

# EMERGENCY TRAUMA CARE

A course on the Early Management of Victims of  
Trauma

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# Section 1: Introduction

## Goals of the Emergency Trauma Care Course

- Provide medical personnel with a standardized systematic approach to caring for trauma victims
- Encompass the care needed for both major & minor trauma
- Improve morbidity & mortality rates in trauma victims

# Basic Sequence of Trauma Care

- Rapid primary assessment of the patient
- Start resuscitative measures
- Complete a secondary assessment
- Determine if the patient needs emergent surgery or transfer to another medical facility for specialized or advanced care
- Definitive care
- Rehabilitation

Note: the ETC Course focuses on the first four items

# Specific Skills Reviewed in the ETC Course

- Primary & secondary patient assessment
- Airway opening maneuvers & ventilation
- Orotracheal & nasotracheal intubation
- Intravenous line placement: peripheral, central
- Intraosseous line placement
- Spine & limb immobilization techniques
- Radiographic identification of injuries
- Surgical procedures: cricothyroidotomy, venous cutdown, pericardiocentesis, thoracentesis, thoracostomy tube, peritoneal lavage, local anesthesia, wound repair

# Why is Trauma Care Important?

- U.S.A. statistics (per year):
  - 60 million injuries total
  - 30 million injuries need medical care
  - 3,6 million injuries need hospitalization
  - 300.000 injuries cause permanent disability
  - 145.000 deaths
  - Trauma is the leading cause of death in the first four decades of life

# What is the Goal of Emergency Care for Trauma?

- Appropriate and timely care given early can significantly improve outcome from trauma
- Health care workers should also be involved with efforts to prevent trauma in the first place

# Deaths Due To Injury Occur in Three Time – Related Peaks After Injury

- First peak – seconds to a few minutes after injury
  - Due to:
    - lacerations of the brain or high spinal cord
    - lacerations of the heart or great vessels
  - Very few of these patients can be salvaged in any system
  - Best “treatment” is prevention

# Deaths Due To Injury Occur in Three Time – Related Peaks After Injury

- Second peak – minutes to a few hours after the injury
  - Due to:
    - Subdural or epidural hematomas
    - Hemo- or pneumo- thorax
    - Ruptured spleen or liver
    - Pelvic fractures
    - Blood loss from other multiple fractures
- These patients can often be saved by proper emergency care & are the focus of this course



# Deaths Due To Injury Occur in Three Time – Related Peaks After Injury

- Third peak – days to weeks after the injury
  - Due to:
    - Severe head injuries
    - Sepsis
    - Multiple organ failure syndrome
- Proper early emergency care can prevent some of these deaths

# The Care Sequence for Major Trauma Patients is Different Than for Stable Medical Patients

- For stable medical patients the standard care sequence is:
  - History of present illness & past medical history
  - Physical exam from head to toe
  - Develop a differential diagnosis
  - Utilize accessory diagnostic tests (lab, X-ray, etc.)
  - Arrive at a final diagnosis
- This approach has to be greatly modified for care of the trauma patient to prevent death

# Three Principles of Emergency Trauma Care

- If a patient has multiple problems or injuries, treat first the one that is the greatest threat to life
- Indicated treatments should not be delayed simply because the diagnosis is not yet certain
- A detailed history is not essential to start evaluation & treatment of an injured patient

# Identifying the Greatest Threats to Life in the Trauma Patient

- Life threats from trauma are (listed in order of decreasing severity):
- Loss of airway – kills most quickly
  - *Head position, blood, vomitus, foreign body, external compression*
- Loss of breathing – kills next most quickly
  - *Pneumothorax, hemothorax, lung injury*
- Loss of circulation
  - *Bleeding (internal or external), heart injury, arrhythmias*
- Expanding intracranial mass

# The "ABCDE" System for Trauma Care

## ➤ Always follow this sequence:

- A – Airway (with cervical spine control)
- B – Breathing
- C – Circulation (and cervical spine control)
- D – Disability (neurologic status)
- E – Expose & Environment
  - Completely undress the patient for exam, but take measures to avoid hypothermia

