 days. RBCs contain hemoglobin, the pigment responsible for the reddish color of the blood.

White blood cells, also known as leukocytes, are categorized into five different types. Neutrophils, the most common WBCs, defend the body against infectious diseases. Lymphocytes, the second most common WBCs, provide a boost to immune defense of the body; they also help respond to viruses, when necessary. Monocytes, the largest cells in normal blood, are phagocytic cells that provide support in cell-mediated immunity. Eosinophils function in allergic or inflammatory responses. Basophils, the least numerous WBCs, contain histamine and provide aid in allergic states.

Platelets, also known as thrombocytes, are the smallest cells founds in the blood. They aid in the process of coagulation, the formation of blood clots that occurs when a blood vessel is damaged. Coagulation is the last step of hemostasis, the process by which the flow of blood ends.

Collection of Specimens
Random Urine Specimens- collected for a urinalysis. No special measures are needed. It is collected anytime.
Midstream Specimen is also called a clean-voided specimen or a clean-catch specimen. The perineal area is cleaned before collected specimen.
The 24 hour specimen is collected during a 24 hour period. Urine is typically chilled or refrigerated to prevent the growth of microbes.

Testing Urine
Testing for pH measures if urine is acidic or alkaline. Routine urine specimen is needed.
Testing for glucose or ketones. Typically used for testing for diabetes. Sugar will appear in the urine (glycosuria). Acetone may also appear in the urine. Double-voided specimens are best for these types of tests.
Testing for blood – injuries or illnesses can cause blood to appear in the urine- (hematuria). Routine specimen is used.
Blood can also appear in stools. Ulcers, some forms of cancer, or hemorrhoids could be the cause. Follow the doctor’s prescription request when testing stools.

Sputum Specimens
Sputum-not saliva- is tested usually due to disorders of the lungs, bronchi, etc. They are studied for blood, microbes, and abnormal cells.

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.
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 tube.

### Test Tubes, Additives and Tests

<table>
<thead>
<tr>
<th>Color of Stopper</th>
<th>Description and Use</th>
</tr>
</thead>
</table>
| Red                    | No additive required. Commonly used for serum determinations in the following: Chemistry testing  
                          | Blood bank testing                                                                  |
| 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) |
| Lavender               | Additive used is ethylenediaminetetraacetic acid (EDTA). Additive binds the calcium needed for clot formation. Commonly used for hematology testing (CBC, reticulocyte count) |
| Green                  | Additive used is Heparin, a natural anticoagulant that inhibits thrombin. Commonly used for routine chemistry testing. |
| Gray                   | Additives used are sodium fluoride, a preservative that inhibits glycotic action and potassium oxalate, an anticoagulant that binds calcium. Commonly used for glucose tolerance and lactic acid measurement. |
| Red/Gray (speckled) top tube | Additives used are clot activator and serum gel separator. Activator encourages clot formation while serum gel creates a barrier between the serum and the cells which prevents contamination of the serum. Commonly used for chemistry and immunology testing. |
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.
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.
When placing the tourniquet on the arm, it is important to not tie too tightly as a petechiae may result. Petechiae are small, red, smooth hemorrhagic spots appearing on a patient’s skin. A hematoma occurs when the needle has gone completely through the vein.

