

TRAUMA EVALUATION AND STABILIZATION



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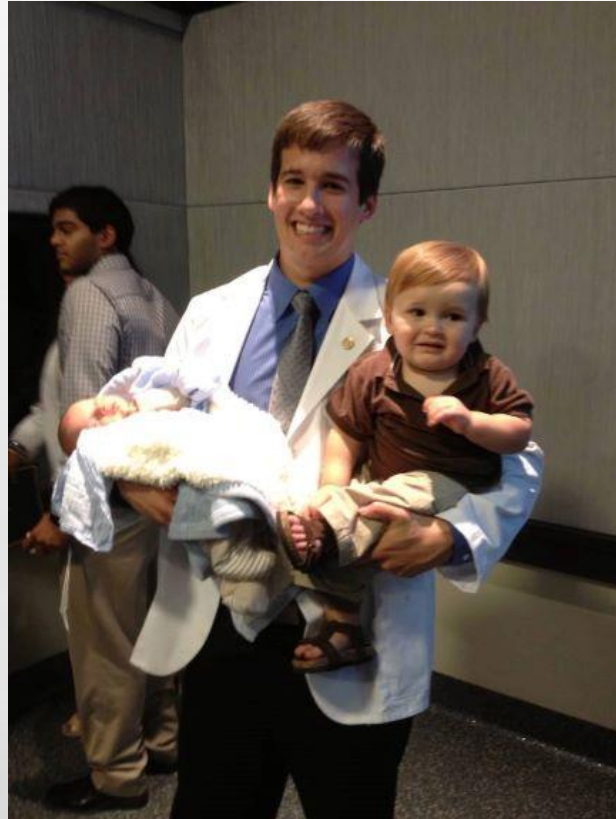
FINANCIAL DISCLOSURES

- **NOTHING TO DISCLOSE**

OBJECTIVES

- **OPEN OUR EYES TO THE GLOBAL HEALTH NEED FOR TRAUMA CARE**
- **LEARN AND PRACTICE THE PROCESS OF EVALUATING A CRITICALLY INJURED PATIENT**
- **DESCRIBE THE BASICS OF TRAUMA STABILIZATION AND LEARN SPECIFIC STABILIZATION MEASURES BASED ON BODY SYSTEMS AFFECTED**
- **DISCUSS CHALLENGES OF EVALUATING TRAUMA PATIENTS IN LOW-RESOURCE ENVIRONMENTS AND HOW TO HELP OVERCOME THESE CHALLENGES**

INTRODUCTION







MY VISION FOR EMERGENCY CARE



START WITH A CASE



WHAT I WAS USED TO



**MODO
WHERE I
TRAINED**



BRING IT.

THE TRAUMA ROOM IN HONDURAS



Case: 30's year old appearing previously healthy male who presents to the ED after a motorcycle accident complaining of severe right hip pain. The patient is moaning in acute distress and is also tachycardic. He is noted to have a right leg deformity that is internally rotated and shortened.

What are the first priorities for evaluating such a patient?

**ABC's then D and E
-Airway-Breathing-Circulation-Disability-Exposure**

TRAUMA CASE

- **ABC'S APPEARED TO BE INTACT**
- **THE PATIENT WAS EXAMINED HEAD TO TOE AND MAIN ISSUE WAS RIGHT HIP PAIN**
- **ORDERED FOR AN X-RAY OF RIGHT HIP**
- **I THEN STARTED TO ASK QUESTIONS:**
 - **WHERE IS THE CT SCANNER?**
 - **IS THERE A TRAUMA SURGEON AVAILABLE?**
 - **IS THERE AN ULTRASOUND FOR FAST EXAM?**

PELVIS X-RAY



HOW TO MANAGE?

