

Department of Defense Fire Academy

TECHNICAL TRAINING

Fire Protection Apprentice

EMR Preparation Reference Handout

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Fire Protection Apprentice Course

EMR Preparation Reference Handout

**17th Training Wing
Goodfellow Air Force Base, Texas
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FOR THE COMMANDER

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OPR: 312 TRS/TRR

Supersedes:

A Note to the Student from the EMR Section Chief

The career field you are about to enter is not for the faint of heart. You will be subjected to physical, academic, and mental extremes that will push the boundaries of what you think you are capable of. However, the benefits of successful completion of apprentice level training are as rewarding as they are difficult. Your hard work now will directly impact countless lives. You are training hard today to save lives tomorrow.

Instruction at the Louis F. Garland DoD Fire Academy starts with 10 academic days of Emergency Medical Responder (EMR) training. As an EMR student, there are several written and practical evaluations that you must perform to satisfy Block I requirements.

The first objective is to receive CPR certification from The American Red Cross. This CPR course is aimed at healthcare providers and includes some basic life support skills. To obtain this certification, students must attend the entire course, complete the practical evaluations, and pass the final exam. The final exam has 25 questions, and you must score at least an 84% to pass.

Next, you must pass a “State-Level” End of Block written test with a score of at least 76%. This test is administered on the 8th training day.

Finally, on day 10, you will be required to pass the National Registry Emergency Medical Responder (NREMR) certification test. Students who fail to pass the test on their first try will remain in the EMR block to prepare for a retest. Only 3 total attempts are allowed; failure to satisfy NREMR examination requirements will result in course elimination.

While not all-encompassing, this packet is designed to give you an overview of The Fire Academy’s most academically challenging block. Summarized here is important information covered during Block I: EMR. The 10 allocated days are jam-packed with objectives and lectures. You are encouraged to read and commit to memory as many of the numbers and definitions provided now, to ease the load you will be expected to memorize later.


GYSgt MURPHY

EMR Section Chief.

<i>Table of Contents</i>	
Section 1 Cardiopulmonary Resuscitation (CPR)	1
Section 2 EMR Preparatory Information	5
Section 3 Airway	11
Section 4 Patient Assessment	14
Section 5 Medical Emergencies	19
Section 6 Trauma Emergencies	29
Section 7 Special Patient Populations	34
Section 8 EMS Operations	37
Section 9 Supplementary Information	40
<i>Tables</i>	
Table 1: CPR Rates and Depths by Age Group	4
Table 2: Ventilation Rates	4
Table 3: Pulse Points	4
Table 4: Typical Vital Signs Based on Age	10
Table 5: Common Word Roots in EMS	44
Table 6: Prefixes Commonly Used in Medical Terminology	44
Table 7: Suffixes Commonly Used in Medical Terminology	45
Table 8: Word Roots that Describe Color	45
<i>Figures</i>	
Figure 1: Anatomy terms for describing a location on the body	9
Figure 2: Anatomy of the Respiratory System	11
Figure 3: Pocket Face Mask and BMD	13
Figure 4: Nasal Cannula and Nonrebreathing Mask	13
Figure 5: Patient Assessment Sequence	14
Figure 6: Cincinnati Prehospital Stroke Scale	22
Figure 7: Symptoms of Exposure to a Nerve Agent	25
Figure 8: Raccoon eyes and Battle signs	33
Figure 9: Normal Vitals for Pediatric Ages	36
Figure 10: The heart External view and Cross-sectional view	40
Figure 11: Anatomy of the respiratory system.	42

SECTION 1: CARDIOPULMONARY RESUSCITATION (CPR)

OBJECTIVE

Given references and a 1-day CPR course, demonstrate proficiency in recognizing and treating a patient with a life-threatening emergency in accordance with the American Red Cross CPR & Basic Life Support Course.

INTRODUCTION

Cardiopulmonary Resuscitation, more commonly known as “CPR”, is a life-saving skill that any emergency healthcare provider should be able to perform. The first day of the EMR block is dedicated to administering the American Red Cross CPR Course. The course consists of six chapters of information, two graded hands-on evaluations, and one written test.

In addition to teaching how to perform the CPR skill, this course also covers *when* to perform CPR. Also taught are basic skills to assist a patient who is not breathing or suffering from an opioid overdose. While too much detail is outside the scope of this preparation handout, the Information section below will provide some general knowledge, and useful information to commit to memory.

INFORMATION

Chapter 1: Foundational Concepts

Critical thinking: *Critical thinking* refers to thinking clearly and rationally to identify the connection between information and actions.

Problem Solving: *Problem solving* refers to the ability to use readily available resources to find solutions to challenging situations or issues that arise.

Closed-Loop Communication: When assigned a task, the *Receiver* should verbally give *Feedback* to the *Sender*. Example: “You, go call 911.” ... “Okay, I’ll call 911.”

Team Leader Responsibilities: There are several responsibilities. Put simply, the Team Leader is the single person in charge of directing efforts. The first responder on scene will be the Team Leader. (Until someone with more training arrives)

Team Member Responsibilities: Follow-on responders will assume the roles of Team Members. Generally, Team Members will fulfil a specific role, but can point out issues that the Team Leader will then be expected to address.

Chapter 2: Assessment

Assess, Recognize and Care concept: a systematic, continuous approach for rapid assessment and re-assessment, accurate recognition, and immediate care.

Rapid Assessment: the essential first step of the Assess, Recognize and Care concept. The steps are:

- Conduct a quick visual survey of the scene. Is it safe for me to enter?
- Obtain an initial impression of the patient(s)
- Look for life-threatening bleeding.
- Determining the need for additional resources.
- Obtain *consent*.
- Check for responsiveness.
- Look, listen, and feel for breathing and a pulse for less **than 10 seconds**.

After performing the rapid assessment, you need to correct any problems detected.

Assessment ABCs: the A-B-C mnemonic is used to remember:

- (A) open the airway.
- (B) Check for the presence (or absence) of normal breathing,
- (C) Assess for circulation by a pulse check

*Sometimes this is altered to **CAB** when correcting life-threatening bleeding is first.

PPE: Personal protective equipment (PPE) can help prevent the spread of bloodborne pathogens that can cause disease and that may be present in blood and other bodily fluids. Examples of PPE: Latex/nitrile gloves, goggles, N95 mask.

Chapter 3: Basic Life Support for Adults

Respiratory Arrest or Failure in Adults: An adult patient is in *respiratory arrest* if they are not breathing and have a central pulse. They are in *respiratory failure* if they have ineffective ventilation but still have a central pulse.

- An adult patient in *respiratory failure* may have some ventilations; however, this ventilation is insufficient to sustain life for long.

To provide care:

- If you have not already done so, activate EMS (“You, call 911!”)
- Deliver 1 ventilation **every 6 seconds**.
- Continue to check breathing and pulse every 2 minutes; if pulse becomes absent, start CPR!

Myocardial Infarction (MI): Commonly known as a heart attack. MI refers to the necrosis (death) of heart tissues because of a loss of oxygenated blood. A myocardial infarction can lead to cardiac arrest.

Cardiac Arrest: A fancy way of saying the heart is not pumping. An adult patient is in cardiac arrest if they are not breathing (or only gasping), and their central pulse is absent. When the patient's heart stops functioning, you need to do CPR to circulate blood containing oxygen to the vital organs.

High-Quality CPR: high-quality CPR can double or triple a patient's chance of survival. During the *Rapid Assessment* step, the absence of a central pulse (at the carotid or femoral pulse points) means it's time to do CPR! Assess breathing and pulse for **no more than 10 seconds**. Once cardiac arrest is recognized, begin CPR **immediately** and use an AED when it is available.

High-quality CPR for adults includes a ratio of 30 chest compressions, followed by 2 ventilations. Remember the ratio **30:2**.

Automatic External Defibrillator (AED): AEDs are portable electronic devices that automatically analyze the patient's heart rhythm and provide defibrillation, an electrical shock that may help the heart re-establish a perfusing rhythm.

Return of Spontaneous Circulation (ROSC): This is a fancy way of saying that the CPR patient is showing signs of life, such as a return of breathing or a pulse.

Chapter 4: Basic Life Support for Children and Infants

CPR Age Guidelines: Guidelines for age related care are simplified for CPR.

- An **infant** is defined as someone under the age of 1.
- A **child** is defined as someone from the age of 1 to the onset of puberty.
- Follow **adult** guidelines from the onset of puberty through adulthood.

Rapid Assessment: This remains largely the same, with some small variations:

- Consent: For patients younger than 18 years, you must obtain consent from the child's parent/guardian, if they are available.
- Check for responsiveness: for an infant, tap the bottom of the foot.
- Pulse check: For an infant, check the pulse at the *brachial* artery.

Respiratory Arrest or Failure in Children and Infants: Definition of arrest and failure remain the same as before. Some variation is indicated based on pulse rate.

- If their central pulse is > 60 bpm, deliver 1 breath every **2 to 3 seconds**.
- If their central pulse is ≤ 60 bpm with signs of poor perfusion, start CPR.

CPR Variations for Infants/Children: With 1 rescuer, the compressions to ventilations ratio remains 30:2. However, when 2 or more rescuers are available, the ratio changes to 15:2. You will learn alternate hand placements during the course.

Chapter 5: Obstructed Airway

Choking occurs when the airway becomes either partially or completely blocked by a foreign object (food, a small toy, or bodily fluids, such as vomit or blood).

- If partially blocked, simply encourage the patient to cough, and stand by.
- If the patient cannot breathe, perform a series of **5 back blows and 5 abdominal thrusts** until they can cough forcefully, speak, or breathe; or they become unresponsive.
- If the patient becomes unresponsive (or if they are found unresponsive and assessed with obstructed airway), follow these steps:
 - Immediately begin *CPR*, starting with chest compressions.
 - After each set of compressions and before ventilations, open the patient's mouth and look for the object.

Chapter 6: Opioid Overdose

If the patient is experiencing a suspected or known opioid overdose, administer *naloxone* as soon as it is available. Otherwise, provide care as outlined above.

Naloxone: Also known as Narcan®. Naloxone can *temporarily* reverse the effects of an opioid overdose. Doses of naloxone may be repeated **every 2 or 3 minutes as needed**. Do not delay other interventions, while waiting for naloxone to work.

