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
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 (cricothyroidotomy) if endotracheal attempt unsuccessful
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
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 thoracoctomy 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
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, paraspinal 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 (all four limbs)
- Reflexes
- Coordination
 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, "betterfly" 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)