

Jon Puryear's EMT NREMT Prep/Refresher Course © 2016

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Introduction to Emergency Medical Care

Primary responsibilities: Personal safety, Patient assessment, care based on assessment findings, Lifting & moving, Transport, transfer of care, Operations

Phases of ambulance call include preparation for call, dispatch, en route to the call, arrival at scene, and transfer of patient to ambulance, en route to receiving facility, at receiving facility, back in service after run. Before first call, EMT must check vehicle, equipment with appropriate checklist to ensure readiness for communication, transport, patient assessment, and care.

3 basic types of ambulances currently used in EMS systems: type I, type II, type III

Operations

Safe emergency vehicle operation is constructed of many components, including physical, mental abilities, knowledge of traffic laws, driver attitude. Seat belt help maintain control of vehicle, no valid excuses for not wearing seat belt

Most state traffic laws mandate use of emergency lights, siren when operator exercising emergency vehicle "privileges"

Sirens may cause fight-or-flight response for operator of emergency vehicle, patient being transported, drivers of other vehicles

Operator must make conscious effort to overcome siren effects on mental attitude, related behavior

Escort vehicle practical when ambulance driver not familiar with route to receiving facility, extra caution at all intersections

Number of factors influence response route planning, including traffic congestion during peak hours, construction delays, nonsequential traffic lights, weather.

4-second rule (counting seconds while passing fixed object) helps establish safe distance between emergency vehicle, vehicle directly in front.

Most common location for emergency vehicle accidents; intersections

Come to complete stop when approaching intersection with red light/stop sign before proceeding

If toxic gases, liquids/other hazards expected/observed at emergency scene, park 100 feet uphill, upwind

When appropriate, notify receiving facility so staff can prepare for arrival

Proper transfer of patient to emergency department staff includes complete, concise patient history

Communication Systems components

Base station radio, Mobile two-way radios, Hand-held/portable radios, Repeater systems, Biotelemetry, Computerized mobile data terminal

Documentation

Record keeping is thorough documentation, Patient advocacy: Consider all aspects of condition, Stay aware, use "help-based" approach, watch your Attitude and actions

Other responsibilities

Public education, Extrication, Communications, Vehicle/equipment maintenance

Medical record: Meticulous documentation important and it is a Legal document requiring Specific, accurate and is a Protection from lawsuits

PCRs serve several functions, including:

Patient record, Legal document, Continuous QA & research data source, Education, Administrative data source

PCR sections include run data, patient data, treatment, narrative

Document special reporting circumstances with appropriate regional/state form

Document death by recording physical findings such as decomposition, extreme dependent lividity, rigor mortis, obvious lethal injuries

Errors: General rules for correcting errors include crossing out error, providing corrected data, initialing next to correction, errors recorded later should include date. Carefully document patient refusal of care, including signature of patient, witness at scene, Document special circumstances, unusual events on PCR

Triage tags, other time-saving methods may be used to document assessment, care in multiple-casualty incidents, Electronic reporting options increase legibility, and may facilitate data collection

Medical Direction is the Physician authority and Medical oversight

Online medical direction: Telephone/radio

Offline medical direction: Written protocols, Standing orders

Scene Safety Must be first concern

Assistance from other agency & PPE required: Hazmat incidents, Rescue operations, Violent scenes, Exposure to contagious diseases

Understanding Communicable Diseases

Transmission & infection control: Close contact from Lice & scabies, same treatment

Infection control is by Blocking spread of infection Most important is Hand washing

Hazardous Situations

Protective clothing with Rescue scenes is to Prevent injury with Turnout gear, Puncture-proof gloves, Helmets, and Protective eyewear

ICS

IMS/ICS is designed to assist with control, direction, coordination of emergency response resources at scene of an MCI. It facilitates interactions with multiple agencies, provides orderly means of communication, information for decision making, operations

EMS sectors at an MCI can include extrication, treatment, transportation, staging, supply, triage, mobile command

Your role as an EMT at scene of disaster is to provide medical care, medical triage

If you are first to arrive at an MCI, you will need rapidly to estimate nature of incident, number of patients, evaluate scene safety, communicate incident to dispatch to recruit needed resources, establish safe zone to keep unnecessary people out of area

If you are asked to respond to disaster incident, report to EMS sector officer where you are assigned for specific duties, then report back to the officer when your task is finished. After determining that the scene is safe, EMS triage begins, most knowledgeable EMS provider should assume role of triage officer, performing initial assessment on all patients first, assigning available personnel, equipment to high-priority patients

Triage at an MCI sorts victims according to 3 levels of priority, from highest to lowest

High-priority victims include those with major but potentially reversible conditions, such as airway, breathing difficulty, severe bleeding, AMS, shock, severe burns, major medical problems

Secondary-priority injuries include burns without airway problems, major or multiple bone/joint injuries, back injuries with/without spinal cord damage

Lowest-priority victims include those with minor injuries, as well as those without vital signs or with mortal injuries. Latter are often categorized as separate, lowest priority, without vital signs/with injuries incompatible with survival

Stress Management in Stressful situations: Critical incident stress management is a must for EMS Professionals along with other counseling

Ethical Responsibilities

The Golden Rule: "Do unto others as you would have them do unto you" Act in best interest of patient

Caring, competent, Responsible to maintain competence, Strive for level of mastery, Requires diligence, self-evaluation, Keep knowledge, skills current, Participate in quality improvement process

Confidentiality

Patients have right to know information given will be kept confidential, Information release must be written, Information to press/media

Health Insurance Portability & Accountability Act (HIPAA)

Widespread –use of electronic records, Potential of patient information transmitted without knowledge/consent, Outlines how private information used, disclosed

Reporting requirements

Reportable circumstances: Child abuse, Geriatric abuse, Family violence, abuse, Violent crimes, Certain infectious diseases, Patients transported against their will, Mentally incompetent, Animal bites, Wounds from guns/knives, Deaths

Scope of Practice is the Range of activities, limitations of medical provider

State EMS laws address: Minimum training standards, Medical control, Vehicle/equipment specifications, Licensure/certification requirements, May specify formation, duties of EMS councils/medical advisory committees. Establishes what EMT legally can, cannot do in emergency medical evaluation, treatment

Standard of care

"Did you do the right thing & did you do it properly?" Describes body of knowledge, laws, policies, common practices, standards, guidelines

Laws, rules, regulations govern EMT practice, Protocols. Doing the same thing that anyone else with the same training would do in the same situation

Equipment, Medications, Medical devices, Check equipment, document equipment failure, report

Negligence

Deviation from accepted standard of care, results in injury to patient. To prove negligence, must show: Duty to act, Breach of duty, Damage, Causal connection

Protection for the EMT

"Good Samaritan" legislation

Protects private citizen, Provides aid without undue fear of litigation, Protects EMT from civil charges, Does not protect from gross negligence

Consent

Before treating a patient, must obtain consent from patient, parent, guardian. Principle of autonomy, self-determination, Right to be self-directing

Consent not always possible: Disoriented, Minors with no parent/guardian available, Mentally handicapped

Expressed (informed) consent: Must be obtained from every conscious, competent adult, Document when patient withholds consent

Prehospital research: Research studies evaluate effectiveness of procedures/treatments

Research studies must be approved by IRBs, Acquire patient consent, Purpose: Respect of patient autonomy, Consent

Implied consent

Verbal/written consent not possible. Reasonable person would want emergency treatment

Other types of consent

Children, mentally incompetent individuals not legally able to give expressed consent. Must obtain consent from parent/guardian Unless implied consent more appropriate

Emancipated minor: Married, Pregnant, Parent, Member of armed forces, Financially independent living away from parents

Refusal of Treatment & Transport

Person has right to refuse care. Must be competent, able to make clear judgment. Patient has right to withdraw from treatment

"False imprisonment" if transferred against will

Assault/battery if you touch, provide care to patient without consent

Try to convince patient to go to hospital. Ensure patient understands consequences of not seeking medical attention

Sign "refusal of treatment" release form. Use best judgment with mental incompetence

Abandonment

EMT discontinues patient-provider relationship without giving patient opportunity to obtain continued care at the same level or higher

Plaintiff must prove patient was owed duty and duty was breached. Charges possible if patient who refused care is incompetent

Intoxicated, Irrational, and Emotionally Disturbed Patients: High legal risk. Held against wishes, charges can result. "Protective custody" Violent/suicidal patients

Forcible removal: "Soft" restraints and Precise documentation

Resuscitation Issues

Proxies: DNR orders, Advance directives, Healthcare proxy, Resuscitation Issues

EMTs must have original/copy DNR order. If patient dies during transport: Ambulance must stop where patient died and the Coroner must be notified

Donor & Organ Harvesting: Individuals may decide in advance to donate organs. Driver's license/separate donor card. Treat donor same as any other patient.

Medical Identification Insignia

Advance directive by medical identification insignia

Bracelet/necklaces that are also for other medical conditions

Emergency care in Crime Scenes

Ensure safety for self, fellow responders. Notify police through dispatch. Try not to disturb any item at scene. Do not cut through holes in clothing, if possible. Chain of evidence/custody

Risk Management

Practices by healthcare providers that reduce possibility of lawsuit/other legal/professional actions taken against EMT/medical director/agency

Act according to standard of care. Document actions carefully. Prehospital care record is backbone of defense and always Act in patient's best interest

Patient Assessment

Overview: It is the Foundation of emergency medical care -comprehensive, systematic patient assessment.

Components: Scene size-up, Initial (primary) assessment, Focused (secondary) assessment

Critical actions: Police respond, secure scene, Identify potential for hazmat, Assist in disentanglement, extrication, Consider weather, environmental threats

Direct additional EMS units to severely injured, Once scene is safe, begin triage and initial assessment

Scene size-up & patient assessment

Assess scene, surroundings. It is an ongoing process

Standard precautions is to Protect against exposure/contact from Blood, All body fluids, Secretion/excretion, Nonintact skin, Mucous membrane

Personal protection and Protective gear: Head gear, Eye protection, Respiratory protection (if required), Gloves, Boots, Coat

Crash/rescue scenes: Most common hazard - surrounding traffic

Scene survey: approach to crash scene Stop 100 ft away, uphill, upwind, Look, listen, Assess resources, Determine if rescue attempt poses undue risk, Approach vehicle, survey victims, During approach, look for downed electrical wires, Evaluate vehicle stability, Traffic delineation devices, Scene Size-Up

Crime scenes do not enter until police have secured scene. If you find yourself with a violent person: Do not block escape or challenge individual, Identify yourself as a medical provider, If person is upset, acknowledge, emphasize that you are there to help, Explain exactly what is being done in a calm, reassuring voice, Do not make quick moves; maintain safe distance, Encourage person to state problems; respond honestly to questions. Environmental hazards: Consider various potential environmental conditions and Is it safe to approach patient?

MOI/NOI: Manner in which injury occurred (MOI). Type of medical symptoms patient exhibits (NOI)

Trauma patients: Determine MOI from inspection of scene and from patient, bystanders, Determine number of patients, Initiate mass casualty plan as needed. Consider spinal precautions, begin primary assessment, triage, Significant MOI, Search for clues on body, Speed at impact, Significant MOI: Look for injury patterns and Hidden injuries.

Infants, children: Bicycle collisions, Struck by vehicles, Fall from small heights

Medical patients: Determine why EMS was activated, Number of patients, Ask about NOI, Scene may offer clues, Call for additional help before patient contact, Identify need for advanced life support (ALS) intercept early, Triage, MCI plan

Initial (Primary) Assessment: General impression Based on immediate assessment of environment, patient's general appearance

Rapid means of assessing and treating the immediate life threats of the Airway, Breathing, Circulation

Treat immediately: Airway management, positive-pressure ventilation, Supplemental O₂, CPR, Defibrillate, ALS intercept, Bleeding control, rapid transport

Spinal immobilization Immobilize appropriately

Assessment of mental status

Central nervous system (CNS) function evaluated by assessing level of consciousness (LOC). Patient's mental state - most sensitive indicator

Airway assessment: Head-tilt/chin-lift, Jaw thrust without head tilt, Tongue-jaw lift, Opening airway is a priority over spinal injury

Breathing assessment: Evaluate adequacy of ventilation, oxygenation. Responsive patient, breathing may be normal or rapid

Rapid (more than 24 breaths/min) Slow (less than 8 breaths/min) Breaths may be shallow or deep. Look, listen, and feel: If inadequate

breathing: Provide supplemental O₂, Determine need for airway adjuncts, ventilatory assistance

Circulation assessment:

Pulse check: Unresponsive patient - carotid pulse, Responsive patient - radial pulse, Child younger than 1 year - brachial pulse; if faint/absent - femoral pulse. If no pulse Start cardio pulmonary resuscitation (CPR), attach AED, Identification of life-threatening bleeding, Rapid external blood loss must be controlled. Direct pressure and then a Tourniquet

Signs of perfusion

Examine skin: Assess by inspection, palpation of Skin color, Skin temperature, Moisture, Capillary refill time, Skin color

Inspect nail beds, oral mucosa, conjunctiva

Abnormal skin color

Pale, poor perfusion - reduced blood flow/low hemoglobin

Cyanotic (blue-gray) - inadequate oxygen in blood/poor perfusion

Flushed - sign of exposure to heat/carbon monoxide

Jaundiced (yellowish tint) - liver abnormalities

Skin temperature & condition

Assess temperature, moisture: Normal, described as warm, Hot indicates fever, Cool, cold, clammy indicates poor perfusion

Assess capillary refilling time

Identification of priority patients: Provide lifesaving treatments as needed during initial assessment, Patients unstable should be transported immediately

Patient History: Patient's chief complaint, signs/symptoms. Rapid assessment of conditions that require emergency care, rapid transport

Determine history of present illness, Signs/symptoms, Patient complaint, Observable evidence (e.g., OPQRST), SAMPLE history, Rapid assessment of body regions, Baseline vital signs

Sources of a history: Best: Alert, competent patient, If patient is unable to communicate - closest family member, If necessary, friend, bystanders at scene,

Reliability of history: History only as good as truth it reveals about current, past history of patient. In some circumstances, patients, family members, others provide false/inaccurate information, Unsure/concerned about accuracy of data, notify physician/nurse on arrival

Chief complaint: History key to assessing, managing patient and it identifies areas of body that require examination, Chief complaint with no prior history of problem, Need condition explored to identify underlying problem, Patients with ongoing illness may know chief complaint, underlying problem

History of present illness Most significant part of assessment for medical patient

Signs, symptoms

Allergies

Medications

Pertinent past medical history

Last oral intake

Events leading to present illness

Signs/symptoms of present illness

Onset

Provocation

Quality

Radiation

Severity

Time

Not clear from answers to previous questions? Ascertain chronology of events leading to call for help

Unresponsive patients - determine if recent trauma occurred

History according to type of patient, Questions asked depend on specific complaint/situation. OPQRST format for complaints of pain/respiratory distress; other situations may require additional questions

Responsive patient History, physical examination directed toward chief complaint

Unresponsive patient or patient with altered mental status

Head-to-toe survey, trauma not playing role, Inspect, feel for injuries, other signs, If unresponsive, ask family, bystanders, placed in recovery position

Respecting privacy & patient autonomy: Be sensitive to right to privacy during questioning, physical examination. Inform patient about your intentions before beginning physical examination

Focused (Secondary) Assessment: Reconsider mechanism of injury to determine patient needs: Head-to-toe survey, Focused physical examination

Baseline vital signs: Measurements of functions of vital body systems, Good indicators of abnormal conditions, Central role in determining Prehospital management, Observe trends, Know norms

Baseline vital signs

Respirations: Normal breathing, Rate, Quality

Normal, Shallow, Labored, Noisy,

Pulse: Alternating expansion, contraction of artery caused by rhythmic propulsion of blood with each heartbeat

Pulse evaluated by rate, quality at Radial, Brachial, Femoral, Dorsalis pedis, posterior tibial, Carotid

Skin - pale

Poor perfusion -impaired blood flow to skin surface

Loss of blood volume, Decreased BP, Blood flow constriction, cold environment, Blockage/tear of vessel supplying area of skin tissue. Pale skin on face, conjunctiva – hypoperfusion

Cyanotic: Poor oxygenation

Flushed: Increased blood flow

Jaundiced: liver failure

Blood pressure: Measure of force blood exerts on artery walls

Factors: Amount of blood ejected from heart each minute, Space within arteries that blood occupies, Measurement of BP reflects phases of heart's cycle: systole (contraction), diastole (relaxation)

