

FUNCTIONS OF THE CMA

Complete Study Guide · Legal, Administrative, and Clinical

Certified Medical Assistant (CMA)

ICS · Institute of Health Sciences | CRUZ Home Care & Educational Services

We care with heart

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Legal Guidelines and Agencies

ADA · OSHA · HCS/NFPA · CMS · FDA · DEA



OSHA STANDARDS

IN THE MEDICAL OFFICE

PROTECT YOURSELF. PROTECT YOUR PATIENTS. IT'S THE LAW.

1 BLOODBORNE PATHOGENS STANDARD  Protects employees who may be exposed to blood or other potentially infectious materials. • Identify hazards • Use safe work practices • Provide training • Offer Hepatitis B vaccine • Provide post-exposure evaluation and follow-up	2 STANDARD PRECAUTIONS AND PPE  Treat all blood and body fluids as if they are infectious. • Hand hygiene • Use PPE • Safe injection practices • Environmental cleaning • Proper waste disposal	3 SHARPS CONTAINER AND BIOHAZARD LABELING  Use puncture-resistant sharps containers. • Keep containers close at hand • Do not recap needles • Replace when 3/4 full • Use proper biohazard labeling
4 EXPOSURE CONTROL PLAN  Your employer must have a written Exposure Control Plan that includes: • Methods to eliminate or minimize exposure • Engineering and work practice controls • PPE selection • Hepatitis B vaccination • Post-exposure procedures • Recordkeeping and annual review	5 EMPLOYEE RIGHTS  You have the right to: • A safe and healthy workplace • Information and training • Necessary protective equipment at no cost • Hepatitis B vaccination at no cost • Report exposures without retaliation • Confidential medical evaluation and follow-up	REMEMBER  SAFETY IS EVERYONE'S RESPONSIBILITY. WHEN IN DOUBT, ASK, REPORT, PROTECT.



SAFETY TODAY. HEALTHY TOMORROW.

For more information, talk to your supervisor or safety coordinator.



What is a Certified Medical Assistant (CMA)?

- A healthcare professional trained to perform administrative and clinical duties under the supervision of a physician.
- **Certification**
 - AAMA (American Association of Medical Assistants) grants the CMA credential.
 - Accredited national exam (NBME / NPCE) with general, administrative, and clinical content.
- **Scope of Practice**
 - Acts by delegation of the physician: DOES NOT diagnose, DOES NOT prescribe, and DOES NOT interpret results.
 - Must recognize their legal limits and refer to the appropriate professional.
 - Essential qualities: professionalism, compassion, trustworthiness, confidentiality, and teamwork.

Federal Laws and Agencies Governing Practice

Acronym	Name	Purpose
ADA	Americans with Disabilities Act (1990)	Prohibits discrimination based on disability
HIPAA	Health Insurance Portability and Accountability Act	Patient information privacy and security
OSHA	Occupational Safety and Health Administration	Worker safety and bloodborne pathogens
CLIA / CMS	Clinical Laboratory Improvement Amendments	Certifies and regulates clinical laboratories
FDA	Food and Drug Administration	Approves and monitors medications and devices
DEA	Drug Enforcement Administration	Controls narcotics and controlled substances
IRS	Internal Revenue Service	Payroll, withholdings, and office taxes

Golden Rule: all CMA functions are performed within the legal framework and authorized scope of practice.

ADA — Americans with Disabilities Act (1990)

The Law

- **Purpose**
 - To prohibit discrimination against individuals with disabilities in employment and services.
 - To ensure equal access to healthcare.
- **Application**
 - Applies to facilities and employers with more than 15 employees.
 - Includes telecommunication services for individuals with hearing or speech impairments.

In Practice

- **Accommodations in the medical office**
 - Access ramps and sufficiently wide doors.
 - Accessible waiting room and restroom.
 - Reserved and marked parking.
 - Reception desk at an accessible height.
- **CMA's role**
 - Offer assistance without assuming incapacity; communicate directly with the patient.

OSHA — Workplace Safety and Biohazard

Prevention

- **Hygiene and barrier protection**
 - Handwashing: the most effective measure (20-30 seconds).
 - PPE: gloves, mask, eye protection, gown.
- **Waste**
 - Red biohazard bags for contaminated material.
 - Rigid sharps containers: never recap needles.

Risk Control

- **Spills and chemicals**
 - Spill protocol with approved disinfectant and full PPE.
 - Safety Data Sheets (SDS) accessible and chemical labeling.
- **Work area**
 - Clean areas separated from contaminated areas.
 - No eating, drinking, or storing food in the specimen area.
 - Immediate reporting of needlesticks and exposures.

Hazard Communication Standard (HCS)

- **What does the standard require?**
 - Every chemical label must bear pictograms warning of the hazard.
 - The pictogram is a black symbol on a white background with a red diamond-shaped border.
 - Each pictogram appears only once per label, even if there are multiple identical hazards.
- **The 9 HCS pictograms**
 - Health Hazard · Flame · Exclamation Mark
 - Gas Cylinder · Corrosion · Exploding Bomb
 - Flame Over Circle · Environment · Skull and Crossbones



HCS Pictograms: What Each Warns Of

Health Hazards

- **Health Hazard**
 - Carcinogen, mutagenicity, reproductive toxicity, respiratory sensitizer, target organ toxicity, aspiration toxicity.
- **Flame**
 - Flammables, pyrophorics, self-heating, emits flammable gas, self-reactives, organic peroxides, desensitized explosives.
- **Exclamation Mark**
 - Skin and eye irritant, skin sensitizer, acute toxicity (harmful), narcotic effects, respiratory tract irritant, harmful to ozone layer.

Physical and Toxic Hazards

- **Gas Cylinder**
 - Gases and chemicals under pressure.
- **Corrosion**
 - Corrosion and skin burns, eye damage, corrosive to metals.
- **Exploding Bomb**
 - Explosives, self-reactives, organic peroxides.
- **Flame Over Circle**
 - Oxidizers.
- **Environment / Skull**
 - Aquatic toxicity · Acute toxicity (fatal or toxic).

NFPA 704 Classification Label

■ The Four-Color Diamond

- Blue (left) — health hazard: 4 deadly, 3 extreme danger, 2 hazardous, 1 slightly hazardous, 0 normal material.
- Red (top) — fire hazard by flash point: 4 below 73 °F, 3 below 100 °F, 2 below 200 °F, 1 above 200 °F, 0 will not burn.
- Yellow (right) — instability: 4 may detonate, 3 detonates with shock or heat, 2 violent chemical change, 1 unstable if heated, 0 stable.

■ White (bottom) — specific hazard

- ACID · ALK (alkali) · COR (corrosive) · OX (oxidizer) · radiation symbol · W with a slash = do not use water.

NFPA 704 FIRE DIAMOND EXPLAINED

★ — HAZARD INFORMATION FOR EMERGENCY RESPONSE AND SAFE HANDLING — ★

RATING SCALE 0-4

FLAMMABILITY	HEALTH	INSTABILITY	SPECIAL HAZARDS
4	4	4	OX Oxidizer
3	3	3	W Reacts with water
2	2	2	SA Simple asphyxiant gas
1	1	1	COR Corrosive
0	0	0	RA Radioactive

FLAMMABILITY
Potential for fire or flash fire

HEALTH
Potential health hazard

INSTABILITY
Potential for violent chemical change

SPECIAL HAZARDS
Special instructions or information

The NFPA 704 Fire Diamond provides a quick at-a-glance summary of the hazards of a material. Always use proper PPE, follow safety procedures, and consult the Safety Data Sheet (SDS) for complete information.

KNOW THE HAZARDS. PROTECT YOURSELF. PROTECT OTHERS.
— SAFETY IS EVERYONE'S RESPONSIBILITY. —

Fire Classes and Extinguishers

- **Class A — green triangle**
 - Ordinary combustibles: wood, paper, cloth.
- **Class B — red square**
 - Flammable liquids: grease, oil, paint, solvents.
- **Class C — blue circle**
 - Live electrical equipment: electrical panel, motors, wiring.
- **Class D — yellow star**
 - Combustible metals: magnesium, aluminum.
- **Class K — black hexagon**
 - Commercial cooking equipment: cooking oils, animal and vegetable fats.



In case of fire: remember RACE

- **R — Rescue**
 - Remove all persons in immediate danger.
- **A — Alarm**
 - Alert others by activating the fire alarm.
- **C — Contain**
 - Contain the emergency by closing doors and windows.
- **E — Evacuate / Extinguish**
 - Evacuate and extinguish the fire only if you are trained and it is safe to do so.
- **Using the extinguisher: PASS**
 - Pull (pull the pin) · Aim (aim at the base) · Squeeze (squeeze the handle) · Sweep (sweep side to side).



CMS / CLIA — Laboratories and records

Certification

- **CMS (Centers for Medicare & Medicaid Services)**
 - Certifies clinical laboratories through the CLIA number.
 - Requires periodic competency testing for personnel.
 - Requires written policies and procedures.
 - Administers Medicare and Medicaid.

Documentation

- **Sample and record retention**
 - Store samples and results according to regulatory timeframes.
 - Quality control and equipment maintenance records.
 - Complete, legible, and auditable documentation.
 - Each test is classified by complexity (waived, moderate, high).

FDA and DEA / IRS

FDA

- **FDA — Food and Drug Administration**
 - Assigns and requires the official generic name of the drug.
 - MedWatch: adverse reaction and product failure reporting.
 - Orange Book: therapeutic equivalence of generics.
 - 5 categories of substances based on their abuse potential.
 - Drug storage temperature standards.