Useful Tables to Memorize:

Table 1: CPR Rates and Depths by Age Group				
Age Group	1-Rescuer Comp/Breath Ratio	2-Rescuers Comp/Breath Ratio	Depth Of Compression	Compression Rate
ADULT	30:2	30:2	At Least 2"	100-120 per minute
CHILD		15:2	About 2"	
INFANT		15:2	About 1 ½"	

Table 2: Ventilation Rates		Table 3: Pulse Points		
AGE	Ventilations per Second	AGE	Responsive	Unresponsive
ADULT	1 Breath every 6 seconds	ADULT	Radial (Wrist)	Carotid/Femoral
CHILD/INFANT	1 Breath every 2-3 seconds	INFANT	Brachial (Arm)	Brachial

SECTION 2: EMR PREPARATORY INFORMATION

OBJECTIVE

Without reference, identify knowledge of emergency medical services (EMS) system, safety and wellbeing of emergency medical responder (EMR), and medical/legal issues, anatomy and function of the human body while awaiting a higher level of care with a minimum of 76% accuracy.

INTRODUCTION

After completing the ARC CPR Course, instruction shifts to the actual EMR Course. The course textbook, *EMERGENCY MEDICAL RESPONDER: Your First Response in Emergency Care* (7th Edition) is broken up into 7 sections, comprising 21 chapters. 450 pages of material will be covered in 7 academic days. On day 8, the State-Level “End of Block” test will be administered. The test contains 50 questions, and a 1-hour time limit. The minimum passing score is 76%. The following information is presented to help prime EMR students with useful information to orient and prepare for instruction. It is highly recommended to commit any acronyms and numerical information to memory.

INFORMATION

EMS Systems

The EMS System: This is the interconnected system of Emergency Medical Services (EMS). Typically initiated by a 911 call, the system includes the dispatcher, the responders, and flows through to transporting to the hospital.

The four levels of EMS providers are:

- EMR – Emergency Medical Responders
- EMT – Emergency Medical Technicians
- AEMT – Advanced Emergency Medical Technicians
- Paramedic

Goals of EMR Training: Basic goals of EMR training aim to teach how to:

- Evaluate, stabilize, and treat patients using a minimum of specialized equipment.
- Improvise.
- Help EMTs, AEMTs and paramedics when they arrive on the scene.

In this course you will learn how to examine patients and how to use basic emergency medical skills. These skills are divided into two main groups:

- Skills needed to treat injured **trauma** patients:
 - Controlling airway, breathing, and circulation
 - Controlling external bleeding (hemorrhage)
 - Treating shock
 - Treating wounds
 - Splinting injuries to stabilize extremities
- Skills needed to care for **medical** patients:
 - Heart attacks
 - Seizures
 - Problems associated with excessive heat or cold
 - Alcohol and drug abuse
 - Poisonings
 - Bites and stings
 - Altered mental status
 - Behavioral or psychological crisis
 - Emergency childbirth

Workplace Safety and Wellness

Standard Precautions: Health care workers assume all patients are potentially infected with pathogens – spread by direct contact, airborne transmission, or blood. Therefore, healthcare workers will wear protective equipment, such as gloves or a mask to prevent exposure to infections.

Personal Protective Equipment (PPE): The equipment EMS Providers use to isolate themselves from infections. PPE may include medical gloves goggles, or disposable gowns. You will wear medical gloves for every hands-on event.

Scene Safety: When arriving on scene, scan entire area carefully to determine what hazards are present and address them in most appropriate order. Generally, any hazard present is outside the scope of training of an EMR. Report your findings to dispatch and request additional resources to mitigate the hazard.

To drill this mindset into EMR students, you will start *every* hands-on event in the block by verbalizing: “BSI, scene safe.”

Lifting and Moving Patients

When to Move a Patient: Delay moving patient, if possible, until additional EMS personnel arrive. Treat patient before moving them unless the patient is in an unsafe environment.

Move a patient immediately in the following situations:

- Danger of fire, explosion, or structural collapse exists.
- Hazardous materials are present.
- Emergency scene cannot be protected.
- It is otherwise impossible to gain access to other patients who need life-saving care. (Example: a second patient in a car.)
- Patient has experienced cardiac arrest.

Medical, Legal, and Ethical Issues

Duty to Act: A legal term that means the EMS provider has an obligation to provide emergency medical care within the limits of their training and available equipment. Duty to Act may or may not apply to an EMR who is off duty, but always applies when employed by an agency and dispatched to a call.

Standard of Care: as a trained EMR, you are expected to use your knowledge and skills to the best of your ability under the circumstances.

To comply with standard of care, you must meet two criteria:

- Treat patient to the best of your ability.
- Provide care that a reasonable, prudent person with similar training would provide under similar circumstances.

Scope of care: the skills you have been taught in this course (or additional skills at your gaining duty station). In addition to the specific skills, you are allowed to use, Scope of Care also outlines *how* to perform said skills.

Consent: means giving approval or permission. In this context, consent is the patient agreeing to be treated. Legally, several types of consent exist.

- **Expressed consent:** the patient actually lets you know—verbally or nonverbally—that he or she is willing to accept treatment.
- **Implied consent:** any patient who does not specifically refuse emergency care can be treated under the principle of implied consent. A common example is an unconscious patient; it is implied that if they were conscience, they would consent to treatment.
- **Minors:** a person who has not yet reached the legal age (usually 18). Under the law, minors are not considered capable of making decisions for themselves. Emergency treatment must wait until a patient or legal guardian consent to treatment. If permission cannot be quickly obtained, do not hesitate to give appropriate medical care.

Communications and Documentation

Medical Terminology: As an EMR, it is important to have some knowledge of medical terminology. Understanding key terms, acronyms, symbols, and abbreviations is important for effective communication and documentation. Understanding medical jargon will enable you to communicate more effectively with other EMS personnel.

Medical terms are made of distinct parts that perform specific functions.

- Word Root: the foundation of the word.
 - Example: Cardio means pertaining to the heart.
- Prefix: what occurs before the root word.
 - Example: Tachy means fast, as in *tachycardia* – a fast heartbeat.
- Suffix: what occurs after the root word.
 - Example: -logy means study of; *cardiology* is the study of the heart.

Refer to the glossary for tables of common roots, prefixes, and suffixes you should attempt to memorize.

The Human Body

Anatomic Position: Standard anatomic position is a person standing and facing you, with arms at sides and thumbs pointing outward. When describing a location on your patient's body, the following terms are the preferred norm. These terms help eliminate ambiguity. (Imagine all the places you might mean if you say, "Under the patient's shoulder.")

- **Anterior:** front surface of body.
- **Posterior:** back surface of body.
- **Midline** refers to an imaginary vertical line drawn from head to toe that separates body into a left half and a right half.
- **Medial:** closer to midline of body
- **Lateral:** away from midline
- **Proximal:** close
- **Distal:** distant
- **Superior:** closer to head
- **Inferior:** closer to feet

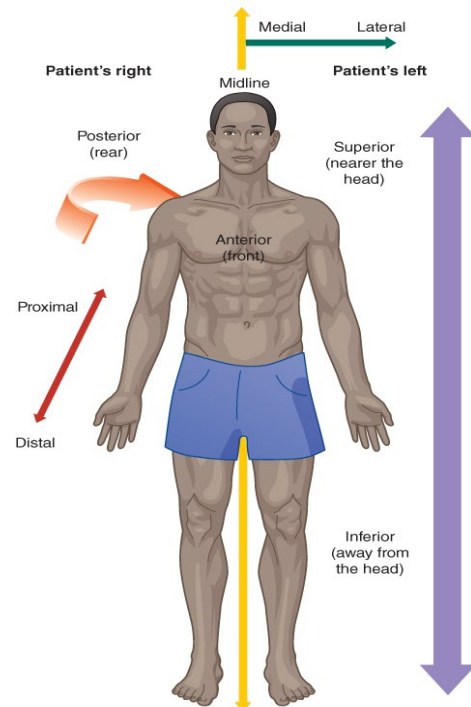


Figure 1: Anatomy terms for describing a location on the body.

Body systems work together to perform common functions. This test will break the body up into eight subsystems.

- Respiratory system: all structures of the body that contribute to breathing.
- Circulatory system: the heart, blood, and blood vessels
- Skeletal system: bones and connective tissues that protect and support framework for body.
- Muscular system: Skeletal muscles (voluntary), Smooth muscles (involuntary), and Cardiac muscle (Heart).
- Nervous system: Brain and spinal cord are *central nervous system* (CNS). Cables of nerve fibers are called *peripheral nervous system* (PNS).
- Digestive system: breaks down food for the body to use.
- Genitourinary system: reproductive functions, kidneys, bladder, and urine.
- Skin: largest organ of the body. *Epidermis* is outer layer of skin. *Dermis*

is deeper, or inner, layer of skin. 3rd layer is the *Subcutaneous*.

Stages of Life: Broken into six ranges, with variations of care and concerns for stages of lifecycle development.

- Newborn: 0 to 1 month
- Infant: 1 month to 1 year
- Toddlers aged 1 to 3 years
- School-aged children 6 to 12 years
- Adolescents 13 to 18 years)
- Early adulthood 20 to 40 years
- Middle adulthood 41 to 60 years
- Late adulthood (61 and older)
- A **geriatric** patient is commonly described as 65 years or older.

Vital Signs: Measuring a patient's vital signs allows you to evaluate a variety of bodily functions. An EMR must be able to measure:

- Pulse (heart rate)
- Respiration rate
- Blood pressure (BP)
- Capillary refill (How fast blood refills capillary blood vessels)
- Skin condition

Table 4: Typical Vital Signs Based on Age			
Age	Pulse Rate (Beats/minute)	Respiration (breaths/minute)	Systolic Blood Pressure
0 – 1 Year	100-180	25-60	50-95
1 – 12 Years	70-150	15-30	80-110
Adults	60-100	12-20	90-140

SECTION 3: AIRWAY

OBJECTIVE

Without reference, identify knowledge to ensure a patent airway, adequate mechanical ventilation, and respiration, recognize shock, respiratory failure or arrest, and cardiac arrest managing the emergency while awaiting additional emergency response with a minimum of 76% accuracy.