Blood pressure cuff: Various sizes available, correct size important. Adult: 1/3 to 1/2 arm circumference, Children: encircle 3/4 of arm

Methods for measuring BP: Auscultation and Palpation

Normal/abnormal BP readings

Vary in adults

Systolic BP – 100 mm Hg + patient's age (max 140 to 150 mm Hg)

Diastolic BP – 65 to 90 mm Hg

Women – 8 to 10 mm Hg lower than men of same age

Children/young adults – lower than adults

Many factors and diseases affect BP. Question patients about their normal BP

Pupils Central, round, black portion of eye, normally changes diameter in light. Measure:

Diameter, Reactivity to light, Equality of size, PERRL

Vital signs assessment you should Continually monitor vital signs on scene, during transport

Stable – every 15 min. Unstable -0 every 5 min. Reassess after any intervention. Compare changes during treatment & transport

Rapid assessment: Approach varies by severity of MOI

Minor injury - focus on injury. Serious injury - head-to-toe assessment

Reconsidering MOI is One of the 1st details to determine when arriving on scene

Anticipate injury patterns. Hidden injuries: Were safety devices used? Used properly? "Lift & look" - airbag deployment. Infants, children: Bicycle collisions, Impact from vehicles, Falls from lesser heights. Elderly patients: Can be seriously injured by lesser MOI, Different response than younger people

Detailed physical examination

Head-to-toe survey on all patients with significant MOI, looking for sign, symptoms of injuries

If potential for spinal/head injury, maintain spinal stabilization while conducting head-to-toe survey

Determine if rapid transport/ALS intercept are warranted

DCAP/BTLS

Deformities

Contusions

Abrasions

Punctures/penetrations

Burns

Tenderness

Lacerations

Swelling

Focused (Secondary) Assessment

Head-to-toe survey

Chest: Observe & palpate on anterior, posterior, lateral planes. Identify open wounds, seal with airtight dressing. Watch for paradoxical/symmetrical movement. Look for use of accessory muscles. Listen to lungs

Abdomen: Inspect for injury, distention, and bloated appearance. Assess for abdominal masses, possible bowel obstruction/abdominal aneurysm

Pelvis: Inspect, palpate hip region

Lower extremities: Observe & palpate bilaterally; compare one leg to other, Evaluate for circulation, nerve function. Focused (Secondary) Assessment

Upper extremities: Inspect & palpate bilaterally. Check for sensation. Evaluate motor function. Check radial pulse

Using spinal precautions roll to inspect & palpate posterior surface of body for injuries when transferring patient to long spine board

Ongoing Assessment (Reassessment)

Reevaluation of patient: Look for changes in condition. Observe dynamic status changes. Document changes. Components:

Repeat initial assessment, Reassess mental status, Maintain open airway, Monitor breathing for rate, quality, Ongoing Assessment (Reassessment),

Reassess pulse for rate & quality, Monitor skin color, temperature, Reestablish priority patients, Reassess & record vital signs, Repeat focused (secondary) assessment, and Check interventions

Airway & Ventilation: A&P and Respiratory Emergencies

Physiology of respiration

Minute volume

Adequate air amount inhaled/exhaled each minute. Normal adult: 6 to 10 L/min

Alveolar, capillary, cellular exchange

Diffusion - movement of molecules from area of higher concentration to area of lower concentration

O₂ – alveoli → capillaries

CO₂ – capillaries → alveoli

Dyspnea: Difficulty breathing, shortness of breath, Common symptom with respiratory emergency, Brain most O₂-dependent organ, Change in mental status needs positive-pressure ventilation, high O₂ concentration

Respiratory distress: Patient works harder to breathe. Signs: ↑ respiratory rate, ↑ accessory muscle use, Nasal flaring, Tripod or bolt upright position, Difficulty speaking in complete sentences, and Agitation or restlessness

Respiratory failure: Inadequate ventilation to support life. Not able to maintain mental status, display muscle tone. Inadequate amount of air to lungs

Respiratory arrest: Complete cessation of breathing and Can progress to cardiac arrest

Signs of adequate & inadequate breathing: Determine whether respiratory distress or respiratory failure. Treatment differs:

All patients need supplemental O₂. Patients in respiratory failure/arrest need positive-pressure ventilation

Normal Rate of breathing: Adult: 12 to 20 breaths/min, Child: 15 to 30 breaths/min, Infant: 25 to 50 breaths/min

Rhythm of breathing: Regular Consistent rise & fall of chest. Irregular Increasing/decreasing rates, tidal volumes with periods of no breathing

Quality of breathing: Assessment Look for chest/abdominal movements, Look for use of accessory muscles, Listen for breath sounds, Feel air movement through mouth, nose, Inspect skin, Evaluate mental status

Opening the Airway: Airway management goals: Establish, maintain patent airway, Ensure adequate ventilation, Ensure adequate oxygenation

Manual techniques: 1st step in opening airway, Use in conjunction with mechanical techniques, Techniques routinely:

Head-tilt/chin-lift, Jaw thrust, Modified Jaw thrust, Jaw lift

Suctioning: General considerations is Act of introducing soft, rigid catheter into airway to vacuum out liquid and small, solid secretions

Check suction equipment regularly:

Should be capable of removing thick secretions, provide negative pressure of at least 300 mmHg (80 to 120 mm Hg children; 100 mm Hg infants)

Infants & children: Use rigid catheter to suction upper airway, Do not touch back of airway, Become hypoxic with prolonged suctioning, Nasal suctioning, use bulb suction device/small, soft catheter with low to medium vacuum

Mechanical techniques

OPA: Elevates tongue away from oropharynx in unconscious patients without gag reflex. Curved plastic extends just anterior to lips down to tongue base in oropharynx

NPA: Same purpose as OPA, used when OPA not tolerated, Gag reflex present, Mouth cannot open from trauma/clenching teeth, Do not use with severe, direct facial injury, possible skull fracture, Extends from nares down to oropharynx

Positive-Pressure Ventilation

Mouth-to-mouth/mouth-to-barrier device: Barrier device protects EMT, Mouth-to-mask, pocket mask, seals around patients mouth & nose with an air-filled bladder, One-way valve prevents exhaled air from reaching EMT, Use 2 hands to create mask seal, lung compliance while delivering rescue breath, Breathe until chest rise over a 1-second period, O₂ can be delivered through port on top of mask, Pinch patient's nose, deliver slow breath over 2-seconds through valve filter, Pocket mask preferred over face shield, Positive-Pressure Ventilation

Bag-mask: Most common, Most unreliable if used improperly, O₂ inlet provides increased concentration to patient, O₂-collecting reservoir delivers 90% to 100%

Cricoid pressure: Air can enter esophagus and cause gastric inflation, increase vomiting/aspiration risk. Only apply if aspiration is possible. Use Sellick maneuver:

Compress esophagus between cricoid cartilage & thoracic spine

Flow-restricted, O₂ -powered ventilation device. Provides highest delivered O₂ concentration 100%

O₂ Therapy: O₂, colorless, odorless gas plentiful in environment, Anyone in respiratory distress/failure receives supplemental O₂, EMTs carry in tanks/cylinders:

Large gas quantity, stored at very high pressure. Color-coded green, Pin index safety system

Cylinder sizes: Smaller - D or E and Larger, - M, G, H

Regulators: Reduces high gas pressure in cylinder, Single-staged, Double-staged, Pressure gauge, Flow meter records flow rate

Cylinder calculations: $\text{Time (min)} = \frac{(\text{Tank pressure [psi]} - 200 \text{ psi}) \times \text{Constant}}{\text{Flow rate (L/min)}}$

O₂ administration devices

When patients are ventilating adequately but in need of supplemental O₂

Nasal cannula: Low-flow, low-concentration, 24% to 40% concentration, 2 to 6 L/min flow rate, Indications: Respiratory distress

Nonrebreather mask: High-flow, high-concentration, Up to 90% concentration, 10-15 L/min. Indications: Respiratory distress, Shock

Pulse oximetry: Monitors amount the hemoglobin is saturated, Also measures CO, Normal hemoglobin saturation: 95% to 100%, More than 95% - good saturation, Less than 95% - hypoxia. Accuracy affected by:

Excessive ambient light, Conditions that reduce circulation to peripheral arteries, Cardiac arrest, Hypotension, Hypothermia,

Vasoconstriction drugs, CO poisoning

Capnography: measures the amount of CO₂ at the lips and nares during respiration. Capnograph should be square

Humidification: Moisturizes inspired O₂, Loosens secretions, prevents airway drying, Useful in smoke inhalation, Prevent contamination of device

Special Patient Populations

Patients with stomas: Permanent/temporary breathing tube or tracheostomy or laryngectomy, obstructed stoma requires suctioning

If positive-pressure ventilation required: Breathe directly through opening/tube, Place infant/child mask directly over stoma, Extension of head, neck not necessary, Squeeze bag, observe chest rise, If you are unable to ventilate through stoma, attempt to breathe through upper airway, If patient has a tube coming out of stoma, attach bag-mask device directly to tube

Infants & children

Airway differs from adults: Internal diameter - smaller at all levels, Tongue larger in relation to airway; greater obstruction risk, Narrowest part of airway - ring formed by cricoid cartilage, Larynx, trachea cartilage softer, Chest wall softer; diaphragmatic breathing,

Differences have practical implications:

Infants - head placed in sniffing, neutral position

Toddlers, small children - neck extended slightly

Keep tongue from obstructing airway

Small obstructions may cause significant blockage

Patients with facial injuries: Because of rich blood supply to face, blunt injuries cause severe bleeding. Makes airway management difficult, Have suctioning readily available, bleeding in cheek, mouth controlled with direct pressure, Turn head to aid drainage

Patients with dental appliances: Dentures remain in place during airway management:

Give form to face, help create better seal with mask device, if loose, may obstruct airway, if dislodged, remove, and continue ventilation

Respiratory Emergencies

Conditions that Cause Respiratory Emergencies: Respiratory emergencies may have new illness or complications of chronic respiratory condition:

Asthma, Emphysema, Chronic bronchitis, Heart failure, Croup, Epiglottitis, Pneumonia, Pneumothorax, Hyperventilation syndrome

General Signs & Symptoms: Signs and symptoms of difficulty breathing include:

Dyspnea, Restlessness, Increased HR, Increased or decreased RR, Shallow or irregular breathing, Abdominal breathing, Noisy breathing,

Crowing/stridor, Audible wheezing, Gurgling, Snoring, Inability to speak, Pale/cyanotic skin. Coughing, Tripod position

Chronic Obstructive Pulmonary Disease (COPD) Includes chronic bronchitis/emphysema. Primary complaint - shortness of breath and Bronchoconstriction

Chronic bronchitis ("Blue Bloater")

Chronic productive cough present more than 3 month/year for more than 2 years. Affects the bronchioles and relatively affects the alveoli, Obese, Productive cough, usually a smoker

Emphysema (Pink Puffer")

Disease caused by destruction of alveoli, Less lung surface in which O₂ can diffuse into blood, Muscle portion of bronchioles within lung, damaged, The alveoli lose their elasticity and thicken, The walls of the alveoli destruct and merge together, Blister like blebs become weak and may rupture

Signs/Symptoms: Pink skin due to polycythemia, Pursed lip breathing, Cyanotic, Symptomatic of respiratory distress or failure

Respiratory distress: Still compensating to exchange gases. Oxygen administration based on condition

Respiratory failure: Respiratory system becomes ineffective, Subject to infections that aggravate patient condition, Oxygen administration by BVM

Asthma: Obstructive respiratory disease Caused by constriction of lower airways. Triggered by stress, infection, or allergy

Acute asthma attack: Shortness of breath, Patient assumes upright posture, Uses accessory muscles to increase ventilation, Patient - flushed and breathes forcefully, Wheezing & prolonged expirations audible without stethoscope

Treatment: Oxygen by respiratory status and Bronchodilators

Severe asthma attack: Patient becomes exhausted & produces little airflow, No wheezing, Difficulty speaking, ↓Breath sounds

Treatment: Assist ventilations during rapid transport and Bronchodilators

Pneumonia: Inflammation of alveolar spaces caused by various infecting organisms/aspiration of gastric contents into tracheobronchial tree

Signs/symptoms: Fever, Cough with productive sputum, Difficulty breathing, Chills, Headache, Pain that increases with breathing/coughing

Treatment: Oxygen and bronchodilators

Pulmonary embolism: Blood clots released from leg veins after surgery/ patients taking birth control. Fat emboli released from long-bone fractures, as clot releases, travels up through vena cava, into right atrium, right ventricle, into pulmonary artery

Signs: Difficulty breathing, Chest pain that increases with breathing, coughing up bloody sputum, Calf tenderness, Hypoxia, including cyanosis, AMS

Recent history of surgery, prolonged bed rest, recent travel, use of oral contraceptives, phlebitis

Physical findings: Often normal, Rapid pulse, Shock, Signs of right-sided heart failure

Treatment: High-concentration O₂, Treat for shock or CPR, Rapid transport to closest appropriate facility

Hyperventilation syndrome: Feel as if cannot breathe, may begin to voluntarily increase rate and depth of breathing often accompanied by anxiety

Increased minute ventilation decreases amount of CO₂ in blood; changes acidity of blood

Chief complaint – shortness of breath

Treatment: Supplemental O₂, Calming measures and reassurance, Do NOT allow patient to rebreathe exhaled air

Spontaneous pneumothorax: Part of lung ruptures Allows air to exit lung, enter space between pleural lining of chest cavity and outer covering of lung

Risk factors: Young, Tall, Thin, Men. Usually occurs during lifting or coughing

Monitor for progression of simple pneumothorax to tension pneumothorax:

Absence of breath sounds on one side, distended neck veins, Hypotension, Tracheal deviation

Cardiovascular Emergencies

Chain of Survival is designed to: Deliver CPR, Perfuse brain/heart, Provide early defibrillation, Prevent subsequent cardiac arrest

Most patients with SCA have VF: Ventricular Fibrillation where the ventricles are having a seizure. CPR and defibrillation need to be administered ASAP!

Major heart disease categories: Ischemic chest pain, Heart failure, sudden cardiac death

Anatomy & Physiology: Cardiac output formula is $CO = SV \times HR$

Blood vessels: Arteries, Veins, and Capillaries

Blood pressure: Force exerted by blood volume on walls of vessels

Systole is during ventricular Contraction and Diastole is ventricular Relaxation

Microcirculation through Capillaries by:

Diffusion- the movement of a gas/solute from area of higher concentration to lower concentration

Osmosis- the movement of a solution from an area of lower concentration to higher concentration (isotonic, hypertonic, and hypotonic solutions)

Microcirculation, Hydrostatic pressure, Plasma proteins, Oncotic pressure

Pushing & pulling forces create balance that ensures adequate fluid in both compartments correcting Fluid balance problems

Shock (hypoperfusion): Inadequate circulation, vital body tissues poorly perfused, Vital body processes fail, Results in inadequate oxygenation of tissues; eventual cell death if prolonged, Can occur when any part of circulatory system fails. Body releases epinephrine to compensate (elevated BP and shunt blood to more vital organs). Patients with signs/symptoms of shock - high-priority patients

Prehospital care: Secure airway, Ensure patient can breathe, and Ensure oxygenation

Cardiovascular Disease: Cardiovascular disease and its complications - leading cause of death in United States

Pathophysiology of ACS:

Arteriosclerosis is a Progressive artery disease and Coronary artery disease

Myocardial O₂ supply and demand is disrupted

Ischemia: ↓ Blood flow to organ/tissue causing problems but not permanent damage

Infarction: Severe obstruction, resulting in heart cell necrosis. From Acute coronary syndromes. Patients with ischemic chest pain - highest priority

Scene size-up: Ensure safe scene, BSI precautions, Identify MOI/NOI, Consider need for ALS, Notify dispatch early

Initial/primary assessment:

Form general impression, Identify: Chief complaint, Age, Gender, Is this a life-threatening condition?, Assess mental status & ABCs, Manage airway/ventilation, Note patient's pulse quality, Check for signs of poor perfusion

Focused/secondary assessment

SAMPLE history

Signs/symptoms: Crushing, Pressing, Tight, Viselike, Heavy, Usually located in anterior chest and Radiates to neck, jaw, either arm/shoulder. Associated complaints: Aching, Constricting, Burning, Discomfort in chest

Allergies & medications

Pertinent past Medical history

Last oral intake

Events leading up to this

Physical examination: Check for JVD, accessory muscle use

Baseline vital signs: Rapid, slow pulses, Variations in BP common, Skin - pale, cool, sweaty, Lungs: presence of equal/abnormal sounds

Ongoing assessment/reassessment: Check: Vital signs, Mental status, Response to therapy, Continuation of pain, dyspnea, Pulse rate, rhythm, quality, Have AED & mechanical aids for CPR readily available

Transportation: Priority transportation decision for chest pain, rapid, quiet, Avoid siren use, Notify hospital of imminent arrival

Emergency medical care: Reduce work of heart and Enhance O₂ delivery to cells by: Limit anxiety & activity, Stress & fear can cause epinephrine release, Reduce energy requirements, ↑ Oxygenation titrating SpO₂ ≥94%, Patient denial; they may have Compromised respiratory/circulatory systems

Nitroglycerin is used to treat ischemic heart disease.