DEA / IRS

- **DEA — Drug Enforcement Administration**
 - Registers professionals who prescribe controlled substances.
 - Requires security of narcotics and syringes under lock and key and inventory.
- **IRS — Internal Revenue Service**
 - Staff payroll, withholdings, and office tax returns.
 - Retention of practice financial records.

2

Administrative Area

Patient management, appointments, insurance, billing, and office

Patient management: reception and registration

Patient Registration

- **1. Initial reception and registration**
 - Complete and verified demographic data.
 - Medical record number (MRN) assigned in the MPI.
 - Emergency contacts and health insurance.
- **2. Personal information update**
 - Verify data at each visit; sign consents.
 - Offer translation or interpreter if necessary.

Clinical Documentation

- **3. SOAP Method**
 - S — Subjective: what the patient reports.
 - O — Objective: vital signs and measurable findings.
 - A — Assessment: physician's impression.
 - P — Plan: treatment, tests, and follow-up.
- **4. Types of consent**
 - Treatment vs. information disclosure.
 - The original is always filed in the medical record.

Rules for manual entry in the medical record

- **Correct ink usage**
 - Write only with black or blue ink.
 - Prohibited to use pencil, liquid correction fluid, or erase.
- **Correction of errors**
 - Cross out with a single line, write the correction, and sign with initials and date.
 - The original data must remain legible.
- **Objectivity**
 - Record observable facts, not opinions or judgments.
 - Quote the patient verbatim when relevant.
- **Real-time**
 - Document immediately after the procedure; never in advance.
- **The medical record is a legal document: if it's not written, it wasn't done.**

Types of appointment scheduling

Type	How it works	When used
Flow (per hour)	Appointments spaced at fixed intervals	General consultation with predictable times
Double booking	Two patients in the same slot	Short or follow-up visits
Walk-in	Seen on a first-come, first-served basis	Walk-in clinics
Open	No assigned time, broad window	Laboratory, vaccination
Clustering	Similar patients in the same block	Prenatal, weight control, physicals

Golden rule: never leave the patient without information about their waiting time.

Contingencies, emergencies, and referrals

Schedule

- **Contingency management**
 - Reserve a 20-minute block for unforeseen events.
 - No-shows: document in the record and reschedule.
 - Delays: inform the patient and offer options.
 - Emergencies: immediate attention, notify the physician immediately.

Coordination

- **Referrals**
 - Coordinate with the specialist: authorization, record, and results.
 - Confirm that the patient attended and that the report arrived.
- **Patient advocacy**
 - The CMA acts as an advocate: clarifies doubts and removes access barriers.
 - Retrospective review of cases to improve service.

Office: correspondence, policies, and infection control

Staff support

- **Correspondence and memos**
 - Memos are not signed: they are initialed.
 - Sober design; they are legal evidence.
 - Classify by urgency and stamp date and time of receipt.
 - Log of expected mail and routing slips.

Procedures

- **Policies, procedures, and algorithms**
 - P&P Manual: official office reference.
 - Flowcharts and patient information brochures.
- **Hygiene and infection control (OSHA)**
 - Disinfection: eliminates microorganisms, not spores.
 - Sterilization (autoclave): destroys everything, including spores.
 - Daily protocol for cleaning surfaces and equipment.

Insurance, billing, and federal programs

Billing

- **Insurance and third-party payers**
 - Verify coverage and eligibility before the visit.
 - The progress note supports everything that is billed.
 - Codes: CPT-4 (procedures) and HCPCS (supplies/services).
 - Submission and follow-up of claims.

Coverage

- **Federal and state programs**
 - Medicare — 65+ years and certain disabilities.
 - Medicaid — low income (federal and state).
 - SCHIP — coverage for children.
 - Tricare — military and their families.
 - Workers' Compensation — work-related injuries.

Accounts receivable and banking operations

Collections

- **Billing cycle**
 - Issue statement and follow up systematically.
- **Aging of balances**
 - 1-30 days: gentle reminder.
 - 31-60 days: notice with follow-up call.
 - 61-90 days: formal notification and payment plan.
 - More than 90 days: evaluate collection agency.

Banking and law

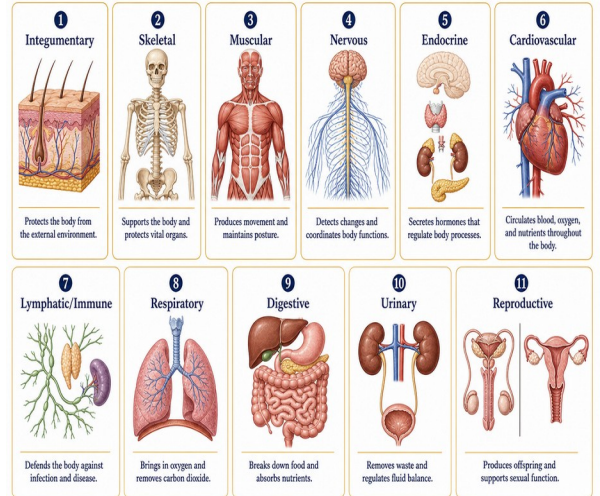
- **Banking operations and legality**
 - Detailed invoice for each service provided.
 - Deposits at least weekly and bank reconciliation.
 - Account types: checking, savings, and payroll.
 - Consumer Protection Act: prohibits abusive collections, threats, and calls at inappropriate times.

3

Anatomy: The Body Systems

The 11 systems, homeostasis, and medical terminology

THE ELEVEN BODY SYSTEMS



The 11 Human Body Systems

System	Main Organs	Function
Integumentary	Skin, hair, nails, glands	Protective barrier and temperature
Skeletal	Bones, cartilage, ligaments	Support, protection, calcium
Muscular	Skeletal, smooth, and cardiac muscle	Movement and posture
Nervous	Brain, spinal cord, nerves	Control and interpretation of stimuli
Endocrine	Thyroid, pancreas, adrenals	Hormones and metabolism
Cardiovascular	Heart, arteries, veins, blood	Transport of O ₂ and nutrients

The 11 Human Body Systems (continued)

System	Main Organs	Function
Lymphatic / Immune	Lymph nodes, spleen, thymus, lymphocytes	Defense and fluid drainage
Respiratory	Nose, trachea, bronchi, lungs	Exchange of O ₂ and CO ₂
Digestive	Mouth, stomach, intestines, liver	Digestion and absorption
Urinary	Kidneys, ureters, bladder, urethra	Filters waste and balances fluids
Reproductive	Ovaries/uterus · testes/prostate	Reproduction and sex hormones

All systems work together to maintain homeostasis.

Homeostasis and levels of organization

Internal balance

- **Homeostasis**
 - Body's ability to maintain a stable internal environment despite external changes.
 - Examples: temperature 37 °C, glucose, blood pH 7.35-7.45, blood pressure.
 - Maintained by negative feedback (body corrects deviation).
 - When it fails, illness appears: fever, dehydration, hyper/hypoglycemia.

Anatomical reference

- **Levels of organization**
 - Cell → Tissue → Organ → System → Organism.
- **Positional terms**
 - Anterior/posterior · superior/inferior · medial/lateral.
 - Proximal (near trunk) / distal (away from trunk).
 - Cavities: cranial, thoracic, abdominal, and pelvic.

Basic medical terminology

Prefixes

- **Common prefixes**
 - hyper- = elevated · hypo- = low.
 - brady- = slow · tachy- = fast.
 - a-/an- = absence · dys- = difficulty.
 - peri- = around · intra- = within.

Suffixes

- **Common suffixes**
 - -itis = inflammation · -emia = in the blood.
 - -algia = pain · -pathy = disease.
 - -ectomy = removal · -otomy = incision.
 - -ostomy = opening · -graphy = record/image.
- **Example: tachy + cardia = rapid heart rate.**

4

Vital signs and assessment

Blood pressure, temperature, ECG, oximetry and medical history

VITAL SIGNS

ASSESS • MEASURE • INTERPRET

1. BLOOD PRESSURE Correct Technique

- Use correct cuff size.
- Ensure 30 minutes: no caffeine, exercise, or smoking.
- Have patient rest quietly for 5 minutes.
- Seat patient with back supported, legs uncrossed, feet flat on the floor.
- Place cuff on bare upper arm.
- Take 2 readings 1-2 minutes apart; record both.

2. TEMPERATURE Routes

Oral: 98.6°F (37.0°C)
Tympanic: 98.6°F (37.0°C)
Axillary: 97.6°F (36.4°C)
Temporal Artery: 98.6°F (37.0°C)
Rectal: 99.1°F (37.3°C)

*Rectal for selected patients only.

3. PULSE Common Sites

• Use index and middle fingers.
• Do NOT use thumb.

4. RESPIRATION Rate

- Observe chest rise and fall.
- Count respirations for 30-60 seconds.
- Multiply by 2 (if 30 sec) or record total (if 60 sec).
- Keep patient unaware when possible.

WHAT COUNTS

- One complete inhale and exhale = One respiration

5. PULSE OXIMETRY (SpO₂)

• Apply to warm, clean finger (nail polish may affect reading).

• Ensure proper fit and minimal movement.

• Allow a few seconds for stable reading.

• Assess in conjunction with clinical status.

SpO₂ Interpretation (General Guide)

≥ 95%	Normal
90-94%	Mild Hypoxemia
< 90%	Hypoxemia - Seek Evaluation

NORMAL ADULT RANGES		
VITAL SIGN	NORMAL RANGE	NOTES
Blood Pressure	90/60 - 120/80 mmHg	Varies with age, activity, and individual.
Temperature	97.6 - 99.6 °F (36.4 - 37.6 °C)	Varies by route (see above).
Pulse (Heart Rate)	60 - 100 beats per minute	Varies with activity, fitness, and stress.
Respiration Rate	12 - 20 breaths per minute	Varies with activity and age.
SpO ₂ (Pulse Oximetry) (at sea level)	95 - 100%	Lower with altitude; interpret with clinical picture.