Venipuncture
In order to perform venipuncture, it is essential to have the following supplies on hand:
- Phlebotomy tray containing antiseptic, vacutainers, holder and needle
- Tourniquet
- Accurate specimen labels
- Disposable gloves
- Sharps container
The following procedure should be used when performing a venipuncture:
- 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.
- Prepare the laboratory requisition.
- Make sure all the appropriate supplies are available for the procedure.
- Identify the patient, introduce yourself, and then escort them to the appropriate area.
- Verify that the patient is prepared for the procedure.
- Position the patient; try to be reassuring if they appear to be nervous.
- Wash your hands carefully and put on gloves.
- Gather and prepare the necessary equipment.
- Apply the tourniquet; it should be applied 3-4 inches above the site where the venipuncture will be made.
- Ask the patient to make a fist or open and close his/her hand.
- Palpate the antecubital area with your index finger in order to determine the exact vein location and site of entry.
- Clean the antecubital area in a circular motion.
- Allow the site to air-dry.
• Assemble the needle and tube holder.
• 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 at a 15-30 degree angle.
• Firmly hold the needle then push the tube toward the holder until the stopper is punctured.
• Release the tourniquet as soon as the blood is flowing freely.
• Politely ask the patient to release his or her fist.
• Fill the tubes in the correct order of draw:
  • Blood Cultures
  • Light Blue top-tubes
  • Red or Speckled tubes
  • Green top tubes
  • Lavender top tubes
  • Gray top tubes
• Remove the last tube from holder then withdraw the needle from the patient’s arm.
• Place folded gauze over the venipuncture site and withdraw the needle. Apply pressure until the bleeding stops.
• Discard needles properly.
• Accurately label each collected specimen, noting the patient’s name and ID number, the time and date of collection, and your initials.
• Check the venipuncture site to see whether the bleeding has stopped, then bandage the area.
• 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 following procedure should be used when performing a venipuncture:

• 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.
• Identify the patient, introduce yourself, and then escort them to the appropriate area (if necessary).
• Verify that the patient is prepared for the procedure.
• Assemble the necessary equipment.
• Wash your hands.
• Select an appropriate dermal puncture site depending on the age of the patient.
• 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.
• Clean the site using 70% isopropyl alcohol. Allow the site to thoroughly air-dry for maximum antiseptic action.
• Prepare the puncture device
• Perform the dermal puncture

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.

Before collection, be sure to use the following steps to avoid analytical errors:
  o Ensure proper coordination of patients
  o Verify time of specimen collection
  o Verify usage of proper tubes
  o Verify that patient is prepared (fasting, medication, etc.)

During collection, be aware of the possibility of the following analytical errors
  o Wrong order of draw
  o Extended tourniquet time
  o Hemolysis
  o Failure to invert tubes
  o Patient is susceptible to syncopal episodes – If a patient is prone to fainting during a phlebotomy procedure, you should be made aware of this by the patient. If it does happen, take the following steps:
    o Remove the needle from the arm
    o Call for help
    o Follow facility guidelines

The following analytical errors may occur after the specimen has been collected:
  o Improper storage of specimens
  o Improper usage of serum separator tubes

Specimen Labeling
Once a specimen has been collected, the following information should be on the label.
  o Patient’s name and identification number
  o Source (collection site) of the specimen
  o Date and time of collection
  o Doctor’s name
  o The initials of the person who took the specimen

Using the Centrifuge
Not all specimens require centrifugation, some just require a gentle mixing of 8-10 times. For those that do require the use of a centrifuge, the following rules should apply. Always follow the facilities rules as well.
  o Time and speed are critical factors in centrifugation

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- Serum specimens should be allowed to clot before going in the centrifuge
- Tubes should always have stoppers in place before beginning
- Tubes should be balanced in the centrifuge – tubes of the same size and volume are placed opposite one another in the centrifuge holders
- Centrifuges should be temperature controlled
- Specimen tubes should not be centrifuged more than once.

**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, 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, chloride), total protein etc. 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
- 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.

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Veins

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

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

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

Needles - Parts of a multi-sample needle
1.) Bevel
2.) Shaft
3.) Threaded hub
4.) Rubber sleeve over needle
B.) Needle size
   1.) The smaller the number of the needle the bigger it is.
      a.) most butterfly needles are usually a 23 to 25
C.) Parts of a syringe system
1.) Bevel
2.) Shaft
3.) Hub
4.) Graduated barrel
5.) Plunger

Preanalytical Considerations
Basal State – refers to the resting metabolic state of the body, usually early in the morning after fasting for at least 12 hours

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.