It dilates larger veins, Allows more blood to pool in dependent areas, Reduces blood returning to heart

It also dilates arteries which decreases resistance to blood moving out of heart

Nitroglycerin available as patch however it is absorbed slowly over several hours so it is not useful for acute attacks

Contraindicated if systolic BP lower than 100 mm Hg and Should be avoided if patient has recently taken Viagra or similar drug

Aspirin decreases formation of clots during ACS

Before administering, assess following contraindications: Is patient allergic to aspirin? Has patient recently taken aspirin? Does patient have recent history of GI bleeding?

Heart Failure: Destruction of heart muscle reduces heart's power to contract and decreases Frank Starling's Law

History hypertension or signs of recent MI, Shortness of breath, weakness, limited activity, weakened heart inadequately pumps blood from ventricles

Left Sided Causing an increased pressure into the lungs

Pulmonary Edema: Abnormal breath sounds, SOB, PND, Orthopnea, JVD, cyanosis, Tracheal tugging, Accessory muscle use

Right Sided Causing a backup of blood into the peripheral system of the body

Peripheral Pitting Edema: JVD, Pitting edema in lower extremities, Ascites, Hepatic/liver congestion, sacral edema, SOB

Treatment

Respiratory Distress: High-concentration O₂ via nonrebreather mask, CPAP, or PPV with PEEP

Respiratory Failure/Arrest: Positive pressure ventilation (PPV) with bag-mask or other ventilation device with PEEP

Upright position allowing legs to hang down, Consider ALS intercept

Thoracic Aortic Dissection: Frequently occurs in men/persons over 50 y/o, Tear in aortic wall; blood enters vessel inner lining and Forms false passage

Dissections: Proximal dissections or distal dissections

History: Thoracic aortic dissection presents tearing, ripping, searing chest pain, may Faint, Show signs of stroke, Experience arm numbness

Physical examination: Findings related to MOI: Occlusion of vessels, Hemorrhage, Pericardial tamponade

Treatment: Immediate surgical intervention at hospital, Rapid transport, Supportive care: High-concentration O₂, PPV, if needed, Treat for shock

Abdominal Aortic Aneurysm: a ballooning of the abdominal aorta and if ruptured, the patient is prone to Exsanguination. It may be from dissecting, congenital, atherosclerotic, trauma, infectious. History: Most common aneurysm, AAA typically presents with abdominal/back pain, Patient usually older, Hypertension

Physical examination: Poor perfusion, Elevated HR, Adrenaline release, Pale, cool, sweaty skin, Rigid and distended abdomen; tenderness, May occlude one or both femoral arteries causing numbness/tingling in the legs, Back or epigastric pain, Pulsating mass

Treatment: Immediate surgical intervention at hospital, Rapid transport, Supportive care: High-concentration O₂, PPV, if needed, Treatment for shock

Pulmonary Embolism: Blood clots released from leg veins, lodged in pulmonary artery, Can occur after surgery; patients taking birth control

Large artery involved, shock may result. It causes a Change in lung circulation

History: Difficulty breathing, Chest pain increases with breathing, Cough up bloody sputum, possibly history of: Calf tenderness, Recent surgery, Prolonged bed rest, Recent travel, Use of oral contraceptives, Phlebitis

Physical examination: Findings often normal, ↑ HR, Shock present in worst cases, significant obstruction, signs of right-sided heart failure, hypoxia, AMS

Treatment: High-concentration O₂, Treatment for shock, as needed, rapid transport crucial

Altered Mental Status

General Symptoms: Mild confusion, Abnormal behavior, Deep coma Indicates problem originating/affecting brain: Hypoglycemia, Poisoning, Hypoxia

General goals of prehospital care: Ensure adequate ventilation/circulation, Administer supplemental O₂/glucose, Assessment/treatment of underlying cause

Terms to describe AMS: *Lethargy, Confusion, Delirium, Semicoma, Coma*

Diabetic Emergencies

Diabetes: Disease caused by inadequate secretion of hormone insulin

Insulin: Helps regulate use/storage of glucose

Glucose: Sugar molecule used by cells for energy

Somatostatin: regulates the release of insulin and glucagon within the Islets of Langerhans

Physiology: *Hypoglycemia* is Low blood glucose level/insulin shock and *Diabetic ketoacidosis* (DKA) is High glucose level

Insulin: Insulin produced within specialized cells in pancreas. After eating, body secretes insulin, Some glucose stored as glycogen in liver/muscle; some converted to fat for future use, As glucose moves into cells, blood glucose level (BGL) falls, insulin secretion is reduced

Glucagon: Ensures adequate supply of blood glucose between meals. Secreted when BGL starts to fall, Converts glycogen back to glucose, Released when use of glucose increased or when intake of glucose from meals is reduced, Can be injected to treat hypoglycemia

Classification of diabetes:

Insulin-dependent (type 1)

Requires treatment with insulin, Patients must balance food intake with medication (Insulin with no food = low BGL)

Non-insulin-dependent (type 2)

Some can control by diet, others require oral medications, Worst cases may require insulin injections

Hypoglycemia: Abnormally low BGL and Can occur in patients who do not have diabetes. Situations that may result in hypoglycemia: Unusual exercise/physical exertion without extra food intake or Person who takes insulin in morning, and then forgets to eat breakfast/lunch

Signs/symptoms: May be mistaken as psychotic or intoxicated, Combative, hostile, bizarre behavior, May progress from agitated/anxious/excited to sleepy/lethargic/confused, May deteriorate to seizures/coma/death, Hunger, Nausea, Uneasiness, Weakness, Increased salivation

As blood glucose level dips lower: Increased HR, Cold, pale, clammy skin, Dilated pupils, Increased nervousness, trembling, excitability

Diabetic ketoacidosis: Blood glucose level too high/insulin level too low. Tends to occur more slowly than hypoglycemia

S/S: Acetone breath, Dehydration, dry, thirsty, Respirations – deep and rapid (Kussmaul Respirations), Extreme situations - patient unresponsive

Treatment: Always consider hypoglycemia reason for AMS, Glucose administration (15 Grams oral Glucopaste) to patients with AMS when hypoglycemia suspected, Never administer oral medication to unconscious patient not able to swallow

Seizures: Temporary alteration in behavior caused by abnormal electrical activity in brain

Causes: Scar on brain, Previous head trauma, Drug/alcohol withdrawal, Eclampsia, Trauma, Infections, Fever, Poisonings, Hypoglycemia, Hypoxia

Types of seizures

Grand mal: Tonic phase: Voluntary muscles – sustained contraction, Lasts up to 30 seconds, Ventilation may become compromised

Clonic phase: Intermittent contractions/relaxation of skeletal muscles, Lasts from few seconds to few minutes, may become cyanotic

Postictal phase: Depressed LOC /confusion/sleepiness, Patient may have headache, aching muscles, sore tongue,

Aura: The patient may smell, hear, taste, feel something prior to having a seizure, This doesn't occur in all seizure patients, It allows them to clear an area around them to decrease injury to themselves

Focal: Seizures that do not generate/involve entire brain, May cause seizure movement in only one part of body, May appear with bizarre behavior

Status epilepticus: Rapid succession of seizures without intervening period of consciousness/prolonged seizure and is Life threatening

Febrile: Child: 6 months to 6 years, High temperature in setting of infection

Petit mal: Brief lapses of attention/awareness Last 10 to 20 sec, Eyes turned upward/to side, Eyelids flutter

Management of Seizures: Airway compromise after grand mal seizure: Assure patent airway If no gag reflex, insert OPA/NPA. If seizure does not stop within 5 minutes or seizures recur without return of consciousness: High-concentration O₂; PPV and Consider ALS intercept

Psychological aspects: Clear crowds, Create private environment

Stroke: 3rd leading cause of death in United States, Leading cause of brain injury in adults, Medication to resolve stroke must be administered less than 3 hrs of symptoms onset. Stroke is part of arteriosclerotic disease

Transient ischemic attack (TIA): Reversible episode of focal neurologic dysfunction. Lasts few min to few hrs, Symptoms may be same as stroke, History of TIAs - an indicator of stroke risk

Acute stroke:

Ischemic: 75% of all strokes are ischemic, Caused by blood clots within brain artery, Clots arising elsewhere in body migrate to artery in brain, become lodged, and obstruct blood flow, Clot-busting thrombolytic medication may be useful
Hemorrhagic: Caused by subarachnoid or intracerebral hemorrhage, Can be fatal at onset, Brain injury progresses quickly; can lead to permanent disability, Thrombolytic medication worsens intracerebral bleeding, Stroke

Assessment of stroke patients

Initial (primary) assessment: 1st priority - Identify/treat life-threats, Check for airway obstruction if unconscious/AMS, Constantly assess and support: Airway, Oxygenation, Ventilation

Focused (secondary) assessment: Suspect stroke in any patient with sudden loss of neurologic function/alteration in consciousness

Most common symptoms in hemorrhagic stroke: Headache, Disturbances in consciousness, Nausea/vomiting

EMTs can greatly assist chances of beneficial treatment by:

Identifying possibility of stroke, Transporting to stroke center, Notifying stroke center before arrival, Awareness of time - critical factor in prehospital assessment/management

Focused history: Quickly interview for chief complaint/symptoms, Headache, Dizziness, Nausea/vomiting, Weakness, Seizure, Difficulty speaking, Establish time of onset of signs/symptoms

Focused physical examination: Identify stroke rapidly, Use stroke scales. Assess patient's LOC, Once stroke suspected – minimize time in field, Check vital signs

General emergency therapy: Maintain airway patency, breathing, circulation

Vital Signs: Hypertension, Bradycardia, Erratic respirations, Temperature variations

Obtain the "last known good" time, Make transport decision, Most important treatment we may provide is to decrease the TIME of the incident to the treatment at the hospital! Oxygen administration titrated to $\geq 94\%$ SpO₂

Initial (primary) assessment: 1st priority - identify & treat life-threats, Unconscious patients at risk for airway obstruction, Establish need for ventilatory support, Assess possibility for head trauma, Hypoxia/hypoglycemia with AMS

Focused (secondary) assessment: Provides rationale for prehospital treatment/early transport decisions

Primary rationale for treatment: Diabetes, Epilepsy, Allergies, Pattern, activity, duration of any seizures

Vital signs: Pulse/BP, Temperature

Focused physical examination; Skin color/moisture, Abnormal smells on breath, Pupils motor/sensory function, Equal strength/sensation, Reevaluate vital signs/mental status, Record findings, Medic identification jewelry

Management: Airway compromise, Ventilation & supplemental O₂, Transport decision

Ongoing assessment (reassessment): Changes in condition during care should be noted, Repeat neurologic assessment scales, Did therapy make any difference?

Chronic Neurologic Diseases: Affects the CNS and/or PNS, Can have adverse effects on ability to: Remember, Function intellectually, Move, Swallow, Breathe

Allergies and Anaphylaxis: Allergy and anaphylaxis caused by antibody-antigen reaction

Allergies - common problem. Signs/symptoms range from simple nasal congestion to anaphylaxis

Anaphylaxis – life-threatening condition that can result in death within minutes

Antibody-antigen reaction gone "haywire". Effects detrimental rather than protective

Histamine release: Blood vessels dilate, Capillaries leak, Lung tissue constricts, Allergies localized or systemic

Effects of Anaphylaxis: Involves multiple body systems, Leads to shock, Tissue swelling, Bronchiole constriction, Airway obstruction, Reaction onset extremely rapid; death in minutes. Needs immediate treatment Maintain open airway and Stabilize cardiovascular system

Anaphylaxis cause agents: Drugs, Penicillin, Cephalosporins, Tetracycline, Nitrofurantoin, Dyes used for radiographic contrast studies, Antiinflammatories

Foods, Insect bites/stings, Latex

Anaphylactic reactions: Constriction of bronchial smooth muscle in airway, Increased permeability of capillaries, Dilation of arterial vessels, Dilation of venous system, Increased mucous secretions in respiratory tree & GI tract, Severe reaction is Shock

Assessment:

Scene size-up & initial (primary) assessment: BSI precautions, Scene safety, ABCs

Focused (secondary) assessment: Hypersensitivity history, Connect onset of symptoms with recent history/significant exposure, Some anaphylactic symptoms occur immediately after antigen contact

Physical examination:

Skin & general signs: Feeling of warmth precedes reaction, Tingling of face/extremities/upper chest, Itching/generalized skin flushing, Urticaria (hives), Angioedema, Nasal congestion/sneezing/itching around eyes, Headache, Abdominal pain, Sense of impending doom

Respiratory signs: Narrowed airway, Cyanosis, Accessory muscle use, Suprasternal/intercostal retractions, Wheezing/noisy breathing, Breath sounds absent/diminished, Complete airway obstruction/respiratory failure

Cardiovascular signs: Leakage of fluid through capillaries, Increased blood flow to skin, Fluid loss, Increased HR/RR, Pale/sweaty skin, Lower BP/brain

Early signs: Flushed skin, Higher HR. Late signs: Pale, cool, clammy skin, Lower BP, AMS

Management: Anaphylactic reaction requires immediate administration of epinephrine

Primary goals: Airway management, Ventilation, Oxygenation, Support of circulation, Administration of epinephrine, Rapid transport

Epinephrine: Anaphylactic kit, patient should self-administer ASAP, If protocols allow, administer Epi as directed ASAP

Rapid onset of action, Clinical effect peaks 15 to 20 min after injection, Initial improvement, then condition deteriorates, May benefit from

second injection, Consult medical direction, Prescribed autoinjector comes as double kit, Epinephrine administered at dose of 0.3 mg to adults,

0.15 mg to children intramuscularly with autoinjector

Respiratory support: Complete airway obstruction Rapid transport to ALS essential, Intubation/surgical airway to establish patent airway, PPV with high-concentration supplemental O₂ during transport

Respiratory distress/failure: High-concentration supplemental O₂ via nonrebreather mask.