INTRODUCTION

Patients must have an open airway and must maintain adequate breathing to survive. This section will cover the life-saving skills associated with airway care and rescue breathing, as well as reviewing cardiopulmonary resuscitation.

INFORMATION

Airway Management

Main purpose of respiratory system is to provide oxygen and to remove carbon dioxide from red blood cells as they pass through the lungs.

As an EMR, you should be familiar with all the structures outlined in Figure 2.

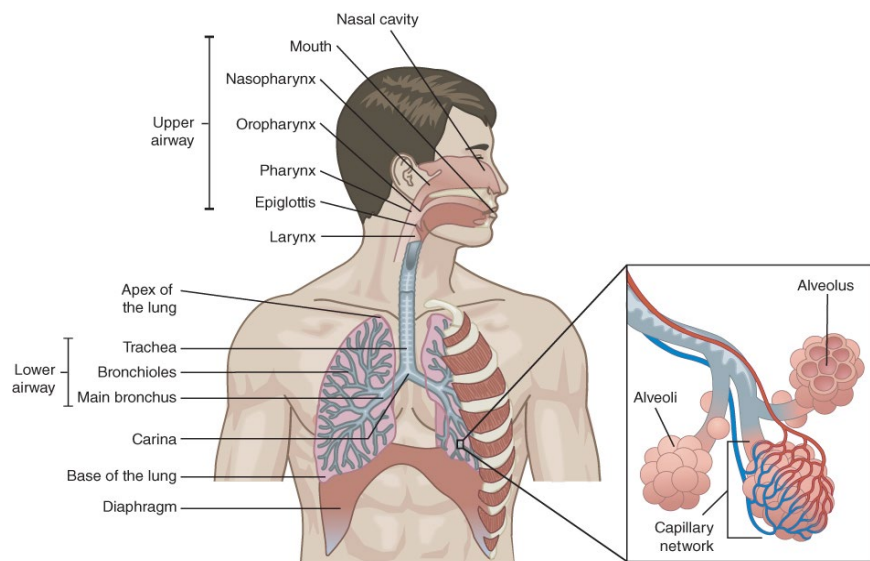


Figure 2: Anatomy of the Respiratory System.

Epiglottis: a thin flapper valve that allows air to enter trachea but helps prevent food or water from entering airway.

Patent Airway: an airway that is open, clear, and free of obstructions.

Head Tilt–Chin Lift Maneuver: An unconscious patient’s airway is often blocked because tongue has dropped back and is obstructing it. Tilting the head back and lifting the chin pulls the tongue up and away, clearing the patient’s airway.

Jaw-thrust maneuver: Similar to the Head tilt-chin lift maneuver, use this variation to open the airway if you suspect a neck injury. This skill will be taught with a hands-on skill drill during the EMR course.

Normal Breath Rate: Normal adults have a resting breathing rate of 12 to 20 breaths per minute. Should be easy and nearly silent.

Signs of Inadequate Breathing: Sounds such as noisy respirations, wheezing, or gurgling indicate a partial blockage or constriction somewhere along the respiratory tract. Rapid or gasping respirations may indicate that the patient is not receiving an adequate amount of oxygen as a result of illness or injury. The patient’s skin may be pale or even blue, especially around the lips or fingernail beds (cyanosis).

Respiratory Arrest: Patient is not breathing.

Characterized by three signs:

- Lack of chest movements.
- Lack of breath sounds.
- Lack of air against side of your face when performing the “look, listen, feel” assessment.

Rescue Breathing: A patient who is breathing *inadequately* or who is in *respiratory arrest* needs you to breathe for them. You will learn how to use either a *pocket face mask* or a *bag-mask device* to administer rescue breaths. You will also learn about other methods.

Rescue breaths will be administered at a rate of one breath every six seconds. Each breath should be delivered over a one-second interval.

Pocket Face Mask: used when performing mouth-to-mask rescue breathing.

Bag-Mask Device (BMD): is a tool designed for two rescuers to perform artificial ventilations. It has three parts: A self-inflating bag, one-way valves, and a face mask.

Supplemental Oxygen: There are many scenarios when administering supplemental oxygen can help your patient. Most notably, oxygen is one of the primary ways to treat for *shock*. Supplemental oxygen can be connected to a pocket face mask or BMD to improve rescue breathing efforts. Supplemental oxygen can also be administered via *nasal cannula* or a *nonrebreathing mask*.

Nasal cannula: Delivers low-flow oxygen at 1 to 6 L/min and in concentration of 24% to 44% oxygen.

Nonrebreathing mask: Consists of connecting tubing, a reservoir bag, one-way valves, and a face piece. Used to deliver a high flow of oxygen at 10 to 15 L/min. Can deliver concentrations of oxygen as high as 90%.

Pulse Oximeter: a device used to measure the amount of oxygen saturated in red blood cells (pulse oximetry). In a healthy patient, oxygen saturation should be between 94% and 100%.

Gastric Distention: occurs when air is forced into stomach instead of lungs.

Professional Rescuer CPR

Professional Rescuer CPR: During the EMR block, you will take a one-day CPR course before transitioning to the EMR course. The textbook contains a bit more information that pertains to CPR performed by a medical professional and will be covered on day 3. However, the bulk of the information remains the same as that taught by the American Red Cross course, and no further detail is needed here.



Figure 3: Pocket Face Mask (above) and BMD (below)



Figure 4: Nasal Cannula (above) and Nonrebreathing Mask (below)

SECTION 4: PATIENT ASSESSMENT

OBJECTIVE

Without reference, identify the scene information and simple patient assessment findings to identify and manage immediate life threats and injuries within the scope of practice of the emergency medical responder (EMR) with a minimum of 76% accuracy.

INTRODUCTION

EMRs are first trained EMS providers at many emergency scenes. While no two calls are ever the same, all medical calls should follow this general systematic sequence: Perform a scene size-up, perform a primary assessment, obtain patient's medical history, perform a secondary assessment, and perform a reassessment.

Scene Size-Up

Scene Size-Up: is a general overview of incident and its surroundings. This phase of the call starts when you receive notification of an emergency and ends when you make contact with the patient.

During this phase, you should accomplish the following:

- Ensure the scene is safe to enter.
- Try to determine **MOI** (Mechanism of injury) or **NOI** (Nature of Illness).
- Select and don appropriate **PPE**.
- Determine the number of patients. (Call for help if needed!)

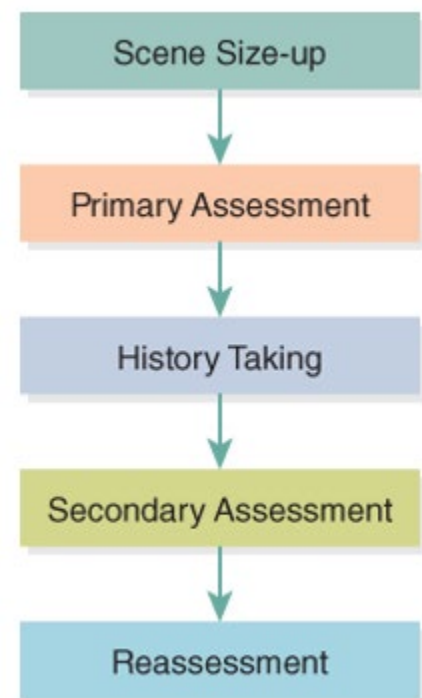


Figure 5: Patient Assessment Sequence.

Primary Assessment

Primary Assessment: is the second step in the patient assessment sequence; in this phase, the goal is to identify life threats, and take swift action to correct them. The primary assessment consists of four steps that should be accomplished rapidly.

Form a general impression: (What appears to be the problem?)

- Note sex and approximate age of patient.
- Look for clues for whether patient has experienced trauma or illness.
- Patient's position may help indicate the nature of problem.
- As you address the patient, you may gain some insight into the patient's level of consciousness.

Assess level of responsiveness (LOC): Is the patient responsive? If so, HOW responsive are they?

- Use the **AVPU** scale to record LOC:
- **Alert:** "Alert and oriented." Aware of *person, place, time, and events*.
- **Verbal:** This patient is responsive to verbal stimuli or sounds.
- **Pain:** A patient who withdraws from painful stimuli is said to be "responsive to painful stimuli."
- **Unresponsive:** Does not respond to either verbal or painful stimuli.

Perform a rapid exam: Identify life threats associated with airway, breathing, and circulation. Commonly referred to as the "**ABC's**".

Check for skin signs: Skin signs can give clues for serious issues that will need to be addressed during the primary assessment.

- **Pale**—white or light in color, indicating *decreased circulation* to that part of body or to all of body.
- **Flushed**—red in color, indicating *excess circulation* to that part of body.
- **Blue**—also called *cyanosis* (cyanotic), indicating *lack of oxygen* and possible airway problems.
- **Yellow**—also called *jaundice*, indicating liver problems.
- **Normal.**

Patient History

Patient History: Gather a systematic account of patient's past and present medical conditions, illnesses, and injuries. You will use the acronym SAMPLE and the mnemonic OPQRST to gather a patient's medical history.

SAMPLE history: provides a framework to ask needed questions of patient.

- **S:** Signs and symptoms – You will use OPQRST to collect this info.
- **A:** Allergies - Ask whether patient is allergic to any medications, foods, or has seasonal allergies.
- **M:** Medications - If patient is taking prescription medications, ask patient purpose of these medicines. Ask if patient is taking OTC supplements or herbal remedies.
- **P:** Pertinent past medical history - Ask patient if he or she has any existing medical conditions, serious illnesses, or serious injuries or she has been hospitalized recently.
- **L:** Last oral intake - Ask when patient last had something to eat or drink.
- **E:** Events leading up to this illness or injury - Ask patient to describe what he or she was doing when symptoms of this event started.

OPQRST: Is a mnemonic used to collect information about *signs* and *symptoms*.

Sign: Something that can be observed or measured when assessing a patient.
Examples: Pulse rate, blood pressure, cyanotic skin discoloration.

Symptom: Something the patient complains of or describes during the secondary assessment. Example: “I feel nauseous”, “My leg hurts”.