BLOOD PRESSURE CLASSIFICATION (Adults ≥18 years)		
CATEGORY	SYSTOLIC (mmHg)	DIASTOLIC (mmHg)
NORMAL	< 120	and < 80
ELEVATED	120 - 129	and < 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 - 139	or 80 - 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	≥ 140	or ≥ 90
HYPERTENSIVE CRISIS (Seek Immediate Medical Care)	> 180	and/or > 120

Classification based on the average of 2 or more readings on 2 or more occasions.
Source: 2017 ACC/AHA Hypertension Guideline

Blood pressure measurement

Procedure

- **Correct technique**
 - Patient seated, back supported, feet on floor, 5 min rest.
 - Bare arm at heart level, supported.
 - Appropriately sized cuff, 2.5 cm above elbow crease.
 - Stethoscope over brachial artery; deflate 2-3 mmHg/second.
 - Korotkoff sounds: first = systolic; disappearance = diastolic.

What to avoid

- **Common errors**
 - Cuff too small (falsely high reading) or too large (low).
 - Arm below heart level.
 - Deflating too quickly.
 - Talking during measurement or crossed legs.
 - Taking BP over clothing or unsupported arm.

Classification of blood pressure in adults

Category	Systolic (mmHg)	Diastolic (mmHg)
Normal	Less than 120	and less than 80
Elevated	120 - 129	and less than 80
Hypertension stage 1	130 - 139	or 80 - 89
Hypertension stage 2	140 or more	or 90 or more
Hypertensive crisis	More than 180	and/or more than 120

Hypertensive crisis: notify doctor immediately — it is an emergency.

Body temperature and normal vital ranges

Temperature

- **Temperature**
 - Oral average: 37 °C (98.6 °F); range 36.5-37.5 °C.
 - Rectal and tympanic: ~0.5 °C higher than oral.
 - Axillary: ~0.5 °C lower than oral.
 - Influencing factors: time of day, age, exercise, ovulation, stress, environment.
 - Fever: 38 °C or more. Hypothermia: less than 35 °C.

Reference values

- **Other vital signs (adult)**
 - Pulse: 60-100 beats per minute, rhythmic and full.
 - Respiration: 12-20 per minute.
 - SpO₂: 95-100%.
 - Blood pressure: less than 120/80 mmHg.
 - Pain: 0-10 scale (fifth vital sign).

Electrocardiography (ECG) and pulse oximetry

ECG

- **ECG — basic waves**
 - P wave: atrial depolarization.
 - QRS complex: ventricular depolarization.
 - T wave: ventricular repolarization.
- **Types of Studies**
 - Resting ECG: 12 leads.
 - Stress Test: 12-15 electrodes.
 - Holter: 3-5 electrodes, 24-48 hours.

Oxygenation

- **Pulse Oximetry (SpO₂)**
 - Normal: 95-100%. Hypoxia: less than 90%.
 - Sensor on finger, earlobe, or foot (infants).
- **Accuracy Limitations**
 - Nail polish, acrylic nails, poor circulation.
 - Movement, intense light, hypothermia.
- **Gas Transport**
 - O₂: 98.5% bound to hemoglobin.
 - CO₂: HCO₃⁻ ~70%, carbaminohemoglobin ~20-23%, plasma ~7-10%.

Initial Interview, Medical History, and Asepsis

Documentation

- **H&P Report (History and Physical)**
 - Acute patients: within 24 hours.
 - Chronic patients: within 30 days.
- **Components of the Medical History**
 - Chief Complaint.
 - History of Present Illness.
 - Medical, Surgical, and Medication History.
 - Family and Social History.
 - Review of Systems (ROS).

Asepsis

- **Medical Asepsis (Clean Technique)**
 - Reduces the number of microorganisms.
 - Hand washing for 20-30 seconds.
- **Surgical Asepsis (Sterile Technique)**
 - Eliminates all microorganisms, including spores.
 - Sterile field: never turn your back or reach over.
 - Anything below waist level is considered contaminated.

Patient Positions, Safety, and Medications

Positions

- **Examination Positions**
 - Trendelenburg: supine with head lower than feet (shock).
 - Sims: left lateral with knee flexed (rectal, enemas).
 - Orthopneic: sitting upright leaning forward (respiratory distress).
 - Always drape the patient and respect their privacy.

Safety and Limits

- **Safety and Patient-Owned Equipment**
 - NFPA (fire) and JCAHO (accreditation and safety) standards.
 - Admission protocol: identify patient-owned equipment (oxygen, CPAP, cane).
 - Document life support restrictions (DNR / advance directives).
- **Self-Administered Medications**
 - The CMA can prepare, verify, and educate; does not prescribe or adjust doses.

5

Physical Examination Preparation

Visual Acuity, Audiological, and Pulmonary Function Tests

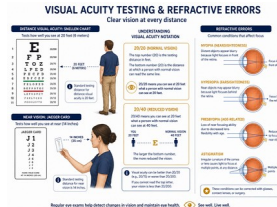
Visual Acuity Tests

Procedure

- **Distance Vision — Snellen Chart**
 - Distance: 6 meters (20 feet).
 - Test with correction (glasses/lenses) and then without.
 - Cover one eye without applying pressure.
 - Interpretation 20/40: the patient sees at 20 feet what a normal person sees at 40.
- **Near Vision — Jaeger Card**
 - Distance: 35.5 cm (14 inches).

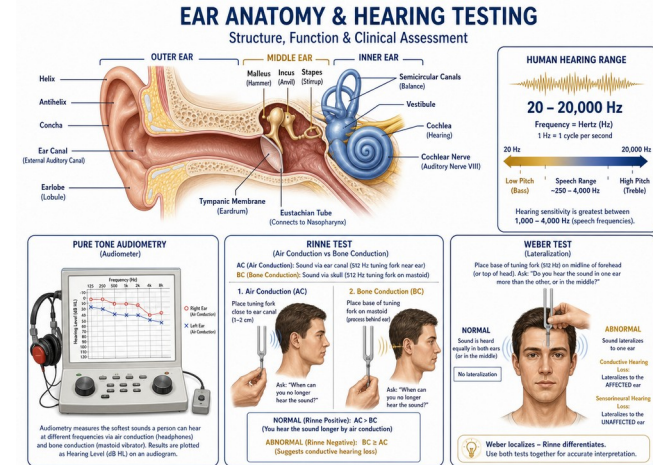
Refractive Errors

- **Myopia**
 - Long eyeball; poor distance vision.
- **Hyperopia**
 - Short or weak eyeball; poor near vision.
- **Presbyopia**
 - Loss of lens elasticity due to age (approx. 45 years).
- **Astigmatism**
 - Irregular corneal curvature causing blurred vision.



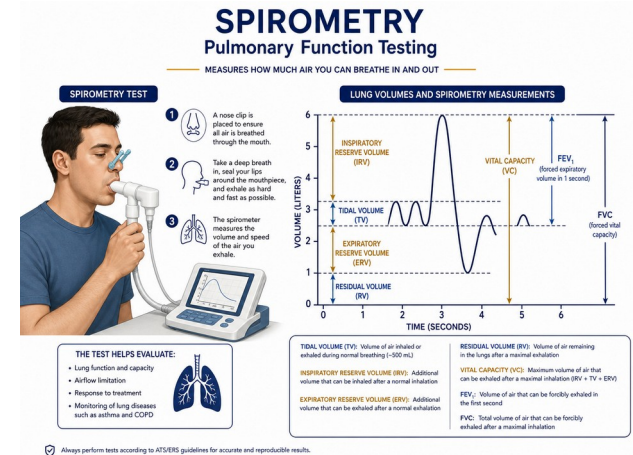
Audiological Tests

- Measure hearing in terms of Intensity (Decibels · dB) and Pitch (Hertz · Hz).
- Normal range: 20 Hz to 20,000 Hz. Human speech is between 500 and 3,000 Hz.**
- Hearing loss: suspected if the patient cannot hear below 25 dB.
- Sounds greater than 85 dB are damaging.**
- Conduction Tests:
 - Air: tuning fork to the sides of the head or headphones.
 - Bone: tuning fork or vibrator over the mastoid bone (behind the ear).



Pulmonary Function Tests (PFTs)

- The spirometer measures lung capacity and volume.
- **Technique**
 - Patient seated, with nose clip.
 - Inhale deeply and exhale forcefully for 6 seconds.
 - The best of 3 readings is taken.
- **Key Definitions**
 - Tidal Volume (TV): normal breathing.
 - Vital Capacity: tidal volume + inspiratory and expiratory reserves.
 - Residual Volume (RV): air always remaining in the lungs to prevent collapse.