Hypoventilating then Give assisted ventilation with 100% O₂, Coordinate rescue breaths with attempt to inspire

Cardiovascular support: Exhibiting signs of shock Place in supine position, Prevent loss of body heat, Record vital signs every 5 min, Nothing by mouth,

Rapid transport, and Consider ALS intercept

Poisoning and Overdoses

Poison: Substance that kills, injures/impairs organism through chemical action

Toxicology: Study of poisons

Overdose: Self-administered drugs taken in excess or in combination with other agents

Incidence: According to the AAPCC, more than 2 million poisonings each year however there are Unreported overdoses

Poison Control Centers are useful and may Provide information about: Toxins, Management of poisoned victims, Antidotes

Services provided: Access to toxicology experts 24/7 by phone and Emergency response coordination

Types of Exposure:

Ingestion: Swallow through GI tract, Inhalation, CO most frequent toxin, Wear PPE

Absorption: Through skin, Injection, Fastest onset - poisons injected directly into bloodstream

Maintain high level of suspicion and have good scene assessment. Look for patterns of multiple exposures Do not jeopardize yourself if exposure possibility

Bring medications and poisons to hospital, Report noticeable odors that give clue to toxin, Search for clues of trauma, Treat patient, not poison

Scene size-up: Survey scene, Protect yourself/bystanders from poisoning, Take adequate protection, Wear PPE, Only trained rescuers should remove patient
Eye exposure & skin contamination then Remove toxin immediately, Remove contaminated clothing, Flood contaminated skin with soap & water to minimize contact, Follow local protocols

Initial (primary) assessment: Get general impression, Evaluate for traumatic injury, Check airway & breathing, Remove pills, tablets, pills from mouth with gloved hand, Protect & support c-spine, Check pulse, Check skin for perfusion

Patient history: Ask about pill bottles/containers. Information needed:

Poison name, Route taken, When, Amount, Time period, Interventions attempted, Patient weight

Focused assessment: Review mental status If unconscious, use alert, verbal, painful, unresponsive (AVPU)

If unable to swallow: Transport, Protect airway, Ensure adequate ventilations, Document findings, Look for signs of injury

Pupil Assessment: Dilated: Stimulants like Cocaine, Speed, Meth. Constricted: Depressants like Barbiturates, Quaalude, Heroin

Ingested Poisons

History & physical examination: Suspect poison from history or physical examination, Patient may give history of poisoning or signs may be noted on exam

Signs/symptoms: Pupils constricted or dilated, Heart rate fast or slow, Mental status agitated or depressed, Seizures, coma, BP high or low, Skin dry or moist, Body temperature alterations, Nausea, vomiting, diarrhea, abdominal pain

History may help clarify chief complaint. Ask patient/bystanders what patient may have taken, Establish ingestion time, Ask if pills were taken at once or more and more at repeated intervals, Ask the amount ingested, Possible alterations in consciousness

Perform physical examination: Note positive/negative findings: Pupil size, Skin condition, Presence/absence of breath odors

Types of ingested poisons

Sedative-hypnotics & anti-anxiety agents. Commonly prescribed

Sedatives – calm, reduce activity and excitement and Hypnotics - induce sleep. Toxic effects: Resp depression, Mental status depression

Opioids: CNS depressant, Alter pain perception, Overdose signs: Reduced respirations, Reduced mental status, Pinpoint pupils

Stimulants: Amphetamines, Methylphenidate, MDMA, Cocaine, PCP. Overdose signs: Increased HR, Increased BP, Chest pain, Anxiety, Delirium, Paranoia, Psychotic & violent behavior, Sudden death from acute cardiac dysrhythmia. Overdose can cause: Myocardial infarction, Bleeding in brain, Convulsions, Coma, respiratory depression

Alcohol: Most frequently abused drug, Depressant effect in high doses. It Slows reflexes, Suppresses inhibitions, Causes uncoordinated movements, Causes unpredictable behavior, Acute intoxication can be lethal. Patient may choke on vomit

Withdrawal causes DTs or Tremors, Weakness, Nausea, Hallucinations, Seizures, Cardiovascular collapse, Death

Chronic alcoholic Physical findings: Slender extremities with distended abdomen, Bruises, Jaundice from failing liver, Ingested Poisons

Management: Treat symptomatically, Dress open wounds, Administer O₂ if short of breath, Transport

Prescription drugs: Suicidal patients take any available medications. Circulatory & respiratory drugs cause wide range of symptoms like

Alterations in heart rate, rhythm, BP changes, Dysrhythmias

Analgesics: OTC pain relievers widely available, often used, Few early symptoms present after overdose, Aspirin overdose, Acetaminophen overdose

Patient should receive further evaluation

Commercial & industrial products: Ingestion of hydrocarbons, caustics, insecticides, household products, Caustics like Acids and Alkalis

Dilute, Do not induce vomiting, Follow local protocols

Methanol & ethylene glycol: Initially cause signs of mild inebriation/no findings, Left untreated, can lead to coma, death

Ethylene glycol (antifreeze) and Antidote is ethyl Alcohol

Methanol & ethylene glycol Ingestion Causes severe acid formation in blood when products break down

To delay effects, administer ethyl alcohol, Patient may hyperventilate, Need hospital care and possible dialysis

Insecticides Contain organophosphates: Overstimulation of secretions, Bronchoconstriction, Muscle weakness, In excess, death by respiratory muscle paralysis or pulmonary oversecretion and bronchoconstriction

Outpouring of secretions from most body openings, includes (SLUDGE): Salivation, Lacrimation, Urination, Diarrhea, GI distress, Emesis

Findings: Small pupils, Low HR, Respiratory distress, Antidote (In WMD situations, auto-injectors by EMTs) Atropine, Pralidoxime, Valium

Prehospital treatment: O₂, Ventilatory support, Rapid transport, May be absorbed through skin, Remove contaminated clothing, Flush skin

Food poisoning Causes: Bacteria, Toxins produced by bacteria, Viruses, Improperly cooked or canned food, Fecal bacteria by food handlers

Symptoms: Abdominal pain, Nausea, Vomiting, Diarrhea

Rescue considerations & precautions: Always approach with consideration of safety, Avoid inhaling fumes, Only trained rescuers enter contaminated area or closed space, Victims should be moved from toxic environment to fresh air ASAP, Ventilatory support, Humidified supplemental O₂

Carbon monoxide is a Lethal & poisonous gas that is colorless, odorless, tasteless

Management: 100% O₂, In severe cases, hyperbaric O₂ treatment

Poisonous gases: Possible asphyxiation/death, Simple asphyxiates, CO₂, Small hydrocarbon molecules

Chemical asphyxiates Attach to molecules in body essential to respiration like Carbon monoxide, Cyanide, Hydrogen sulfide

Irritant gases: Causes inflammatory damage to airway, bronchoconstriction, Most soluble agents (ammonia, sulfur dioxide, hydrogen chloride react almost immediately, Low-solubility agents (phosgene, nitrogen oxides) are less likely to react immediately

Absorbed Poisons: Skin damaged by corrosive, caustic agents, Causes severe chemical burns

Findings: History of exposure, Liquid or powder on patient's skin, Burns, Itching, Irritation, Redness

Skin damaged by corrosive, caustic agents, severe chemical burns. Remove contaminated clothing, Flood skin, then wash with soap and water, Irrigate eyes with water for more than 20 min; continue en route, Call PCC, Wear PPE

Injected Poisons Cause most rapid onset of drug effects Often self-administered overdoses. Bites, stings result in venom poisoning

Legal/illegal drugs are usually Repeated self-administration and they build up a Tolerance and Dependency on the drug

Management: Maintain open airway, Provide ventilation & O₂, Prevent further absorption, Depends on exposure type

Prevent further absorption:

Activated charcoal: Absorbent material that binds most toxins (not Tylenol), Keeps toxins in GI tract until eliminated, Dose: 1 g/kg body weight,

Premixed is thick, soup like slurry, Sweeteners used for children, No harm if patient can swallow & can protect airway

Induction of vomiting not recommended, except for plant ingestion and Contraindicated for certain drugs/poisons or patients

General Management

Treat signs & symptoms; Few poisons have antidotes available, Counteracts effects of poison, Provide supportive care, Transport. If unconscious/deteriorating mental status then Protect airway, continuously assess for respiratory support, Place in recovery position

Environmental Emergencies

Thermoregulation:

Range of normal central core temperature is 96.4°F to 99.8°F (35.8°C to 37.7°C). Strenuous exercise is 104°F (40°C), Body at rest is 96.4°F (35.8°C)

Hypothalamus: Normal metabolism gives off heat as a by-product, Regulates production/conservation of heat/heat loss, Heat distributed throughout body by cardiovascular system/lost through skin

Core temperature: Body core is Temperature within the Skull, Thorax, Abdominal-pelvic cavities. Body's regulatory processes maintain this temperature within narrow limits. Regions of body's shell have different temperatures as distance from heart/trunk increases.

Heat production: All metabolic processes within body generate heat.

Basal metabolism: Provides constant supply of heat. Metabolic rate can be increased by hormones under central nervous system

Heat Loss: The body can lose heat in 5 different mechanisms:

Radiation: Transfer of heat in form of infrared heat rays

Conduction: Transfer heat to objects in direct contact with body. Influenced by heat transfer properties of material in direct contact with body

Convection: Heat carried away by air currents

Evaporation: Moisture vaporizes on body's surface. depends on: Temperature, Movement of air, Humidity, Wind current important on humid day,

Breathing Inhaled air – heated/cooled to body temperature

Mechanisms of Control:

Cardiovascular system Brings heated blood from body core to skin & extremities. If more heat must be lost then Skin vessels dilate, Increase in cardiac output

If heat must be conserved, then Skin vessels vasoconstrict. Vasodilation/vasoconstriction of skin's blood vessels result in great changes in blood flow through skin

Cold Emergencies

Physiologic response to cold is Faced with cold, body's thermoregulatory centers respond by increasing heat production & decreasing heat loss

Early response to cold: Increase in metabolic rate to generate more heat, Vasoconstriction to reduce heat loss, Shivering occurs if these measures are inadequate. Shivering occurs because Involuntary contraction of small groups of muscles

Signs that CNS is affected: Amnesia, Slurred speech, AMS

Hypothermia: Cold exposure

Subacute exposure: Exposure to cold air results in longer survival times than submersion in water of the same temperature

Chronic exposure: Hypothermia, Disease & drug intoxication affect outcome, Shock can compromise heat production and compensatory actions

Mild hypothermia (89.6°F to 95°F; 32°C to 35°C)

Earliest stage of hypothermia: Pale skin, Shivering, Difficulty in speech/movement, Amnesia, Vital signs may be normal

Moderate hypothermia (80.6°F to 89.6°F; 27°C to 32°C)

Muscular rigidity, Gradual loss of voluntary motion, Cardiac output drops, Pulse/respirations depressed, Pupils dilate, Skin pale/cyanotic, Pulse irregular, Ventricular fibrillation may develop when core temperature reaches 86 degrees F

Severe hypothermia (less than 80.6°F; less than 27°C)

Cerebral blood flow is one third normal, Unresponsive to pain, Cardiac output greatly depressed, Significant hypotension, Cardiac arrest

Local cold injuries: Tend to occur in exposed extremities, Localized, sharply demarcated, Gradually progress from superficial to deep with continued exposure,

Rewarming causes marked vasodilation of the area

Frostnip: Reversible cold injury caused by intense vasoconstriction, Warmed by: Applying firm pressure with warm body part Blowing warm breath

Superficial frostbite: Freezing of water within upper layers of skin, Thawing

Deep frostbite: Freezing extends throughout dermis, Can involve subcutaneous tissues, muscle, tendons, neurovascular structures, bone

Management of frostbite: Well-controlled, rapid rewarming, Protect from further heat loss, Insulate with layers of clothing/blankets, Remove wet clothes, Do not break blisters, cover with sterile dressings, Separate fingers/toes with folded dressings, Do not allow patient to walk on affected lower extremity, Administer supplemental O₂, Assess patient for hypothermia/other injuries, Prepare for evacuation from scene

Wilderness situations: Rapid rewarming may be advisable, Best if walk attempt is made on frozen extremity, not on a thawed or partially one

Rapid rewarming: Immerse affected part into basin of water large enough to accommodate part without it touching walls of container, Preheat water temperature to 105°F (40.6°C), Maintain water temperature, Keep water circulating, Anticipate patient will feel pain, Dress area with sterile dressings, Protect thawed part from refreezing. Determined by Time required to transport patient and Degree of hypothermia

Prehospital management: Reduce further heat loss, Transport patient rapidly/gently, Avoid maneuvers that may precipitate dysrhythmias/ventricular fibrillation. CPR initiated, continue until patient is rewarmed

Active rewarming techniques Application of heat internally/externally, Internal techniques applied in hospital. In field Warm/humidified oxygen, Application of local heat to large superficial vessels, Warm fluids containing sugar to conscious patient capable of drinking

Transport: Undertaken as soon as possible, Handle gently, Rough ride should be avoided

Resuscitation techniques: Supplemental O₂ should be given, Ventilatory assistance, Avoid hyperventilation, Avoid stimulating gag reflex, Assessment of pulses must be undertaken before cardiac compressions initiated, Assess pulse before CPR, Arrests, attach automated external defibrillator (AED), Shock, provide one shock/continue CPR, Temperature below 86°F (30°C), withhold further shocks until temperature raised

Trench foot or immersion foot Prolonged exposure (10 to 12 hours) to above-freezing temperatures & dampness Causes damage to small vessels/nerves/occurs in stages: Vasoconstriction, Followed by increased circulation, Ulcers, gangrene may follow

Management: Keep extremity warm, dry, Protect from weight bearing/further injury

Heat Emergencies

General types of heat-related conditions & heat related emergencies: Heat rash, Heat cramps, Heat exhaustion, Heat syncope, Heat stroke

Heat rash

Red rash with small bumps, Caused by blocked sweat glands, More common in young persons, Not emergency, but can interfere with body's ability to compensate for heat production

Heat cramps: Painful muscular contractions of heavily exercised muscles, May be induced during excessive exercise or hard work

Signs & symptom: muscle cramping in heavily used muscles during or immediately after exertion, Usually experience period of excessive sweating

Management Move patient to cooler environment, Replace fluid and electrolyte losses with electrolyte fluid solution or water, Stretch cramp

Heat Exhaustion: compensated as the body is still trying to cool itself down.

Signs & symptoms: Hot environment, Period of recent exertion, Moist skin, Body temperature elevated, Weakness or exhaustion, Dizziness, Faintness, Nausea, Headache, Skin gray/cold/pink

Management of heat exhaustion: Move to cooler environment, Modest amounts of fluid – orally or intravenously, Loosening/removing clothing, Supine

Heat syncope: Transient loss consciousness Blood vessels dilating compensate excessive heat

Signs & symptoms: History of high temperature exposure & report short loss of consciousness, Awake, but weak & dizzy on standing, Hot & diaphoretic, Pulse rate increased, Blood pressure lower than normal

Management of heat syncope: Keep patient cool, Supine position, Administer O₂ as needed, Transport for further evaluation

Heat stroke: "decompensated" Complete failure of thermoregulatory system Results in extreme increases in core body temperature & damage to cells, as well as changes in mental status. Characterized by hot, dry skin signaling importance of evaporation, Life-threatening emergency, Mortality rate is 80%

Signs & symptoms of heat stroke: AMS ranging from confusion to coma, High body temperature, Hot, dry skin, Moist skin at time of collapse, Skin pink or flushed, may appear ashen, Increased heart, respiratory rate, Hyposensitive, Seizures

Management of heat stroke Lower body temperature, highest priority, Apply ice packs to large superficial blood vessels, Provide O₂, Rapid transport

Stop cooling when temperature reaches 102°F (38.8°C)

Drowning & Submersion Episodes

Drowning Approximately 4000 people drown in United States each year, Respiratory impairment from submersion or immersion in liquid medium, Major

problem: lack of O₂, Hypoxia results in unconsciousness, Time to cardiac arrest varies, particularly in cold water, Patients benefit from mammalian diving reflex

Management of submersion episodes: Unresponsive, breathing adequately then Place patient in recovery position & Administer supplemental oxygen

Breathing inadequately then Establish patent airway and Administer high-concentrated O₂. Water in upper airway should be removed by drainage or use of suction. Occasionally, water swallowed during submersion episode. No pulse felt then Initiate cardiac compressions

Cardiac arrest: Place patient on dry surface Towel-dry chest wall before attaching electrode pads of AED

Spinal injury suspected Remove from water with alignment of spine maintained, float Long spine board under Jaw thrust without head tilt maneuver

Animal Bites & Stings

Brown recluse spider: Bite can cause local necrosis around bite, Venom causes local pain/spreads to surrounding skin, Center darkens, Surrounding area blanches, Outermost ring turns reddish, Systemic reaction

Black widow spider: Venom contains neurotoxin, Can cause weakness and respiratory depression, Antivenin available for severe cases, Small children and debilitated adults are most susceptible to severe consequences, Immobilize extremity

Fire ants: Can inflict multiple stings, Sting can cause small, circumscribed elevated lesion, produces pus in 6 to 24 hours, Care is supportive

Ticks: Small parasite that lives off blood of mammals & birds, Attach to host by harpoon type structure at mouth, Responsible for spread of many diseases, Treatment supportive, Do not remove tick, Assess patient for signs of transmitted disease, Muscle aches, Headache

Scorpions and tarantulas: Cause local pain but rarely fatal, Unpleasant tingling feelings at site and at distant sites, Problems with vision and swallowing, Slurred speech, Excess salivation, Involuntary jerking and shaking, Prehospital care supportive, Antivenin is sometimes used in severe cases