- **O:** Onset – What the patient was doing when the pain started.
- **P:** Provocation – Finding out if anything “Provokes” or “Palliates” the pain. That is, does anything makes it better or worse.
- **Q:** Quality – The “quality” of a patient’s pain. Describe *HOW* it feels.
- **R:** Region/Radiates – Where the pain is on the body and whether it radiates (extends) or moves to any other area.
- **S:** Severity – Ask a patient to rate their pain; 0-10. *HOW BAD* is it?
- **T:** Time – How long the pain has been going on. Constant or intermittent.

Secondary Assessment

Secondary Assessment: assess non–life-threatening conditions after you have completed primary patient assessment and stabilized life-threatening conditions. There are two main components of the secondary assessment: the hands-on systematic assessment, and the collection of a full set of vital signs.

Systematic Assessment: Locate and begin initial management of signs and symptoms of illness or injury. You will use the mnemonic DCAP-BTLS to assist in this assessment. The full-body assessment can be done whether patient is conscious or unconscious. An exam of a specific area of body is generally performed on patients who have sustained nonsignificant MOIs or on responsive medical patients.

- **D:** Deformities.
- **C:** Contusions (Bruises).
- **A:** Abrasions.
- **P:** Punctures or Penetrations.
- **B:** Burns.
- **T:** Tenderness.
- **L:** Lacerations.
- **S:** Swelling.

Vital Signs: During the secondary assessment, you will gather a full set of the patient's *vital signs*. A full set of vitals includes: breath rate, pulse rate, capillary refill, blood pressure, skin condition, and pupils. Normal ranges for these values can vary based on patient's age, or if that are particularly healthy/unhealthy.

Breath Rate: Measured as respirations per minute. *Normal* is 12-20 RPM.

Pulse Rate: Measured as beats per minute. *Normal* is 60 to 100 BPM.

Capillary Refill: ability of the circulatory system to return blood to capillary vessels after blood has been squeezed out. It is checked on patient's fingernails or toenails. Squeeze patient's nail bed firmly between your thumb and forefinger until nail bed looks pale. Release pressure and count 2 seconds. Patient's nail bed should return to pink in this time, indicating a normal capillary refill.

Blood Pressure: Measured as a reading of two numbers, representing pressure in arteries as heart contracts and relaxes. Systolic over Diastolic. Normal is 120/80.

Skin Condition: Check for skin color, temperature, and moisture.

Pupils: Determine whether pupils are of equal size and whether both react when light is shone into them. The PERRL acronym is used to recall that:

- Pupils
- Equal and
- Round
- Reactive to
- Light

Pupils that are not PERRL (pronounced: “pearl”) indicate drug use or head injury.

Reassessment

Reassessment: If other trained EMS personnel arrive during the first four phases of the patient care sequence, all you need to do is provide a patient handoff report. However, if you need to continue to care for patient, some parts of the patient assessment need to be repeated:

- Repeat the primary assessment.
- Recheck the patient’s level of responsiveness and ABCs.
- Continue to maintain an open airway and to monitor breathing and pulse for rate and quality.
- Reassess vital signs.
- Reassess chief complaint to see if any changes.
- Recheck effectiveness of *interventions* (treatments) provided.
- If patient’s status changes, determine whether you need to alter your care.

A patient is said to be *unstable* if their condition is likely to get worse without your assistance. If your patient is unstable, repeat the reassessment *every 5 minutes*. Otherwise, reassess a stable patient *every 15 minutes*.

SECTION 5: MEDICAL EMERGENCIES

OBJECTIVE

Without reference, recognize and manage life threat based on assessment findings of a patient with a medical emergency, and acutely injured patient while awaiting additional emergency medical response with a minimum of 76% accuracy.

INTRODUCTION

As alluded to in the Scene Size-Up portion of Section 4: *Patient Assessment*, an EMR should expect to respond to two general categories of calls: medical, or trauma. A patient suffering from an acute medical emergency is said to have a “Nature of Illness” (NOI). This section will cover some of the common medical conditions you may find yourself dispatched to.

Medical Emergencies

Medical Conditions: EMRs can prepare to treat medical patients by studying the signs, symptoms, and treatments of each condition. This handout will detail some common medical conditions, and their signs and symptoms. Treatment steps will be covered during the formal EMR course.

Common medical conditions include:

- Heart Conditions such as:
 - Angina Pectoris
 - Heart Attack.
 - Cardiac Arrest.
 - Congestive heart failure (CHF).
- Dyspnea.
- Stroke.
- Hypoglycemia
- Hyperglycemia (Diabetic Coma).
- Abdominal pain.

Heart Conditions

Heart Conditions: You should be able to recognize Signs and Symptoms for *angina pectoris*, *heart attack*, *cardiac arrest*, and *Congestive heart failure*.

Atherosclerosis: This disease process causes layers of fat to coat the inner walls of arteries and narrow them. Of note, special blood vessels (called coronary arteries) that supply blood to the heart muscle may narrow because of atherosclerosis. The heart receives oxygen from these arteries, narrowing can cause heart conditions.

Angina Pectoris: Chest pain caused by an *inadequate* flow of blood and oxygen to heart muscle.

Signs and Symptoms of Angina Pectoris:

- Angina is often described as pressure or heavy discomfort.
- Angina attacks are usually brought on by exertion, emotion, or eating.
- Crushing pain may be felt in chest and may radiate to either or both arms, the neck, jaw, or any combination of these sites.
- The patient is often short of breath and sweating, is extremely frightened, and has a sense of doom.

Nitroglycerin: a drug that usually relieves angina pain may be prescribed to the patient. If the patient has been prescribed nitroglycerin, assist the patient in taking one pill or administering the aerosol spray.

Myocardial Infarction (MI): More commonly known as a heart attack. MI results when one or more of the coronary arteries are completely blocked, leading to cell death to effected heart muscle “downstream” of the blockage.

Signs and Symptoms:

- Patient suffers immediate and severe pain.
- Pain may radiate from chest to left arm or to jaw or to back.
- Patient is usually short of breath, weak, sweating, and nauseated and may vomit.
- If blocked area is critical or large, heart may stop completely*.

***Cardiac Arrest:** Complete cessation of heartbeat is called *cardiac arrest*. Review page 7: *High-Quality CPR* to recall how to deal with a patient in cardiac arrest.

Congestive Heart Failure (CHF): caused by failure of heart to pump *adequately*. Unlike Angina Pectoris and MI, *CHF* is caused by the failure of the heart to move fluid around the body adequately. The result is congestion within the circulatory System, characterized by a buildup of fluids in effected parts of the body.

If the left portion of the heart (that is responsible for sending blood to the body) is functioning inadequately, but the right side of the heart is still pumping blood to the lungs, the congestion will manifest as fluid buildup in the lung tissue. This patient can be said to be “drowning” in their own body fluids.

Signs and symptoms of Congestive Heart Failure (CHF):

- Shortness of breath (major symptom).
- Rapid, shallow breathing.
- Moist or gurgling respirations.
- Profuse sweating.
- Anxiety.
- Fluid buildup within the body’s circulatory system may present as:
 - *Jugular Vein Distention* (Enlarged neck veins.)
 - *Pedal Edema* (Swollen ankles.)

Dyspnea

Dyspnea: Shortness of breath or difficulty breathing. May be a result of the above heart-related causes (*angina pectoris*, *heart attack*, and *Congestive heart failure*).

Dyspnea may also be caused by Pulmonary (lung) diseases: such as *chronic obstructive pulmonary disease* (COPD), *emphysema*, *chronic bronchitis*, *pneumonia*, and *asthma*.

Chronic Obstructive Pulmonary Disease (COPD): refers to a group of diseases that cause airflow blockage and breathing-related problems. The most common COPD conditions are *emphysema* and *chronic bronchitis*.

Emphysema: develops over time and involves the gradual damage of lung tissue, specifically the destruction of the alveoli (tiny air sacs).

Chronic Bronchitis: long-term inflammation of the bronchi. Caused by an inflammation of the bronchi (airways) in the lungs.

Pneumonia: an infection that affects one or both lungs. It causes the air sacs, or alveoli, of the lungs to fill up with fluid or pus.

Asthma: an acute spasm of air passage associated with excess mucus production and swelling of lining of respiratory passage.

Other Medical Emergencies

Stroke: most strokes are caused by a blood clot that blocks blood supply to a part of brain.

Signs and Symptoms of Stroke:

- Headache.
- Numbness or paralysis on one side of body.
- Dizziness/Confusion.
- Drooling.
- Inability to speak.
- Difficulty seeing.
- Unequal pupil size.
- Unconsciousness.
- Seizures.
- Respiratory arrest.
- Incontinence.
- Unresponsiveness.

The Cincinnati Prehospital Stroke Scale is a tool you can use to tell if there is a high probability that a patient has experienced a stroke. This scale requires you to quickly assess three things: facial droop, arm drift, and abnormal speech.	
Facial droop Normal Abnormal	Have patient show teeth or smile. Both sides of the face move equally. One side of the face does not move as well as the other side.
Arm drift Normal Abnormal	Patient closes eyes and holds both arms straight out for 10 seconds. Both arms move the same or both arms do not move. One arm does not move or one arm drifts down compared with the other.
Abnormal speech Normal Abnormal	Have patient say, "You can't teach an old dog new tricks." Patient uses correct words with no slurring. Patient slurs words, uses the wrong words, or is unable to speak.

Note: If any of these three signs is abnormal, the probability of a stroke is 72%.
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Figure 6: Cincinnati Prehospital Stroke Scale

Diabetes: body's inability to process and use glucose (sugar). A healthy body produces insulin, which enables glucose to move into individual cells. However, if the body does not produce enough insulin, cells become "starved" for glucose and diabetes results.

Hypoglycemia: occurs if body has enough insulin but not enough blood glucose. To help remember, break down the word into its prefix and root. *Hypo* means “not enough of...” and *glycemia* is referring to the level of glucose in the blood. Thus, *hypoglycemia* = [not enough of] + [blood sugar]. or low blood sugar.

Signs and symptoms of Hypoglycemia:

- Pale, moist, cool skin.
- Rapid, weak pulse.
- Dizziness or headache.
- Confusion or unconsciousness. (May appear to be drunk.)
- Sweating.
- Hunger.
- Rapid onset of symptoms (within minutes).

Hyperglycemia (Diabetic Coma): Occurs when body has too much blood glucose and not enough insulin. *Hyperglycemia* = [too much of] + [blood sugar] or, high blood sugar.

