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HOSPITAL CARE FOR ACCIDENT AND TRAUMA VICTIMS

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HEAD A & E MULAGO NATIONAL REFFERAL HOSPITAL

Goals

- Discuss strategies to identify potential life threatening injuries
- Integrate physical exam findings, mechanism of injury, and history in order to make patient care decisions
- Develop understanding of basic interventions within initial assessment of the trauma patient (specific techniques will be discussed elsewhere)

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Epidemiology

- 5 million worldwide deaths from trauma
- Globally injury burden will increase by ~30% by 2030
- In Ugandan urban centers trauma and injury responsible for up to 25% of all deaths
  - 79% Male
  - 46% Road crashes

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Initial Assessment & Management

Primary Survey: ABCDE's

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Preparation

- Pre-hospital Phase
  - Coordination with pre-hospital agency/personnel and notification
- In-hospital Phase
  - Advanced planning for the trauma patient's arrival
    - Identify Team Leader and assign tasks
    - Wear personal protective equipment
    - Gather equipment, IV fluids, monitor, drugs

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Primary Survey: ABCDE

- **E- exanguination**
- **A**irway & C-Spine protection
- **B**reathing & Ventilation
- **C**irculation & Control of hemorrhage
- **D**isability & Assessment of Neurologic Status
- **E**xposure & prevention of hypothermia

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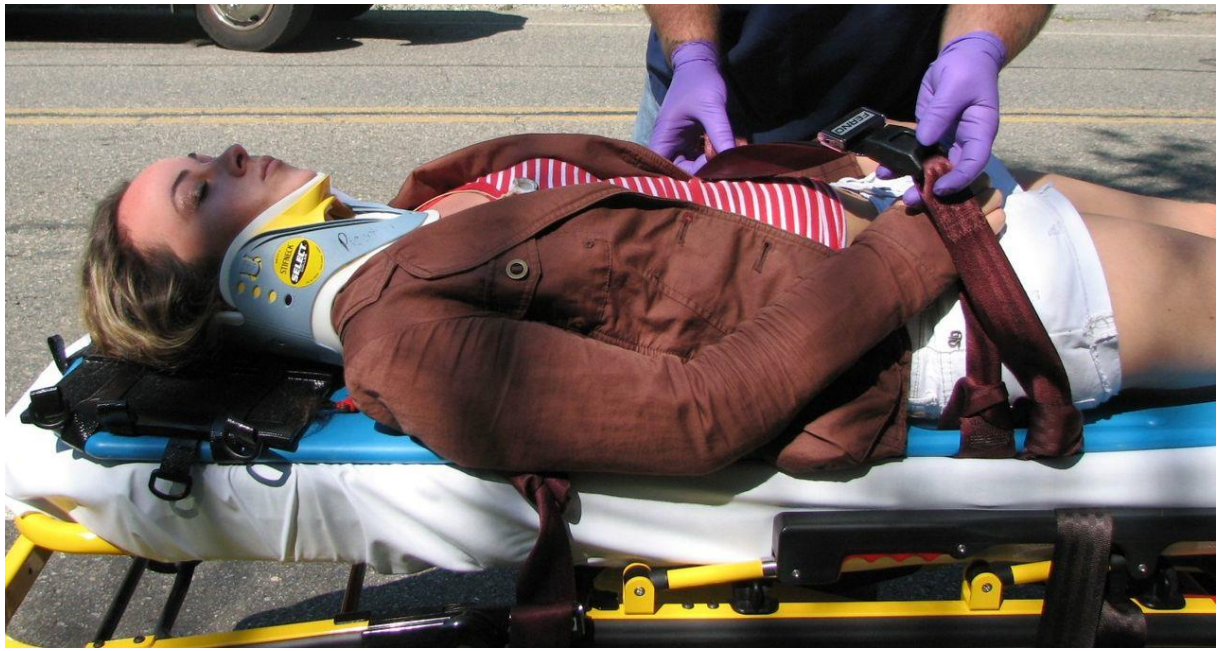
Airway Assessment

- Maintain C Spine immobilization in case there is cervical injury
- The head should **not** be hyperextended, hyperflexed, or rotated