Bees and wasps: Stings painful, Local irritation, Red, inflamed appearance, Systemic allergies and anaphylactic reaction must be treated aggressively

Snakebite: Pit vipers: Causes local necrosis, Definitive care requires use of antivenin, Do not contain venom at bite site

Recognition: Fang marks at bite site, Fangs inject venom, Swelling, Pain & redness

Coral snakes: Causes no local necrosis, Nervous system is affected when poison is absorbed, Treat by delaying absorption

Recognition: Found in southern United States, Distinguished by red, yellow, & black bands, Tiny fangs that are close together, Drop of blood expressed after envenomation, Often hold onto & "chews" victims for few seconds, Early signs and symptoms are minimal redness & swelling

Management: Have patient rest, Remove jewelry, Immobilize extremity, Swelling present, make small mark at its edge, Transport patient to closest hospital able to care for snakebites, Coral snake bites, application of loose elastic bandage over/around bite site, Follow local protocols

Marine animals: Sea animals can cause stings and punctures

Treatment: Flood affected area with sea water, Wash with acetic acid or isopropyl alcohol, Apply shaving cream, sand or talcum powder to area, then scrape off, Avoid washing area with fresh water

Punctures Treatment: Immobilize, Soak in water as hot as patient can tolerate for 30 to 90 minutes, Avoid water that could cause heat injury, Toxin should be inactivated by hot water

Diving Emergencies: Incidence 9 million certified divers in United States, 900 to 1000 dive-related injuries/year, 90 dive-related deaths/year

Risk factors Divers not properly trained or certified, Poor shape, Not allowing enough time between dives, Use of drugs or alcohol

Physiology Most diving injuries are associated with pressure changes occurring as diver descends & ascends

Boyle's law: Ears "pop" because gases in ear expand

Henry's law: As body is exposed to higher pressures, more of the gases in the body will dissolve and be absorbed, resulting in toxic levels

Dalton's law: Ratio of gases within body stays the same as pressure increases

Dybarism: Generalized term - physiologic changes seen when person exposed to pressure changes. Areas of body filled with air

Hollow organs & lungs have greatest potential to be affected As gases contract & expand, structures can be stretched or can collapse

Decompression sickness: Body descend to depths, gases in body dissolve, Diver ascends too quickly, gases form bubbles

Signs range from Pain & itching, Shortness of breath, Shock, Death

Treatment: Symptomatic, Transport to hospital with hyperbaric oxygen

Barotrauma: Air-filled chambers most susceptible to pressure changes, Diver ascends too quickly, Pressure in ears may increase, causing rupture

Pressure in lungs may increase, causing pneumothorax

Arterial gas embolism: Lungs damaged during ascent, Air may be drawn into arterial circulatory system,

Signs: Shortness of breath, Seizure, Paralysis, Weakness

Nitrogen narcosis: "Raptures of the deep", Diver descends, nitrogen is affected, Dissolves in bloodstream, Works as narcotic drug, May act illogically

Altitude Illness: Incidence Seen in men and women equally, Less severe forms, Acute mountain sickness, High-altitude pulmonary edema, Altitude Illness

Physiology: Occurs when rapidly ascending to higher altitude, At higher altitudes, there is less atmospheric pressure which can affect pressure gradients within body

Types

High-altitude cerebral edema (HACE): Swelling of brain following rapid ascent to altitude, Signs can mimic stroke

High-altitude pulmonary edema (HAPE): Fluid pushed into alveolar spaces as person ascends rapidly to high altitude, Life-threatening situation

Acute mountain sickness (AMS): Not as severe as HAPE or HACE, Can resemble flu, Altitude Illness

Treatment: Similar for all altitude illness, Airway must be monitored, controlled, High-flow O₂, Suction airway adjuncts, bring patient to lower altitude

Bleeding and Shock

Trauma - leading cause of death in United States for persons between 1 and 44 yrs. Loss of blood volume accounts for many of these deaths

Anatomy & Physiology

3 major components of circulatory system: Blood, Heart, Blood vessels. Components function together to perfuse body with blood

Effects of epinephrine: Prepares body to meet many challenges ("fight/flight" reaction), Also occurs when individual is injured and severely bleeding, is in respiratory distress, or is severely ill, Cardiac output increased, Blood flow to brain increased, Pupils dilate, Blood flow redistributed, Respiratory rate increases, May not elevate BP, Increased cardiac output, adjusts tone of blood vessels, Redistribution of blood

External Bleeding: Severity of blood loss Depletes RBCs Hemoglobin, necessary to carry O₂, Blood volume, necessary to fill vascular space, Platelets, clotting factors, necessary to stop bleeding

Severity of blood loss: Sudden blood loss

1 L (1000 mL) in adult, ½ L (500 mL) in child, 100 to 200 mL in infant is considered serious

Severity based on signs, symptoms & general impression of amount of blood loss

Left untreated, individuals who lose ½ blood volume experience circulatory arrest & death

Earliest cause of shock & death in bleeding patient

Normally a person has 3 to 4 times amount of RBCs and hemoglobin necessary to sustain life

Many patients with chronic diseases live with 1/2 normal levels of hemoglobin

Anemic – Low supply of hemoglobin

External Bleeding: Types of bleeding are Artery (Arterial Spurt), Vein (Venous Flow), Capillary (Capillary Ooze)

Types of bleeding

Color: Recognizing types of bleeding is aided by color flowing from wound

Location: External veins are more superficial than arteries, Arteries run deeper in body and along bony surfaces

Clotting: Normally begins 4 to 6 minutes after injury occurs, Capillaries clot faster, Partially severed arteries are least likely to clot; high pressure of blood flowing through

Control of bleeding

Direct pressure: Apply sterile dressing to wound, Compress bleeding vessels

Pressure bandage: Apply once bleeding has been controlled with direct pressure; allows attention to other tasks

Elevation: Controls bleeding in extremities, use in conjunction with direct pressure

Tourniquets: No blood can flow beyond tourniquet, BP cuff, inflated above systolic blood pressure, can be used, Place proximal to wound, do not apply directly over joint, Stops blood flow, starving distal tissue of O₂, Pressure of tourniquet transmitted to nerves

Special areas of bleeding: Bleeding from nose and mouth deserves special consideration to ensure blood stays out of airway

Nosebleeds (epistaxis) can result from: Skull trauma, Digital trauma, Medical conditions

Nosebleeds can be serious enough to cause severe blood loss. Most nosebleeds arise from anterior section of nose

Control bleeding: Direct pressure both sides of nostrils, Have patient sit & lean forward to reduce chance of aspiration, Hold at least 5 minutes, so clotting can occur

Skull fractures sometimes accompanied by bleeding from ears or nose: Discharge may be blood, mixed with cerebrospinal fluid (CSF), Do not attempt to stop bleeding, Use loose sterile dressing to prevent entry of outside debris

Internal Bleeding

Signs: Vomiting blood, Heavy vaginal or rectal bleeding, Dark, tarry stools, Painful swelling of limb, Rigid abdomen

Skull fractures: Rarely significant bleeding within skull; cranium is nonexpandable space, Exceptions are open wounds or skull fractures in infants

Medical conditions: Stomach and duodenum ulcers, History of abdominal aneurysm, Ruptured ectopic pregnancy

Potential sites of hidden blood loss

Hemothorax: up to 3 liters in one side of thorax

Abdomen: up to 3 liters

Femur: up to 2 liters

Pelvis: up to 3 liters

Skull: infants hold more than adults

Prehospital management: Recognize existence, Maintain oxygenation and ventilation, Control external bleeding, Rapid transport, Watch S/S shock

Shock: Failure of circulatory system to adequately perfuse and oxygenate body tissues. Caused by disruption of any components of circulatory system, Onset can be immediate or delayed, Early recognition is important, Be familiar with signs/symptoms, Ability to assess shock is aided by knowledge of compensatory mechanisms body uses to survive

Classification of shock: Cardiovascular system is composed of: Heart, blood volume, Vascular system

Cardiogenic shock: Heart or pump failure, Most common cause is myocardial infarction (MI), Decreased cardiac output caused by abnormal heart rhythms. Pump failure effects seen on both arterial and venous sides of circulation, Distended neck veins result from systemic side of circulation, Pulmonary side back up evidenced by fluid in lungs

Hypovolemic shock: Caused by low blood volume, Most life-threatening cause is severe and rapid bleeding, or hemorrhage (hemorrhagic shock)

Signs & symptoms of blood loss, Dynamic changes to circulatory system, Degree determines type of compensatory mechanisms body uses to maintain blood flow: Constriction of veins, Constriction of arteries, Increased heart rate, Increased rate of breathing

Blood loss – 10% to 15%

First response, constriction of circular muscles in venous system, Veins change space blood must occupy to compensate for blood volume loss, No signs or symptoms may be present, Most difficult to evaluate

Blood loss - up to 30%

Constriction of veins insufficient to compensate and maintain perfusion, Less blood returns to heart, cardiac output decreases; less blood pumped out with each beat, Body senses imminent fall in BP, BP is maintained within normal range, signs of epinephrine release are evident

Blood loss - up to 30%

Patient further stressed by attempting to sit or stand from lying position; feels weaker, faint, or dizzy and must lie down

Capillary refilling time useful; helps gauge blood loss, Do not allow to drink fluid, Normal BP when supine misleading

Blood loss – 30% to 45%

Compensatory mechanisms working to maximum capacity, blood return to heart falls, Mental status deteriorating, Gasp for air, Heart starts to fail, BP is falling despite heart's efforts, Heart rate slows as shock progresses, Patient still has more than ½ the normal hemoglobin, Sudden loss of volume is critical factor in acute hemorrhage

Blood loss greater than 45%

Circulatory system collapses, Constriction of venous and arterial vessels, Patient becomes hypotensive, constricting muscles in vascular tree are less perfused, Muscle become exhausted, vessels dilate, Decrease in BP results in total circulatory collapse then cardiac arrest, Hospital intervention within minutes or death is certain

Infants & children: Can maintain their blood pressure until blood volume is depleted by more than one half, Young healthy hearts can compensate even after extensive bleeding, When blood pressure does decrease; they may decompensate rapidly

Vasodilatory shock: Circulatory system fails, Anaphylaxis & spinal injury, Psychogenic shock, Septic shock

Management: After attention to ABCs, treat for shock

High concentration supplemental O₂, Splint bone or joint injury, Maintain body temperature with blankets, Many patients with hypovolemic shock can be resuscitated with timely treatment, Bring patients to definitive therapy ASAP

Pneumatic antishock garment (PASG)

Indications

May be used as a pressure splint to help control bleeding in massive soft tissue injuries to lower extremity, Severe hypovolemic shock (systolic pressure less than 50 mm Hg)/palpable pulse with no measurable BP, May be used if the source of bleeding in pelvis or abdomen, May help with bleeding from abdominal aortic aneurysm

Contraindications

Penetrating chest injuries, Diaphragm rupture, Cardiac tamponade, Significant chest injury or abnormal breath sounds, Cardiac shock, Acute MI, Pulmonary edema, Conditions involving abdomen

Soft Tissue Injuries: Skin, Subcutaneous layer of fat, Connective tissue beneath the skin, Skeletal muscles, Tendons, Ligaments

Injuries are classified as: Open – skin is broken, Closed – Skin remains intact

Anatomy & Physiology

Skin: Largest organ, Provides protective covering & insulation, Separates internal from external environment, Barrier to infection and loss of body fluids

Major layers:

Epidermis: Surface, outermost layer, Avascular

Dermis: Dense connective tissue that contains: Nerves, Blood vessels, Sweat glands, Sebaceous glands, Hair follicles. Skin grafting is here

Subcutaneous tissue: Layer of fat and connective tissue, Serves as body insulator, Fascia

Mucous Membranes: Lines internal surface of the body, Rich in mucus glands

Wounds

Closed wounds: Result of blunt force, Do not break integrity of skin

Bruise/contusion: Blood vessels leak or rupture from blunt or compression force, May be accompanied by swelling from leakage or plasma into injured area

Ecchymosis: Blood leakage from injured vessels, Visible just under skin, Black-blue area

Hematoma: Blood collects in pocket beneath skin, Tumor or swelling containing blood

Open wounds: Skin surface broken,

Abrasion: Scraping of surface of skin or mucous membrane, May damage superficial capillaries, No significant blood loss, Subject to infection

Laceration: Tearing of skin or other soft tissues, Result from blunt tearing force or sharp object, Extent of tissue damage dependent on mechanism of injury, Severe bleeding possible

Puncture, penetrations: Occurs when sharp instrument is driven through the skin's outer layer, Punctures can be deceiving, Little external bleeding, but may have severe internal bleeding

Amputations: Cutting away from the body of a limb or protruding structure, Can be caused by sharp or crushing forces, Amputated part has no blood supply, Bleeding massive/limited

Crush injury: May result in both open and closed wounds, Result of severe compressing force that damages the soft tissues and underlying structures

Wound management: Obtain history, Life-threatening conditions to ABCs take priority, For projectile injuries, look for exit wound, If loss of function, consider damage to bones and muscles or nerves and vessels, Check for neurovascular function distal to injury, Record findings

Bleeding control: 1st expose wound, Control bleeding through: Direct pressure and Elevation, Tourniquet application

Infection: All open wounds are subject to infection, Sterile dressings applied when possible, Superficial abrasions can be washed gently with sterile saline solution before dressing is applied, Abrasions washed gently with sterile saline solution/sterile water before dressing

Special considerations

Chest and abdominal injuries: Require special attention because of the major organs that lie within, Wounds through chest wall Require airtight, occlusive dressing

Abdominal wounds with exposed organs (evisceration): Can dry out and be damaged when exposed to air for an extended period Cover with moist, sterile dressing

Amputations, avulsions: Avulsed portion of skin may be reattached to cover an open wound, Parts detached from body remain viable for a few hours when left at room temperature, If cooled, can be viable for up to 18 hours

Impalement injury: Stabilize object with bulky dressings, Remove object if it impedes with: CPR and Airway compromise Identify available resources when special rescue techniques needed

Neck wounds: May lead to air embolism when large veins are torn, Cover with occlusive, airtight dressing, Transport in supine or head-down position to reduce chance of air embolism, When torn/lacerated, bleeding is usually severe because the neck is highly vascular

Dressings: Any material that covers wounds, Prevent further contamination, Bleeding control, Basic dressing is sterile gauze

Bandages: Material to secure dressing in place, Provides pressure to help in bleeding control, Tight enough to control bleeding but must not cut off circulation

Facial Injuries

Face, neck: 1st concern is airway, Facial bones give structural support to the airway, Loss of their integrity can compromise airway patency

Possible airway obstructions: Bleeding, Foreign bodies, Broken teeth and dentures, Vomitus: Bleeding from face or within oral cavity should be controlled with direct pressure, Impaled objects in cheek should be removed, Do not use excessive force, Stabilize object, Position patient to allow for drainage

Eye injuries

Anterior chamber: Filled with aqueous humor, Circulating watery fluid, Specialized capillaries, Is drained and reabsorbed back into other capillaries, When drainage is obstructed, pressure builds up and causes glaucoma

Posterior chamber: Filled with vitreous humor. Firmer, gel-like fluid, Not formed or drained continuously, Cannot be lost without permanent damage, Direct pressure must never be applied to the eyeball

Management: Principles of care, Avoid pressure, Cover both eyes to limit movement, Patient's cooperation needed

Chest and Abdominal Emergencies

Thoracic & abdominal cavities Highly vascular, contain vital organs. Injury results in: Hemorrhage, Damage to organs, Death. Both cavities large enough to contain body's entire blood volume, concealing internal bleeding

Management: Application of airtight, occlusive dressings, Stabilization of multiple rib fractures, Ventilation and oxygenation, Organs may extrude (evisceration), requiring special handling, Understand importance of injuries, Learn signs of injury requiring emergency care at scene and early transport

Chest: Contained within thoracic cavity: Heart, Lungs, Great vessels, Esophagus travels through middle of thoracic cavity posterior to trachea

Rib fractures: If isolated, usually not serious emergency, Broken ribs can puncture lung or blood vessel, Fracture of lower ribs may signal injury to abdominal organs underneath, Most often the results of blunt trauma

Complaints: Increased pain with breathing when moved, To avoid pain, patient tends to reduce movement of the injured area, called "splinting", Local tenderness, crepitus can be felt

Flail chest: ≥ 2 ribs fractured in ≥ 2 places, Portion of chest wall unstable, alters mechanics of breathing, Paradoxical motion.