Signs and symptoms of Diabetic Coma (Hyperglycemia):

- History of diabetes.
- Warm, dry skin.
- Rapid pulse.
- Deep, rapid breathing.
- Fruity odor on patient’s breath.
- Weakness, nausea, and vomiting.
- Increased hunger, thirst, and urination.
- Slow onset of symptoms (days).

Seizures: Caused by sudden episodes of uncontrolled electrical impulses in brain.

- Generalized seizures: shaking movements involving the entire body. They usually last 1 to 2 minutes, although may continue for longer.
- Absence seizures: Some seizures result in only a brief lapse of consciousness. These seizures are called *absence seizures*.
- Febrile seizures: One cause of generalized seizures is a sudden high fever. These seizures are called *febrile seizures*.

Poisoning and Substance Abuse

Ingestion: Poison enters through mouth and is absorbed by digestive system.

Signs and symptoms of ingested poison:

- Unusual breath odors.
- Nausea and vomiting.
- Abdominal pain.
- Diarrhea.
- Discoloration or burning around mouth.

Inhalation: Poison enters through mouth or nose and is absorbed by mucous membranes lining respiratory system.

Signs and symptoms of inhaled poisons:

- Respiratory distress.
- Dizziness.
- Cough.
- Headache.
- Hoarseness.
- Confusion.
- Chest pain.

Injection: Poison enters through a small opening in skin and spreads through circulatory system.

Signs and symptoms of injected poisons (from bites and stings) include following:

- Obvious injury site (bite or sting marks).
- Tenderness.
- Swelling.
- Red streaks radiating from injection site.
- Weakness.
- Dizziness.
- Localized pain.
- Itching.

Absorption: Poison enters through intact skin and spreads through circulatory system.

Signs and symptoms of absorbed poisons:

- Traces of powder or liquid on skin.
- Inflammation or redness of skin.
- Chemical burns.
- Rash.
- Burning.
- Itching.
- Nausea and vomiting.
- Dizziness.
- Shock.

Nerve Agents: Nerve agents can be absorbed through skin, inhaled, or injected. Most common nerve agents: Sarin (GB) Soman (GD) Tabun (GA) V agent (VX).

Nerve agents block an essential enzyme in nervous system and cause these SLUDGEM-like symptoms.

S	Salivation, sweating
L	Lacrimation (excessive tearing of the eyes)
U	Urination
D	Defecation, drooling, diarrhea
G	Gastrointestinal upset and cramps
E	Emesis (vomiting)
M	Muscle twitching, miosis (pinpoint pupils)

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Figure 7: Symptoms of Exposure to a Nerve Agent

Drugs: may be ingested, inhaled, injected, or absorbed into body. Drug abuse may lead to a medical emergency.

Amphetamines: stimulate the central nervous system (CNS). They include speed, ice, crystal, cocaine (coke, crack, rock), synthetic stimulant-type drugs such as bath salts.

Signs of amphetamine use include:

- Restlessness.
- Irritability.
- Talkativeness.

Pain relievers (opioids) and heroin: An opioid is a type of medication used to relieve pain. They include Hydrocodone (Vicodin), Oxycodone (OxyContin), Morphine, Codeine. Heroin is made from morphine and is powerful and addictive.

Signs and symptoms of opioid drug overdose:

- Slow, difficult, shallow breathing, or no breathing.
- Small or pinpoint pupils.
- Weak pulse.
- Low blood pressure.
- Blue nails and lips.
- Drowsiness and disorientation.
- Delirium.
- Coma.

Hallucinogens: chemicals that cause people to see things that are not there. Hallucinogens include PCP*, LSD, peyote, mescaline, and some mushrooms. *PCP users may feel no pain and may seriously injure themselves or others.

Signs and symptoms of PCP overdose:

- Convulsions.
- Coma.
- Heart and lung failure.
- Stroke.

Behavioral Emergencies

Behavioral emergencies: situations in which persons exhibit abnormal, unacceptable behavior that cannot be tolerated by patients themselves or by family, friends, or community.

Five main factors contribute to behavioral changes are:

- Medical conditions.
- Physical trauma.
- Psychiatric illnesses.
- Mind-altering substances.
- Situational stresses.

Environmental Emergencies

Environmental Emergencies: include exposure to excess heat, excess cold or Unintentional exposure to water.

Hyperthermia: when a person is exposed to excess heat, the body's mechanisms for regulating temperature can be overwhelmed, resulting in *heat cramps*, *heat exhaustion*, or *heatstroke*.

Heat Cramps: painful involuntary spasms of muscles. They often occur after exercise, especially in hot weather. They occur most often in leg or calf muscles.

Heat Exhaustion: occurs when a person is exposed to temperatures greater than 80°F usually in combination with high humidity. (Welcome to San Angelo. Please remember to hydrate!) Heat exhaustion can also occur as result of vigorous exercise at lower temperatures.

Signs and symptoms of heat exhaustion:

- Profuse sweating.
- Lightheadedness.
- Dizziness.
- Nausea.
- Weak pulse.
- Low blood pressure.

Heatstroke: occurs when body is subjected to more heat than it can tolerate and normal mechanisms for getting rid of excess heat, such as sweating, are *overwhelmed*. Patient's body temperature rises until it reaches a level at which brain damage occurs. Without prompt and proper treatment, a patient with heatstroke will die.

Signs and symptoms of heatstroke:

- Flushed, dry skin that feels hot to touch.
- Altered mental status: verbal to unresponsive.
- Internal temperatures as high as 104°F.

Hypothermia: occurs when a person's body temperature falls to a subnormal range of below about 95°F

Signs and symptoms of hypothermia:

- Feeling cold.
- Shivering.
- Decreasing level of consciousness.
- Sleepiness.
- Lack of coordination.
- Mental confusion.
- Slowed reactions.
- As body temp goes below 90°F (32°C), patient will lose consciousness.
- Weak and very slow pulse.

Localized Cold Injury (Frostbite): Can result when exposed parts of body are exposed to a cold environment. Broken down into 2 categories: *Superficial frostbite* and *deep frostbite*.

Superficial frostbite (frostnip): An affected body part becomes numb and then turns a bright red color. Eventually the area loses its color and changes to pale white. There may be a loss of feeling and sensation in injured area.

Deep frostbite: Patient's skin will be white and waxy. The skin may be firm or frozen. Swelling and blisters may be present. If skin has thawed, it may appear flushed with areas of purple and white or may be mottled and cyanotic.

Submersion injuries: result from being beneath surface of water or another liquid.

Signs and symptoms of submersion injury:

- Coughing.
- Vomiting.
- Difficulty breathing.
- Respiratory arrest.
- Cardiac arrest.
- Broken bones or spinal injuries.
- Hypothermia (when wet or low air temps).

SECTION 6: TRAUMA EMERGENCIES

OBJECTIVE

Without reference, identify the principles of recognizing shock, respiratory failure or arrest, cardiac arrest, managing life threats for acutely injured patients while awaiting additional emergency medical response with a minimum of 76% accuracy.

INTRODUCTION

Section 5: *Medical Emergencies* introduced you to the first of the two general categories of calls. This section will cover the other category: Traumatic Emergencies. These emergencies are classified as being the result of some kind of “Mechanism of Injury” (MOI). As an EMR, you may need to assist with relatively minor scrapes and bruises, or you may need to take immediate life-saving steps to save a severely injured patient. This section will outline some useful information about trauma emergencies.

Shock

Shock (hypoperfusion): is defined as failure of the circulatory system. Simplified to its core elements, the circulatory system has three main components: the *pump* (heart), the *pipes* (blood vessels), and *fluid* (blood). These elements working together (among other things) have the vital function of delivering oxygen to all the cells in the body. More trauma patients die from shock than from any other condition.

When the circulatory system is working properly, it provides adequate *perfusion* of oxygen and nutrients to the body’s cells. When one or more of those components are disrupted, perfusion can become inadequate. Inadequate perfusion is called *hypoperfusion*. The body will work hard to maintain adequate perfusion, but these attempts will fail over time. How quickly they fail varies depending on the type and severity of the underlying cause of hypoperfusion (shock).

Signs and Symptoms of shock:

- Confusion, agitation, restlessness, or anxiety. *
- Cold, clammy, sweaty, pale skin.
- Rapid shallow breathing.
- Rapid, weak pulse.
- Increased capillary refill time.
- Nausea and vomiting.
- Weakness or fainting.
- Thirst.

*Changes in mental status may be first signs of shock, so monitoring overall mental status of a patient can help you detect shock.

Causes of Shock: three main causes are *pump failure*, *pipe failure*, and *fluid loss*.

Pump Failure (Cardiogenic shock): Cardiogenic shock occurs if heart cannot pump enough blood to supply needs of body. Pump failure can result if the heart has been weakened by a heart attack. Inadequate pumping of heart can cause blood to back up in vessels of lungs, resulting in congestive heart failure (CHF). *See Heart Failure above for more details.*

Pipe Failure: Pipe failure is caused by expansion (dilation) of capillaries to as much as three or four times their normal size. This causes blood to pool in capillaries, instead of circulating throughout system. When blood pools in capillaries, the rest of body is deprived of blood.

Four types of shock are caused by pipe failure.

- Psychogenic shock: Shock induced by major psychological or emotional stress. As the nervous system reacts, capillaries suddenly expand to three or four times their normal size. Fainting is body's response the major psychological or emotional stress. The fainting corrects itself once patient is placed in a horizontal position.
- Anaphylactic shock: Shock caused by an extreme allergic reaction to a foreign substance. Patient appears flushed, breathing may become difficult, and BP drops rapidly.

- Septic shock: Leaky and porous blood vessels dilate due to an overwhelming infection throughout body. Life-threatening emergency which often occurs in older adults.
- Spinal (Neurogenic) shock: May occur in patients who have sustained a spinal cord injury. Injury allows capillaries to expand, and blood pools below level of injury. Vital organs are deprived of blood, resulting in shock.

Fluid Loss: caused by excessive bleeding (hemorrhage) is the most common cause of shock. External bleeding is not difficult to detect because you can see blood escaping from circulatory system. Internal bleeding cannot be seen, but you may see these signs: bruising, swelling, rigidity, or severe pain in immediate area.