# ETC Course Outline: Didactic Lectures

- Introduction
- Initial assessment
- Airway / ventilation
- Shock / IV fluids
- Chest trauma
- Abdominal trauma
- Pelvic trauma
- Genitourinary trauma
- Head trauma
- Spine trauma
- Limb trauma
- Burns
- Electrical injuries
- Hypothermia & frostbite
- Pediatric trauma
- Trauma in pregnancy
- Animal bites, tetanus, rabies
- Facial trauma
- Gunshot wounds
- Wound repair
- Near – drowning
- Snakebites
- Prehospital trauma management
- Interhospital transfer

# ETC Course Outline: Skills Labs

- Airway management / intubation
- Splints & spine immobilization
- Simulated initial assessment of patients
- Radiographic films review
- Intraosseous infusion / IV insertion
- Local anesthesia / Wound repair
- Surgical procedures (may be optional)
- Written & practical Tests

## Section 2: Initial Assessment

- Objectives
  - Identify and treat immediately life – threatening injuries in the correct priority sequence
- Establish needed resuscitative measures to then allow a complete secondary survey to be conducted
- Allow triage decisions to be made when there are multiple simultaneous patients



# Proper Trauma Care Sequence

- Initial Assessment – rapid Primary Survey
- Start resuscitation measures
- Detailed secondary survey
- Diagnostic studies
- Re-evaluate the patient at frequent intervals
- Decide on patient disposition and definitive care

# Basic Principle of Initial Assessment

- Correction of life-threatening emergencies (resuscitation) must be done simultaneously with the primary survey
- Treatment takes precedence over diagnosis

# Communication Between Prehospital Personnel and the Emergency Department

- Patient care is improved when there is good communication from prehospital personnel to E.D.
- Radio or phone reports on trauma patients should be brief (< 45 seconds), and should be given as soon as possible before arrival in the E.D.

# What Information Should be Relayed in the Prehospital Care Report?

- Number of victims and their ages and gender
- Mechanism of injury
- Suspected injuries
- Vital signs
- Treatment measures started
- Estimated time of arrival (“E.T.A.”)
- Any special precautions for the E.D.
  - Hazardous materials contamination
  - Combative patient or accompanying persons

# Preparation of the E.D. to Receive a Major Trauma

- Collect adequate E.D. personnel
- Clear a bed or room for the victim
- Obtain and arrange:
  - Airway equipment, IV fluid bags and lines, bandages, chest tubes and waterseal bottles, blood units from the blood bank (O-negative)
- Alert ancillary personnel
  - X-rays, laboratory, respiratory therapy, special nursing units, security

# Preparation of the E.D. to Receive a Major Trauma (con' t.)

- Ideally, if resources permit, “universal precautions” to protect all E.D. personnel from patients’ blood and body fluids should be followed
- These involve:
  - Eye protection (goggles or face shields)
  - Gloves
  - Waterproof gowns
  - Shoe covers
- Additional protection using a lead gown is recommended for E.D. personnel if they will be in the room when X-rays are taken

# The Primary Survey

- A – Airway (& C – spine control)
- B – Breathing
- C – Circulation (hemorrhage control)
- D – Disability (mini-neurologic exam)
- E – Expose / environment

*(To some extent D and E are really part of the secondary survey)*

# How to Do the Primary Survey

- Look at the patient from across the room:
  - Is he breathing ?
  - Is he speaking ?
  - What is his skin colour ?
  - Is he bleeding ?
  - Is he immobilized properly ?
- Obtain a quick history of what happened:
  - Mechanism of injury
  - Time of injury



# How to Do the Primary Survey (con' t.)

- Assess the airway
  - Do airway-opening maneuvers if necessary (maintain c-spine injury precautions)
  - Place oral airway, if unconscious
- Assess breathing
  - Listen with stethoscope to the chest
  - Obtain pulse oximetry if available
  - Bag – valve – mask (BVM) assisted ventilation if needed
  - Start oxygen by high flow face mask on all patients
- Early cervical spine injury precautions:
  - Immobilize the neck if any possibility of neck injury
  - “Hard” collar
  - Blocks on either side of head and tape across forehead

# Patients Who Might Have a Neck Injury and Need Early C-Spine Immobilization

- Appropriate mechanism of injury
  - Fall
  - Vehicle accident
  - Struck by object on neck or head
- Unconscious
- Complaining of neck pain
- Crepitus or deformity of posterior neck
- Altered mental status (alcohol, etc.)