Depending on mechanism of injury, observe for: Paradoxical motion during breathing, Flail segment tender, movable during palpation, Underlying injury, pneumothorax, Diminished breath signs, Flail segments can range from small areas of to separation of entire sternum from anterior thorax

Management: Supplemental O₂, Paradoxical motion noticeable, Continued inadequate breathing, Positive-pressure ventilation

Traumatic asphyxia: Results from severe compression of thorax. Heart compressed; blood in veins is driven into upper thorax, neck, brain, Causes severe swelling, ecchymosis of neck and face, Discoloring, swelling, Associated injuries to heart, lungs, chest wall with or without inability to breathe are all life threatening

Management: High-concentration O₂, PPV, as needed

Pneumothorax: Collection of air in pleural space that results in lung collapse, Occurs when air enters normally closed space between linings of chest wall and lungs (visceral and parietal pleurae), Causes of pneumothorax: Blunt or penetrating trauma may puncture or damage chest wall or lung, Lung wall may spontaneously rupture, result of bleb, blisterlike defect, in lung tissue

Open pneumothorax (Sucking Chest Wound): Chest wall punctured, hole in wall stays open, Air drawn into pleural space during inspiration if it is greater than 2/3 the diameter of the trachea, Larger the hole, more serious effect on breathing, Patient with pneumothorax may complain of difficulty breathing and chest pain that is worse with breathing, Take immediate action to restore mechanics of breathing, seal open wound, Penetrating wound discovered on chest wall

Closed pneumothorax: Pneumothorax without open wound, Injury can occur when broken rib pierces lung, air enters pleural space

Tension pneumothorax: Air entering chest cavity becomes trapped within pleural space, Air enters pleural space during inspiration, cannot exit during exhalation. Open chest wounds function as 1-way valves.

Signs: Breath sounds absent on affected side, Distended neck veins, Signs of shock, such as tachycardia and hypotension, Shifting of trachea away from affected side. If signs develop after airtight dressing, remove dressing immediately, Signs developed after blunt trauma or with a spontaneous pneumothorax

Hemothorax: Blood vessel in chest cavity injured, blood accumulates in pleural space, Up to 3 liters in each side of the chest, Has a 75% mortality rate Result of penetrating or blunt trauma, bleeding can be severe enough to cause shock

Both hemothorax and pneumothorax can occur independently or in combination

Pulmonary contusion: Severe blows to chest wall resulting in bruising of lungs, Swelling, fluid backup that result within lung tissue decrease diffusion of O₂ into capillaries, May not initially be evident, it can progress during 1st hours after surgery

Pericardial tamponade: Mechanical compression of heart by large amounts fluid or blood within pericardial space, Penetrating wound to heart can cause bleeding in space between heart and its covering (pericardium), Need rapid hospital intervention

Aortic tear: Torn by deceleration forces; shearing forces tear aorta where mobile and attached portions meet, Blood loss so severe and immediate that 80% patients die at scene. Signs: Chest pain or shortness of breath, Inadequate blood flow to extremities

Abdomen: bounded by: Diaphragm superiorly, Bony pelvic cavity inferiorly, Spine posteriorly, Sides and anterior portions protected by layers of muscle

Abdominal cavity organs of digestion and excretion: Stomach, Small and large intestines, Liver, Gallbladder, Pancreas, Kidneys, Ureters, Spleen

Abdominal quadrants: UL, UR, LL, LR through umbilicus and midline of the body. Pelvic bone bleeds heavily and cause injury to pelvic organs when fractured

Peritoneum; lining of inner abdominal wall. 2 parts: Parietal & Visceral

Peritonitis is an inflammation of the Peritoneum. Kidneys and other major structures are located behind peritoneum

Abdominal pain: Transmitted by 2 pain pathways: Visceral & Somatic

“Referred” pain: Liver: Right Shoulder, Pancreas: Left Shoulder, Kidney: Flank Pain radiating to groin

Evisceration: Special circumstances requiring prehospital handling and dressing, Cover with a moist multi-trauma dressing.

Management: Definitive care should be at hospital, Immobilize spine, treat life-threatening injuries, Maintain airway, High concentration O₂, Control external bleeding, Secure penetrating objects in place, Dress open wounds, Treat for shock, Position according to need, Give nothing by mouth, may need surgery, Complete examination en route to hospital, Select hospital by local protocols for trauma center candidates

Musculoskeletal Injuries

Fracture: Break in bone continuity: Complete or Incomplete

Closed fracture: No break in skin

Open fracture: Exposed to external environment, Skin broken, Risk of infection, Cover with sterile dressing

Sprains: Ligament injury Usually result from stretching forces

Strains: Muscles/tendons injuries, Result from stretching or violent contractions

Dislocation: Displacement of bones in joint from their normal anatomic position, Stretching or tearing of the joint ligaments must take place

Signs, symptoms: Grating/crepitus Indicates bone fragments rubbing against each other, Exposed bone is a Sign of open fracture, Joint locked into position/dislocation, Can result from both direct and indirect injuries, May be associated with a fracture

Associated injuries:

Bleeding: Can be life-threatening complication of fractures, Fractures of the pelvis and femur are serious, associated with blood loss

Vascular injuries: Pinched or torn by bone fragments, Injured by same force that caused the fracture, Can go into spasm, compressed by soft swelling,

Peripheral nerve injury: Nerves injured more than arteries, Mechanisms similar to those that injure arteries can cause nerve contusion or complete disruption. Must evaluate nerve & vascular function in every case Distal to injury, Continued swelling after injury or constriction caused by tightly applied splints can cause nerve damage

Injuries to internal organs: Force can be transmitted to underlying organs, Injuries to the pelvis may injure: Bladder, Urethra, Rectum, Lower intestine Reproductive organs

Injured thorax may cause: Hemothorax, Pneumothorax, Rupture of the spleen and liver

Management: Life-threatening conditions managed 1st, Administer O₂, Splint injuries in preparation for transport or en route, Apply cold packs Elevate splinted extremity

Splinting: Goals: Reduce pain, Prevent further injury, Reduce blood loss

Injuries to the Head and Spine Emergency care goal: ensure brain viability

Majority trauma deaths result from direct injury to nervous system

Brain - control center for other vital organ systems: Respiration, Circulation, Dysfunction results in: Cardiopulmonary failure, Death

Nervous system - center for consciousness. Intellectual, emotional, behavioral functions that make up characteristics of personality, human behavior, Receives and interprets stimuli from internal & external environment, Directs & regulates other organs & tissues, Some activities are conscious; much is unconscious or involuntary. Composed of central nervous system (CNS) & peripheral nervous system (PNS)

CNS: Brain, spinal cord

Central computer: Processes sensory input from sensory nerves, Organizes responses, Transmits to body by outgoing motor nerves

Injuries to Spine: Assessment: Determine whether spinal injury exists, Determine and document level injury

Special assessment considerations:

Respirations: Injuries at or above C5, loss of intercostals, diaphragmatic breathing only

Pulse & BP: Spinal injury can alter findings, Spinal cord severed at or above upper thoracic, Sympathetic nerves control tone of vessels

Neurogenic shock/Spinal Shock, Trauma causing cord damage may cause other injuries

Priapism: Sustained penile erection, Condition explained by loss of sympathetic influence, Bladder and bowel functions altered

Immobilization

Cervical collars: Helps immobilize spine, Limit flexion, extension, lateral neck movement, Soft foam filled, rigid plastic, Proper sizing

XCollars: Cervical Splinting Device

Spine board: Essential for lifting, moving suspected spine injuries, Several varieties used

Injuries to Head

Brain injury: Hypoxia, Hypotension, Hypoglycemia, Infections, Increased ICP

Scalp wounds: Result from head injuries. Skull fractures and injury to brain may or may not be present, Scalp has numerous small blood vessels, Best controlled with direct pressure, Can bleed to death, Hypotensive

Skull fractures:

Open: Skin over fracture is not intact, allowing communication between outside environment and meninges, Increased infection risk

Closed: Skin above fracture intact

Types of skull fractures: linear, depressed, impaled object, basal

Traumatic brain injuries:

Concussion: Transient loss of consciousness or neurologic function from blow to brain, sends shock waves that temporarily disrupt brain function

Increased intracranial pressure (ICP):

Signs and symptoms: Headaches, Nausea, Vomiting, Level of consciousness may begin to deteriorate; most sensitive indicator

Children experience drowsiness, nausea, vomiting after minor head injuries

Eye & motor findings: Dilated, constricted, unequal, unresponsive

Further deterioration, may assume abnormal body positions or postures, Classic postures decorticate and decerebrate posturing if brain herniation continues. With transmission of more ICP to brainstem, centers controlling vital functions affected

Respirations: Abnormal respiratory patterns indicate damage to different levels of brain, Describe patterns during presentation to hospital personnel

Pulse & BP: Late sign of ICP; increasing BP with slow pulse, Effort to restore perfusion by drastic increase in systolic BP to overcome increased ICP
BP receptors outside head note increased BP, signal for slower heart rate, Leads to increased BP and slower pulse

Bleeding can also occur within the coverings of the brain inside the skull, exerting more pressure on brain

Epidural hematoma: Laceration of arteries along inner surface of cranium can lead to hematomas in space outside dura

Early recognition of signs, increased ICP important. Bleeding must be stopped, clot surgically evacuated, Typically present with short period of unconsciousness after blunt trauma to head. Some don't have initial LOC Death occurs if untreated, Blow itself is not cause of deterioration

Subdural hematoma: Veins rupture under dura, bleeding confined to space between dura & arachnoid membrane, Because of speed cranium hematomas cause death, early transport necessary, Hospital relies on accurate, knowledgeable record of: MOI, Initial signs/symptoms, Subsequent evaluations of status en route

Management: Body substance isolation, Ensure open airway, Adequate ventilations, Effective circulation

Airway: Ventilations Inadequate, assist with bag-mask or other ventilation device, Maintain cervical immobilization, Good ventilations ensures adequate supply of O₂ and prevents buildup of CO₂, Hypoventilation – when CO₂ level in blood increases, cerebral vessels dilate, allow less blood flow to brain. Cerebral Herniation Syndrome: PHTLS standards state mild hyperventilation, EtCO₂ titrated to 33 mm Hg

Burns: Injury cause: Thermal, Chemical, Electrical, Radiological

Skin most often injured by burns – 15% of body weight in an adult

Burns result in: Loss of temperature control, Loss of body fluids and water, Susceptibility to infection

Thermal burns: Most occur in the home from flames or scalding water. Ages 3 to 4 years: burning clothing most common source

Smoke produced by burning materials contains toxins:

Most common is CO: Colorless, Tasteless, Odorless gas, Impairs O₂ transport, Smoke inhalation

Assessment of burn injuries: Wide criteria used to assess severity: Depth, Extent, Location, Age, Respiratory involvement, Associated medical/traumatic conditions

Assessment of burn injuries: Depth of burns:

Superficial/1st-degree burns. Involve epidermis only, Skin appears reddened and is dry and warm, 1st degree burns are generally painful because the nerves in the deeper layers are left intact, Possible slight edema from congestion and dilation of the intradermal vessels, Heal spontaneously

Burns

Partial-thickness/2nd-degree burns: Common characteristic edema, blister. Blisters left intact, Color may vary, depending on depth, Extremely painful, sensitive, Deeper burns, normal/decreased sensation, Very deep, no sensation, Skin functions lost, Heal spontaneously

Full-thickness/3rd-degree burns: Involve entire thickness of epidermis, dermis, Skin charred, yellow-brown, dark red, white, translucent, No pain, nerves destroyed, Texture of skin is leathery, Skin has restricted skin movement, Heal only from margins of the wound

4th-degree burn: full thickness burn that also burns the bone.

Extent of burns

Amount of skin burned indicates severity of the burn, Calculations made according to the “rule of nines”

Always describe depth of burns in reports and communications: Do not delay transport to calculate burn severity

Location of burns

Perineum & genital prone to infection, Facial burns can involve special structures, with respiratory tract involvement

Circumferential burns involve extremities, neck, torso

Physical signs of inhalation injury

Singed nasal hairs, Sputum with black particles, Burns around mouth, nose, Hoarseness of voice, Respiratory distress

Management of burns: Stop burning:

Remove patient from burning/smoky environment, Extinguish flames with blankets or water, Remove smoldering clothing and jewelry
Pour cool, sterile water over articles of clothing that adhered to skin to stop the burning process, Use caution in applying cool, wet compresses

Treat life-threatening conditions first

Assess for airway compromise, respiratory distress signs

Stridor, Hoarseness, Use of accessory muscles, Cyanosis, Other signs of respiratory distress, Signs of inhalation injury

If evidence of inhalation injury, shock or extensive burns: Administer high-concentration supplemental O₂, Assume patient inhaled CO

Administer high-concentration O₂

Assess for associated trauma and shock caused by other injuries

Cover the wound: Sterile clean dressings/sheets, Remove rings/bracelets that may constrict, Never apply ointments, Leave blisters intact

Covering the wound often gives some pain relief, In cool environments, use blankets to insulate and maintain body temperature

Chemical burns: Sodium, potassium: Extinguish with fire extinguisher, Smother with sand, Cover with petroleum jelly

Hydrofluoric acid: Water used for irrigation, Soak dressing with Calcium chloride, Calcium gluconate, Magnesium oxide paste

Burns to eyes: Chemical damage depends on nature of chemical, duration of contact, Flush eye immediately with clean water/irrigating solution

Irrigate at least 20 minutes, Longer contact with eye, greater risk of injury, Exposure to infrared light, ultraviolet light, Burns to eyelids

Electrical burns: When electricity traverses the body, it is converted to heat that burns tissues in its path, High-voltage arcs generate intense amount of heat and can burn nearby person, Death can occur from passage of current through vital organs, EMTs must take precautions to protect self and patient

Electrical basics: Amperage, Voltage, Resistance, Conductors, Insulator, Electricity seeks to flow along path of least resistance from higher to lower potential

Electrical effects on body: Electrical current passes through body as part of circuit, Follows internal path of least resistance, Burns to soft tissues extend from superficial to full thickness burns, Longer duration of contact - greater severity of burn

Immediate life-threatening effects are Respiratory and Cardiac arrest. Lightning injuries burn skin, soft tissue

Electrical burns Assessment, management: Ensure rescuer safety. After, assess & manage life-threatening conditions, Look for cervical spine injury if falls or violent contractions have occurred. Look for fractures and splint, When assessing the skin, look for entrance and exit wounds, Cover wounds with sterile dressings, Transport

Powders/dried chemicals: Brushed off, Contaminated clothing & shoes removed before irrigation, Yellow/white phosphorus

Affected part kept submerged in water or covered with soaked dressings

Sodium, potassium: Extinguished with fire extinguisher, Smothered with sand, Covered with petroleum jelly

Hydrofluoric acid: Water used for irrigation, Soak dressing

Obstetrics and Gynecology

Gynecologic Emergencies

Vaginal bleeding: Often are pregnant, may be unaware she is pregnant

Major objectives when treating vaginal bleeding: Estimate blood loss, Treat blood loss with O₂ and positioning, BSI

Ectopic pregnancy: Occurs outside uterine cavity, Leading cause of death, May occur in: Cervix, Ovaries, Abdominal cavity
90% occur in fallopian tubes - *tubal pregnancies*

Symptoms: Begin at 4 to 6 weeks pregnant, History of amenorrhea, Positive pregnancy test result, Abdomen swollen, Patient may not tell/know she is pregnant, Bleeding usually light, Poorly localized lower abdominal pain, Pain may radiate to shoulder area and may be severe, Some vaginal or rectal pain may be present, Nausea and vomiting, Often mistaken for appendicitis. If patient has lost much blood, treat for shock if hypovolemia symptoms are present. Occasionally, cyst on ovaries ruptures. It is Life threatening

Rape: Extreme sensitivity must be used, Psychologic injuries

To preserve evidence, encourage patient not to:

Bathe, Shower, Urinate, Defecate, Douche, Brush teeth, Change clothes

Many hospitals have rape teams trained in treating rape patients, Injuries treated as needed, Preserve evidence when possible

Perineal injuries: Perineum most vascular area of body, Injuries can be painful and involve substantial blood loss

Wide range of causes: Rape, Straddling boy's bicycle, Snow skiing, Gymnastics

Lacerations or hematomas possible, Possible bladder or urethral injury with painful spilling of urine onto injured site, Control bleeding with direct pressure, Apply ice pack

Menarche: Onset of menstruation, Occurs at about age 12 to 14 yrs, Continues approximately every 28 days until age 40 to 60

Menopause: Menstruation ceases

Menstruation/menstrual cycle: Every 28 days, egg released from ovaries, In preparation to receive the egg, blood supply to uterus increases and walls thicken

If egg is fertilized, it will implant on wall of uterus, If egg is not fertilized, body discards egg, extra blood, and tissue

Pregnancy: Implantation of embryo: Occurs 7 days after fertilization in upper segment of uterus, Single cell multiplies into a sphere containing hundreds of cells, develop into placenta

Placenta: Vascular organ of pregnancy that serves as exchange area, Afterbirth, Placenta & fetal membranes after they are expelled following birth

Amniotic sac: Grows from fetal side of placenta, Completely encases baby, Is a double-layered membrane, Contains developing fetus

Amniotic fluid: 16 to 32 ounces of clear, watery liquid, Fetus floats in fluid

Meconium: When fetus is deprived of O₂, fetus' bowels empty into amniotic fluid, Greenish tinge, Alerts you that baby is or has been stressed

May cause respiratory distress if baby aspirates into lungs at birth

Umbilical cord: Provides 2-way blood flow between placenta & fetus. Contains 3 blood vessels surrounded by clear protective gelatin:

1 Umbilical vein and 2 Umbilical arteries

Physiologic changes in pregnancy

Cardiovascular changes: Plasma volume increases by up to 50%, Red blood cell volume increases by 18% to 32%, Heart rate increases 15 to 20 beats/min, BP becomes lower than normal.