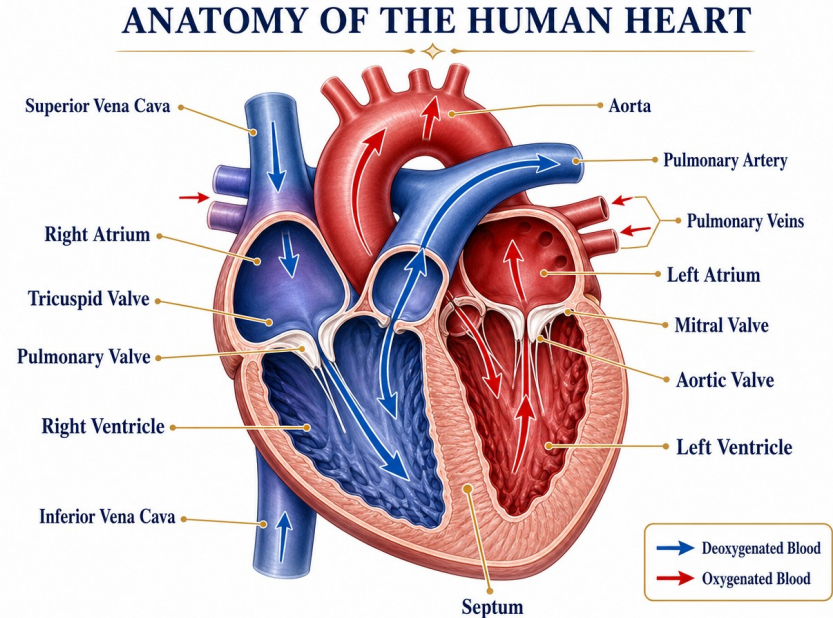
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Supportive Anatomy and Physiology

Heart and Circulation · Gas Exchange · Nervous System

The Heart: Chambers, Valves, and Great Vessels

- **4 chambers**
 - Atria (right and left): receive blood.
 - Ventricles (right and left): pump blood out.
- **4 valves**
 - Tricuspid: atrium → right ventricle.
 - Pulmonary: right ventricle → pulmonary artery.
 - Mitral (bicuspid): atrium → left ventricle.
 - Aortic: left ventricle → aorta.
 - *Prevent blood backflow.*
- **Septum**
 - Separates the right side (O_2 -poor blood) from the left (O_2 -rich blood).



Blood Flow: Entry and Exit

Pulmonary Circulation (Lesser)

- **OXYGEN-POOR blood ENTERS**
 - 1. Superior and inferior vena cava → right atrium.
 - 2. Tricuspid valve → right ventricle.
 - 3. Pulmonary valve → pulmonary artery.
 - 4. EXITS to the lungs: CO₂ is released and O₂ is taken up.
- *Note: the pulmonary artery is the only artery that carries oxygen-poor blood.*

Systemic Circulation (Greater)

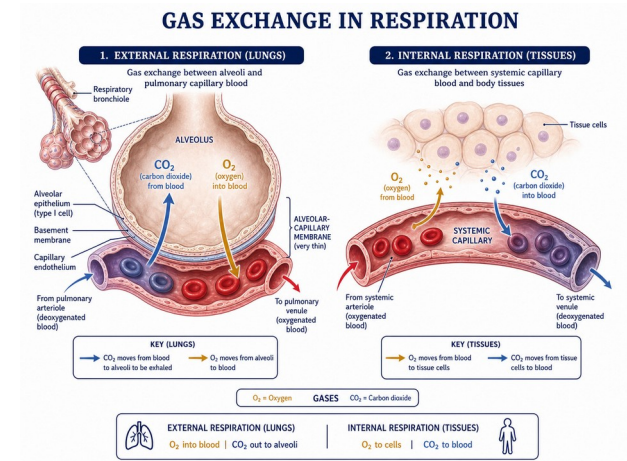
- **OXYGEN-RICH blood RETURNS**
 - 5. Pulmonary veins → left atrium.
 - 6. Mitral valve → left ventricle.
 - 7. Aortic valve → aorta.
 - 8. EXITS to the entire body via the arteries.
- *Note: the pulmonary veins are the only veins that carry oxygen-rich blood.*

Cardiac Cycle: Key Data for the CMA

- **Systole and Diastole**
 - Systole: contraction; the ventricle expels blood (high number of blood pressure).
 - Diastole: relaxation; the chambers fill (low number of blood pressure).
- **Heart Sounds**
 - "Lub" (S1): closure of the tricuspid and mitral valves.
 - "Dub" (S2): closure of the pulmonary and aortic valves.
- **Conduction System**
 - SA node (natural pacemaker) → AV node → Bundle of His → Purkinje fibers.
- **Coronary Circulation**
 - Coronary arteries nourish the heart muscle itself; their obstruction causes myocardial infarction.

Gas Exchange

- Vital process of oxygen (O_2) and carbon dioxide (CO_2) diffusion across alveolar-capillary membranes, in the lungs and tissues, facilitated by pressure gradients (simple diffusion).
- **External Respiration (Lungs)**
 - Inhaled oxygen enters the alveoli and diffuses into the blood (from high to low pressure).
 - CO_2 from the blood passes into the alveoli to be exhaled.
- **Internal Respiration (Tissues)**
 - O_2 diffuses from the capillaries into the cells for cellular respiration.
 - CO_2 (waste) diffuses from the cells into the blood.
- Blood in the pulmonary capillaries is low in O_2 and high in CO_2 .



Nervous System

General Organization

- Complex biological network that controls, coordinates, and regulates bodily functions and interactions with the environment.
- **Structural Division**
 - CNS (Central): processing and command center — brain and spinal cord.
 - PNS (Peripheral): connects the CNS to the rest of the body.
- **Functional Division**
 - Somatic: voluntary actions.
 - Autonomic: involuntary, divided into sympathetic and parasympathetic.
- *The basic functional unit is the neuron; it transmits impulses via dendrites and axons.*

Lobes and Structures

- **Frontal Lobe**
 - Speech, motor control, cognitive skills.
- **Parietal Lobe**
 - Touch, pressure, taste, spatial awareness.
- **Temporal Lobe**
 - Hearing, facial recognition, processing memory.
- **Occipital Lobe**
 - Vision.
- **Cerebellum**
 - Coordination and balance.
- **Spinal Cord**
 - Transmits messages between the brain and nerve pathways.

7

Laboratory Procedures

Venipuncture, Capillary Puncture, Urine, Stool, and Diagnostic Imaging

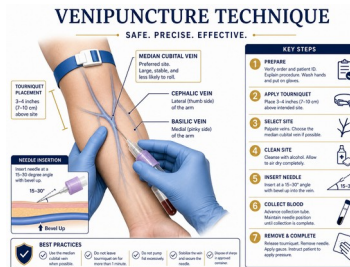
Venipuncture: Protocol and Safety

Identification and Consent

- **Verify identity (wristband/card) and concordance with the request. If there is a discrepancy, STOP.**
- Right to refuse: a conscious adult can refuse; proceeding without permission is legal assault.
- Implied consent: applies only if the patient is unconscious.

Extraction Technique

- **Insertion angle: 30° with the bevel facing up.**
- Tourniquet: do not leave on for more than 1-2 minutes (prevents hemoconcentration and false calcium levels).
- Post-puncture: constant pressure for 4 to 6 minutes (longer if taking anticoagulants). Do not bend the arm.



Order of Tube Filling

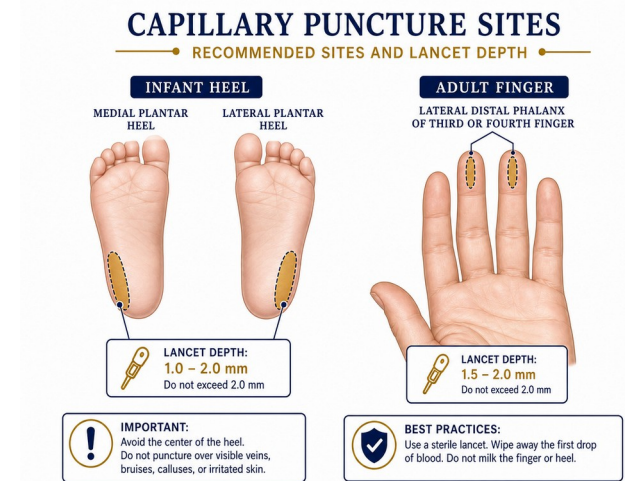
Color	Additive	Order	Main Use	Inversions
Yellow	SPS	First	Blood Culture	8-10 times
Light Blue	Sodium Citrate	Second	Coagulation (PT, PTT, INR)	3-4 inversions
Red	None	Third	Chemistry / Serology	Do not mix
Gold (SST)	Separator Gel + Activator	Fourth	Serum Chemistry	5 times
Green	Heparin	Fifth	Plasma Chemistry	8-10 times
Lavender	EDTA	Sixth	Hematology	8-10 times
Gray	Fluoride / Oxalate	Seventh	Glucose · Lactate	8-10 times



The order prevents cross-contamination of additives between tubes.

Capillary Puncture: Procedure and Sites

- Used for small amounts of blood (blood glucose, neonatal PKU) or when veins are difficult.
- **Puncture Sites**
 - Newborns: lateral or medial plantar surface of the heel (avoid the calcaneus bone).
 - Adults: palmar surface of the distal phalanx (fingertip).



Urine Analysis (N-Multistix)

- Rapid interpretation of reagent strips for health screening.
- Blood / Leukocytes: indicate infection or trauma.
- Glucose / Ketones: markers of uncontrolled diabetes or malnutrition/extreme diets.
- Nitrites: presence of bacteria (such as E. coli).
- pH (5 to 9): acidic urine resists infections; alkaline urine promotes bacterial growth.
- Proteins: if present, suggest damage to the nephrons (kidneys).

