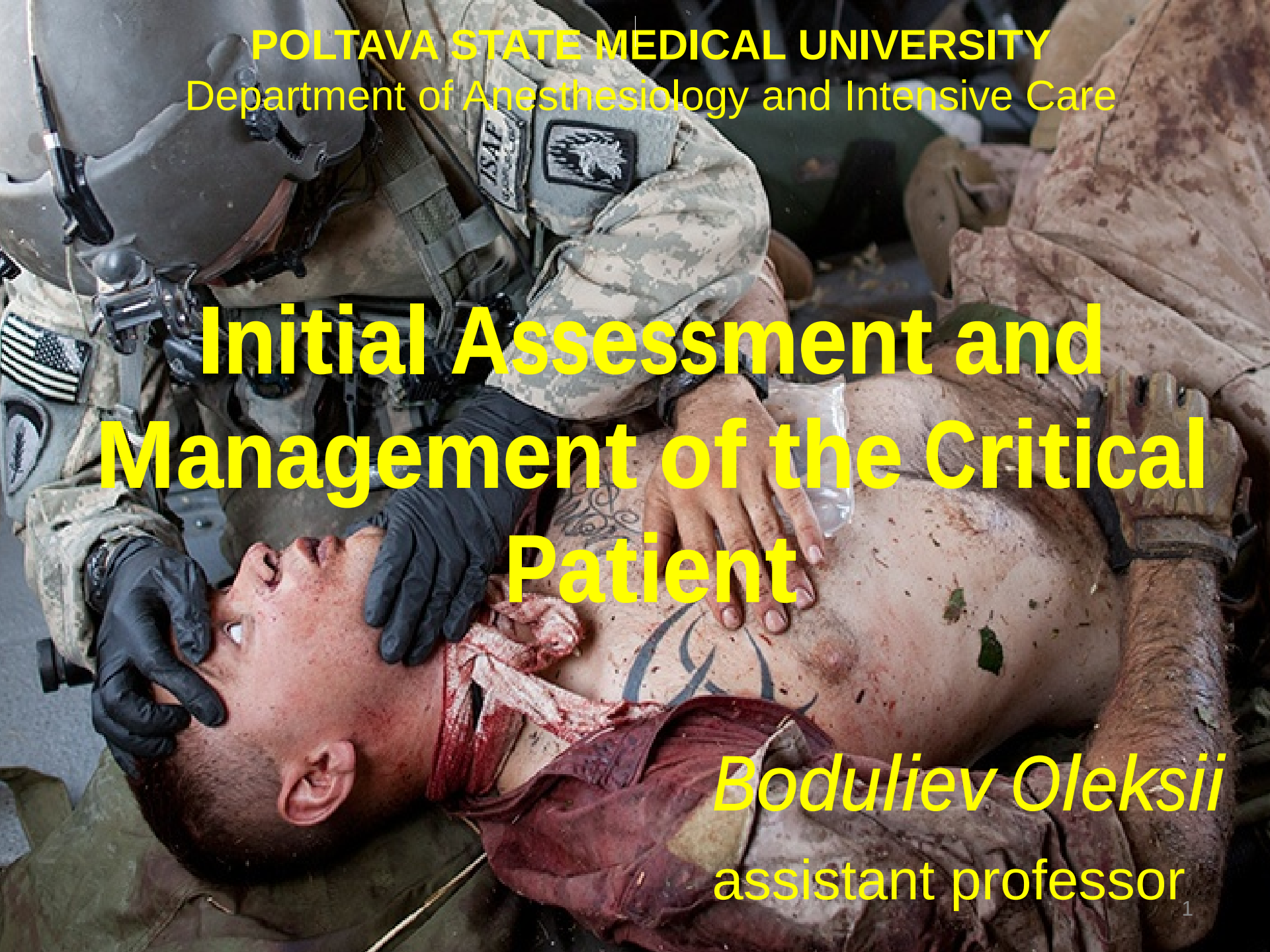
POLTAVA STATE MEDICAL UNIVERSITY
Department of Anesthesiology and Intensive Care



Initial Assessment and Management of the Critical Patient

Boduliev Oleksii
assistant professor

Plan of lecture

- Definition of primary survey
- Protection of rescuers
- Decision
- Airway and Protection of Spinal Cord
- Breathing and Ventilation
- Circulation & massive hemorrhage control
- Disability
- Exposure and Control of the Environment

