Medical and Respiratory Emergencies Overview

**Introduction to Medical and Trauma Emergencies**

Category Definition Examples Medical Emergencies Illnesses or conditions caused by disease COPD, diabetes, infections Trauma Emergencies Injuries from physical forces Fractures, lacerations Both Patients can have both medical and trauma conditions Diabetic patient in a car crash

* Medical emergencies involve illnesses caused by disease.
* They differ from Trauma emergencies which result from physical forces.
* Patients can have both medical and trauma conditions.

There are various types of Medical emergencies. These include Respiratory emergencies like difficulty breathing. Cardiovascular emergencies affect the circulatory system. Neurological emergencies involve the brain. Gastrointestinal conditions involve the digestive system.

**Patient Assessment in Medical Emergencies**

Assessment Step Key Actions / Mnemonics Scene Size-up Ensure safety, use standard precautions, determine NOI Primary Assessment Evaluate ABCs, mental status (AVPU), identify life threats History Taking Use SAMPLE and OPQRST mnemonics Secondary Assessment Focused physical exam, head-to-toe for unconscious patients Vital Signs Assess pulse, respirations, blood pressure, SpO2, blood glucose

* Assessing a medical patient focuses on the nature of illness and Chief complaint.
* Establishing an accurate medical history is crucial.
* Use dispatch information to guide your response.
* Avoid tunnel vision, focusing only on one aspect.
* Maintain a professional and calm demeanor.
* The Scene size-up ensures safety for you, your crew, and the patient.

**Transport Decisions in Medical Emergencies**

* Reassessment starts after initial assessment and treatment.
* It continues throughout transport.
* Most emergencies need hospital treatment beyond pre-hospital care.
* Critical patients need rapid transport.
* Criteria for rapid transport include unconscious or altered mental status.
* Airway or breathing problems are also a criterion.
* Obvious circulation problems like bleeding or shock require rapid transport
* Very old or very young patients are also transported rapidly.

**Infectious Diseases in Emergency Care**

DiseaseTransmission Route PPE Recommendations Influenza Direct contact, airborne droplets Gloves, eye protection, HEPA/N95 mask Hepatitis A: oral or fecal contamination; B: far more contagious than HIV Vaccination (Hep B) recommended for EMTs MeningitisSecretions from nose/mouth Standard precautions, gloves, mask Tuberculosis (Pulmonary) Airborne droplet nuclei N95 and HEPA masks required COVID-19 Droplets, airborne particles, direct contact Social distancing Surgical mask on patient, notify receiving facility EbolaContact with infected people Surgical mask on patient, follow local/CDC PPE protocols, notify receiving facility

* Approach patients with infectious diseases like other medical patients.
* Perform Scene size-up and Standard precautions.
* Complete the primary assessment.
* Gather patient history.
* Pay attention to medicines and events leading up to the problem.
* Ask about recent travel or contact with travelers.

**Anatomy and Physiology of the Respiratory System**

* The respiratory system includes the diaphragm, chest wall muscles, accessory muscles, and nerves.
* The upper airway consists of structures above the larynx.
* These include the nose, mouth, jaw, oral cavity, pharynx, and larynx.
* The larynx is the division point between the upper and lower airways.
* The lower airway includes the trachea, bronchi, bronchioles, and alveoli.
* The main function of the lungs is respiration.

**Pathophysiology of Impaired Breathing**

* Gas exchange can be hindered by airway abnormalities, disease, trauma, or issues with pulmonary vessels.
* Some patients have consistently high levels of carbon dioxide in their blood.
* Over time, this can impair the respiratory center in the brain.
* This is often seen in patients with Chronic Obstructive Pulmonary Disease (COPD).
* Their ability to exhale carbon dioxide is hindered.
* The brain adapts to these high levels.