URINALYSIS REAGENT STRIP (DIPSTICK) CHART

COLOR GUIDE AND NORMAL VALUES				
TEST (Reagent Pad)	COLOR REACTION SCALE (Results vary with concentration)			
				NORMAL / NEGATIVE (Typical Range)
GLUCOSE (Glucose Oxidase)	NEGATIVE	100	250	mg/dL
	NEGATIVE	SMALL	MODERATE	LARGE
BILIRUBIN (Diaz)	NEGATIVE	SMALL	MODERATE	LARGE
	NEGATIVE	TRACE	SMALL	MODERATE
KETONES (Acetoacetic Acid)	NEGATIVE	TRACE	SMALL	MODERATE
	NEGATIVE	TRACE	SMALL	MODERATE
SPECIFIC GRAVITY (Refractometry)	1.000	1.005	1.010	1.015
	1.000	1.005	1.010	1.015
BLOOD (Peroxidase)	NEGATIVE	TRACE	SMALL	MODERATE
	NEGATIVE	TRACE	SMALL	MODERATE
pH (pH Indicator)	5.0	6.0	6.5	7.0
	5.0	6.0	6.5	7.0
PROTEIN (Protein Error of pH Indicator)	NEGATIVE	TRACE	30	100
	NEGATIVE	TRACE	30	100
NITRITE (Griess Reaction)	NEGATIVE	POSITIVE		
	NEGATIVE	POSITIVE		
LEUKOCYTES (Leukocyte Esterase)	NEGATIVE	TRACE	SMALL	MODERATE
	NEGATIVE	TRACE	SMALL	MODERATE
UROBILINOGEN (Ehrlich's Reaction)	NORMAL (0.2)	1.0	2.0	4.0
	NORMAL (0.2)	1.0	2.0	4.0



INTERPRETATION NOTES

- Results should be read at the time specified by the manufacturer.
- Hydration, diet, medications, and certain medical conditions can affect results.
- Correlate with clinical findings and microscopic urinalysis.

IMPORTANT

This test is a screening tool. Abnormal results should be confirmed by additional laboratory testing.

Stool Collection and Occult Blood

- Detection of parasites and microscopic bleeding.
- O&P (ova and parasites): a teaspoon of stool is mixed in formalin.
- Pinworms (tape test): collected at night or upon waking, by touching the anus with tape or a paddle.
- **Occult Blood (Guaiac)**
 - Prior diet (3 days): avoid melon, turnip, broccoli, and radish (cause false positives).
 - Rapid test: if the sample with peroxide turns blue in 2 seconds, it is positive for blood.

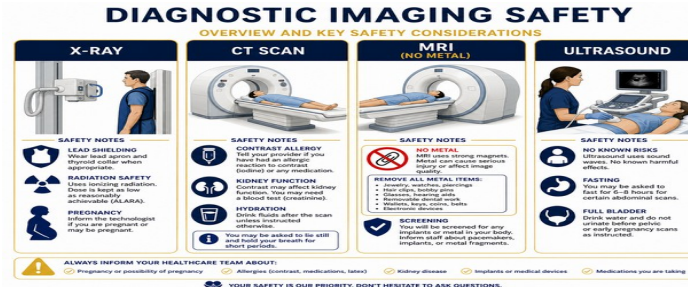
Imaging Diagnostics and Safety

X-rays, CT, MRI, and Ultrasound

- **MRI (Magnetic Resonance Imaging) Safety: crucial! The magnet is extremely powerful.**
- Prohibited: pacemakers, metal clips, jewelry, hearing aids, credit cards (will be erased), and metal objects in body piercings (will heat up).
- Tattoos: inform the technician if recent (can cause burns).

Contrast, Allergies, and Preparation

- **Always verify allergies to iodine / contrast media and latex.**
- For women of childbearing age, mandatory pregnancy test before an MRI or X-ray.
- Preparation: inform about fasting (8 h) or prior water/laxative intake depending on the study.



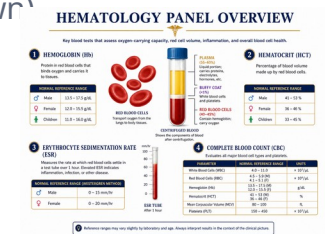
8

Laboratory Sample Processing

Hematology, Coagulation, Biochemistry, and Lipid Profile

Hematology

- **Hemoglobin (Hb)**
 - Complex protein composed of heme (containing iron) and globin chains.
 - Normal values: women 12-16 g/dL · men 14-16 g/dL.
- **Hematocrit (Hct)**
 - Percentage of packed red blood cells.
 - Values: men 42-52% · women 36-48%.
- **Erythrocyte Sedimentation Rate (ESR)**
 - Measures the distance and time in which rouleaux (aggregates) are formed.
 - Elevated ESR: indicates inflammation, necrosis, or infection (not diagnostic on its own)
 - Values: men 0-15 mm/h · women 0-20 mm/h.



Anticoagulation Monitoring

- Critical tests for patients at risk of thrombosis or on Warfarin treatment.
- **INR (International Normalized Ratio): is the current global standard.**
 - Normal: 0.9 to 1.2.
 - Therapeutic: 2.0 to 3.0 (up to 3.5 in high risk of clots).
 - Hemorrhage: INR of 3.0 to 4.5 indicates significant bleeding.
- PT (Prothrombin Time): normal 10-12 sec. Evaluates factors VII to I.
- aPTT (Activated Partial Thromboplastin Time): normal 25-38 sec. Evaluates factors XII to I.



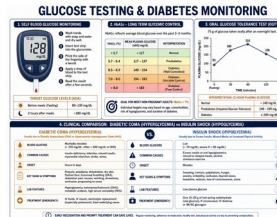
Biochemistry: Glucose and Renal Function

Diabetes

- **HbA1c**
 - Reflects glucose control over the last 3 months (red blood cell lifespan).
- **OGTT (Oral Glucose Tolerance Test)**
 - Diagnosis of prediabetes; fasting samples and after glucose load.

Renal Profile

- **BUN (Urea Nitrogen)**
 - Normal 7-18 mg/dL. Elevated in ESRD (60-100 mg/dL).
- **Creatinine**
 - Product of muscle metabolism. Elevated (>1.5 mg/dL) indicates kidney failure.
- **Albumin**
 - Its deficiency causes edema (swelling).



Biochemistry: Liver Function and Lipid Profile

Liver

- **Alkaline Phosphatase (ALP)**
 - Differentiates bone from liver disease.
- **ALT / AST**
 - Ideal ratio 1:1. Alterations indicate hepatitis (less than 1:1) or cirrhosis (greater than 1:1).
- **Bilirubin**
 - Bile pigment. Its excess causes jaundice. Light sensitive.

Lipids

- *Requires 12-14 hours of fasting.*
- Total cholesterol: desirable <200 mg/dl.
- LDL (bad): optimal <100 mg/dl.
- HDL (good): >40 (M) / >50 (F).
- Triglycerides: normal <150 mg/dl.

9

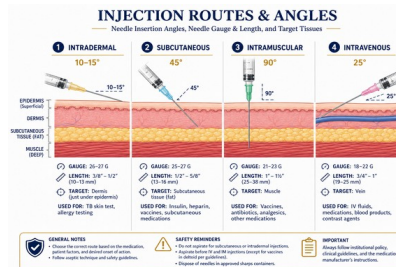
Technical Care and Emergencies

Injections, Cold Chain, Crash Cart, Triage and Urgent Care

Administration Routes and Injections

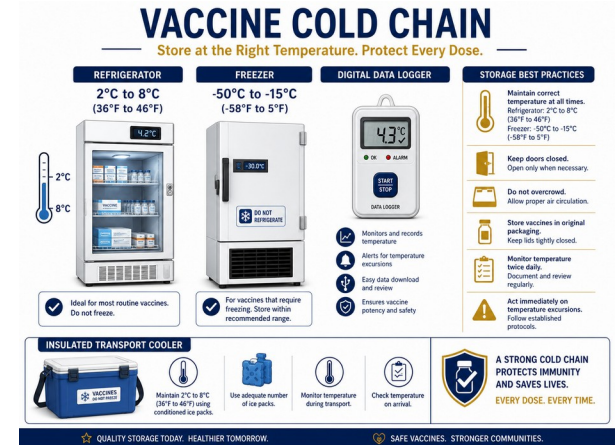
Injection Type	Angle	Needle (gauge/length)	Max. Amount	Common Site
Subcutaneous (SC)	45°	24-25G / 1.27 cm	0.5 ml	Abdomen, arm (fat)
Intramuscular (IM)	90°	20-22G / 2.54 cm	5.0 ml	Deltoid, gluteus, vastus lateralis
Intradermal (ID)	10-15°	26-27G / short bevel	0.1 ml	Forearm (TB test)

The chosen route depends on urgency and drug solubility.



Cold Chain and Vaccine Storage

- Incorrect storage degrades the biological product before its expiration.
- **Refrigerator:** ideal 5 °C (range 2 °C to 8 °C).
- **Freezer (MMR/Varicella):** ideal -18 °C (range -15 °C to -20 °C).
- **Protocol**
 - NEVER store in the refrigerator door.
 - Record temperature 2 times a day (start and end of shift).
 - Rotate inventory weekly (oldest in front).
 - Prohibited: storing food or biological samples with vaccines.



Resuscitation Cart (Crash Cart)

Contents

- **The MA must know the location and contents of the "crash cart".**
- Oxygen tank (green).
- Defibrillator (AED).
- Masks.
- Emergency medications.

MA Role in Emergencies

- Activate the emergency system (911).
- Place the patient in Trendelenburg position (feet elevated) or recovery position.
- Administer oxygen (2 to 4 L/min) if indicated.
- Prepare the AED and assist with CPR.



Triage and START System

Assessment

- Prioritization of victims in mass casualty incidents.
- **RPM Assessment (30 seconds)**
 - Respiration.
 - Perfusion (radial pulse / capillary refill).
 - Mental status.

Color Coding

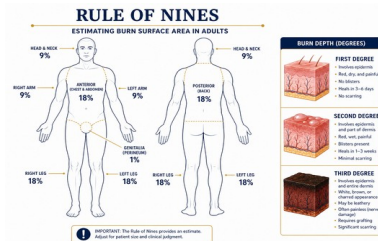
- **Red (Priority 1): immediate.** Treatable life-threatening risk.
- **Yellow (Priority 2): delayed.** Serious but stable injuries.
- **Green (Priority 3): "walking wounded".** Can walk.
- **Black:** deceased or injuries incompatible with life.