- **SPOKE WITH THE ORTHOPEDIC SURGEON DOWN THE HALL**
- **NEED SEDATION TO RELOCATE – ONLY HAVE VERSED (NEED ANESTHESIOLOGIST FOR MORE)**
- **GOT IT BACK IN AND PATIENT STABILIZED**

FRIENDSHIPS FORMED



THOUGHTS FROM THIS EXPERIENCE

- **MANY FACILITIES IN LOWER INCOME COUNTRIES ARE ILL EQUIPPED FOR TRAUMA CARE**
- **MANY PROVIDERS HAVE LIMITED TRAINING** IN TRAUMA MANAGEMENT AND LIMITED RESOURCES
- **THERE IS A HUGE NEED FOR TRAINING** BUT ALSO FOR PREVENTION
- **PREVENTION** CAN HELP TO AVOID OVERWHELMING THE SYSTEM WHILE CAPACITY IS BEING BUILT

DEFINING THE PROBLEM

- **INJURIES/TRAUMA CAUSE 5 MILLION DEATHS A YEAR – MORE THAN HIV/AIDS, MALARIA, AND TUBERCULOSIS COMBINED**
- **OF THESE DEATHS - 90% OCCUR IN LOW- AND MIDDLE-INCOME COUNTRIES**
- **FOR EVERY INJURY RELATED DEATH – THERE ARE MANY MORE HOSPITALIZATIONS, ER VISITS, AND INJURIES WHICH FREQUENTLY LEAD TO PERMANENT DISABILITY (10-50X AS MANY PEOPLE AS DIE)**
- **LEADING CAUSE OF DEATH WORLDWIDE AGES 10-19, #1 CAUSE OF DEATH AGES 1-44 IN US**
- **DISABILITY AND INJURY FURTHER PERPETUATE THE CYCLE OF POVERTY AS OTHERWISE HEALTHY PEOPLE LOSE THEIR ABILITY TO WORK**

INJURY PYRAMID



THE ECONOMICS OF TRAUMA

- ROAD TRAFFIC INJURIES COST **US \$500 BILLION GLOBALLY** - FAR GREATER THAN TOTAL GLOBAL EXPENDITURES IN DEVELOPMENTAL ASSISTANCE
- DEVELOPMENT ASSISTANCE FOR HEALTH IS NOT DISPERSED PROPORTIONATELY TO BURDEN OF DISEASE
 - **1% FOR TRAUMA CARE VS 30% FOR HIV/AIDS, MALARIA, AND TUBERCULOSIS**
 - **\$0.04/DALY (DISABILITY ADJUSTED LIFE YEAR) LOST TO TRAUMA VS \$4.05 FOR HIV/AIDS, \$25.09 FOR TB, \$9.62 FOR MALARIA AND \$45.75 FOR MATERNAL AND CHILD HEALTH**
- THERE IS **LACK OF PRIORITIZATION OF TRAUMA PREVENTION IN LOW-INCOME COUNTRIES** – **\$0.07/CAPITA SPENT FOR ROAD SAFETY IN PAKISTAN AND \$0.09/CAPITA IN UGANDA**

VULNERABILITIES OF DEVELOPING WORLD



EMS IN HONDURAS



VULNERABILITIES OF DEVELOPING WORLD

- **WHAT ARE FACTORS INCREASING INJURIES AND TRAUMA IN LOW- AND MIDDLE-INCOME COUNTRIES?**
 - **INCREASED MOTORIZATION WITH DEVELOPMENT**
 - **UNSAFE VEHICLES ARE CHEAPER AND MORE AFFORDABLE IN LOW-INCOME COUNTRIES**
 - **ROAD SAFETY LAWS AND INFRASTRUCTURE HAVE NOT DEVELOPED AS QUICKLY**
 - **ENGINEERING OF VEHICLES AND EQUIPMENT IS NOT HELD TO SAME STANDARD**
 - **INCREASED PREVALENCE OF VIOLENT CONFLICT**
 - **FEWER PROTECTIONS FOR WORKERS AND THOSE OPERATING MACHINERY**
 - **POOR PREPAREDNESS FOR DISASTERS**
 - **UNDERDEVELOPED TRAUMA CARE SYSTEM INCLUDING EMS AND HOSPITAL-BASED CARE**