Capillary Puncture Equipment and Procedures
A.) Puncture Equipment
   1.) Lancet
B.) Collection Devices
   1.) Microcollection Containers
   2.) Microhematocrit Tubes and Sealants
C.) Tests that cannot be Performed on Capillary Punctures
   1.) ESR
   2.) Coagulation studies
   3.) Blood cultures
   4.) Tests that require large volumes of serum or plasma
D.) Order of Draw
   1.) EDTA specimens
   2.) Other additive specimens
   3.) Serum specimens

Special Procedures
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.
C.) Lactose Tolerance Test - same procedures as GTT but patient must drink lactose rather than glucose
D.) Bleeding Time Test - (BT) test is preformed 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.) Arterial Blood Gas (ABG) - most common site radial artery. Use Modified Allen Test to see if patient has adequate circulation. Must cleanse the site with alcohol and then clean with iodine. Insert syringe needle at a 45 degree angle. When complete apply pressure for at least 3 to 5 minutes.

**Stool Specimens**
Stool samples are collected in order to identify any type of bacteria or virus that may be responsible for a patient experiencing diarrhea, abdominal pain or other related symptoms. Stool specimens must be collected in a clean, dry container and transported to the testing area in a container with a tightly fitted lid.

**Culture & Sensitivity**
Culture and sensitivity testing refers to the process of cultivating a specimen in order to determine whether the developed organism is sensitive to antibiotics. The process begins with the collection of a direct specimen which is then cultivated in a special media, or agar. The special media functions to encourage the growth of present microorganisms in the specimen. When the growth of a microorganism is detected, the organism is tested against different antibiotics for sensitivity to antibiotics. An antibiotic is considered effective if it is able to stop or slow down the organism's growth in a controlled situation.

**Throat Culture**
A throat culture is performed on a patient to detect a disease-causing organism and determine an appropriate method of treatment. Throat cultures are performed to identify bacteria that may cause any of the following: strep throat, whooping cough, and epiglottitis. The procedure is performed using the following steps:

1. Gather necessary equipment.
2. Prepare a sterile swab and ask the patient to open their mouth as wide as possible.
3. Use one hand to depress the patient's tongue with sterile tongue depressor while using the other hand to swab the back of the patient’s throat with a sterile swab. Be sure to roll the swab over at least two areas.

**Wound Culture**
Wound cultures are performed to identify the pathogen that is responsible for an infection of a patient’s wound. Specimens may be collected from animal bites, ulcers, and skin wounds. A wound culture is performed by swabbing the inside of a wound and placing the swab in a transport container.

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Urinalysis
A urinalysis, a test used to identify components of the urine, is usually conducted on patient’s that are pregnant, have an illness, or are suspected to have abused an illegal substance.

A physician may request a clean-catch or voided-midstream specimen, which is obtained when the patient voids into a sterile container. It is essential to ensure that the labels for the specimen bottles are correct before giving them to the patient. Patients should be instructed to clean both their hands and genital area before collecting a specimen.

A 24-hour specimen collection is performed to identify certain components of the urine that can vary throughout the day. This specimen collection provides an accurate account for the composition of the urine despite the fluctuations that may occur due to levels of hydration, activity, and the patient’s metabolic rate.

A urinalysis is often used to assess many different characteristics of the urine. The term anuria is used to refer to the absence of urine, and polyuria refers to the passage of large volumes of urine.

Red or dark-brown urine is often a sign of an abnormal and is defined as hematuria, the presence of red blood cells in the urine. A yellow-brown or green-brown color indicates the presence of bile pigments. Dark-brown or black urine may be a result of hemoglobin darkening upon standing. (Remember that hemoglobin is the pigment responsible for the color of the blood).

The consumption of certain foods such as asparagus usually gives the urine a unique odor. However, certain odors can be the sign of conditions such as diabetes mellitus (the urine may have a sweet, fruity odor) or other amino acid disorders (the urine may have a rancid odor).