START TRIAGE			
SIMPLE TRIAGE AND RAPID TREATMENT			
TRIAGE TAG	CATEGORY	CRITERIA (ADULT)	CRITERIA (CHILD)
	RED IMMEDIATE PRIORITY 1	- Not breathing (after airway management) - RR > 30 per minute - Perfusion: capillary refill > 2 seconds - Cannot follow simple commands	- Not breathing (after airway management) - RR > 30 per minute - Perfusion: capillary refill > 2 seconds - Cannot follow simple commands
	YELLOW DELAYED PRIORITY 2	- Breathing - RR 15-30 per minute - Perfusion: capillary refill < 2 seconds and radial pulse present - Can follow simple commands	- Breathing - RR 15-30 per minute - Perfusion: capillary refill < 2 seconds - Can follow simple commands
	GREEN WALKING WOUNDED PRIORITY 3	- Breathing - RR 15-30 per minute - Perfusion: capillary refill < 2 seconds - Can follow simple commands - Alert and oriented	- Breathing - RR 15-30 per minute - Perfusion: capillary refill < 2 seconds - Can follow simple commands - Alert and oriented
	BLACK DECEASED EXPECTANT PRIORITY 4	- Not breathing (after airway repositioning) - No signs of life	- Not breathing (after airway repositioning) - No signs of life
NOTE: Use of physical restraints may be necessary for some patients. Reassess frequently - conditions can change.			
ASSESS - TRIAGE - TREAT - TRANSPORT			

First Aid: Burns and Choking

Burns

- **Rule of Nines**
 - Evaluates the % of total body surface area (TBSA) to decide transfer to a burn unit.
- **Treatment**
 - Cold water for 20 minutes.
 - DO NOT use ice or butter.
 - Cover with loose sterile gauze.



Asphyxia (Choking)

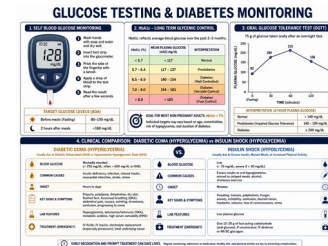
- **Universal sign: hands to throat.**
- Heimlich maneuver: subdiaphragmatic compressions until the object is expelled or the patient loses consciousness.
- Unconscious: initiate CPR and perform a finger sweep if the object is visible.



Diabetic coma vs. insulin shock

Characteristic	Diabetic coma (hyperglycemia)	Insulin shock (hypoglycemia)
Cause	Excess sugar / lack of insulin	Lack of sugar (<70 mg/dL) / excessive exercise
Symptoms	Thirst, nausea, abdominal pain, confusion	Nervousness, hunger, tremors, irritability
Signs	Dry, red skin, fruity breath, ketones in urine	Cold sweat, pale skin, rapid loss of consciousness
Action	Inform physician; requires insulin and rehydration	Rule of 15: 15 g carbohydrates, re-evaluate in 15 min

It is vital to distinguish between excess and lack of sugar to save the patient's life.



Diabetic coma and insulin shock: detail

Diabetic coma

- A series of disorders in diabetic patients, considered a medical emergency as they are life-threatening.
- The person suffers an alteration of consciousness because blood glucose is greater than 170 (hyperglycemia, due to diabetic ketoacidosis or hyperglycemic hyperosmolar nonketotic state) or less than 50 (hypoglycemia, the most severe of acute complications).
- **Prevention**
 - Regularly monitor glucose levels.
 - Strictly follow medication plan (insulin or oral drugs).
 - Maintain a balanced diet.

Insulin shock

- Medical emergency characterized by a drastic and dangerous drop in blood sugar (hypoglycemia), caused by an excess of insulin relative to available glucose.
- Primarily affects people with diabetes who use insulin and requires immediate attention to prevent seizures or loss of consciousness.
- **Prevention**
 - Regularly monitor glucose levels.
 - Constant insulin adjustments.
 - Consistent eating.

10

Basic Pharmacology

The 7 Rights · Routes · Abbreviations · Controlled Substances



PHARMACOLOGY BASICS

FOR MEDICAL ASSISTANTS



★ THE SEVEN RIGHTS ★

- 1 RIGHT PATIENT
- 2 RIGHT MEDICATION
- 3 RIGHT DOSE
- 4 RIGHT TIME
- 5 RIGHT ROUTE
- 6 RIGHT DOCUMENTATION
- 7 RIGHT REASON (INDICATION)

COMMON DRUG CLASSIFICATIONS

- ANALGESICS**
Pain relievers
Examples: Acetaminophen, Ibuprofen
- ANTIBIOTICS**
Fight bacterial infections
Examples: Amoxicillin, Cephalexin
- CARDIOVASCULAR AGENTS**
Affect the heart and blood vessels
Examples: Lisinopril, Metoprolol
- RESPIRATORY AGENTS**
Affect the lungs and airways
Examples: Albuterol, Montelukast
- GASTROINTESTINAL AGENTS**
Affect the stomach and intestines
Examples: Omeprazole, Loperamide
- CENTRAL NERVOUS SYSTEM AGENTS**
Affect the brain and nerves
Examples: Sertraline, Gabapentin
- ENDOCRINE AGENTS**
Affect hormones and metabolism
Examples: Metformin, Levothyroxine

PRESCRIPTION ABBREVIATIONS

ABBREVIATION	MEANING
PO	By mouth
PRN	As needed
BID	Twice daily
TID	Three times daily
QID	Four times daily
ac	Before meals
pc	After meals

DOSAGE CALCULATION

FORMULA:

$$\frac{\text{DESIRED DOSE}}{\text{HAVE (ON HAND)}} \times \text{QUANTITY TO GIVE}$$

EXAMPLE:
Order: 250 mg Have: 125 mg per tab Quantity to give: 2 tabs
 $\frac{250 \text{ mg}}{125 \text{ mg}} \times 2 \text{ tabs} = 4 \text{ tabs}$

CONTROLLED SUBSTANCE SCHEDULES (I–V)

- I** **Schedule I**
• High potential for abuse
• No accepted medical use
• Example: Heroin, LSD
- II** **Schedule II**
• High potential for abuse
• Accepted medical use with severe restrictions
• Example: Morphine, Oxycodone, Adderall
- III** **Schedule III**
• Moderate potential for abuse
• Accepted medical use with moderate restrictions
• Example: Codeine, Testosterone (certain formulations)
- IV** **Schedule IV**
• Low potential for abuse
• Accepted medical use with limited restrictions
• Example: Alprazolam, Tramadol
- V** **Schedule V**
• Lowest potential for abuse
• Accepted medical use with minimal restrictions
• Example: Dextromethorphan, Loperamide



Always follow the 7 Rights, use accurate calculations, and be familiar with medications and legal responsibilities.

WHEN IN DOUBT, ASK!



The 7 Rights of Medication Administration

Rights 1 to 4

- **1. Right Patient**
 - Verify full name and date of birth; never by room number.
- **2. Right Medication**
 - Read the label three times: when taking it, when preparing it, and when discarding or storing it.
- **3. Right Dose**
 - Calculate and verify; if in doubt, confirm with the physician before administering.
- **4. Right Route**
 - Oral, SC, IM, ID, topical, ophthalmic, otic, rectal, or inhaled as per order.

Rights 5 to 7

- **5. Right Time**
 - Respect the indicated interval; document the actual administration time.
- **6. Right Documentation**
 - Record immediately after, never before. Note site, lot, and reaction.
- **7. Right Education and Right to Refuse**
 - Explain purpose and effects; patient may refuse and it is documented.
- **Golden Rule**
 - The CMA only administers under direct physician order and supervision, within their scope of practice.

Most Used Prescription Abbreviations

Abbreviation	Meaning	Abbreviation	Meaning
PO	By mouth	q.d. / QD	Once a day
NPO	Nothing by mouth	BID	Twice a day
PRN	As needed	TID	Three times a day
STAT	Immediately	QID	Four times a day
SC / SubQ	Subcutaneous	q4h	Every 4 hours
IM · IV · ID	Intramuscular · Intravenous · Intradermal	HS	At bedtime
gtt · tab · cap	Drop · tablet · capsule	a.c. / p.c.	Before / after meals

Never guess an abbreviation: if the order is not legible or clear, ask the physician.

Dose Calculation and Classifications

Dose Calculation

▪ Basic Formula

- $\text{Desired dose} \div \text{available dose} \times \text{quantity} = \text{dose to administer.}$
- Example: 250 mg ordered and vial is 500 mg/5 ml $\rightarrow 250/500 \times 5 = 2.5 \text{ ml.}$

▪ Equivalencies

- $1 \text{ g} = 1000 \text{ mg} \cdot 1 \text{ mg} = 1000 \text{ mcg} \cdot 1 \text{ L} = 1000 \text{ ml} \cdot 1 \text{ cc} = 1 \text{ ml.}$
- $1 \text{ kg} = 2.2 \text{ lb}$ (weight in pounds $\div 2.2 = \text{kg}$, for pediatric doses).
- $1 \text{ teaspoon} = 5 \text{ ml} \cdot 1 \text{ tablespoon} = 15 \text{ ml} \cdot 1 \text{ ounce} = 30 \text{ ml.}$

Classification and Schedules

▪ Common Classifications

- Analgesic (pain) · Antipyretic (fever) · Antibiotic (bacterial infection).
- Antihypertensive · Diuretic · Anticoagulant · Bronchodilator.
- Antihistamine · Antiemetic · Hypoglycemic · Sedative.