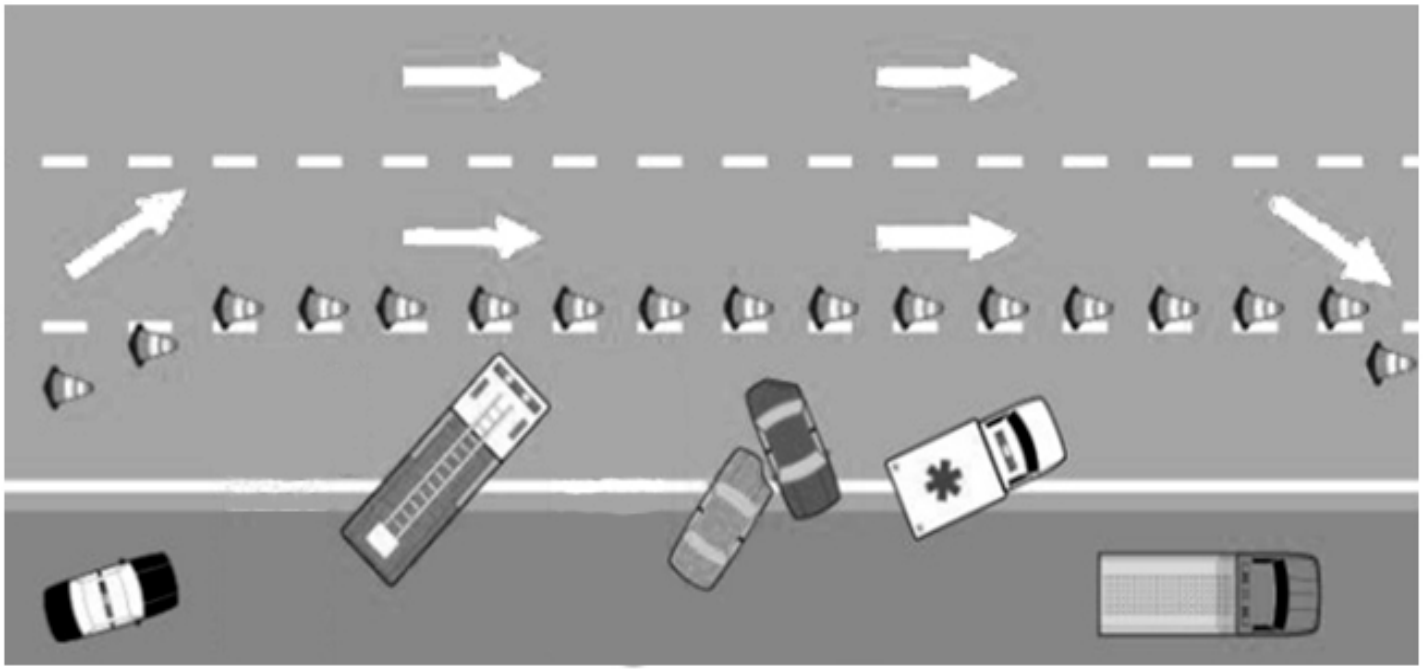
Primary Survey

- Key Principles
  - When you find a problem during the primary survey, FIX IT.
  - If the patient gets worse, restart from the beginning of the primary survey
  - Some critical patients may not progress beyond the primary survey

Primary Survey

- **P**rotection of rescuers
- **D**ecision
- **A**irway and Protection of Spinal Cord
- **B**reathing and Ventilation
- **C**irculation & massive hemorrhage control
- **D**isability
- **E**xposure and Control of the Environment

Car accident



Water accident

Water accident

Electric injury

Decision

DO NOT CPR!!!

- manifestations of biological death;
- injury incompatible with life;
- the last stage of incurable diseases;
- refusal of resuscitation