The term specific gravity refers to the measurement of a specific volume of urine to an equivalent volume of water. For an adult with a normal diet and normal fluid intake, the normal range of specific gravity is from 1.016 to 1.022. Certain diseases will cause the urine to be more concentrated and the specific gravity will be higher.

Non-blood Specimens and Tests
A.) 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. Must be a mid-stream clean catch specimen. Drug screening is random sample in clean covered container. 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

B.) Cerebrospinal Fluid- (CSF) mostly obtained through a lumbar puncture and looks for cell counts, chloride, glucose, and total protein
## Basic Life Support:

<table>
<thead>
<tr>
<th>Component</th>
<th>Adults</th>
<th>Children</th>
<th>Infants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recognition</strong></td>
<td>No breathing or abnormal breathing like gasping</td>
<td>No breathing or abnormal breathing like gasping</td>
<td>No breathing or abnormal breathing like gasping</td>
</tr>
<tr>
<td></td>
<td>No pulse palpated within 10 seconds (healthcare professionals)</td>
<td>No pulse palpated within 10 seconds (healthcare professionals)</td>
<td>No pulse palpated within 10 seconds (healthcare professionals)</td>
</tr>
<tr>
<td><strong>CPR Sequence</strong></td>
<td>CAB</td>
<td>CAB</td>
<td>CAB</td>
</tr>
<tr>
<td><strong>Compression rate</strong></td>
<td>At least 100/min</td>
<td>At least 100/min</td>
<td>At least 100/min</td>
</tr>
<tr>
<td><strong>Compression depth</strong></td>
<td>At least 2 inches</td>
<td>2 inches or 1/3 anteroposterior chest circumference</td>
<td>1 ½ inches or 1/3 anteroposterior chest circumference</td>
</tr>
<tr>
<td><strong>Chest wall recoil</strong></td>
<td>Complete recoil between compressions</td>
<td>Complete recoil between compressions</td>
<td>Complete recoil between compressions</td>
</tr>
<tr>
<td><strong>Compression interruptions</strong></td>
<td>Limit chest compression interruptions to less than 10 seconds, if at all</td>
<td>Limit chest compression interruptions to less than 10 seconds, if at all</td>
<td>Limit chest compression interruptions to less than 10 seconds, if at all</td>
</tr>
<tr>
<td><strong>Airway</strong></td>
<td>Head tilt – chin lift (healthcare professionals – jaw thrust if indicated by trauma)</td>
<td>Head tilt – chin lift</td>
<td>Head tilt – chin lift</td>
</tr>
<tr>
<td><strong>Compression to ventilation ratio</strong></td>
<td>30:2 (1 or 2 rescuers)</td>
<td>30:2 (Single Rescuer)</td>
<td>30:2 (Single Rescuer)</td>
</tr>
<tr>
<td></td>
<td>15:2 (two rescuers)</td>
<td>15:2 (two rescuers)</td>
<td>15:2 (two rescuers)</td>
</tr>
<tr>
<td><strong>Ventillations for untrained rescuer</strong></td>
<td>Compressions only</td>
<td>Compressions only</td>
<td>Compressions only</td>
</tr>
<tr>
<td><strong>Defibrillation</strong></td>
<td>Use AED as soon as possible Minimize interruptions in chest compressions before and after shock Resume compression immediately after each shock</td>
<td>Use AED as soon as possible Minimize interruptions in chest compressions before and after shock Resume compression immediately after each shock</td>
<td>Use AED as soon as possible Minimize interruptions in chest compressions before and after shock Resume compression immediately after each shock</td>
</tr>
</tbody>
</table>

*Taken from the 2010 American Heart Association Guidelines for CPR*

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Review Exam

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. NCCLS

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.) 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

6.) 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
7.) What type of motion would a phlebotomist use when cleaning a site for a routine venipuncture?
   A. Vertical
   B. Horizontal
   C. Crossing
   D. Concentric