▪ Controlled Substances (DEA)

- Schedule I: no accepted medical use, high potential for abuse (heroin, LSD).
- Schedule II: high abuse, medical use (morphine, oxycodone, methylphenidate). Locked and double counted.
- Schedule III-V: moderate to low potential (combined codeine, benzodiazepines, antitussives). Record 2 years.

11

CPR / BLS and AED Use

Chain of Survival · Compressions · Defibrillator · Choking



Adult CPR Sequence (C-A-B)

Assessment and Compressions

- **Before starting**
 - Verify scene safety and put on gloves.
 - Check for response: gently shake and call out loudly.
 - Activate the emergency system (911) and ask for the AED.
 - Check pulse and breathing simultaneously (maximum 10 seconds).
- **C — Compressions**
 - Center of the chest, lower half of the sternum; heel of one hand with the other on top.
 - Depth 2 inches (5 cm), rate 100-120 per minute, allow for chest recoil.

Airway and Breathing

- **A — Airway**
 - Tilt head and lift chin; if cervical trauma is suspected, jaw thrust.
- **B — Breaths**
 - Ratio 30 compressions : 2 breaths of 1 second each, with visible chest rise.
 - Use a pocket mask or barrier device.
- **Key points**
 - Minimize interruptions (less than 10 seconds).
 - Switch rescuers every 2 minutes (5 cycles).
 - Continue until advanced personnel arrive.

CPR by patient age

Parameter	Adult	Child (1 year - puberty)	Infant (under 1 year)
Hands	Two hands	One or two hands	2 fingers (or 2 thumbs if 2 rescuers)
Depth	5 cm (2 in.)	One third of chest (~5 cm)	One third of chest (~4 cm)
Rate	100-120 / min	100-120 / min	100-120 / min
Ratio 1 rescuer	30:2	30:2	30:2
Ratio 2 rescuers	30:2	15:2	15:2
Pulse to check	Carotid	Carotid or femoral	Brachial

The quality of compressions is the most influential factor in survival.

AED and Choking

Automated External Defibrillator

- **AED use step-by-step**
 - 1. Turn on the device and follow voice prompts.
 - 2. Dry the chest and shave if very hairy; remove medication patches.
 - 3. Place pads: one below the right clavicle, the other on the left side below the armpit.
 - 4. No one touches the patient during rhythm analysis.
 - 5. If shock is indicated, loudly announce "Clear!" and press the button.
 - 6. Immediately resume compressions for 2 minutes and re-evaluate.
 - Pediatric pads for children under 8 years or less than 25 kg; if not available, use adult pads.

Choking

- **Airway Obstruction**
 - Mild obstruction: patient coughs forcefully and speaks — encourage them to keep coughing.
 - Severe obstruction: cannot speak or cough, clutches throat (universal sign).
 - Conscious adult and child: Heimlich maneuver, abdominal thrusts above the navel, upward.
 - Pregnant and obese individuals: chest thrusts instead of abdominal thrusts.
 - Infant: 5 back blows and 5 chest thrusts, alternating.
 - If unconscious: start CPR and check the mouth before each breath.

12

Asepsis, Sterilization, and PPE

Chain of Infection · Autoclave · Standard Precautions

STERILIZATION & ASEPSIS

Clean is Good. Sterile is Safe.

SANITIZATION, DISINFECTION & STERILIZATION: WHAT'S THE DIFFERENCE?

SANITIZATION

Reduces the number of microorganisms to a safe level as judged by public health standards.



LOWER RISK

Examples: Hand soap, cleansers, surface wipes

DISINFECTION

Kills most pathogenic microorganisms, but not necessarily bacterial spores.



INTERMEDIATE RISK

Examples: Alcohol 70%, chlorine bleach, quaternary ammonium compounds

STERILIZATION

Destroys or removes ALL forms of microbial life, including bacterial spores.



NO RISK

Examples: Autoclave (steam), dry heat, gas (e.g., ethylene oxide), radiation

STEAM STERILIZATION (AUTOCLAVE)

Clean hands prevent infection.



TEMPERATURE
250 °F / 121 °C

PRESSURE
15 psi

TIME
20-30 MINUTES

Recommended exposure time once proper temperature and pressure are reached.

PARAMETER TIP: Time begins when the set temperature and pressure are achieved. Do not open door until pressure returns to zero.

STERILIZATION INDICATORS & POUCHES

CHEMICAL INDICATOR STRIPS

Change color when exposed to sterilization conditions.

BEFORE (UNPROCESSED)

STEAM

Check 4

REJECT

BEFORE (UNPROCESSED)

STEAM

Check 4

ACCEPT

AFTER (EXPOSED)

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

STERILIZATION POUCHES

Designed to maintain sterility until opened.

BEFORE (UNPROCESSED)

STEAM

Check 4

REJECT

BEFORE (UNPROCESSED)

STEAM

Check 4

ACCEPT

AFTER (EXPOSED)

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

Check 4

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Check 4

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ACCEPT

Check 4

ACCEPT

Check 4

ACCEPT

STERILE FIELD RULES

KEEP IT IN VIEW

Keep all items in the sterile field in full view.

NO REACHING OVER

Do not reach over the sterile field. Ask for items.

EDGE IS CONTAMINATED

The outer 1-2 inches (2.5-5 cm) of the field are considered contaminated.

KEEP IT DRY

Moisture can carry microorganisms. Keep the field and items dry.

LIMIT TRAFFIC & TALK

Limit movement around the sterile field. Avoid unnecessary talking, coughing, or sneezing over the field.

USE TIMERS

Set up sterile field right before use. Do not leave open longer than necessary.

HAND HYGIENE: THE FOUNDATION OF ASEPSIS

HOW TO HANDWASH

Wash for 20-30 seconds.

1. Wet hands with soap, running water.

2. Rub palms together.

3. Rub palm against the back of the other hand.

4. Rub heel of one hand against the back of the other hand.

5. Rub fingers against the palm of the other hand.

6. Rub thumbs against the palm of the other hand.

7. Dry hands with a clean towel.

8. Use hand sanitizer if hands are not visibly soiled.

9. If hands are not visibly soiled, use alcohol-based hand rub (20-30 seconds).

10. If hands are visibly soiled, wash with soap and water.

11. Before patient contact.

12. Before aseptic task.

13. After body fluid exposure risk.

14. After patient contact.

15. After contact with patient surroundings.

16. If hands are not visibly soiled, use alcohol-based hand rub (20-30 seconds).

17. If hands are visibly soiled, wash with soap and water.

18. Before patient contact.

19. Before aseptic task.

20. After body fluid exposure risk.

21. After patient contact.

22. After contact with patient surroundings.

23. If hands are not visibly soiled, use alcohol-based hand rub (20-30 seconds).

24. If hands are visibly soiled, wash with soap and water.

25. Before patient contact.

26. Before aseptic task.

27. After body fluid exposure risk.

28. After patient contact.

29. After contact with patient surroundings.

30. If hands are not visibly soiled, use alcohol-based hand rub (20-30 seconds).

31. If hands are visibly soiled, wash with soap and water.

32. Before patient contact.

33. Before aseptic task.

34. After body fluid exposure risk.

35. After patient contact.



ASEPSIS SAVES LIVES



Clean your hands.



Use the right process.



Protect your patients.



Protect yourself.

Chain of Infection and Precautions

Chain of Infection

▪ The 6 links

- 1. Infectious agent (bacteria, virus, fungus, parasite).
- 2. Reservoir (person, animal, equipment, water).
- 3. Portal of exit (blood, secretions, feces).
- 4. Mode of transmission (contact, droplets, airborne, vehicle, vector).
- 5. Portal of entry (mucous membranes, broken skin, puncture).
- 6. Susceptible host (immunocompromised, elderly, newborn).
- Breaking a single link stops the infection: hand hygiene is the most effective measure.

Types of Precautions

▪ Standard precautions

- Treat all blood and body fluids as potentially infectious.
- Hand hygiene before and after each patient, 20 seconds with soap and water.
- Never recap needles; dispose of them in a rigid red container.

▪ Transmission-based precautions

- Contact: gloves and gown (C. difficile, scabies).
- Droplet: surgical mask within 1 meter (influenza, pertussis).
- Airborne: N95 respirator and negative pressure room (tuberculosis, measles).

Medical, Surgical Asepsis, and Sterilization

Cleaning, disinfection, and sterilization

- **Levels of control**
 - Sanitization: removes visible debris; cleaning with water and detergent.
 - Disinfection: destroys pathogenic microorganisms, not spores (high, intermediate, or low level).
 - Sterilization: destroys ALL forms of microbial life, including spores.
- **Medical asepsis (clean) vs. surgical asepsis (sterile)**
 - Medical: reduces the number of microorganisms — hand washing, clean gloves.
 - Surgical: eliminates all microorganisms — sterile field, sterile gloves and technique.

Autoclave and sterile field

- **Autoclave (steam under pressure)**
 - Typical parameters: 121 °C (250 °F) at 15 psi for 20-30 minutes.
 - Instruments are washed, dried, and packed open or unlocked.
 - Use external chemical indicator (color change) and biological spore test weekly.
 - Label each package with date and contents; shelf life according to office policy.
- **Sterile field rules**
 - Never turn your back to the field or reach over it; anything within 2.5 cm of the edge is not sterile.
 - Anything below waist level or wet is considered contaminated.

Personal Protective Equipment (PPE)

Correct sequence

- **Order for donning PPE**
 - 1. Hand hygiene · 2. Gown · 3. Mask or respirator · 4. Eye protection · 5. Gloves.
- **Order for doffing PPE**
 - 1. Gloves · 2. Eye protection · 3. Gown · 4. Mask · 5. Hand hygiene.
 - The most contaminated item (gloves) comes off first; the mask is removed by the ties, outside the room.