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Airway Continued

- If patient is verbal, airway likely not immediately threatened
  - If patient is non-verbal and Glasgow Coma Scale (GCS) < 8, patient requires intubation
- Open Airway to assess visually
  - Chin lift or jaw thrust
    - Maintain C-Spine immobilization
- Inspect airway for:
  - Foreign body
  - Blood or vomitus
  - Anatomical obstruction (i.e. tongue)
- Airway requires constant reevaluation
- Intubation or surgical airway takes priority over all other interventions

Breathing

- Assess neck
  - JVD
  - Tracheal Deviation
- Assess chest
  - Auscultate lung sounds
  - Chest wall excursion
  - Crepitus
  - Increased WOB
    - Nasal flaring
    - Chest wall retractions
    - Accessory muscle use

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Breathing

- Identify
  - RR <8 or > 30
  - Tension pneumothorax
    - Tracheal deviation
    - Obstructive shock
  - Massive hemothorax
    - Tracheal deviation
    - Obstructive Shock
  - Open pneumothorax
  - Flail Chest Segment
    - Paradoxical chest wall movement
- Ensuring Breathing & Ventilation takes precedent over all other interventions
- Small procedures such as chest tube insertion may be lifesaving, needle thoracotomy.

Circulation & Hemorrhage Assessment

- Assess blood volume status
  - Level of consciousness
  - Skin color, condition, temperature
  - Capillary refill
  - Distal pulse strength
  - Blood pressure

- Apply pressure to control external bleeding
  - May require tourniquet placement

Circulation & Hemorrhage Assessment

- Classify Hemorrhage

Hemorrhage Class	Blood Loss mL's	Blood loss %	Pulse	BP	RR	Mental Status
Class I	750 mLs	15%	<100	Normal	14-20	Mildly Anxious
Class II	750-1500 mLs	15-30%	100-120	Normal	20-30	Anxious
Class III	1500-2000 mLs	30-40%	120-140	Decreased	30-40	Confused
Class IV	>2000 mLs	>40%	>140	Decreased	>35	Lethargic

- Identify
  - Hypovolemic shock
  - Internal bleeding
    - Chest, abdomen, pelvis, retroperitoneum, long bones

If there is concern for internal bleeding **Send for a Surgeon!**

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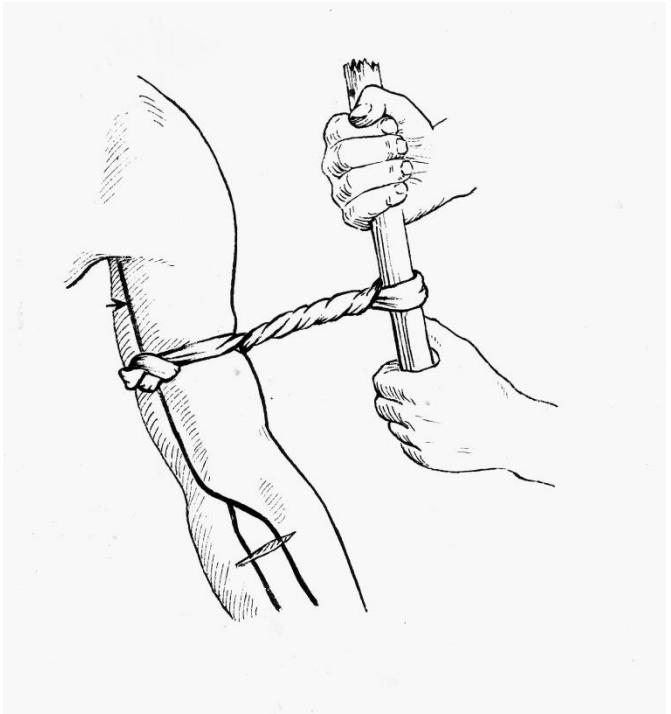
Circulation & Hemorrhage Assessment

- Establish IV or IO access
- Begin resuscitation of warmed isotonic crystalloid (NS or LR)
  - Adults
    - Assess response to up to 2L bolus
  - Children
    - Bolus consists of 20 cc/kg followed by reevaluation
- Consider blood transfusion if unresponsive to initial crystalloid

Hemorrhage Control

- Direct pressure or tourniquet



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Disability Assessment

- Rapid Neurologic evaluation
  - Establish level of consciousness
    - AVPU
  - Pupillary exam
  - Lateralizing signs & withdrawal from pain