**Causes and Signs of Dyspnea**

Condition Effect on Breathing

* Pulmonary Edema Fluid in the lungs
* Hay Fever Allergic reaction causing cold-like symptoms
* Pleural Effusion Collection of fluid around the lungs
* Obstruction of the Airway Mechanical blockage
* Hyperventilation Syndrome Over breathing leading to low carbon dioxide levels
* Environmental/Industrial Exposures Inhaling harmful substances
* Dyspnea means difficulty breathing.
* Dyspnea can result from many different conditions.
* Altered mental status can indicate the brain is hypoxic.
* Medical conditions causing difficulty breathing include Pulmonary edema and hay fever.
* Pleural effusion and airway obstruction can also cause Dyspnea.
* Hyperventilation syndrome, environmental exposures, carbon monoxide poisoning, or drug overdose are causes.

**Upper and Lower Airway Infections**

* Infectious diseases can cause Dyspnea by affecting various parts of the airway.
* Inadequate oxygen delivery to tissues is often due to some form of obstruction.
* Croup is typically seen in children aged 6 months to 3 years.
* It causes inflammation and swelling of the pharynx, larynx, and trachea.
* Epiglottitis is inflammation of the epiglottis, usually bacterial.
* RSV is a common and highly contagious viral illness in children.

**Pulmonary Edema and COPD**

Lung Sound Type Characteristics Associated Condition(s) Wet Lung Sounds Bronchi, Crackles, Rales Pulmonary Edema, Congestive Heart Failure Dry Lung Sounds Wheezes COPD

* Pulmonary edema occurs when the left side of the heart cannot pump blood from the lungs effectively.
* Fluid backs up in the alveoli and lung tissue.
* It's usually a result of congestive heart failure (CHF).
* COPD is a lung disease with chronic, irreversible airflow obstruction.
* It's an umbrella term including Emphysema and chronic bronchitis.
* Chronic bronchitis involves ongoing irritation and excessive mucus production.

**Allergic Reactions Affecting the Airway**

* Hay fever, Asthma, and anaphylaxis are grouped together because they result from allergic reactions.
* Asthma is an acute spasm of the bronchioles with excessive mucus production and swelling.
* It affects all ages but is most prevalent in children aged 5-17.
* Acute Asthma attacks can be triggered by allergic reactions, emotional distress, exercise, or infection.
* In its most severe form, an allergic reaction can cause anaphylaxis.
* Anaphylactic reactions are severe allergic reactions with severe airway swelling and widespread blood vessel dilation.

**Other Respiratory Conditions**

* Pneumothorax is the partial or total accumulation of air in the pleural space.
* It is most often caused by trauma but can also result from medical conditions.
* A spontaneous Pneumothorax occurs suddenly.
* Pleural effusion is a collection of fluid around the lung.
* This fluid compresses the lung and causes Dyspnea.
* Patients with Dyspnea may have a mechanical obstruction of the airway.

**Environmental and Industrial Exposure**

* Breathing problems can be caused by environmental or industrial exposures.
* This includes inhaling substances like pesticides, cleaning solutions, chemicals, and gases.
* Carbon monoxide (CO) poisoning is caused by an odorless, highly poisonous gas.
* It is the leading cause of accidental poisoning deaths in the US.
* CO is produced by fuel-burning household appliances and is present in smoke.
* Symptoms include flu-like complaints and Dyspnea.

**Patient Assessment in Respiratory Emergencies**

Assessment Step Key Actions / Focus Areas

* Scene Size-Up Ensure safety, use PPE, consider airborne hazards with multiple patients
* Nature of Illness Determine why 9-1-1 was activated, question patient/family/bystanders
* Primary Assessment Identify immediate life threats, general impression, level of distress, age, position
* Airway (A) Evaluate if open and adequate
* Breathing (B) Assess adequacy, listen to lung sounds (early, both sides)
* Circulation (C) Assess pulse, evaluate for shock/bleeding, check perfusion
* Scene size-up is crucial, always starting with assessing safety.
* Using PPE is important, especially with infectious respiratory diseases and toxic substances.
* If multiple people have Dyspnea, consider an airborne hazardous material release.
* Determine the nature of illness.
* The primary assessment focuses on identifying immediate life threats.
* Form a general impression of the patient's distress level.