Selection and legal backing

- **When to use each item**
 - Gloves: whenever there is contact with blood, fluids, mucous membranes, or non-intact skin.
 - Impermeable gown: when splash onto clothing is anticipated.
 - Mask and eye protection or face shield: risk of splash to the face.
 - Fitted N95 respirator (annual fit test): airborne pathogens.
- **OSHA Documentation**
 - Exposure control plan, accessible SDS sheets, annual training, and hepatitis B vaccine offered at no cost.

13

CLIA waived rapid tests

Strep · COVID · Pregnancy · Quality control

CLIA-WAIVED RAPID TESTS

IN THE MEDICAL OFFICE

SIMPLE. FAST. RELIABLE RESULTS AT THE POINT OF CARE.

EASY TO USE **RESULTS IN MINUTES** **AID IN CLINICAL DECISIONS**

1. RAPID STREP (Group A Streptococcus)

RESULTS

Positive: Two lines (C and T)
Negative: One line at C
Invalid: No line at C

Sample: Throat swab
Time: 5 minutes

2. INFLUENZA A/B

RESULTS

Positive: Lines at C and A or C and B
Negative: One line at C
Invalid: No line at C

Sample: Nasal or nasopharyngeal swab
Time: 10-15 minutes

3. COVID-19 ANTIGEN (Ag)

RESULTS

Positive: Two lines (C and T)
Negative: One line at C
Invalid: No line at C

Sample: Nasal swab
Time: 10-15 minutes

4. URINE PREGNANCY (hCG)

RESULTS

Positive: Two lines (C and T)
Negative: One line at C
Invalid: No line at C

Sample: Urine
Time: 3-5 minutes

5. MONONUCLEOSIS (Heterophile Antibodies)

RESULTS

Positive: Two lines (C and T)
Negative: One line at C
Invalid: No line at C

Sample: Whole blood (fingerstick)
Time: 5-10 minutes

6. HEMOGLOBIN A1c

RESULTS

Good Control: Line at C only
High A1c: Line at C and T
Invalid: No line at C

Sample: Whole blood (fingerstick)
Time: 5 minutes

7. FECAL OCCULT BLOOD (FOB)

RESULTS

Positive: Two lines (C and T)
Negative: One line at C
Invalid: No line at C

Sample: Stool
Time: 5 minutes

QUALITY CONTROL EVERY TIME

Accurate results depend on proper testing and valid quality control.

1. READ THE INSTRUCTIONS

- Follow the manufacturer's instructions for use (IFU).
- Check specimen type, volume, and timing.

2. CHECK EXPIRATION DATES

- Do not use expired tests.
- Verify storage requirements.

3. VERIFY TEST INTEGRITY

- Do not use if the pouch is damaged or open.
- Ensure the test device appears intact.

4. RUN INTERNAL CONTROLS

- A control line (C) must always appear for the test to be valid.
- No control line = invalid result. Repeat test.

5. DOCUMENT RESULTS

- Record results in the patient's medical record.
- Note test lot number if required.

REMEMBER

A valid control line (C) means the test worked. No control line (C) means the test is invalid and must be repeated.

⚠️ These tests are for in vitro diagnostic use. **📋** Results should be interpreted in the context of clinical findings. **🏥** When in doubt, confirm with additional testing.

What are CLIA waived tests

Legal framework and best practices

▪ Definition

- Exempt complexity tests approved by the FDA that the CMA can perform in the office (POCT) under supervision.
- Require a current CLIA Certificate of Waiver in the office.

▪ Golden rules

- Follow the manufacturer's insert exactly: no shortcuts or approximate times.
- Check the expiration date of the kit and control before use.
- Observe the exact reading time; reading before or after invalidates the result.
- Document lot, time, result, and initials of the person who performed the test.

Most frequent tests

▪ Common office tests

- Group A Streptococcus: tonsil and posterior pharynx swab, without touching tongue or teeth.
- COVID-19 and influenza: nasal or nasopharyngeal swab depending on the kit.
- Pregnancy (hCG): first morning urine, the most concentrated.
- Capillary glucose and waived HbA1c.
- Hemoglobin and hematocrit, urine reagent strip, fecal occult blood (guaiac).
- Mononucleosis, rapid HIV, cholesterol, point-of-care INR.

Quality control and interpretation

Quality control

- **Quality Control (QC)**
 - Run positive and negative controls with each new lot, each shipment, and as indicated by the manufacturer.
 - Record QC in the logbook; if it fails, DO NOT report patient results.
 - Record refrigerator and room temperature daily.
 - Calibrate and maintain equipment according to the manufacturer's schedule.

How to read and report

- **Cassette reading**
 - Control line (C): must always appear; if absent, the test is invalid and must be repeated with a new kit.
 - Test line (T): its presence indicates a positive result, even if faint.
 - False negative: insufficient sample, test too early, or incorrect reading time.
 - Never interpret or diagnose: the CMA reports the result to the physician, who interprets it.

14

Communication and patient education

Barriers · Special populations · Cultural competence

PATIENT COMMUNICATION SKILLS

FOR MEDICAL ASSISTANTS

Clear communication. Stronger relationships. Better outcomes.

1 ACTIVE LISTENING

Give your full attention.

Show you are listening.

Be patient and nonjudgmental.

Summarize and clarify.

Respond thoughtfully.

I understand. Let me make sure I have this right.

Patients feel heard, respected, and more likely to share important information.

2 THERAPEUTIC vs. NON-THERAPEUTIC COMMUNICATION

THERAPEUTIC

- Shows empathy and respect
- Is honest and supportive
- Encourages expression
- Maintains confidentiality
- Focuses on the patient's needs

NON-THERAPEUTIC

- Interrupts or talks over the patient
- Is dismissive or judgmental
- Gives false reassurance
- Shares personal problems
- Changes the subject

Therapeutic communication builds trust and supports patient care.

3 VERBAL AND NONVERBAL CUES

VERBAL CUES

- Tone of voice
- Volume
- Pace
- Word choice
- Clarity

Speak clearly, kindly, and respectfully.

NONVERBAL CUES

- Eye contact
- Facial expressions
- Posture
- Gestures
- Personal space

Your body language can show you care before you speak.

Be aware of both verbal and nonverbal cues—they send a powerful message.

4 OPEN-ENDED QUESTIONS

Open-ended questions encourage patients to share more about their feelings, concerns, and experiences.

Examples:

- Can you tell me more about that?
- How have you been feeling?
- What concerns you the most?

Open-ended questions lead to better information and better care.

5 CULTURAL SENSITIVITY AND INTERPRETER USE

CULTURAL SENSITIVITY

- Respect differences in beliefs, values, and traditions
- Avoid assumptions
- Be open-minded and respectful
- Use inclusive language
- Cultural awareness builds trust and promotes quality care.

INTERPRETER USE

- Use a trained interpreter for accurate communication
- Speak directly to the patient
- Use short sentences
- Allow time for interpretation

Language access is a patient right. Use interpreters—never family or friends.

6 COMMUNICATION BARRIERS

Barriers can affect understanding and lead to errors.

Common Barriers:

- Language differences
- Hearing or vision loss
- Low health literacy
- Emotional distress
- Distractions (noise, phone, interruptions)

Identify barriers and take steps to overcome them for safe, effective communication.

GOOD COMMUNICATION IS AN ESSENTIAL PART OF GREAT CARE. | LISTEN. RESPECT. CONNECT. CARE.

Therapeutic communication and barriers

Effective communication

- **Elements of the process**
 - Sender, message, channel, receiver, and feedback.
 - Verbal (words) and non-verbal (posture, gestures, eye contact, tone): non-verbal communicates more.
- **Techniques that help**
 - Active listening, open-ended questions, paraphrasing, and summarizing.
 - Sit at eye level, call the patient by name, allow silence for response.
 - Verify understanding with the "teach-back" method.

Obstacles and reactions

- **Barriers to avoid**
 - Using medical jargon without explanation; speaking fast or with your back turned.
 - Interrupting, minimizing feelings, giving false assurances ("everything will be fine").
 - Judging, giving personal advice, or changing the subject.
 - Noise, rush, lack of privacy, and cultural prejudices.
- **Patient defenses**
 - Denial, regression, projection, rationalization, and displacement: recognize them without confronting.

Special Populations and Education

Groups requiring adjustment

- **Elderly**
 - Speak clearly and slowly face-to-face, without shouting; provide written instructions in large print.
 - Allow more time and confirm they are using glasses or hearing aids.
- **Pediatric**
 - Simple and honest words; include the caregiver; never say "it won't hurt".
- **Disability**
 - Deafness: look face-to-face, use paper and pencil or a sign language interpreter.
 - Blindness: announce yourself upon entering, describe each step, and offer your arm.
 - Cognitive: one instruction at a time, repeat calmly.

Culture, teaching, and privacy

- **Cultural Competence**
 - Respect beliefs, diet, modesty, and family roles in health decisions.
 - Use a qualified interpreter, not family members or children; speak to the patient, not the interpreter.
 - Avoid assumptions about physical contact, eye contact, or personal space.
- **Patient Education**
 - Teach in an unhurried environment; combine explanation, demonstration, and printed materials.
 - Confirm with teach-back and document what was taught and who was present.
 - Remember HIPAA: never discuss patient information in public areas or with unauthorized third parties.

Quick review before the exam

20/40

Sees at 20 feet what a normal person sees at 40

30°

Venipuncture angle, bevel up

2-8 °C

Vaccine refrigerator

INR 2.0-3.0

Therapeutic range

Rule of 15

15 g of carbohydrates, re-evaluate in 15 min

45° · 90° · 10-15°

SC / IM / ID injection angles