- Assess for movement in all extremities

Glasgow Coma Scale

Eye Response	Verbal Response	Motor Response
1 = None	1 = None	1 = None
2 = To Pain	2 = Incomprehensible Sounds	2 = Extensor Response to Pain
3 = To Verbal Stimuli	3 = Inappropriate Words	3 = Flexor Response to Pain
4 = Spontaneous	4 = Confused	4 = Withdraws from Pain
	5 = Oriented	5 = Localizes Pain
		6 = Obeys Commands

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Posturing

Decorticate Posturing:
Abnormal flexion

Decerebrate Posturing:
Abnormal extension

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Exposure/Environment

- Remove ***all*** clothing
- Log roll while maintaining neutral, in-line stabilization of the C spine
- Inspect the thoracic and lumbar spine, back, flank, and buttocks
- Cover with a blanket to maintain warmth, patient warmers (bair hugger)

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Re-evaluate ABCDE

- Airway: still patent?
- Breathing: patient oxygenating/ ventilating?
- Circulation: responding to fluids? Concern for uncontrolled bleeding?
- Disability: change in mental status; better/worse?
- Environment: any environmental concerns?

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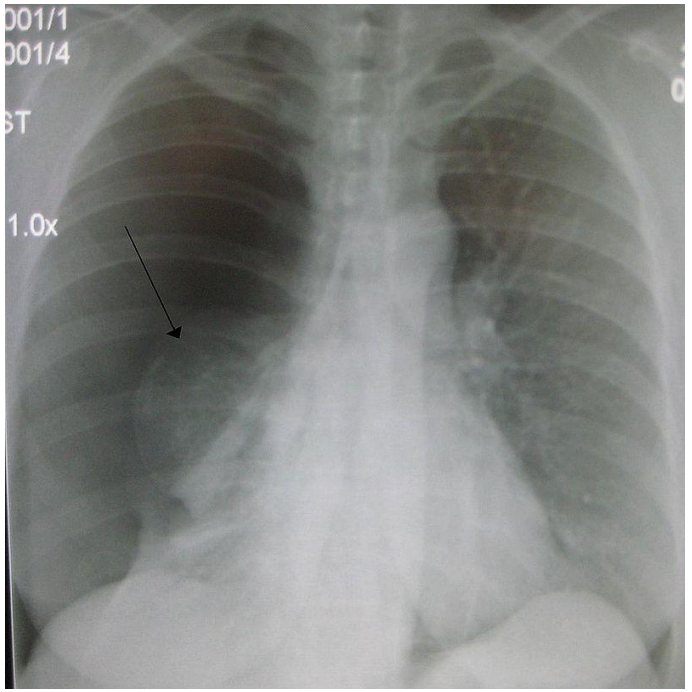
Adjuncts to monitor ABCDEs

- Airway or Breathing concerns:
  - Arterial Blood Gas
  - End Tidal CO2
  - Chest x-ray



- Circulation concerns:
  - Continuous BP monitoring
  - ECG
  - Urinary catheter
  - Nasogastric or orogastric tube
  - Chest, abdominal or pelvic X-Ray
    - Assess for pneumothorax, hemothorax, diaphragmatic rupture, hollow viscous rupture or pelvic fracture
  - FAST exam or Diagnostic Peritoneal Lavage (DPL)