Decision

manifestations of biological death

Livor mortis

Rigor mortis

Decision

Injury incompatible with life

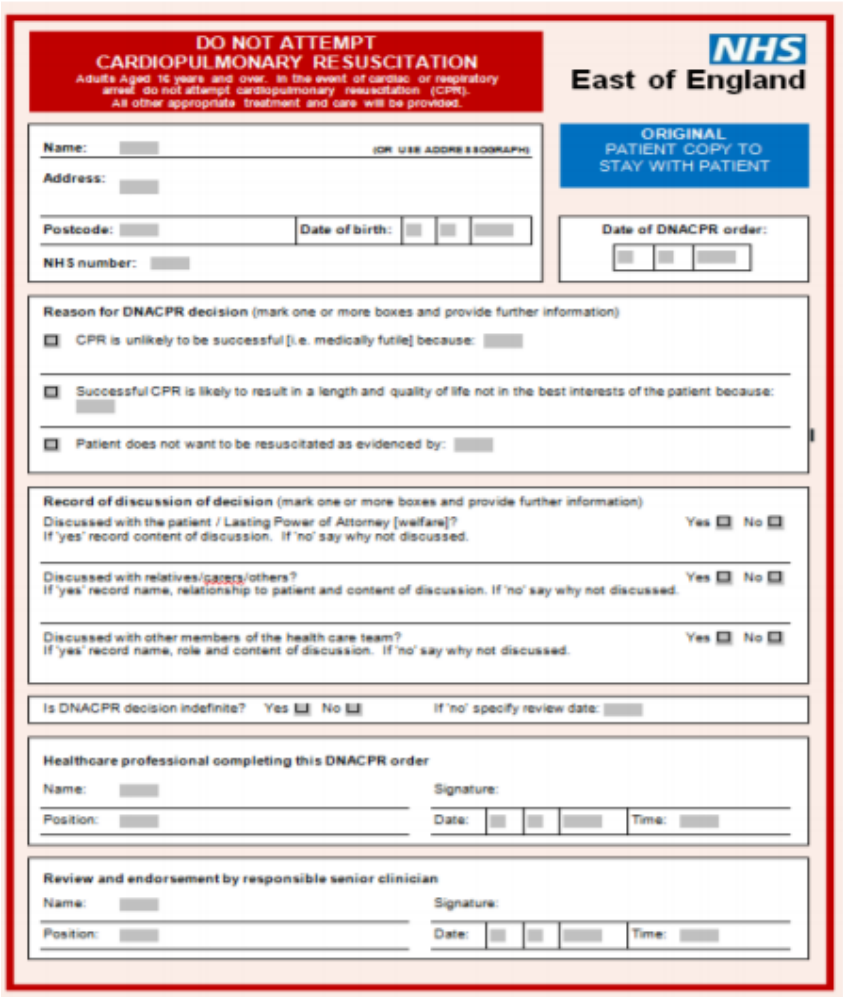
Decision

Incurable diseases

- **Cancer**
- **AIDS**
- **Tuberculosis**
- **Liver cirrhosis**
- **Multiple sclerosis**
- **Dementia (Alzheimer’s disease)**

Decision

manifestations of biological death



DO NOT ATTEMPT CARDIOPULMONARY RESUSCITATION

Adults Aged 16 years and over. In the event of cardiac or respiratory arrest do not attempt cardiopulmonary resuscitation (CPR). All other appropriate treatment and care will be provided.

NHS East of England

Name: (OR USE ADDRESSOGRAPH)

Address:

Postcode: Date of birth:

NHS number:

ORIGINAL PATIENT COPY TO STAY WITH PATIENT

Date of DNACPR order:

Reason for DNACPR decision (mark one or more boxes and provide further information)

- ☐ CPR is unlikely to be successful [i.e. medically futile] because:
- ☐ Successful CPR is likely to result in a length and quality of life not in the best interests of the patient because:
- ☐ Patient does not want to be resuscitated as evidenced by:

Record of discussion of decision (mark one or more boxes and provide further information)

Discussed with the patient / Lasting Power of Attorney [welfare]? Yes ☐ No ☐
If 'yes' record content of discussion. If 'no' say why not discussed.

Discussed with relatives/carers/others? Yes ☐ No ☐
If 'yes' record name, relationship to patient and content of discussion. If 'no' say why not discussed.

Discussed with other members of the health care team? Yes ☐ No ☐
If 'yes' record name, role and content of discussion. If 'no' say why not discussed.

Is DNACPR decision indefinite? Yes ☐ No ☐ If 'no' specify review date:

Healthcare professional completing this DNACPR order

Name: Signature:

Position: Date: Time:

Review and endorsement by responsible senior clinician

Name: Signature:

Position: Date: Time:

Airway and Protection of Spinal Cord

- Why first in the algorithm?
  - Loss of airway can result in death in < 3 minutes
- Airway Assessment
  - Vital Signs = RR, O2 sat
  - Mental Status = Agitation, Somnolent, Coma
  - Airway Patency = Secretions, Stridor, Obstruction
  - Traumatic Injury above the clavicles
  - Ventilation Status = Accessory muscle use, Retractions, Wheezing
- Clinical Pearls
  - Patients who are speaking normally generally do not have a need for immediate airway management
  - Hoarse or weak voice may indicate a subtle tracheal or laryngeal injury
  - Noisy respirations frequently indicates an obstructed respiratory pattern