Loss of 2 or more pints (about one liter) of blood can produce shock.

External bleeding may be classified as *capillary*, *venous*, or *arterial*. Arterial bleeding is the most life-threatening.

Wounds

Wound: an injury caused by any physical means that leads to damage of a body part. Wounds are classified as open or closed.

Closed Wounds: Injuries to the soft tissue beneath the skin, but the skin remains intact. One example of a closed wound is a *contusion* (bruise). Bruising and swelling may be a sign of an underlying fracture.

Open Wounds: An open wound results in a break in skin, and can be classified as one these wound types:

- Abrasion: such as a scrape, road rash, or rug burn.
- Puncture: occurs when a sharp object penetrates skin.
- Laceration: commonly called a cut. Most common type of open wound.
- Avulsion: a piece of skin torn completely loose or left hanging as a flap.
- Amputation: If an entire body part is torn away, wound is called a traumatic amputation.

Burns

Superficial burns (first-degree burns): Characterized by reddened and painful skin. Injury is outermost layers of skin. Patient has minor to moderate pain.

Partial-thickness burns (second-degree burns): Blistering is present. Patient has moderate to severe pain.

Full-thickness burns (third-degree burns): Damage to all layers of skin. Pain is absent because nerve endings have been destroyed. Patients lose large quantities of body fluids and are susceptible to shock and infection.

Rule of nines: a method for estimating what percentage of body has been burned. In an adult, head and arms each equal 9% of total body surface. Front and back of trunk and each leg are equal to 18% of total body surface. Groin is remaining 1%.

Type of Burns: In addition to burn depth (1st/2nd/3rd degree), extent of burns (a percentage, estimated by the rule of nines), burns can be classified by their type:

- Thermal burns: Caused by heat.
- Respiratory burns: Consists of burns to any part of airway.
- Chemical burns: From chemicals, such as strong acids or drain cleaners.
- Electrical burns: causes major internal damage, rather than external.

Injuries to Muscles and Bones

EMRs will encounter many types of musculoskeletal injuries. Including: *fractures, dislocations, sprains, strains, head injuries, spinal cord injuries* and *chest injuries*. You must understand the basic anatomy and functioning of the musculoskeletal system and be able to recognize signs and symptoms of musculoskeletal injuries.

Fracture: a broken bone. Can be open or closed if the skin was broken/unbroken.

Dislocation: a disruption that tears supporting ligaments of joint.

Sprain: a joint injury caused by excessive stretching of supporting ligaments.

Strain: caused by stretching or tearing of a muscle.

Signs and symptoms of extremity (arm or leg) injuries:

- Pain at injury site.
- An open wound.
- Swelling and discoloration.
- Patient's inability or unwillingness to move extremity.
- Deformity or angulation.
- Tenderness at injury site.

Signs and symptoms of head injuries:

- Confusion.
- Unusual behavior.
- Unconsciousness.
- Nausea or vomiting.
- Blood from an ear.
- Decreasing consciousness.
- Unequal pupils.
- Paralysis.
- Seizures.
- External head trauma: (bleeding, bumps, bruises).
- A serious head injury may produce raccoon eyes and Battle signs (Figure 5).
 - Raccoon eyes look like black eyes that develop after a fistfight.
 - Battle sign appears as a bruise behind one or both ears.



Figure 8: A: Raccoon eyes.
B: Battle signs

Spinal injuries can cause irreversible paralysis or death. Suspect a spinal injury if patient has sustained high-energy trauma and take appropriate precautions.

Signs and symptoms of spinal cord injury:

- Laceration, bruise, or other sign of injury to head, neck, or spine.
- Tenderness over any point on spine or neck.
- Pain in neck or spine or pain radiating to an extremity.
- Extremity weakness, numbness, paralysis, or loss of movement.
- Loss of sensation or movement, or tingling/ burning sensation in any part of body below neck.
- Loss of bowel or bladder control.

SECTION 7: SPECIAL PATIENT POPULATIONS

OBJECTIVE

Without reference, recognize and manage life threats based on simple assessment findings for patients with special needs while awaiting additional emergency response with a minimum of 76% accuracy.

INTRODUCTION

This section will look at some of the key concepts to understand when assisting especially young or old patients. Much of the steps to take and knowledge to know remains the same, but there are some special considerations for pediatric and geriatric patients. This section also covers childbirth. An EMR can assist the mother with a normal delivery. Normal childbirth is *not* treated as an emergency. However, an EMR should know what possible complications may arise that would then escalate the birth to an emergency requiring a higher level of care.

Childbirth

Stages of Labor: There are 3 stages of labor. They begin with the onset of regular contractions and end with the delivery of the afterbirth (placenta).

- First stage: pregnant woman's body prepares for birth.
 - Initial contractions occur.
 - Bag of waters (amniotic sac) breaks.
 - Bloody show (mucous plug) occurs.
 - Newborn's head does not appear during contractions.
 - There may still be time to transport (*see contractions below*).
- Second stage: birth of newborn.
 - You will see newborn's head crowning during contractions, at which time you must prepare to assist woman with delivery.
 - There is no time for transport.
- Third stage: delivery of placenta.

Contractions: measured from the start of one contraction to the start of the next, contraction cycles are a good tool to help estimate the time until birth is imminent.

- When 5 or more minutes apart, there is probably time to transport.
- When 2 minutes apart, birth is imminent.
- When between 3-4 minutes apart, you'll need to take other factors explained in the full EMR textbook into account to help estimate.

Complications of Pregnancy and Childbirth: While normal pregnancy and delivery is not an emergency, there are several possible complications that an EMR should be able to recognize and provide care for. They include: *ectopic pregnancy, miscarriage, premature birth, prolapse of umbilical cord, breech birth, stillborn delivery, multiple births, and excessive bleeding after delivery.*

Ectopic Pregnancy: occurs when a fertilized egg becomes implanted in fallopian tube rather than in uterus. As embryo starts to grow, it expands and causes fallopian tube to rupture, leading to acute abdominal pain, internal bleeding, and shock.

Miscarriage (spontaneous abortion): delivery of an incomplete or underdeveloped fetus. A fetus before 20 weeks of pregnancy cannot survive outside the womb. Vaginal bleeding is often first sign of a miscarriage.

Premature Birth: Any newborn weighing less than 5 pounds (2 kg) or delivered before 36 weeks is premature.

Prolapse Of Umbilical Cord: On rare occasions, umbilical cord appears from vagina before fetus is delivered. This is a serious emergency requiring immediate transport.

Breech birth: Newborn's buttocks come down birth canal first, rather than head. In very rare cases, arm or leg is first part of newborn to appear in birth canal. Limb presentation is an extreme emergency that cannot be handled in field.

Stillborn delivery: a lifeless fetus that dies in uterus before labor begins.

Pediatric Emergencies

Pediatric Emergencies: Sudden illness and medical emergencies are common in children and infants. A child's airway is smaller in relation to rest of body compared to an adult's airway. It is more easily blocked by secretions or swelling.

Vital signs: In addition to anatomical differences outlined above, you must be familiar with the normal vital sign ranges for different age groups. You should absolutely memorize the normal vitals for adult patients and have a good understanding of how these vital signs change for different age groups. Notice that as the patient age is lower, the rates are higher; rising to the normal adult range of 60-100 beats/min and 12-20 breaths/min that is expected in an adult.

Age	Heart Rate (beats/min)	Respirations (breaths/min)
Newborn (0 to 1 month)	90–180	30–60
Infant (1 month to 1 year)	100–160	25–50
Toddler (1 to 3 years)	90–150	20–30
Preschool age (3 to 6 years)	80–140	20–25
School age (6 to 12 years)	70–120	15–20
Adolescent (12 to 18 years)	60–100	12–20

Figure 9: Normal Vitals for Pediatric Ages

Croup: an infection of upper airway that occurs mainly in children between 6 months and 6 years of age. A lack of fright and willingness to lie down are important signs that distinguish croup from *epiglottitis*.

Epiglottitis: a severe inflammation of the epiglottis, small flap that covers trachea during swallowing. Usually occurs in children between ages 3 and 6 years.

Signs and symptoms of epiglottitis:

- Child is usually sitting upright.
- Child cannot swallow.
- Child is not coughing.
- Child is drooling.
- Child is anxious and frightened.
- Child's chin is thrust forward.

Geriatric Emergencies

Geriatric Emergencies: A geriatric patient is a patient who is older than 65 years. There are many small nuances that an EMR should be prepared to adjust their care to when treating an elder patient. These differences are best covered during formal lecture, and do not fit well within the scope of this preparatory handout.

SECTION 8: EMS OPERATIONS

OBJECTIVE

Without reference, identify the principal knowledge of operational roles and responsibilities to ensure safe patient, public, and personnel safety with a minimum of 76% accuracy.

INTRODUCTION

This final unit serves as a bit of a catch-all for information that is important for an EMR to know but doesn't quite fit into the more medical skills categories in sections 1-8. This section will cover information relating to transport operations, vehicle rescue, special rescue, and how to manage large scale emergencies.

Vehicle Extrication and Special Rescue

As a general rule, the role of an EMR does not include training on vehicle or special rescue. If, after completing Block 1: EMR you then move on to blocks 2 and 3 to learn about the fundamentals of firefighting and fire suppression, you will additionally learn some basic skills on how to perform certain types of rescues. Later in your career, you may receive specialized training on special rescue situations.

Until then, the expectations of an EMR on a rescue scene are simple. Obtain safe access to patients and ensure the patient is stable.

Water and Ice Rescue

Person in water may be fatigued, may have sustained a diving injury, or may have fallen through ice in winter.

Jumping into water to save someone can endanger your own life.

In a water rescue situation, remember these steps:

- Reach:
 - Use any readily available object such as a branch, pole, oar, or paddle.
- Throw:
 - Throw a life buoy or flotation device if one is available.
- Row:
 - Row out to drowning person if a small boat or canoe is available.
 - Consider this option only if you know how to operate or propel craft properly.
- Go:
 - As a last resort, you may have to go into water to save person.
 - Enter water only if you are a capable swimmer trained in lifesaving techniques.

Ice rescue is extremely hazardous because no ice is truly safe. Do not exceed limits of your training and do not put yourself at undue risk. Basic rules of ice rescue are same as water rescue: reach–throw–row–go.