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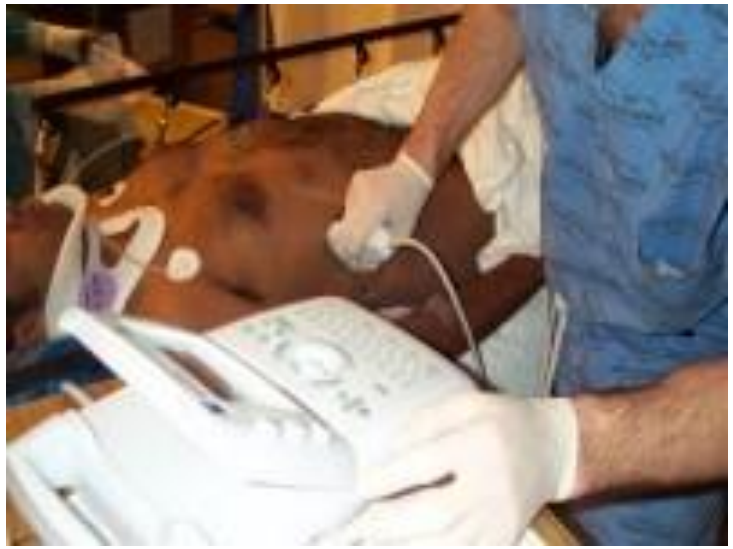
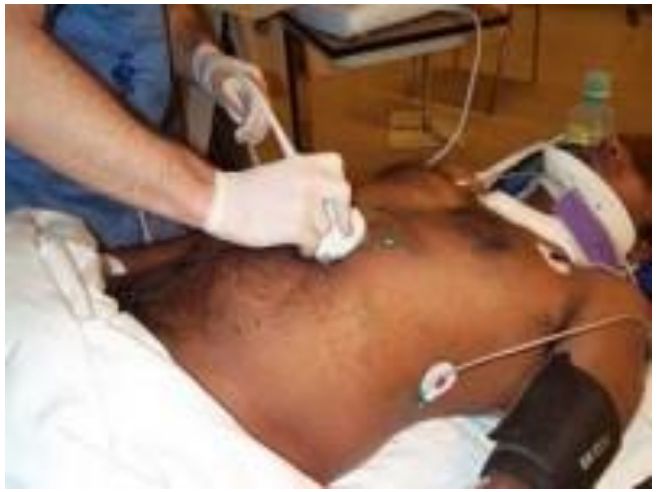
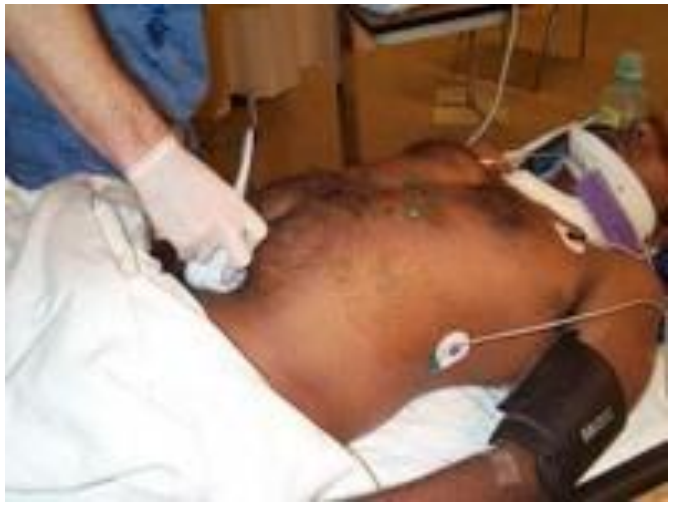
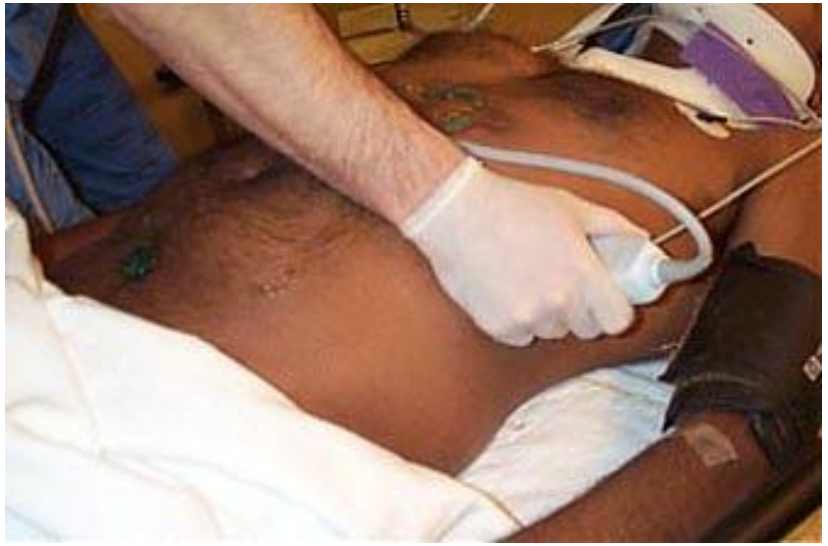
Focused Assessment with Sonography for Trauma (FAST)









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Initial Assessment & Management

Secondary Survey

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Secondary Survey

- Focused History
- Head to toe examination
  - Repeat GCS
- Continuous Reassessment

Do NOT begin secondary survey until the primary survey is complete and the patient is being resuscitated