Airway Interventions

- Maintenance of Airway Patency
  - Suction of Secretions
  - Chin Lift/Jaw thrust
  - Nasopharyngeal Airway
  - Definitive Airway
- Airway Support
  - Oxygen
  - NRBM (100%)
  - Bag Valve Mask
  - Definitive Airway
- Definitive Airway
  - Endotracheal Intubation
  - Surgical Crichothyroidotomy
- In-line cervical stabilization

Airway Interventions

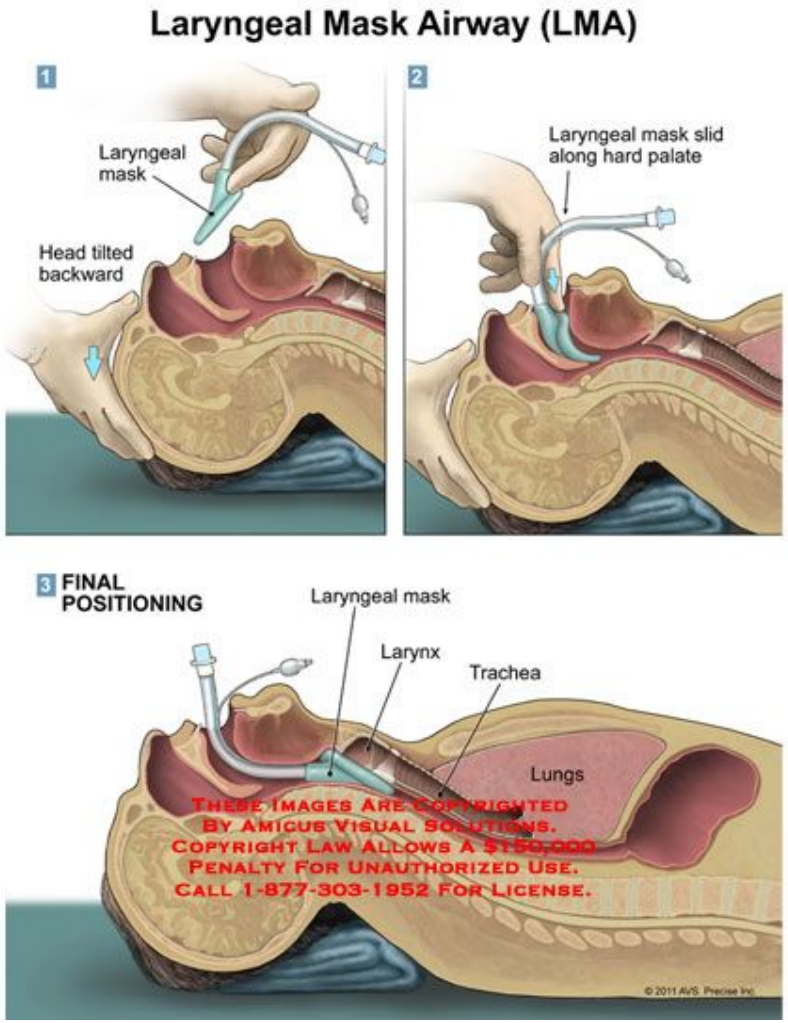
Suction

Airway Interventions

Bag Valve Mask

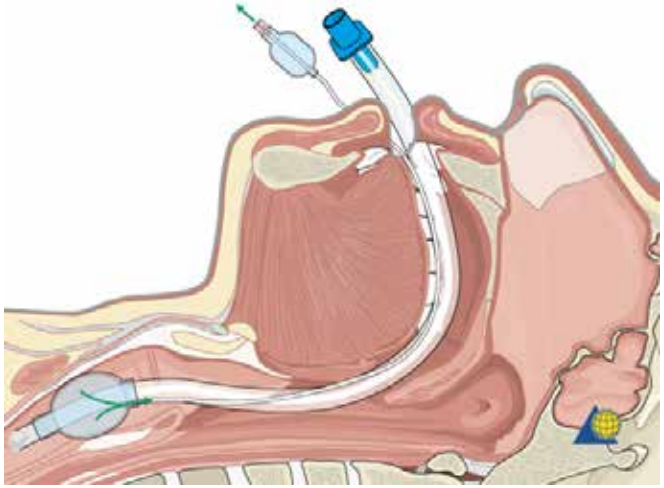
Airway Interventions

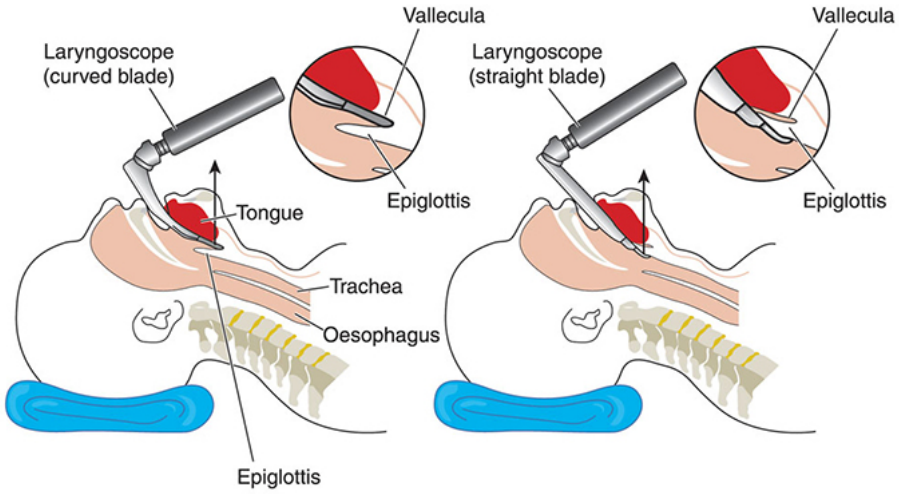
Laryngeal Mask



Airway Interventions

Trachea intubation





Protection of Spinal Cord

- General Principle: Protect the entire spinal cord until injury has been excluded by radiography or clinical physical exam in patients with potential spinal cord injury.
- Spinal Protection
  - Rigid Cervical Spinal Collar = Cervical Spine
  - Long rigid spinal board or immobilization on flat surface such as stretcher = T/L Spine
- Etiology of Spinal Cord Injury
  - Road Traffic Accidents (47%)
  - High energy falls (23%)
- Clinical Pearls
  - Treatment (Immobilization) before diagnosis
  - Return head to neutral position
  - Do not apply traction
  - Diagnosis of spinal cord injury should not precede resuscitation
  - Motor vehicle crashes and falls are most commonly associated with spinal cord injuries
  - Main focus = Prevention of further injury

A

C-spine Immobilization

- Return head to neutral position