**HOW DO WE GET THE OPPORTUNITY TO
MINISTER TO THOSE THAT HAVE BEEN
TRAUMATIZED?**

EVALUATING THE CRITICALLY INJURED

- **NOT TALKING ABOUT MINOR TRAUMA**
- **THIS TALK IS GEARED TOWARD INJURIES THAT ARE LIFE AND LIMB THREATENING**
- **THERE IS A SPECIAL SKILLSET FOR EVALUATING THESE PATIENTS THAT REQUIRES A **METHODICAL APPROACH** AND **PREPARATION OF RESOURCES****
- **THIS IS NOT A COMPREHENSIVE ATLS COURSE BUT I HIGHLY RECOMMEND ATLS IF INTERESTED**

FIRST STEP – CHECK YOUR OWN PULSE

- **HYPE, ANXIETY AND FREAK OUT WILL CAUSE CHAOS AND BE UNHELPFUL**
- **WHAT DO YOU FEEL WHEN THEY ANNOUNCE SOMEONE HAS BEEN SHOT 5 TIMES IS COMING TO YOU?**
- **OR IF SOMEONE FROM A CAR ACCIDENT HAS MULTIPLE MANGLED EXTREMITIES AND HAS UNSTABLE VITAL SIGNS IS ABOUT TO ARRIVE TO YOUR HOSPITAL?**

BE PREPARED!

- **THE BEST WAY TO AVOID PANIC IS TO HAVE A PLAN AND PRACTICE IT**
- **CONSOLIDATE THE NEEDED RESOURCES INTO A TRAUMA ROOM OR AREA**
 - **THIS CAN BE ESPECIALLY USEFUL IN LOW-RESOURCE ENVIRONMENTS**
- **FIGURE OUT A WAY TO MOBILIZE NECESSARY RESOURCES AND PERSONNEL QUICKLY WHEN NEEDED**
- **PRACTICE! PRACTICE! PRACTICE!**



NECESSARY SUPPLIES FOR TRAUMA ROOM

| | | | | | | |
|----------------------------|---|-------------------------------|----------------------------|--|-----------------------------------|--------------------------------|
| Trauma bed | Monitor or equipment for vital signs | IV start kits | Tubes to draw blood | Tourniquets | Sutures/staples | Wound care materials |
| Hemostatic agents | Airway equipment | Ventilator or ambu bag | Scalpels | Chest tubes | Iv fluids | Blood products |
| Splinting materials | Cervical collars | Ultrasound | X-ray | Meds (pain, abx, sedative, local, pressors, tlap) | Minor surgical instruments | Peds specific equipment |

NEED TIERED/GRADED APPROACH

- **NOT ALL TRAUMA PATIENTS ARE INJURED TO EQUAL SEVERITY**
- **THEY HAVE TO BE TRIAGED IN THE FIELD TO **ALLOCATE RESOURCES EFFECTIVELY****
- **USUALLY **SEPARATED INTO A LEAST TWO GROUPS** (TYPE A VS B, LEVEL 1 VS 2, RED VS YELLOW)**
- **DIFFERENT LEVELS REQUIRE DIFFERENT RESOURCE MOBILIZATION**