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Focused History - AMPLE

- A – Allergies
- M – Medications
- P – Past medical history, hospitalizations, and surgeries
- L – Last Meal, Last Menstrual Period
- E – Events leading to injury

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Head/ Face

- Palpate skull and soft tissue
  - Look for signs of skull fracture
  - Lacerations, abrasions

- Palpate face
  - Forehead
  - Periorbital ridge
  - Nose
  - Maxilla
  - Mandible

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Eyes, Ears, Nose, Mouth

- Eye evaluation:
  - Visual acuity and eye movements
  - Pupillary size
  - Examine for foreign bodies, conjunctival hemorrhage
- Ear evaluation
  - Look with otoscope
  - Assess for hemotympanum, CSF leak
- Nose
  - Palpate for fracture (fractures of midface may also have fracture of cribiform plate)
  - Examine for blood in nares
- Mouth
  - Inspect teeth
  - Look for foreign bodies

Cervical Spine & Neck

- If maxillofacial or head trauma, assume patients have unstable cervical spine injury. Immobilize neck until able to fully evaluate spine.
- Inspect:
  - Neck Veins
  - Trachea for deviation
  - Foreign bodies, penetrating injuries
- Palpate:
  - C-spine for tenderness
  - Soft tissue for subcutaneous emphysema
- Auscultate:
  - Carotid for bruits

Chest

- Inspect:
  - Chest symmetry
- Palpate clavicles, ribs, chest wall
  - Tenderness
  - Crepitus
  - Subcutaneous emphysema
  - Pain
- Auscultate
  - Percussion for hyperresonance
  - Breath sounds
  - Heart sounds

CXR as adjunct to secondary survey

Abdomen

- Inspect
  - Distention
  - Signs of puncture/ penetration
  - Ecchymosis
- Palpate
  - Peritoneal signs: guarding, rebound, firmness
  - Tenderness
- Auscultate/ Percussion
  - Bowel sounds

FAST, DPL, CT Scan are adjuncts to Secondary Survey

Musculoskeletal

- Inspect:
  - Lacerations, contusions, deformities
  - Ecchymosis over iliac wings, pubis, scrotum suggest pelvic fracture

- Palpate:
  - Pelvis
    - Gentle anterior-to-posterior pressure
  - Extremities
    - Distal pulses
    - Motor and sensory exam
    - Obtain x-rays if tender to palpation
    - Suspect pelvic fracture if unequal leg length
  - Spine
    - Thoracic and lumbar spine

X-ravs are adjuncts to secondary survey

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Perineum, Rectum, Vagina

- Perineum
  - Examine for contusions, hematomas, lacerations, urethral bleeding
  - Blood at urethral meatus or perineal bruising are contraindications to foley catheter placement
- Rectum
  - Digital rectal exam
  - Assess for gross blood, sphincter tone
- Vagina
  - Assess for presence of lacerations or blood in vaginal vault
  - Perform pregnancy test on all females of childbearing age

Neurologic Exam

- Reassess mental status
  - Repeat GCS
  - Level of consciousness
  - Pupillary size and response
- Motor and sensory evaluation of extremities

- Immobilize and protect spinal cord until spine injury is excluded

Minimize Missed Injuries

- Maintain a high index of suspicion
- Provide continuous monitoring of patient status
- Specialized diagnostic testing to identify and exclude injuries
- Early surgical consults
- Re-evaluate often including tertiary exam
  - Tertiary exam = repeat secondary survey after 12-24 hours to avoid missed injuries

Adaptations for Resource Limited Settings

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Resource Limited Settings:

- No CT scanner
  - Use clinical acumen to identify pathology
- No blood products
  - Give IV fluids
  - Identify and control hemorrhage
- No ICU or ventilators
  - Consider early tracheostomy
- EARLY consultation with a specialist

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Case Study

Initial Management

44 year old male driver of a car crashed head-on into a wall. He was found unresponsive at the scene. He arrives at the hospital with a c-collar in place and strapped to a backboard. His breathing is being assisted by a bag-valve mask.

What are your initial steps in management?

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Useful Resources

- *Epidemiology overview:* Disparities in Injury Mortality Between Uganda and the United States: Comparative Analysis of a Neglected Disease. Jayaraman et al.
- Trauma.org
- Trauma Care Manual - Ian Greaves, Keith Porter, Jim Ryan
- Trauma Management- Demetrios Demetriades, Juan A. Asenio

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