- Maintain in-line stabilization
- Correct size collar application
- Blocks/tape
- Sandbags

C-spine Immobilization

Manual in-line stabilization

Minimale immobilization

Immobilization in 30°-supine position without cervical collar

Complete immobilization

Breathing and Ventilation

- General Principle: Adequate gas exchange is required to maximize patient oxygenation and carbon dioxide elimination
- Breathing/Ventilation Assessment:
  - Exposure of chest
  - General Inspection
    - Tracheal Deviation
    - Accessory Muscle Use
    - Retractions
    - Absence of spontaneous breathing
    - Paradoxical chest wall movement
  - Auscultation to assess for gas exchange
    - Equal Bilaterally
    - Diminished or Absent breath sounds
  - Palpation
    - Deviated Trachea
    - Broken ribs
    - Injuries to chest wall

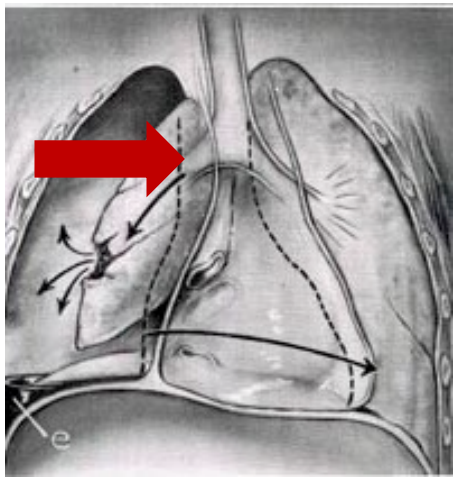
B

Breathing and Ventilation

- Look
- Listen
- Feel

Breathing and Ventilation

- Identify Life Threatening Injuries
  - Tension Pneumothorax
    - Air trapping in the pleural space between the lung and chest wall
    - Sufficient pressure builds up and pressure to compress the lungs and shift the mediastinum
    - Physical exam
      - Absent breath sounds
      - Air hunger
      - Distended neck veins
      - Tracheal shift
    - Treatment
      - Needle Decompression
        - 2nd Intercostal space, Midclavicular line
      - Tube Thoracostomy
        - 5th Intercostal space, Anterior axillary line