National Guideline for the Field Triage of Injured Patients

RED CRITERIA

High Risk for Serious Injury

| Injury Patterns | Mental Status & Vital Signs |
|--|--|
| <ul style="list-style-type: none">• Penetrating injuries to head, neck, torso, and proximal extremities• Skull deformity, suspected skull fracture• Suspected spinal injury with new motor or sensory loss• Chest wall instability, deformity, or suspected flail chest• Suspected pelvic fracture• Suspected fracture of two or more proximal long bones• Crushed, degloved, mangled, or pulseless extremity• Amputation proximal to wrist or ankle• Active bleeding requiring a tourniquet or wound packing with continuous pressure | <p>All Patients</p> <ul style="list-style-type: none">• Unable to follow commands (motor GCS < 6)• RR < 10 or > 29 breaths/min• Respiratory distress or need for respiratory support• Room-air pulse oximetry < 90% <p>Age 0-9 years</p> <ul style="list-style-type: none">• SBP < 70mm Hg + (2 x age years) <p>Age 10-64 years</p> <ul style="list-style-type: none">• SBP < 90 mmHg or• HR > SBP <p>Age ≥ 65 years</p> <ul style="list-style-type: none">• SBP < 110 mmHg or• HR > SBP |

Patients meeting any one of the above RED criteria should be transported to the highest-level trauma center available within the geographic constraints of the regional trauma system

YELLOW CRITERIA

Moderate Risk for Serious Injury

| Mechanism of Injury | EMS Judgment |
|--|--|
| <ul style="list-style-type: none">• High-Risk Auto Crash<ul style="list-style-type: none">- Partial or complete ejection- Significant intrusion (including roof)<ul style="list-style-type: none">• >12 inches occupant site OR• >18 inches any site OR• Need for extrication for entrapped patient- Death in passenger compartment- Child (Age 0-9) unrestrained or in unsecured child safety seat- Vehicle telemetry data consistent with severe injury• Rider separated from transport vehicle with significant impact (eg, motorcycle, ATV, horse, etc.)• Pedestrian/bicycle rider thrown, run over, or with significant impact• Fall from height > 10 feet (all ages) | <p>Consider risk factors, including:</p> <ul style="list-style-type: none">• Low-level falls in young children (age ≤ 5 years) or older adults (age ≥ 65 years) with significant head impact• Anticoagulant use• Suspicion of child abuse• Special, high-resource healthcare needs• Pregnancy > 20 weeks• Burns in conjunction with trauma• Children should be triaged preferentially to pediatric capable centers <p>If concerned, take to a trauma center</p> |

Patients meeting any one of the YELLOW CRITERIA WHO DO NOT MEET RED CRITERIA should be preferentially transported to a trauma center, as available within the geographic constraints of the regional trauma system (need not be the highest-level trauma center)

**WHO IS
MOBILIZED
(DEPENDS ON
SITE AND
RESOURCES)**

- **EMERGENCY CARE PHYSICIAN**
- **EMERGENCY CARE
NURSES/TECHS**
- **RESPIRATORY THERAPIST**
- **RADIOLOGY PERSONNEL**
- **SURGEON**
- **BLOOD BANK**
- **PHARMACIST/TECH**
- **OPERATING ROOM PERSONNEL**
- **HOSPITAL DSO/BED
COORDINATOR**
- **LAB TECHS**

ASSIGNMENT OF ROLES

- **NEED TO HAVE CLEAR DESIGNATION OF ROLES OR CHAOS WILL ENSUE**
- **NEED TO HAVE TEAM LEADER COMMANDING THE ROOM**
- **NURSES AND TECHS NEED TO HAVE ROLES: IV/BLOOD, MONITOR AND PATIENT EXPOSURE, SCRIBE, MEDS/SUPPLIES, ETC**
- **CLOSED-LOOP COMMUNICATION IS KEY**

THE X-ABCDE'S OF PRIMARY SURVEY?

 Airway

Breathing

Circulation

Disability

Exposure



EXSANGUINATING EXTERNAL HEMORRHAGE

- **STOP THE BLEED FIRST – LOOK FOR ANY SERIOUS EXTERNAL BLEEDING AND STOP IT**
 - **APPLY TOURNIQUETS AND STOP SCALP BLEEDING**
 - **STICK A FINGER IN IT!**
 - **DIRECT PRESSURE → PACKING → TOURNIQUET**

AIRWAY

- **WHAT SHOULD WE BE LOOKING FOR OR WHAT QUESTIONS SHOULD WE ASK?**
- **CAN THE PATIENT SPEAK?**
- **IS THERE SIGN OF AIRWAY TRAUMA OR BURNS?**
- **DOES THE PATIENT HAVE IMPENDING AIRWAY COMPROMISE OR RESPIRATORY FAILURE?**
- **IF NONE OF THESE THEN “AIRWAY INTACT” OR “PATENT TO VOICE”**

BREATHING?