Hypovolemia in pregnancy: When occurs, a self-protective measure causes constriction of the uterine arteries and redirects blood to major organs
Compensatory mechanism occurs long before changes in vital signs. Position of patient can intensify hypovolemia effects

Supine hypotension syndrome: Pregnant woman lies in supine position, Transport pregnant patient on left side

Pulmonary changes: Respiratory rate remains same or increases slightly, Tidal volume increases by 50%, O₂ consumption increased because of fetal demand

Progesterone relaxes diaphragm and causes feeling of air hunger, Administer O₂

GI changes: Progesterone has a slowing effect on the digestive tract, Rate of gastric emptying decreased and food remains in stomach for longer time, Pregnant uterus physically crowds abdominal contents, Causes some relaxation of sphincter between stomach and esophagus, Assume stomach is full, Aspiration is possible

Genitourinary changes: Urinary bladder becomes abdominal organ in 2nd & 3rd trimesters. Compression of the bladder between uterus and abdominal wall and stretching of the urethra causes: Sense of fullness, Inability to empty bladder completely, Need to urinate frequently, Changes make bladder more susceptible to injury from blunt and penetrating trauma. Inability to empty bladder may cause "burst balloon" rupture with blunt trauma

Bladder infections may cause premature labor: Flank pain, Suprapubic pain, Frequency of urination, Constant urgency to void, Increased fluid intake and antibiotics relieve premature labor caused by infection

Hormonal changes cause: Changes in mood, Spontaneous crying, Unexplained feelings of anxiety, Self-conscious about appearance, Concern for losing baby, Concern about delivery & ability to care for baby

Childbirth

Stages of labor

1st stage: Begins with first contraction, Ends when cervix is fully dilated, Powerful uterine muscles contract intermittently

Braxton Hicks contractions are false labor

Labor contractions: Timed from beginning of 1 contraction to beginning of next contraction, Towards end of 1st stage, become more painful, longer & closer together, Mother may begin to shake & shiver, Bloody show may be seen, Amniotic sac may break any time

2nd stage: "Pushing stage", Begins when cervix fully dilated, Ends with birth, Usually lasts 1+ hours with 1st baby, Pressure on the rectum by fetal head as it descends causes urge to push

3rd stage: Begins with delivery of baby, Ends with placenta delivery, Uterus greatly reduced in size, Uterine wall reduced, Placenta is squeezed off uterine wall, Uterus contracts into hard ball & slows flow of blood from open blood vessels

Assessment Questions: Focused patient history questions

Is this your 1st pregnancy? How long were previous deliveries? Did you have any problems? What time did your contractions start? Has your water broken? Do you have an urge to move your bowels? Have you had any bleeding? When is your due date? Do you have any medical problems?

Do you take any medications? Gravida/Para/Miscarriage/Abortion

Normal delivery: Assessment of patient in labor

Decide whether to transport mother to hospital or prepare for immediate delivery at the scene, Visual examination needed if the patient:, Cannot walk/talk during contractions, Is in so much pain that she cannot answer you and appears to be pushing, Complains of urge to push and tells you the baby is coming. Must provide privacy. Patient must consent to physical examination

Visual exam: Check for distention or bulging of the perineum, Inside wall of the rectum may be visible as sphincter is stretched open by pressure on perineum, Perform during contraction, Crowning, After crowning, Presenting part descends into pelvis, As presenting part fills the pelvic cavity, any fecal material in the mother's rectum is expelled

Signs/symptoms of imminent delivery: Crowning evident, Notice "bloody show", Contractions strong, Patient feels need to have bowel movement, Patient has strong urge to push and tells you the baby is coming

Managing delivery at scene: You will have little time to prepare, Lift patient onto stretcher & move into ambulance, Provides privacy, If complications occur, you are ready to transport, If you prepare for delivery & mother does not deliver within 10 minutes, transport

Preparing mother for delivery: Position mother on stretcher in semi-sitting position, Unwrap OB kit, Place 2 towels on mother's abdomen, another under mother's hip

Delivering the baby:

Head: Slowed/controlled. Apply gentle pressure on back of baby's head with 1 hand, Support perineum with other hand, If amniotic sac not yet ruptured, tear it with your fingers, Spread membranes away from baby's face. Once head is born, support with your left hand, Wipe blood/fluid away from baby's face using 4 x 4 inch gauze sponge, Use bulb syringe in right hand to suction mouth 1st, then nose before infant has a chance to take a breath. Check for loops of cord around baby's neck

Shoulders: Continue to support head as baby rotates externally to left/right

If shoulder's do not deliver spontaneously: Have mother push, Hold baby's head in each hand, Give gentle downward traction

When anterior shoulder visible: Lift head upward to deliver posterior shoulder. Once upper body is born, maintain grip around back of neck with left hand, Slide right hand along emerging body, Prepare to catch feet, Manipulations always carried out gently without twisting baby's neck. If force necessary Mother should push harder Push during contractions, force of uterus works with you

Partner should record exact time of delivery, Remove blood/mucus from newborn's face:

Use gauze. Hold baby in neutral position at level of vagina, Suction mouth/nose one more time

Cutting the cord: Hold infant at level of vagina, Clamp cord 1" from infant's abdomen, Place 2nd clamp 2" away from 1st clamp, Place infant on towel on mother's abdomen, Cut cord between 2 clamps, Examine stump of cord to ensure clamp is secure and not bleeding, Continue 3rd-stage care of mother

3rd-stage care of mother: Begins with delivery of baby, Ends with delivery of placenta, Uterus contracts every 2 to 3 minutes after birth, Placenta separates from uterine wall, Uterus assumes constant round, hard shape, Placenta slides down birth canal

Signs placenta is delivering: Placenta separates from uterine wall, Umbilical cord lengthening, Contraction of uterus into raised globular shape

Gush of blood from vagina, With signs, have mother bear down to deliver placenta

Never pull on umbilical cord/placenta

Palpate uterus: Should feel solid wall of muscle at umbilicus, If uterus fails to contract into hard ball & large amount of vaginal bleeding occurs:

Gently massage uterus with kneading motion until bleeding is minimal & uterus is firm

If uncontrolled bleeding or signs of hypovolemia: Administer O₂ to mother, Treat for shock

If placenta does not deliver within few minutes: Prepare mother for transport, Remove soiled towel from beneath her, Place sanitary pad on perineum gently, Ask patient to bring knees together & straighten legs, Cover with warm blanket, If planning to breast-feed & baby healthy, mother may breast-feed. Never leave mother alone at this time

Resuscitation & Care of Newborn

Major objectives in newborn care: Provide warmth and Continuously evaluate: Respirations, Heart rate, Color

Provide stimulation, airway, adequate ventilation through: Proper positioning, Suctioning, Administration of O₂, Positive-pressure ventilation

Provide cardiac compressions for heart rate less than 60 beats/min

If meconium-stained fluid present and baby is NOT vigorous: Thoroughly suction mouth/nose before stimulating infant to Dry baby vigorously while on mother's abdomen, discard wet towel, place on clean towel, Prevents heat loss, Stimulates respirations

After drying: Place infant in neutral position, Stimulate by rubbing infant's back, As infant cries, more fluid may be brought up from lungs

Wrap in warm towel, cover head to minimize heat loss. Chilled newborn Metabolism speeds up

Requires large amount of O₂ and glucose, Causes hypoglycemia. Brain damage may occur. O₂ depletion causes acidosis

Resuscitation, if needed, should be initiated without delay: Criteria for resuscitation evaluated in order: Respirations, Heart rate, Color

Respirations: Drying, positioning, suctioning and stimulating the newborn should take only a few seconds. Evaluate respirations

Alveoli of fetus is filled with fluid, Most fluid is forced through walls of the alveoli with 1st few breaths of life, Baby must cry vigorously

Weak, slow, or gasping respirations are not sufficient to expand and drain lungs and oxygenate infant

If baby not breathing sufficiently to expand lungs: Begin PPV with bag-mask, 100% O₂. Use clear mask Fit tightly enough to form seal over mouth/nose/chin without touching eyes

PPV in newborn: Rate 40 to 60 breaths/min, Only fingertip compression needed

If no detection of chest rise: Reposition mask, Suction mouth, Increasing force of compression on the bag is last resort

Heart rate: Listen for 6 seconds, Multiply number of beats x 10, Fewer than 100 beat/min, PPV continued for 30 sec

Less than 60 beat/min: Begin chest compressions, Accompany with PPV, After 30 sec, check heart rate, If still less than 60 beats/min, continue chest compressions & ventilations

If more than 60 beats/min but less than 100 beats/min: Discontinue chest compressions, Continue with PPV

If more than 100 beats/min: Discontinue PPV, Continue O₂

Color: Infant should be pink except slight cyanosis of hands and feet, "Pressure face" is not true cyanosis, O₂ not needed, Bluish discoloration

Crying/healthy baby, Pink body/mucous membranes

Cyanosis: Results from: Poor air exchange, Hypothermia, Blood loss

Skin tone: Blue, Pale, Mottled, Dark-skinned babies may appear gray, Mucous membranes inside mouth will be blue

Deliver O₂ close to 100% until pink, If remains cyanotic: Give 15 to 30 sec of PPV, Free-flow O₂

O₂ in high concentrations: Not harmful in short-term situation, Not needed if: Infant cries vigorously, HR more than 100 beats/min, Good color

Monitor color continuously: Major indicator of respiratory distress

Other signs of respiratory distress: Nasal flaring, Sternal retractions, Respiratory grunting

Apgar score: System used to evaluate newborn rapidly, Performed 1 min after birth; repeated 5 min

Appearance, Pulse, Grimace, Activity, Respirations. Score lower than 7 is poor. Score 8 to 10 - crying spontaneously soon after birth

Premature infant: Weighs less than 5 ½ lb, Born less than 37 wks gestation, Younger gestational age More likely baby will have respiratory/other problems

Respiratory problems occur because of insufficient pulmonary surfactant to keep lungs expanded

Maintain warm environment, Do not allow very premature babies to nurse, Handle extremely gently, Blood volume is only few ounces

Shoulder dystocia: Shoulders wedged in mother's pelvis, If gentle downward traction fails: Suction baby's mouth, Transport mother & infant immediately

Breech delivery: Buttocks lowermost in pelvis

Frank breech: Buttocks are presenting part

Limb presentation: Arm or feet enter pelvis first

Shoulder presentation: Baby lying transverse in uterus, Baby cannot be delivered vaginally

Unless entire buttocks are clearly visible and about to emerge, transport immediately, Place patient on left side with hips elevated, high O₂

Labor usually lasts longer, Buttocks do not make a good wedge to dilate the cervix, Buttocks are not as large as the head so they may emerge before the cervix is fully dilated, Large amounts of thick meconium are common, Meconium is expelled because of pressure on the baby's abdomen

Once uterus is partially emptied of baby's body in a frank breech: Placenta may separate prematurely from the uterus before the head is expelled

Cuts off baby's O₂ supply

Assistance given only after baby's body is partially delivered in a breech presentation. Woman with a baby in any other breech position should be rushed to the hospital. Have mother scoot down to the edge of the stretcher. All breech deliveries should be slow & controlled. External rotation of the shoulders must occur for the shoulders and arms to be born. Once one of the baby's armpits is visible, the body should be lifted or pulled down to deliver the arms in whatever sequence they appear. To deliver the anterior arm, apply downward traction, To deliver posterior arm, lift up the body. After shoulders and arms are delivered, body should rotate so back is again facing upward

If baby's head not delivered spontaneously, Flex baby's chin onto chest before moving head through curved plane pelvis

If baby's head is not delivered spontaneously: While supporting the baby's body on your forearm: Place fingers of your left hand into the vagina

Locate baby's mouth and place your fingers on either side of the nose, Flex baby's face by pressing on the maxilla

At the same time, apply slight pressure on the back of the baby's head with fingers of your other hand

Once the baby's head is flexed, apply gentle downward traction to complete the delivery of the head

Body should be lifted upward until the face and the rest of the head are born

If unable to accomplish breech delivery within 3 min: Transport mother to hospital, Provide an airway for the baby en route

To provide an airway: Place your hand in the vagina with your palm facing the baby's face, Form a "V" under the nose, pushing the vaginal wall away from the face, May provoke delivery of the head. If no head delivery, elevate mother's buttocks to relieve pressure on the umbilical cord. Continue to provide an airway, Administer high-concentration O₂ to the mother, Notify hospital

Possible complications: Prolapsed cord, Premature separation of the placenta, Meconium aspiration, Fractured clavicle, Nerve damage with paralysis to one or both arms, Head/neck injury

Limb presentation: Foot, leg, or arm dangle out of vagina when the cervix is only a few centimeters dilated, Position mother on her left side, Elevate her hips

Provide high-concentrated O₂, Do not attempt to replace the dangling limb

Prolapsed cord: Umbilical cord slips down past presenting part of fetus into vagina. Once prolapsed, cord may be crushed between the baby and the pelvic bones or vaginal wall, Elevate mother's hips with pillows or place her in the knee-chest position, Elevate presenting part of the baby, Administer high-concentrated O₂, Rapid transport vital, Notify hospital

Multiple births

Always call for assistance if you are expecting a multiple delivery in the field. Anticipate the need for extra equipment & personnel

Factors that make delivery more risky: More likely born premature, No idea if 2nd twin is in breech position, 1st twin may be born rapidly, but may have a long waiting period for 2nd twin. After 1st twin is born, uterus has decreased in size and the placenta may separate

If both twins are born rapidly, pass off 1st to your partner and care for the 2nd twin yourself. Will need 2 OB kits. Record times of delivery for each twin and keep track of which twin was born first. Never wait more than 10 min for 2nd twin to be born. Provide support for mother. Resuscitate babies as needed

Postpartum hemorrhage: Blood loss greater than 500 mL after delivery

Early postpartum hemorrhage: Occurs within 24 hrs after delivery. Causes: Uterine atony, Genital lacerations, Uterine rupture, Coagulation defects

Uterine inversion: Can cause massive blood loss, May be precipitated by excessive traction on cord while delivering placenta or by bearing down too hard during 2nd stage of labor. Can happen when delivery is with mother standing upright and no one to catch the baby,

Uterine prolapse, Supporting structures of uterus fail. Can occur when uterus fails to contract after delivery, Massive bleeding from the vagina is a classic symptom. Signs of shock quickly follow. On palpation, uterus is either poorly defined or resembles a soft, boggy mass, often above the level of the umbilicus. Uterus should be massaged until it becomes firm and hard. If bleeding is severe, treat for shock

Late postpartum hemorrhage: Occurs 6 to 10 days after delivery. Causes: Retained placental tissue, Infection, Coital (sexual) trauma, Rupture of episiotomy wound. Treat all cases with uterine massage and your local shock protocol. May be able to control bleeding:

Uterine massage, In perineal trauma or postdelivery wound separation, direct pressure with sanitary pad may help

Do not place packing or dressings inside the vagina

Vaginal bleeding: Possible cause: Preterm labor, Abruptio placentae, Placenta previa, Threatened abortion

Treatment: Focus is on prevention and treatment of shock, Place patient on her left side, Elevate hips with pillows to alleviate pressure on the cervix

Administer O₂, Monitor vital signs

Threatened abortion/stillbirth

Abortion/miscarriage: Loss of pregnancy before 20 wks gestation, *Stillbirth* - after 20 wks, Earliest age of viability that an infant can survive outside the womb is approximately 23 wks. Attempt resuscitation if in doubt about viability unless: Maceration exists

Signs: Loss of substantial amount of blood, Leaking of amniotic fluid in the 1st trimester

If stillbirth or abortion: Respect parents' religious requests, Be sensitive to their needs, Parents may feel guilt, might blame themselves

Treat body of stillborn with the same gentle care provided to a living infant, Wrap the baby in a blanket and, when appropriate, offer baby to the parents to see and hold

Ruptured uterus: Weakening of the uterine wall causes the uterus to split open, Women at greatest risk for uterine rupture have: Had previous cesarean birth or other uterine surgery, Multiple births, Carried >1 fetus

Signs/Symptoms: Acute abdominal pain, Once ruptured, contractions cease entirely, May be able to palpate the fetus beneath the abdominal wall, Vaginal bleeding is usually present, Signs of shock follow

Mortality rate for fetus and mother is high. Mother may have an amniotic fluid embolism. Amniotic fluid is released into maternal circulation

Resembles pulmonary embolism. Major symptoms: Dyspnea, Chest pain, Cyanosis, Shock, Rapid transport necessary

Preeclampsia & eclampsia

Preeclampsia – *toxemia* 2nd leading cause of maternal death in United States.