**Differentiating COPD and Congestive Heart Failure**

Characteristic COPD Patients Congestive Heart Failure (CHF) Patients Age Usually older than 50 Not specified in this document section History Often have lung problems, long-term active or former cigarette smokers Not specified in this document section, but associated with pulmonary edema Complaints Tightness in chest, constant fatigue Difficulty breathing, especially when lying flat Physical Appearance Barrel-like chest, digital clubbing (enlarged fingertips) Not specified in this document section Breathing Patterns Often use accessory muscles, often exhale through pursed lips Rapid, shallow respirations (with pulmonary edema) Breath Sounds Exhibit abnormal breath sounds Wet lung sounds (bronchi, crackles, rales) often present with pulmonary edema

* Differentiating between COPD and Congestive Heart Failure (CHF) patients is important.
* COPD patients are usually over 50 years old.
* They often have a history of lung problems.
* Most are current or former long-term cigarette smokers.
* They complain of chest tightness and constant fatigue.
* Their chest may have a barrel-like appearance.

**Management and Treatment of Respiratory Distress**

* Repeat the primary assessment to check for changes in condition.
* Confirm that interventions are adequate.
* Interventions for respiratory problems include providing high flow oxygen.
* Positive pressure ventilations may be needed.
* Airway management techniques may be necessary.
* Non-invasive ventilatory support with CPAP might be provided.

**Treatment of Specific Respiratory Conditions**

ConditionTreatment ApproachUpper/Lower Airway Infection Administer humidified oxygen Suspected Epiglottitis Do not suction or place OPA, position comfortably, transport Pulmonary Edema100% oxygen, suction if needed, position comfortably (seated), CPAP if indicated/allowed, prompt transport COPD Assist with inhaler (watch for overuse), position comfortably, prompt transport Asthma Prepare to suction, assist with inhaler, aggressive airway management, oxygen, prompt transport Anaphylaxis Remove agent, aggressive airway management, oxygen, prompt transport, administer Epi (if protocol allows)

* For upper or lower airway infections, administer humidified oxygen.
* Do not suction or place an OPA in a patient with suspected Epiglottitis.
* For Pulmonary edema (fluid in lungs), provide 100% oxygen.
* For COPD, assist with an inhaler.
* For Asthma, be ready to suction, assist with an inhaler.
* Hay fever is usually not an emergency.

**Anatomy and Physiology of the Cardiovascular System**

* Cardiovascular disease is the leading cause of death in America.
* The heart is a muscular pump.
* The heart is divided into left and right sides by the septum.
* Each side has an atrium for receiving blood.
* Each side has a ventricle for pumping blood.
* One-way valves control blood flow.

**Circulation and Perfusion**

* During stress, the heart muscle needs more oxygen.
* Increased oxygen demand is met by dilation of coronary arteries.
* Coronary arteries start at the aorta above the aortic valve.
* The right coronary artery supplies the right atrium, right ventricle, and part of the left ventricle.
* The left coronary artery supplies the left atrium and left ventricle.
* Capillaries allow nutrient and waste exchange at the cellular level.

**Pathophysiology of Cardiac Conditions**

Characteristic Acute Myocardial Infarct (AMI) Dissecting Aortic Aneurysm Onset of Pain Gradual, usually slow Abrupt without additional symptoms Description Tightness or pressure Sharp or tearing Severity Increases with time Maximum on onset

* Heart-related chest pain often results from ischemia.
* Ischemia means decreased blood flow to the heart.
* Ischemia signifies an inefficient supply of oxygen and nutrients.
* Atherosclerosis is a disorder where calcium and cholesterol form plaque inside blood vessels.
* This plaque can completely block a coronary artery.
* A thromboembolism is a blood clot floating through a blood vessel.

**Consequences of Acute Myocardial Infarction**

Signs and Symptoms Cardiogenic Shock Mental StatusAnxiety or restlessness Respirations"Air hunger" or inability to breathe Skin Pale, cool, clammy skin Pulse Rate Higher than normal pulse rate Pulse Quality Irregular and weak pulses as shock worsens Blood Pressure Falling below normal (late finding), Systolic BP < 90 mm Hg (late finding)

* An AMI can lead to three serious outcomes.
* These are sudden death, cardiogenic shock, or congestive heart failure.
* Sudden death can result from a dysrhythmia.
* Cardiogenic shock occurs when body tissues don't get enough oxygen.
* This is often caused by a heart attack.
* Congestive heart failure (CHF) often occurs after an AMI.