8.) The heart valve that is situated between the right atrium and the right ventricle is called?
   A. The pulmonic valve
   B. The mitral valve
   C. The aortic valve
   D. The tricuspid valve

9.) The third step of analyzing an ECG rhythm is:
   A. Evaluate the QRS complex
   B. Determine the heart rate
   C. Determine the regularity
   D. Evaluate the P-wave

10.) Mrs. Rogers was experiencing a successful venipuncture when petechiae arose on her forearm. This was the result of:
    A. Allergy to the antiseptic used to cleanse the area
    B. The needle puncturing completely through the vein
    C. The tourniquet being applied too tightly
    D. A rare genetic disorder

11.) The PR intervals get progressively longer in:
    A. 1st-degree AV heart block
    B. 2nd-degree AV heart block, Type I
    C. 3rd-degree AV heart block
    D. Sinus dysrhythmia

12.) The fifth step of analyzing an ECG rhythm is to:
    A. Determine the regularity
    B. Examine the P waves
    C. Evaluate the PR intervals
    D. Determine the heart rate

13.) Normal QRS complexes are those that:
    A. Look different
    B. Are inverted
    C. Are wide and bizarre
    D. Are upright and narrow
14.) The dysrhythmia that always produces an irregularly irregular rhythm is called:
   A. Sinus arrest
   B. Ventricular tachycardia
   C. Atrial fibrillation
   D. 2nd-degree AV heart block, Type I

15.) The muscular wall that separates the right side from the left side of the heart is called the:
   A. Chordae tendineae
   B. Syncytium
   C. Septum
   D. Skeleton of the heart

16.) Which of the following is a fever that comes and goes or, fluctuates and returns into the average range?
   A. Continuous
   B. Intermittent
   C. Remittent
   D. Crisis

17.) A patient’s general medical history is obtained preferably:
   A. Before admission to the hospital
   B. Over the telephone before the initial appointment
   C. At the end of the first office visit
   D. Whenever the need arises

18.) Which of the following is considered inappropriate communication with a patient?
   A. Taking the time to listen with patience and kindness
   B. Using positive non verbal responses such as a warm smile
   C. Touching and holding the hands of the patient intimately
   D. Communicating clearly, without the use of “uh’s” or “you know”

19.) What should a Clinical Medical Assistant do first when a patient is having a synocopal episode while venipuncture is being performed?
   A. Remove the needle from the arm
   B. Call for help
   C. Apply a cold compress
   D. Use an ammonia inhalant
20.) All of the following information must be on the specimen label, except:
   A. Patient’s name
   B. Date
   C. Diagnosis
   D. Time of Collection

21.) Which of the following thermometers is considered the most accurate indicator of body temperature?
   A. Oral
   B. Aural or tympanic
   C. Axillary
   D. Rectal

22.) Which of the following is not considered a vital sign?
   A. Blood pressure
   B. Pulse Rate
   C. Respiration
   D. Weight

23.) Which route is involved in administering a drug by placing it under the patient’s tongue and leaving it there until it is dissolved?
   A. Buccal route
   B. Sublingual route
   C. Subcutaneous route
   D. Transdermal route

24.) The average normal heart rate is:
   A. 63 beats per minute
   B. 72 beats per minute
   C. 81 beats per minute
   D. 96 beats per minute

25.) This test is collected in a tube with a light-blue top:
   A. Glucose
   B. Platelet Count
   C. Prothrombin time
   D. Red blood count
Review Answers

1. C
2. D
3. B
4. A
5. D
6. C
7. D
8. D
9. D
10. C
11. B
12. C
13. D
14. C
15. C
16. B
17. A
18. C
19. A
20. C
21. D
22. D
23. B
24. B
25. C

Question Rationale
1. C - In the case of intravenous drugs, most cases require a licensed individual to administer this type of therapy. A medical assistant can assist by laying out supplies and equipment necessary for the infusion or injection being administered.