Breathing and Ventilation

- Hemothorax
  - Blood collecting in the pleural space and is common after penetrating and blunt chest trauma
  - Source of bleeding = Lung, Chest wall (intercostal arteries), heart, great vessels (Aorta), Diaphragm
  - Physical Exam
    - Absent or diminished breath sounds
    - Dullness to percussion over chest
    - Hemodynamic instability
  - Treatment = Large Caliber Tube Thoracostomy
    - 10-20% of cases will require Thoracostomy for control of bleeding

B Breathing and Ventilation

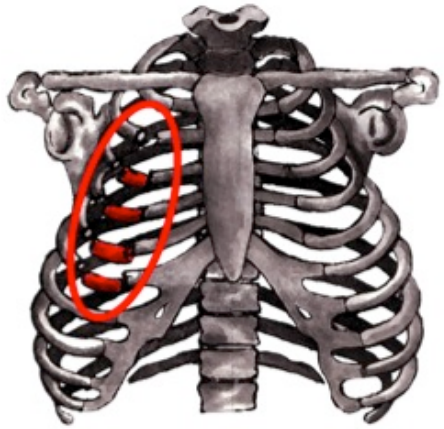
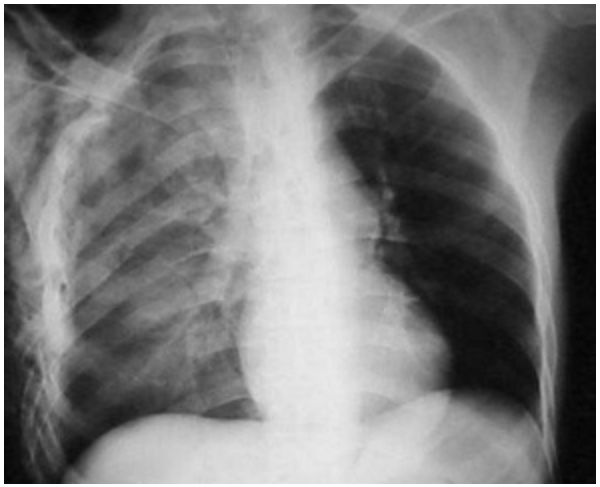


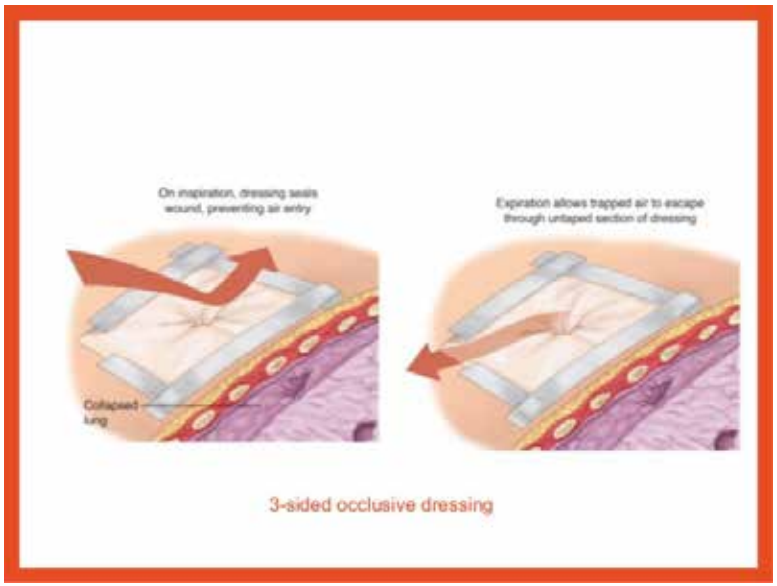
Figure Flail chest occurs when three or more adjacent ribs fracture in two or more places.