**Hypertensive Emergencies and Aortic Aneurysms**

* Hypertensive emergencies involve a systolic blood pressure over 100 mmHg or a rapid increase.
* A common sign is a sudden severe headache.
* Other symptoms include a strong, bounding pulse, ringing in the ears, nausea, vomiting, and dizziness.
* Untreated, a hypertensive emergency can lead to a Stroke or a dissecting aortic aneurysm.
* An aortic aneurysm is a weakness in the aorta wall.
* The aorta dilates at the weakened area, risking rupture.

**Emergency Medical Care for Chest Pain**

Step Action:

1. Obtain an order from medical control.
2. Take the patient's blood pressure; administer only if systolic BP is > 100 mm Hg.
3. Check medication and expiration date.
4. Ask about the last dose and its effects.
5. Ensure the patient understands the administration route.

**Prepare for the patient to lie down to prevent fainting.**

* Patient assessment starts with Scene size-up to ensure safety.
* Dispatch information helps determine the nature of illness.
* In the primary assessment, form a general impression.
* If the patient is unresponsive and not breathing, start CPR and call for an AED.
* Assess the patient's airway and breathing.
* Assess circulation.

**Medications and Cardiac Monitoring**

* Aspirin prevents new clots or prevents existing clots from getting bigger.
* The recommended dose is 162 to 324 mg.
* Low-dose aspirin is 81 mg.
* Nitroglycerin (Nitro) is available as a tablet, spray, or skin patch.
* Nitro relaxes blood vessel wall muscles and dilates coronary arteries.
* This increases blood flow and supply to the heart.

**Cardiac Surgeries and Assist Devices**

* Open heart surgeries have been performed for decades.
* In a coronary artery bypass graft (CABG), a vessel is sewn from the aorta to the coronary artery beyond the obstruction.
* Percutaneous transluminal coronary angioplasty (PTCA) dilates the affected artery.
* PTCA involves introducing a long, thin tube with a tiny balloon into a large artery.
* Sometimes a stent is placed inside the artery.
* Some people have cardiac pacemakers to maintain regular rhythm and rate.

**Cardiac Arrest and Defibrillation**

* Cardiac arrest is the complete stop of heart activity.
* It is indicated by the presence or absence of a carotid pulse.
* Cardiac arrest was nearly always fatal until CPR and external defibrillation.
* An Automated External Defibrillator (AED) is a computer that analyzes heart electrical signals.
* It identifies ventricular fibrillation and is highly accurate.
* An AED administers a shock when needed.

**Return of Spontaneous Circulation (ROSC)**

* Return of Spontaneous Circulation (ROSC) is when a pulse is regained.
* When ROSC is achieved, monitor spontaneous respirations.
* Provide oxygen via bag valve mask at 10 breaths per minute.
* Maintain oxygen saturation between 95% and 99%.
* Assess the patient's blood pressure.
* See if the patient can follow simple commands.

**Hypovolemic Shock**

* Hypovolemic shock means low blood volume.
* You have a reduced volume of blood.
* There are multiple causes of hypovolemic shock.
* The first and most common cause is external blood loss.
* This is almost exclusively caused by trauma or injury.
* You can also see things like bleeding fistula sites.

**Obstructive Shock**

* Obstructive shock is an obstruction that impacts blood flow.
* It is due to one of various mechanical issues.
* The end result is ultimately the same as cardiogenic shock, which is pump failure.
* Tension Pneumothorax is a cause of obstructive shock.
* Air begins to come in and fill the space between the lung and chest wall.
* With each successive breath, the lung will get smaller.

**Distributive Shock (Anaphylactic Shock)**

* Distributive shock includes three types.
* These are anaphylactic shock, neurogenic shock, and septic shock.
* The underlying cause for the shock state is very similar.
* You end up with excessive vasodilation.
* You will have leaky blood vessels.
* These two things contribute to that shock state.