2. D - All phlebotomy programs are subject to standards which are set by The National Committee for Clinical Laboratory Standards. (NCCLS)

3. B – Direct transmission occurs through contact with an infected person’s mucous membranes. Indirect transmission occurs through contact with a fomite – an inanimate object that is a reservoir for the transmission of microorganisms. For example, a drinking glass. The droplets from a sneeze are a common way for an infection to be transmitted.

4. A – ABG or Arterial blood gas deals directly with the respiratory system. CSF is cerebrospinal fluid and TSH is thyroid stimulating hormone. UA is a distracter.

5. D - C&S testing is used for UTI symptoms -must be a mid-stream clean catch specimen.

6. C - Tubes should be balanced in the centrifuge – tubes of the same size and volume are placed opposite one another in the centrifuge holders.

7. D – Concentric or circular is the motion necessary for performing phlebotomy.


9. D - The five steps in analyzing an ECG are: heart rate, regularity, P-waves, QRS complex, and P-R interval.

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10. **C** - When placing the tourniquet on the arm, it is important to not tie too tightly as a petechiae may result. Petechiae are small, red, smooth hemorrhagic spots appearing on a patient’s skin. A hematoma occurs when the needle has gone completely through the vein.

11. **B** - Longer P-R intervals indicate the impulse was slowed down more than it should have been usually in the AV node. The PR intervals get progressively longer in a 2nd degree heart block, Type 1. Absent P-R intervals indicate that there are too many impulses in the atria to signify a P-R interval (i.e. atrial fibrillation or flutter).

12. **C** - The five steps in analyzing an ECG are: heart rate, regularity, P-waves, QRS complex, and P-R interval.

13. **D** - Normal ORS complex should be .06 to .12 sec. in duration and 5mm to 30mm in amplitude. A normal QRS complex indicates the impulse originated above the ventricles and traveled through the ventricles in a normal fashion. Normal QRS complexes are those that are upright and narrow.

14. **C** - **Rate**: atrial rate over 350bpm, ventricular rate can vary **Regularity**: irregularly (totally) irregular; **P-wave**: absent (chaotic baseline); **QRS-complex**: normal; **PR-interval**: absent

15. **C** - See diagram on Page 23.

16. **B** - Intermittent: fluctuating fever that returns to or below baseline then rises again.

17. **A** - A patient’s medical history is generally taken before admission to the hospital; it may be taken at the doctor’s office or in the admitting office of the hospital.

18. **C** - Communication is an important part of the task of the medical assistant. See page 7 and 8 for the appropriate forms of communication.

19. **A** - Patient is susceptible to syncopal episodes – If a patient is prone to fainting during a phlebotomy procedure, you should be made aware of this by the patient. If it does happen, take the following steps:
   a. Remove the needle from the arm
   b. Call for help
   c. Follow facility guidelines

20. **C** - Once a specimen has been collected, the following information should be on the label.
   o Patient’s name and identification number
   o Source (collection site) of the specimen
   o Date and time of collection
   o Doctor’s name
   o The initials of the person who took the specimen
21. D - Rectal temperature, the most accurate, is taken when oral temperature is not feasible. However, it is not taken from the following patients:
- patients with heart disease
- patients with rectal disease or disorder or has had rectal surgery
- patients with diarrhea
It is taken with the patient in a side-lying position and the thermometer and the patient’s hip is held throughout the procedure so the thermometer is not lost in the rectum or broken.

22. D - Vital signs include the heart beat, breathing rate, temperature, and blood pressure. These signs may be watched, measured, and monitored to check an individual's level of physical functioning.

23. B - Buccal administration is between the cheek and gum and sublingual administration is placed under the tongue until the drug dissolves.

24. B - The normal range for adults is 12 to 18 per minute. One inspiration (inhale) and one expiration (exhale) counts as one respiration. It is counted for 30 seconds multiplied by two or for a full minute.

25. C – See chart on page 38.