# How to Do the Primary Survey

## ➤ Assess circulation

- Check pulse, blood pressure, respiratory rate
- Also check temperature if it can be done quickly
- Check for external bleeding and apply direct pressure with gauze dressings
- Place cardiac monitor leads and determine the patient's cardiac rhythm

# Emergency Resuscitation Procedures That Should Be Done Immediately With the Primary Survey

- If inadequate airway:
  - Airway opening maneuvers
  - Oral airway if unconscious
- If inadequate breathing:
  - Attempt BVM ventilation
  - Consider Heimlich maneuver
  - Endotracheally intubate if BVM inadequate or unsuccessful

# Emergency Endotracheal Intubation

- Oral intubation with assistant holding head and neck steady usually best
- May attempt nasal intubation if:
  - No possible nasal or mid-facial fractures
  - No known coagulopathy
- Surgical airway (cricithyroidotomy) if endotracheal attempt unsuccessful

# Emergency Resuscitation Procedures That Should Be Done Immediately With the Primary Survey (con' t.)

- If inadequate circulation or suspected major blood loss:
  - Start at least one large bore IV (at least 18 gauge, preferably 16 or 14 gauge)
  - Run lactated ringers (preferred) or normal saline
    - Run very slow if only isolated closed head injury
    - Run wide open (very fast) if patient hypotensive
    - Rapidly infuse O-negative blood 2 or more units if obvious ongoing blood loss and severely hypotensive

# Initial Blood Draw

- With the IV stick, draw tubes of blood
  - Type and cross – most important (red top tube)
  - CBC, Amylase, Glucose, Electrolytes, CPK, medication levels, pregnancy test
  - Drug (especially alcohol) or toxin levels may also be needed

# Emergency Resuscitation Procedures That Should Be Done Immediately With the Primary Survey (con' t)

- If major external bleeding:
  - Apply direct pressure with gauze dressing
  - Rarely direct clamping may be needed (clamps can damage adjacent nerves however)
  - Apply sterile dressings to cover any open fractures or exposed viscera
  - Tourniquets are almost never indicated



# Emergency Resuscitation Procedures That Should Be Done Immediately With the Primary Survey (con' t.)

- After assessment of the patient's chest:
  - Suspected tension pneumothorax – immediate needle thoracostomy, then follow with tube thoracostomy
  - Flail chest – stabilization with broad taping or overlaying heavy flat dressing
  - Open "sucking" pneumothorax – seal defect with gauze and dressing; insert thoracostomy tube
  - Suspected pericardial tamponade with imminent cardiac arrest – perform pericardiocentesis (*very rarely indicated*)
  - Consider checking an arterial blood gas (ABG)

# Completion of the Primary Survey

- Once you have completed assessment of the ABC's and done appropriate resuscitation procedures, the primary survey is completed and you should go on to the secondary survey

# Sequential Priorities of the Secondary Survey

- Completely undress patient to allow complete exam – clothing may need to be cut off if movement may hurt the patient
- Use room warming heat lamps, and / or heating blanket to help protect the patient against hypothermia
- Recheck the vital signs – obtain temperature if not done yet

# Sequential Priorities of the Secondary Survey

- Complete head to toe exam
- Consider nasogastric (NG) and / or urinary bladder (foley) tube placement (if no contraindications are found on exam)
- Decide what X-ray studies are needed – usual minimum to obtain emergently are chest X-ray (CXR), lateral c-spine, and pelvis
- Decide if other lab studies are needed

# Secondary Survey

- First, clarify the history of injury
- One simple mnemonic is AMPLE:
  - Allergies
  - Medications
  - Past illnesses
  - Last meal (time)
  - Events (preceding injury)
- Clarify mechanism of injury
- Assess for other conditions
  - Hypoglycemia, toxin exposure, smoke / carbon monoxide exposure

# Secondary Survey: How to Start the Head to Toe Exam

- Assess mental status – assign Glasgow Coma Score
- Palpate scalp (use gloves)
- Look at tympanic membranes
- Look at nasal passages
- Look in mouth
- Palpate face and mandible
- Assess pupillary light reaction and extraocular movements
- Fundoscopy can be done, but not usually helpful