Incident Management

Incident Management: It is important for you to understand the purpose of an incident management system. The DoD uses the *National Incident Management System* (NIMS).

National Incident Management System (NIMS): designed to effectively and efficiently handle immediate response, mitigation, and long-term recovery of small and massive natural and man-made incidents.

NIMS was developed by US Department of Homeland Security to provide a consistent and unified approach to handling emergency incidents.

Hazardous Materials Incidents: During a hazardous materials incident, your top priority is to protect yourself and bystanders from exposure and contamination. The *Emergency Response Guidebook* (ERG) is a useful tool to recognize a hazardous material, and update or request additional resources.



Mass-Casualty Incidents (MCI): situations involving more than one sick or injured individual. Examples: Multiple vehicle collision, bus crash, train wreck, major fire, building explosion, CO leak, etc.

These incidents require a very different method of operation from other emergency medical calls.

Your goals should be to provide greatest medical benefit for greatest number of people, and match patients' medical needs with appropriate treatment and transportation.

Triage: sorting of patients into groups according to their need for treatment.

Simple Triage and Rapid Treatment (START) triage system. START triage system is designed to help rescuers find most seriously injured patients. START lets EMRs triage each patient in 60 seconds or less, based on following three primary observations: Breathing, Circulation, and Mental Status.

Triage tagging:

- Priority One (red tag): immediate care; injuries are life threatening.
- Priority Two (yellow tag): urgent care; can delay up to 1 hour.
- Priority Three (green tag): delayed care; can delay up to 3 hours.
- Priority Four (gray or black tag): patient is dead; no care is required.

SECTION 9: SUPPLEMENTARY INFORMATION

Circulatory System details

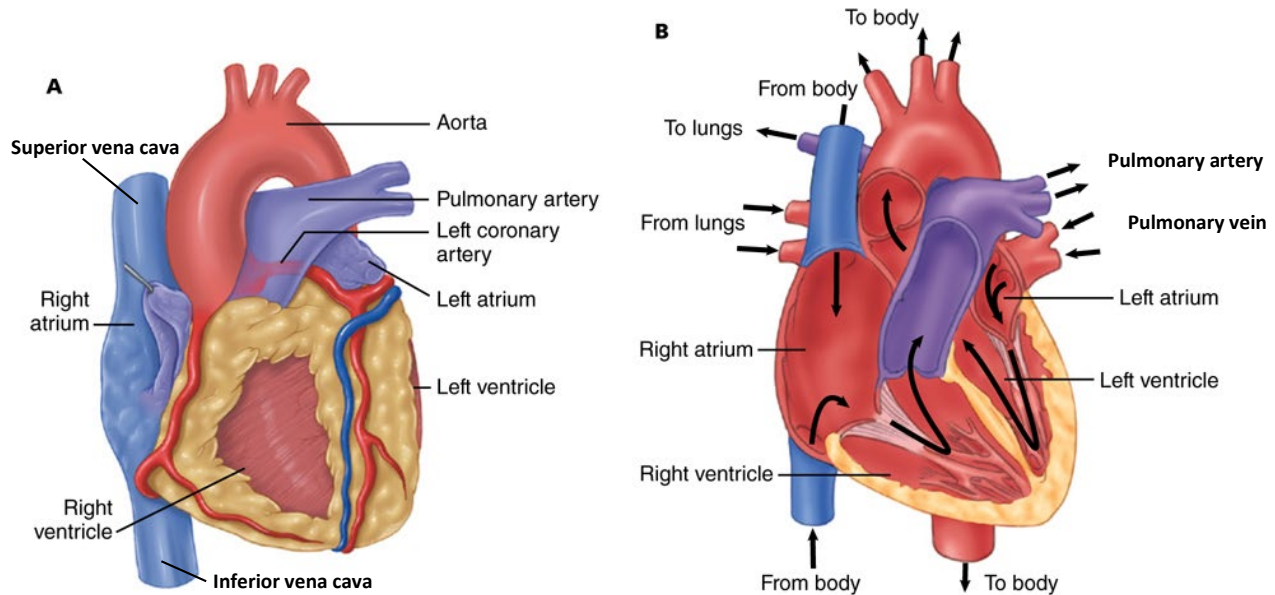


Figure 10: The heart functions as the pump of the human circulatory system. A. External view. B. Cross-sectional view

Heart: The pump of the circulatory system. Its major structures are depicted in figure 10. Note that “Left” and “Right” are labeled from the patient’s perspective, and thus appear mirrored left to right in most illustrations.

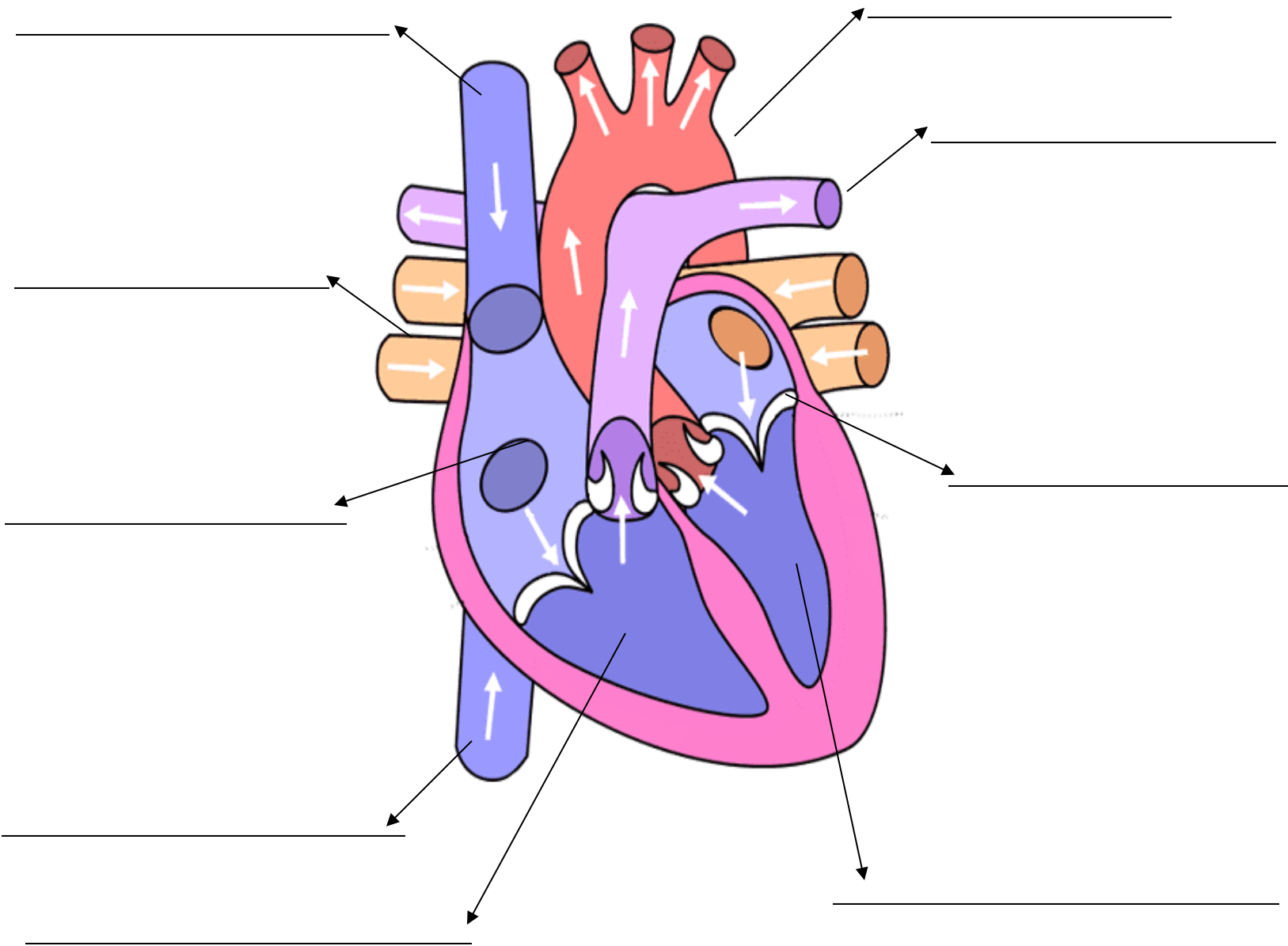
Arteries: Carry blood away from the heart. *Most* arteries carry oxygen rich blood. However, the *Pulmonary Artery* carries deoxygenated blood away from the right ventricle of the heart to the lungs, where the reoxygenation step of the cycle happens.

Veins: Carry blood back to the heart from the body. Most veins carry deoxygenated blood. The *Pulmonary Vein* carries oxygen rich blood from the lungs to the heart.

Types of Bleeding

- **Arterial Bleeding:** Bright red Spurting with each beat of the heart (most life-threatening)
- **Venous Bleeding:** Steady flow of dark red blood
- **Capillary Bleeding:** Slow oozing of bright red blood (most common).

Self assessment. Can you label all these parts of the heart?