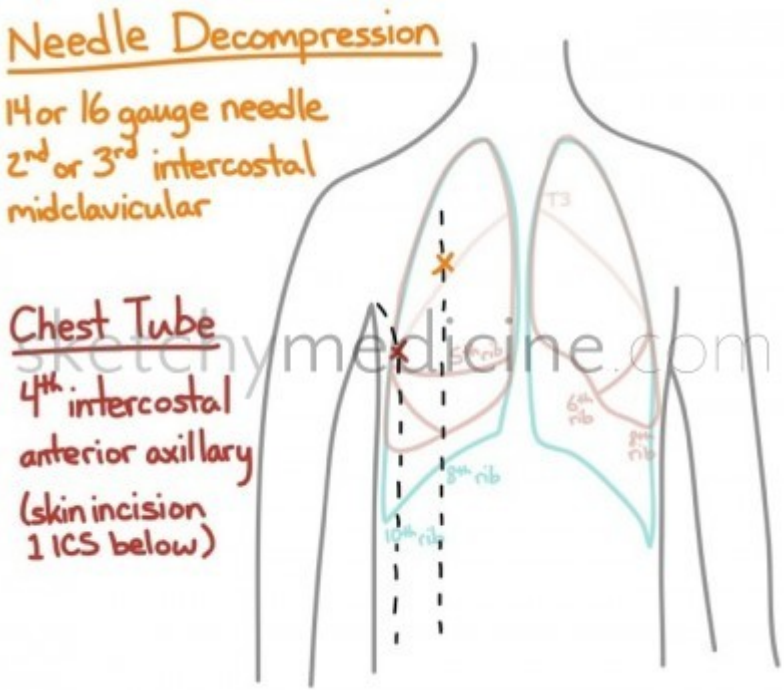
- Flail Chest
  - Direct injury to the chest resulting in an unstable segment of the chest wall that moves separately from remainder of thoracic cage
  - Typically results from two or more fractures on 2 or more ribs
  - Typically accompanied by a pulmonary contusion
  - Physical exam = paradoxical movement of chest segment
  - Treatment = improve abnormalities in gas exchange
    - Early intubation for patients with respiratory distress
    - Avoidance of overaggressive fluid resuscitation

Breathing and Ventilation

- Open Pneumothorax
  - Sucking Chest Wound
  - Large defect of chest wall
    - Leads to rapid equilibration of atmospheric and intrathoracic pressure
    - Impairs oxygenation and ventilation
  - Initial Treatment
    - Three sided occlusive dressing
    - Provides a flutter valve effect
    - Chest tube placement remote to site of wound
    - Avoid complete dressing, will create a tension pneumothorax



B Needle Thoracocentesis



- Midclavicular line
- 14 gauge angiocath
- Over the 2nd rib
- Rush of air is heard

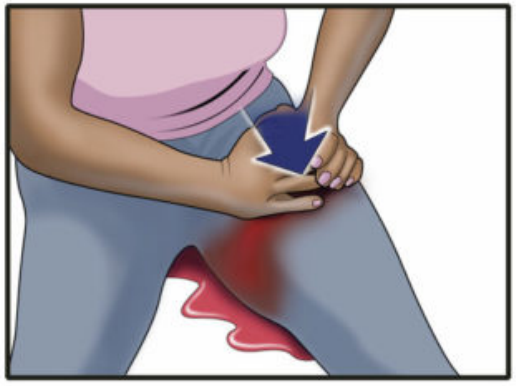
C

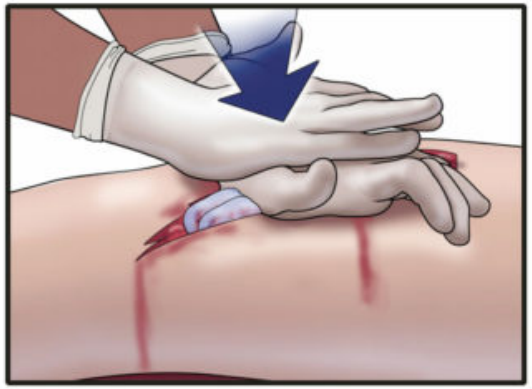
Massive hemorrhage control

C

Massive hemorrhage control

SEE SOMETHING. DO SOMETHING.





Circulation

- Shock
  - Impaired tissue perfusion
  - Tissue oxygenation is inadequate to meet metabolic demand
  - Prolonged shock state leads to multi-organ system failure and cell death
- Clinical Signs of Shock
  - Altered mental status
  - Tachycardia (HR > 100) = Most common sign
  - Arterial Hypotension (SBP < 120)
    - Femoral Pulse – SBP > 80
    - Radial Pulse – SBP > 90
    - Carotid Pulse – SBP > 60
  - Inadequate Tissue Perfusion
    - Pale skin color
    - Cool clammy skin
    - Delayed cap refill (> 3 seconds)
    - Altered LOC
    - Decreased Urine Output (UOP < 0.5 mL/kg/hr)