As toxemia worsens, seizures occur and advances into eclampsia

Symptoms: Preeclampsia: High BP, Protein in urine, Edema

Presentation: Complaints of headaches and dizziness, Blurred vision of other visual disturbances, Epigastric pain, Signs of pulmonary edema

BP increases so greatly, causes possible: Stroke, Renal failure, Abruptio placentae

Eclampsia is when the patient has a seizure. Doesn't have to be witnessed by the EMT. It may be described by family or bystanders

Care: Provide quiet, dark environment, Avoid use of siren and lights, Use soft voice; avoid unnecessary jostling or noise, Have airway suction available in case a seizure begins. If seizures occur, administer O₂, Transport in left lateral recumbent position

Trauma in pregnancy

MVCs are responsible for majority of all injuries. Injury is less severe if mother is wearing a seat belt with shoulder restraint, Sudden increase in pressure from lap belt alone can cause: Burst-balloon uterine rupture, Abruptio placentae, Fetal death

Pelvic fractures and blunt/penetrating wounds to the abdomen are usually serious. Broken ribs or pelvic bones may cause uterine lacerations

Premature labor is complication of pregnancy trauma. Uterine stimulation caused by blunt trauma may:

Precipitate labor contractions, Cause premature membrane rupture, Abruptio placentae

Fetal outcome determined by: Extent of placental abruption, Rapidity of treatment, Fetus age

Treating pregnant trauma victim: Recall physiologic changes of pregnancy, Assume stomach is full, Treating 2 patients, Prevent shock, Spinal precautions, Initial ABCs, Pregnant transport position

Infants and Children

Causes of most deaths are Preventable injuries like Motor vehicle injuries, Falls, Poisoning, Assaults, Drowning, Respiratory arrest. Also: Asthma, Trauma, Drug ingestion, Drowning, Smoke inhalation, Sudden infant death (SIDS), Infection, sepsis, meningitis, Croup, Epiglottitis, Foreign body aspiration

Pediatric cardiopulmonary arrest from Heart damage at birth, Usually follows respiratory problem, Hypoxia

Differences Between Children & Adults

Treating children: Concern for parent as well as child. Parents may feel: Anxious, Fearful, impatient

It is important to: Mobilize parents energies into constructive activities to gather history & calm the child, To elicit cooperation & support, Gain parents' confidence, Act in calm and professional manner. Understand & face your own emotional reactions to sick children. Reactions can be influenced by behavior & atmosphere encountered at scene, Tend to see children as innocent & vulnerable, Once understood, you can influence rather than participate in the emotional turmoil

Developmental differences: Approach, evaluation, & treatment must consider patient's developmental stage:

Newborn, Infant, Toddler, Preschool, School-age, Adolescent

In general: Keep child & parent together, Remain calm, Honesty required in every situation

Newborn/Neonate birth – 1 month of age

Infant – 1 to 12 months of age, Minimal language capability, Responds to facial expressions, tone of voice, Minimal "stranger anxiety", Obtain history from parents, Examine infant within sight of parents or in parent's arms, Provide warm environment, Gather information before you touch the baby, Listen to lungs first, Perform physical exam in trunk-to-head manner

Toddler: 1 to 3 years of age, May refuse to cooperate, See themselves as individuals & are assertive, Fear pain & separation from parents, Talk in soothing tone, Examine on parent's lap, Approach at eye level, If possible, do not undress the toddler all at once, Do not let child see scissors or instruments unnecessarily

Preschool child: 3 to 6 years old, Period of intensive learning, Varied levels of ability to express thoughts & feelings, Do not like being touched, Are apprehensive about separation from parents, Fear pain, Dislike clothing removed, May feel "suffocated" by face mask, May believe they are responsible for illness/injury

Preschool children: May fear blood & permanent injury, May have feelings of modesty, Are curious & communicative, If they are not in pain and you take a few moments to play, can be very cooperative, Often merge fantasy with reality. Be friendly, Talk to parents 1st. Assure child that the illness/injury is not his fault, Approach at eye level in nonthreatening manner, Offer toy, Give simple explanations, Try not to show sharp objects, Be honest. If you have to perform a procedure, wait until the last minute to explain, then do it immediately

School-age child: 6 to 12 years old, Fight between desire to be treated as child & desire to be an adult, Have many personal fears, May have feelings of modesty, Talk to child 1st. Explain what you are doing during examination & treatment

Adolescent: 12 to 18 years old, All school-age considerations true for adolescent, Want to see themselves as adults, May feel helpless and childlike, Respect their "space", Answer their questions, Respect shyness, Allow them to retain as much control as possible, Treat adolescent as an adult, Respect desire to be assessed privately

Differences Between Children & Adults

Pediatric patient better able to compensate in early phases of severe illness/injury

When compensatory mechanisms fail, condition can deteriorate rapidly

Must recognize early signs of stress and rapidly treat & transport

Airway: Smaller airways at all levels: Nasopharynx, Oropharynx, Larynx, Trachea, Bronchi, Bronchioles

Tongue is large in relation to airway so Greater potential for obstruction. Glottis is in more anterior & superior position Protected by relatively large, U-shaped epiglottis. Cricoid cartilage – narrowest part of upper airway and the Vocal cords narrowest part of adult's airway. Airway is softer and more pliable

Breathing: Interventions: Administer humidified O₂, Keep warm, PPV, Do not overventilate, Closely observe rise of chest to determine the end point of ventilation, More subject to gastric distention and air overflow into the esophagus

Circulation

Pulse rate: Decreases with age, Infant averages 130 beats/min

BP: Increases with age, Formula used to approximate lower limit SBP in children younger than 2 yrs, Always use appropriate cuff size to prevent false readings. SBP lower than 70 mm Hg with tachycardia & cool skin is an indicator of shock in children

Broselow tape used to reference normal vital signs: Measures child's size, Correlates with vital signs, CPR techniques, airway adjunct sizes

Bleeding & shock: Hypovolemic shock causes: Acute dehydration, Acute blood/fluid loss

Susceptible to less common causes of shock like Vasodilation is seen with sepsis, anaphylaxis and spinal cord shock, Tension pneumothorax, Cardiac tamponade

Possible causes of cardiogenic shock: Previous congenital heart disease, Acute infection of myocardium, Severe contusion to heart

Metabolic considerations: Keep child warm, Have higher baseline metabolic rate than adult, Need more O₂ and glucose, Consume more calories per unit of weight than adults, Expend more energy to remain warm, Intake of food & water usually decreases in sick/injured child, Fever increases metabolic rate. Infant younger than 6 mos cannot shiver in response to cold, which generates heat through muscular contraction

Neurologic differences: Infant's head is large in relation to body, More likely to sustain head injury, Can lose enough blood within cranium to cause shock. Infant & children more prone to episodes of apnea with head trauma

Management

Opening airway:

Head-tilt/chin-lift - preferred method, Degree of neck extension varied based on age, Do not hyperextend the neck of infant under 1 yr

Maintain head & neck in neutral or slightly extended position with padding under torso, Younger than 8 yrs, slight neck extension is useful

Do not hyperextend neck to avoid kinking airway

O₂ therapy & PPV: Pop-off valve. Designed to avoid barotraumas, When there is high resistance, may release before adequate volumes of air can be delivered to cause chest rise, Can be closed shut with finger or tape, or by twisting

O₂-powered breathing devices not recommended for pediatric patients, High airway pressures may develop, Causes tension pneumothorax, Possible gastric distention, Gentle pressure applied on cricoid cartilage only if aspiration is possible, Helps prevent gastric distention, Use finger pressure over cricoid cartilage and press down gently, Is enough to close off esophagus & airflow into stomach, Avoid excessive pressure, especially in infants

Common Pediatric Conditions

Respiratory disorders: Most common cause in pediatric death, Failing/failed respiratory system, Most important element of pediatric resuscitation is controlling:

Airway, Ventilation, Oxygenation

Early signs of respiratory distress include: Tachypnea, Tachycardia, Mottling of skin, Nasal flaring, Retractions, Stridor, Wheezing, Grunting

Signs of increasing respiratory distress/failure: retractions, Grunting, Increased RR & HR, AMS, Poor peripheral perfusion, Cyanosis, Lower muscle tone

Signs of imminent respiratory arrest: Cyanosis/grayish hue, Bradycardia, Shallow breathing/ apnea, Unconsciousness, Weak distal pulses, muscle tone

Upper airway: Major upper airway diseases requiring emergency attention: Croup, Epiglottitis, Choking

Distinction must be made between infectious causes and foreign body presence because management will differ

Croup: Viral infection affecting: Larynx, Trachea, Bronchi. Causes airway narrowing and Produces stridor

Signs & symptoms; Hoarseness, Low-grade fever, Cough that sounds like a barking seal, Varying degrees of inspiratory stridor,

Retractions with inspiratory effort, Often worse at night or on awakening. Most common from age 6 mos to 3 yrs,

Effective management: Humidification, Hydration, Oxygenation

Epiglottitis: Infectious swelling of epiglottis, Caused by bacterial infection, Rapid onset of 10 to 12 hrs, Usually affects children ages 2 to 7 yrs

Major signs & symptoms: High fever, Sore throat, Dysphagia (difficulty swallowing), Occasional inspiratory stridor, Drooling, Restlessness, Flushed face, Signs of dehydration. Potentially life threatening, Stimulation of the pharynx with tongue blade can cause reflex spasm, Results in total airway obstruction

Approach to management: Use gentle and calm handling, staying away from child's airway, Let child stay in parent's arms, Offer humidified O₂; if child resists, do not persist, Hold mask near airway, If cyanosis & lethargy evident – attempt PPV

Choking: Foreign body aspiration, Determine whether episode is mild or severe by assessing: LOC, Air exchange, Ability to speak or cry

Lower airway: Primary diseases: Bronchiolitis, Asthma, Pneumonia, Other infectious processes, Small foreign objects

Management: Reduce stress & exertion, Administer humidified O₂, Transport to hospital

For all pediatric patients with lower airway disease, treatment is based on: Administration of humidified O₂, Reduction of exertion & emotional stress, Transport in upright position or in a position of comfort. Pay careful attention to: Signs of respiratory failure, Need for positive-pressure breathing

Respiratory failure & respiratory arrest Immediate intervention necessary. Lifesaving steps performed as you look for the underlying cause. Key signs of respiratory failure: Cyanosis/mottling, Fast/slow RR relative to patient's age, Little/no air movement, Labored breathing & retractions

Sudden infant death syndrome (SIDS): Occurs beyond first 2 wks of life; most before 6 mos, Incidence higher in late fall & winter, Most die in their sleep, Many are in perfect health or may have had a minor respiratory infection before death

Significant risk factors: Low socioeconomic group, Adolescent mother, Infant sleeping on stomach, Drug use during pregnancy, Prematurity, Low birth weight, Poor prenatal care, Mother smoked during pregnancy. No single cause, Sleeping on back has reduced death rate

Fever: Common in children, Rapid temperature rise triggers febrile seizure, Simple virus, High fever well tolerated in absence of a serious infection, Any febrile child should be transported, Infection - major concern, not the fever, Do not cover body with tepid-/cold- or alcohol-soaked cloth

Seizures: Seizure itself is not life threatening, As long as the airway is maintained, child can tolerate a grand mal seizure of more than 20 min without permanent damage

Febrile seizure: Common during childhood, 1st sign of illness, Brief (less than 5 min), Associated with fever and tonic-clonic generalized convulsion, Patient likely to be in postictal phase when you arrive

Causes: Infections: Encephalitis, Meningitis, Roseola, Shigellosis,

Metabolic disorders: Hypoglycemia, Hypoxia, Fever, Hyponatremia, Hypocalcemia

Management of seizures: Maintaining patent airway, Administering O₂, Preventing injury, Having suction ready, Place patient on side to prevent aspiration

Trauma: Leading cause of death—ages 1 to 14, Second cause of death in infants. Prevention: Use of car seats, seat belts, & bicycle helmets significantly reduces morbidity and mortality, Educate public

CHILD ABUSE

Most children who die or are disabled from abuse have previous history of suspicious injury or suspected neglect. The younger the child, the higher the risk for abuse. Categories of child abuse: Physical abuse, Sexual abuse, Emotional mistreatment/neglect

Physical abuse: Suspicious bruising: Bruising over meaty area, Injury with pattern, Multiple bruises in various stages healing

Burn suspicion: Unusual patterns, Sharp demarcations, Genitalia

Intentional injury to the CNS: Leading cause of death and permanent morbidity, An infant can sustain subdural hematoma from being shaken, no external signs of injury, "Shaken Baby Syndrome". Any fracture is suspicious

Sexual abuse: Abuser usually known or close to the child. Signs: External genital trauma, Difficulty walking. Usually reluctant to admit anything because of fear, guilt, and unwillingness to break up family. Must take child's statement seriously

Neglect: All children entitled to: Adequate food, Clothing, Shelter, Education, medical care, Dental care, Emotional nurturing, Appropriate supervision, Failure to provide is neglect

Signs and symptoms: Lack adult supervision, Malnourished appearance, Unsafe living environment, Untreated chronic illness

Assessment: Careful observation without accusation/confrontation, Once at the hospital, relay suspicions/observations

Alert to possible abuse: Repeated calls to same address, Parents' story not consistent with injury, Changes in history, Witnesses giving contradictory histories, Parent reluctant to give history, Delay in obtaining medical attention, Timing of injury not consistent with clinical findings, Parents' response not appropriate to severity of injury, Child exhibiting inappropriate agitation, Obvious alcohol/drug use by parents, Child fearful of discussing how injury occurred, Conflicting stories, Fresh burns. Pay attention to the environment, Sanitary state of the home, Any evidence of a struggle. Determine: Time of the incident, Present witnesses, History of recent illness, Condition of child's clothing

Special Considerations: Technology Assisted Children:

Children may depend on technology & medical devices: Tracheostomy tubes are required in children because of chronic dependence on a ventilator or upper airway obstruction caused by congenital problems. If transporting child on ventilator, allow parent to maintain control of ventilator during transport

IV lines provide continuous IV therapy, medication, nutrition. Gastrostomy tube are placed directly into stomach for feeding, Shunts drain excess CSF from brain

"You are the last of a dying breed because you are the only one that makes house calls anymore. Take this opportunity and become the field practitioner you are destined to be." Dr. Raymond Fowler

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