Word Bank:

Pulmonary Vein
Aorta
Left Ventricle
Right Atrium
Inferior Vena Cava

Left Atrium
Superior Vena Cava
Pulmonary Artery
Right Ventricle

Respiratory System Details

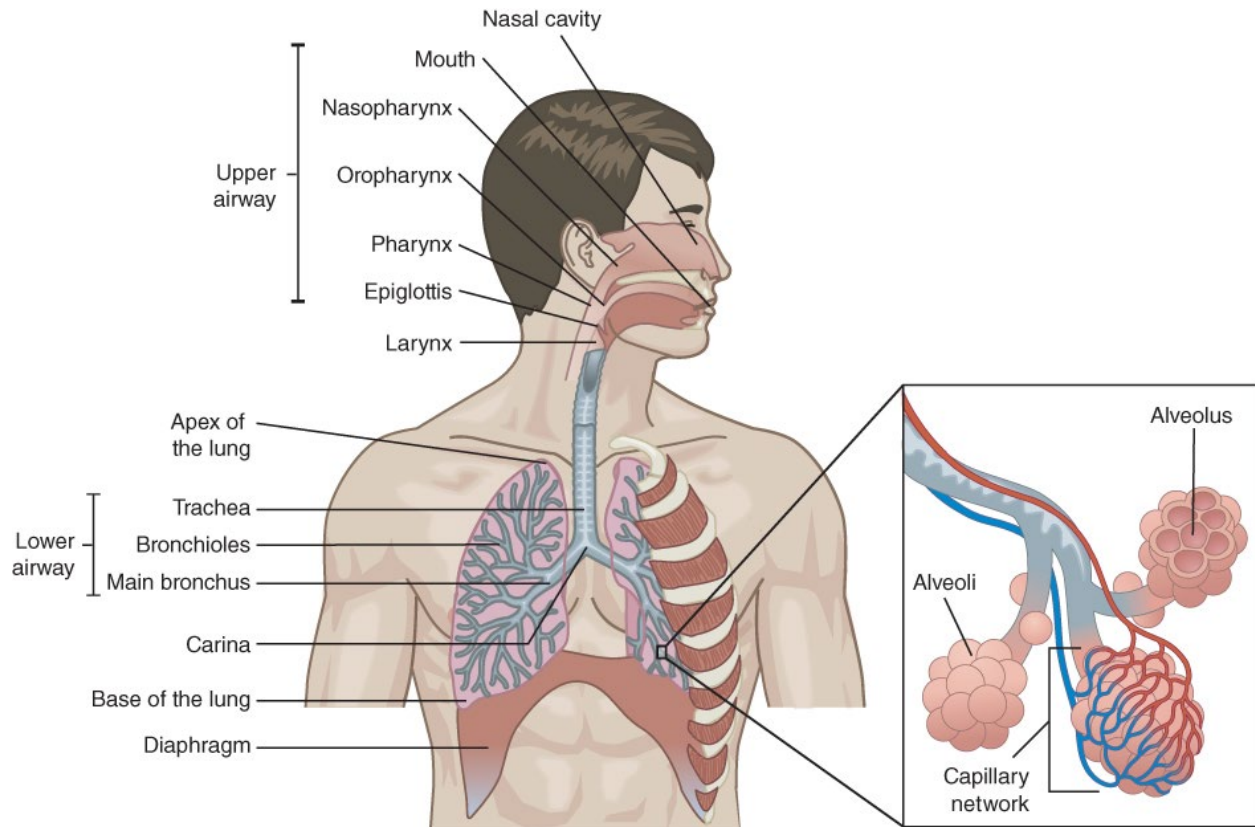


Figure 11: Anatomy of the respiratory system.

Respiratory System: Main purpose of respiratory system is to provide oxygen and to remove carbon dioxide from red blood cells as they pass through the lungs.

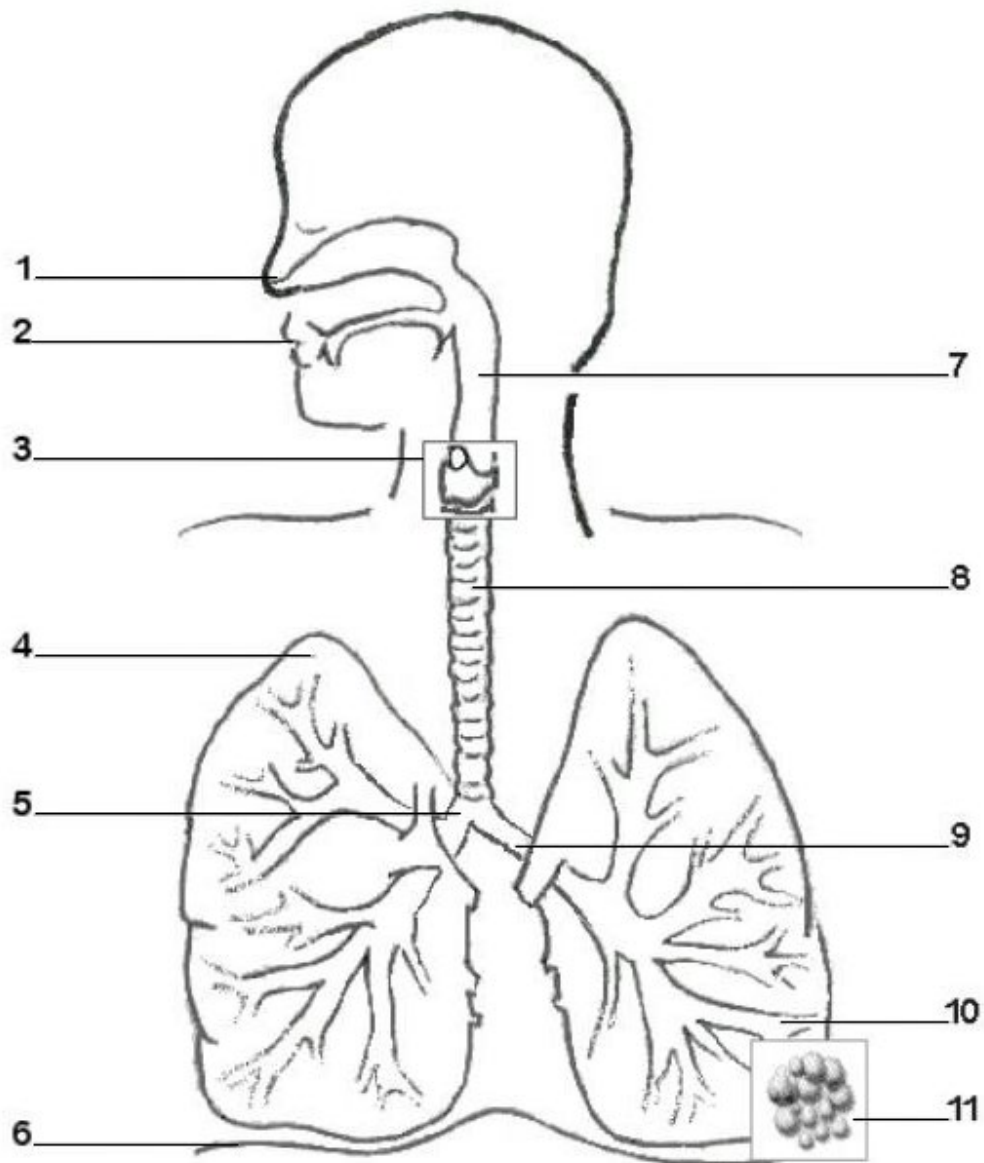
Lack of oxygen, even for a few minutes, can result in irreversible damage and death. If brain cells are deprived of oxygen and nutrients for 4 to 6 minutes, they begin to die.

Pharynx: The throat. A muscular tube in the middle of the neck. It helps breathe and digest food.

Nasopharynx: The posterior (back) of the nose. It is the upper part of the pharynx, connecting with the nasal cavity above the soft palate.

Oropharynx: The posterior (back) of the mouth. It is the part of the pharynx between the soft palate and the upper edge of the epiglottis.

Self assessment. Can you label all these parts of the respiratory system?



Word Bank:

Larynx	Left Bronchus
Trachea	Nose
Lung	Diaphragm
Mouth	Right Bronchus
Alveoli	Pharynx
Bronchiole	

Medical prefix/root/suffixes

Medical terms: made of distinct parts that perform specific functions.

- Word Root: the foundation of the word.
- Prefix: what occurs before the root word.
- Suffix: what occurs after the root word.
- Combining vowels: join one or more word roots to other components of a term.

Table 5: Common Word Roots in EMS			
Root	Meaning	Example	Definition of example
Cardi	Heart	Tachycardia	Fast Heart rate
Hepat	Liver	Hepatomegaly	Enlargement of the liver
Nephr	Kidney	Nephropathy	Disease of the kidney
Neur	Nerves	Neurologist	Nerves system doctor
Psych	Mind	Phycology	Study of the mind
Thorac	Chest	Thoracic	Pertaining to the chest or thorax

Table 6: Prefixes Commonly Used in Medical Terminology			
Prefix	Meaning	Example	Definition of example
Brady-	Slow	Bradypnea	Slow breathing
Tachy-	Rapid or swift	Tachycardia	Fast Heart rate
Therm-	In relation to quantities of heat	Thermometer	Used to measure temperature
Hyper-	Above, excessive, or beyond	Hyperventilation	Fast ventilations
Hypo-	Below, underneath, or deficient	Hypoperfusion	Below-normal blood flow to organs
Naso-	Denoting the nose	Nasopharyngeal airway adjunct	A tool used to help ensure a patient airway; inserted in the nose.
Arterio-	Relationship to an artery	Arteriosclerosis	A type of vascular disease effecting the arteries
Cardio-	Heart	Cardiovascular	Pertaining to the heart and blood vessels
Hem-, hema-, hemo-	Blood	Hemorrhage	Loss of blood from a damaged blood vessel
Neuro-	Denoting nerve, nervous system/tissue	Neurotransmitters	A signal from one neuron to another neuron
Vaso-	Vessel, as in blood vessel	Vasodilator	A medicine that dilates (opens) blood vessels

Table 7: Suffixes Commonly Used in Medical Terminology			
Suffix	Meaning	Example	Definition of example
-al	Pertaining to	Syncopal	Pertaining to syncope (fainting)
-algia	Pertaining to pain	Arthralgia	Joint pain
-ectomy	Surgical removal of	Appendectomy	Surgical removal of the Appendix
-ic	Pertaining to	Diaphoretic	Pertaining to diaphoresis (sweat)
-itis	Inflammation	Epiglottitis	Inflammation of the Epiglottis
-logy	Study of	Cardiology	Study of the heart
-logist	Specialist	Pulmonologist	Lung Specialist
-megaly	Enlargement	Cardiomegaly	Enlargement of the heart
-meter	Measuring instrument	Sphygmomanometer	Used to measure blood pressure
-oma	Tumor (cancer)	Lymphoma	Cancer of the Lymphatic system
-pathy	Disease	Nephropathy	Disease of the kidneys

Table 8: Word Roots that Describe Color			
Prefix	Meaning	Example	Definition of example
Cyan/o	Blue	Cyanosis	Blue discoloration of the skin
Leuk/o	White	Leukocyte	White blood cells
Erythr/o	Red	Erythrocyte	Red blood cells
Cirrh/o	Yellow-orange	Cirrhosis	Inflammation of the liver
Melan/o	Black	Melena	Black tarry stool

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