# Secondary Survey: Neck and Chest

- Hold patient's head and neck stable
  - Open the c-collar and observe anterior neck – check tracheal position
  - Palpate posterior neck
  - Reapply collar
- Percuss and palpate chest wall and clavicles
- Auscultate lungs
- Auscultate heart
- Palpate upper back

# Secondary Survey: Abdomen, Perineum, and Back

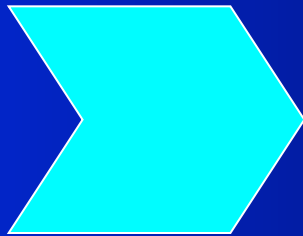
- Auscultate and palpate and percuss abdomen
- Palpate back
  - Costovertebral angles, spinous processes, paraspinous muscles
- Palpate and rock pelvis
- Logroll patient to look at back (maintain spine and limb stability with the logroll)
- Palpate genitalia
- Vaginal exam
- Rectal exam
  - Check for high-riding prostate
  - Check stool guiac



# Secondary Survey: Exam of extremities

- Palpate along all four limbs
- Assess active joint range of motion
- Palpate pulse and capillary refill
- Assess tendon function

# Secondary Survey: Neurologic Exam

- Assign Glasgow Coma Scale score (GCS)
  - Mental status / orientation (to person, place, time, events)
  - Cranial nerves II thru XII
  - Motor
  - Sensory
  - Reflexes
  - Coordination
- 
- (all four limbs)

# Secondary Survey: Additional Considerations

- Splint and bandage injuries as these are discovered
- Cleanse dirty wounds to allow better assessment of their depth and extent
- Leave deeply imbedded objects in place for removal in the operating room (premature removal could result in exanguination if the object is tamponading a major vessel)

# Secondary Survey: Final Consideration

- Consider 12 lead EKG (if hypotensive, major chest trauma or chest pain)
- Usually minimum X-rays needed are (for major truncal trauma): lateral c-spine, CXR, AP pelvis (order these while doing secondary survey)
- X-ray all sites of potential fractures (order these all at one time for greatest efficiency)
- Decide if special studies needed:
  - Peritoneal lavage, computed tomography, angiography, ultrasound
- Place foley and / or NG tube if no contraindications

# Contraindications to NG or Foley Insertion

- NG tube
  - Nasal fractures, midfacial fractures, severe coagulopathy
  - Insert via mouth (“orogastric tube”) if any of these are present
- Foley
  - Suspected anterior urethral injury – blood at meatus, “high-riding” or nonpalpable prostate, “butterfly” perineal hematoma

# After Completion of the Secondary Survey

- Decide if the patient will need to be transferred to another medical facility and start arranging this while the patient is being X-rayed
- Talk to the patient's family and advise them about the patient's injuries identified so far
- If the patient still is unstable or requires further resuscitation, do not leave the bedside
- Consider pain medications once the exam is complete
- Continue to reevaluate the patient and repeat vital signs frequently as long as he is in your care
- Monitor urine output and any other drains or fluid output

# Initial Assessment Summary

- First - Primary Survey / Resuscitation
  - A, B, C, D, E
- Next – Secondary Survey
  - X-rays, labwork, NG, Foley
- Next - Reassessment
  - Final diagnosis
  - Decide on disposition; Options are:
    - Discharge home, admit to ward, admit to ICU, admit to operating room, transfer to another facility

# Triage Decisions When There Are Multiple Simultaneous Trauma Victims

- Capabilities of the medical facility are exceeded by the situation:
  - Treat the patients first that have the greatest chance of survival
  - Treat the patients first that require the least time, personnel, or equipment
- Capabilities of the facility are not exceeded by the situation:
  - Treat first the patients with life threatening or multiple injuries



# Considerations for Forensic Evidence

- If injury is due to suspected criminal activity or intent:
  - Notify law enforcement personnel
  - Save all the patient's clothing and other belongings
  - Cut around, not through, bullet or stab holes in clothing
  - Widely separate the suspected perpetrator and victim(s)