Circulation

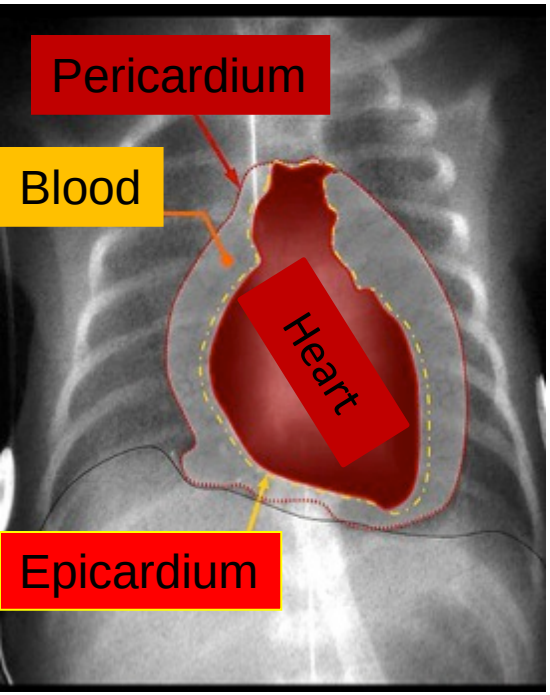
- Types of Shock in Trauma
  - Hemorrhagic
    - Assume hemorrhagic shock in all trauma patients until proven otherwise
    - Results from Internal or External Bleeding
  - Obstructive
    - Cardiac Tamponade
    - Tension Pneumothorax
  - Neurogenic
    - Spinal Cord injury
- Sources of Bleeding
  - Chest
  - Abdomen
  - Pelvis
  - Bilateral Femur Fractures

Circulation

- Emergency Nursing Treatment
  - Two Large IV Lines
  - Cardiac Monitor
  - Blood Pressure Monitoring
- General Treatment Principles
  - Stop the bleeding
    - Apply direct pressure
    - Temporarily close scalp lacerations
  - Close open-book pelvic fractures
    - Abdominal pelvic binder/bed sheet
  - Restore circulating volume
    - Crystalloid Resuscitation (2L)
    - Administer Blood Products
  - Immobilize fractures
- Responders vs. Nonresponders
  - Transient response to volume resuscitation = sign of ongoing blood loss
  - Non-responders = consider other source for shock state or operating room for control of massive hemorrhage

Circulation

- Pericardial Tamponade
  - Pericardium or sac around heart fills with blood due to penetrating or blunt injury to chest
  - Beck's Triad
    - Distended jugular veins
    - Hypotension
    - Muffled heart sounds
  - Treatment
    - Rapid evacuation of pericardial space
    - Performed through a pericardiocentesis (temporizing measure)
    - Open thoracotomy



Aceofhearts1968(Wikimedia)

Disability

- Baseline Neurologic Exam
  - Pupillary Exam
    - Dilated pupil – suggests transtentorial herniation on ipsilateral side
  - AVPU Scale
    - Alert
    - Responds to verbal stimulation
    - Responds to pain
    - Unresponsive
  - Gross Neurological Exam – Extremity Movement
    - Equal and symmetric
    - Normal gross sensation
  - Glasgow Coma Scale: 3-15
  - Rectal Exam
    - Normal Rectal Tone
- Note: If intubation prior to neuro assessment, consider quick neuro assessment to determine degree of injury

Disability

- Key Principles
  - Precise diagnosis is not necessary at this point in evaluation
  - Prevention of further injury and identification of neurologic injury is the goal
  - Decreased level of consciousness = Head injury until proven otherwise
  - Maintenance of adequate cerebral perfusion is key to prevention of further brain injury
    - Adequate oxygenation
    - Avoid hypotension
  - Involve neurosurgeon early for clear intracranial lesions

Disability

- Cervical Spinal Clearance
  - Patients must be alert and oriented to person, place and time
  - No neurological deficits
  - Not clinically intoxicated with alcohol or drugs
  - Non-tender at all spinous processes
  - No distracting injuries
  - Painless range of motion of neck

Exposure

- Remove all clothing
  - Examine for other signs of injury
  - Injuries cannot be diagnosed until seen by provider
- Logroll the patient to examine patient's back
  - Maintain cervical spinal immobilization
  - Palpate along thoracic and lumbar spine
  - Minimum of 3 people, often more providers required
- Avoid hypothermia
  - Apply warm blankets after removing clothes
  - Hypothermia = Coagulopathy
    - Increases risk of hemorrhage

Exposure

Exposure

Trauma Logroll

- One person = Cervical spine
- Two people = Roll main body
- One person = Inspect back and palpate spine

Literature

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Questions?