- **ARE THERE BILATERAL BREATH SOUNDS?**
- **IS THE PATIENT IN RESPIRATORY DISTRESS?**
- **IS THE PATIENT HYPOXIC?**
- **ARE RESPIRATIONS AGONAL OR DOES THE PATIENT HAVE BRADYPNEA?**

CIRCULATION?

- **IS THE PATIENT BLEEDING FROM ANYWHERE?**
 - **STOP THE BLEEDING OR IF INTERNAL GIVE BLOOD**
- **DOES THE PATIENT HAVE GOOD PULSES IN ALL EXTREMITIES?**
 - **ESPECIALLY TO MANGLED EXTREMITIES**
- **DOES THE PATIENT HAVE A GOOD BLOOD PRESSURE?**
- **IS THE PATIENT TACHYCARDIC OR SHOW SIGNS OF SHOCK?**

DISABILITY?

- **WHAT IS THE PATIENT'S GCS?**
 - **HIGHEST IS 15 (E4, V5, M6), LOWEST IS 3**
 - **LESS THAN 8, THINK INTUBATE**
- **IS THE PATIENT ABLE TO MOVE ALL EXTREMITIES?**
- **ANY OBVIOUS NEUROLOGIC DEFICITS?**
- **DOES THE SPINE NEED TO BE IMMOBILIZED?**

EXPOSURE?

- **HAVE I COMPLETELY EXPOSED THE PATIENT TO EXAMINE WHOLE BODY FOR INJURIES?**
 - **ALL CLOTHING NEED TO BE REMOVED OR CUT OFF**
- **AFTER EXPOSING THE PATIENT, WHAT IS BEING DONE TO KEEP THEM WARM?**

ADJUNCTS TO PRIMARY SURVEY?

- **X-RAY OF CHEST, PELVIS, OR MANGLED EXTREMITIES**
- **ULTRASOUND OF CHEST AND ABDOMEN**
 - **DETECT PNEUMOTHORAX, HEMOTHORAX, HEMOPERICARDIUM, HEMOPERITONEUM**

DON'T MOVE ON IF UNSTABLE! INTERVENE!

- **IF ANY ONE OF THE PRIMARY SURVEY ELEMENTS IS ABNORMAL OR UNSTABLE, ADDRESS IT IMMEDIATELY BEFORE MOVING ON**
- **THIS IS WHERE THE FUN STUFF HAPPENS!**

INTERVENTIONS IN PRIMARY SURVEY?

- **INTUBATION**
- **CRICOTHYROTOMY**
- **CHEST TUBE PLACEMENT**
- **TOURNIQUET APPLICATION**
- **EMERGENT FRACTURE OR DISLOCATION REDUCTION**
- **LACERATION CLOSURE, VESSEL TIE OFF OR PRESSURE TO STOP BLEEDING**
- **START BLOOD TRANSFUSION**
- **PLACE LARGE BORE CATHETER FOR RAPID BLOOD PRODUCT INFUSION**
- **PERICARDIOCENTESIS**
- **OPEN THORACOTOMY**

SECONDARY SURVEY

- **PERFORM MORE DETAILED HEAD-TO-TOE ASSESSMENT EVALUATING FOR OCCULT INJURIES**
- **COLLECT BASIC PATIENT HISTORY AND DETAILS OF TRAUMA MECHANISM**
- **GIVE IMPORTANT MEDICATIONS: ANTIBIOTICS FOR OPEN FRACTURES, TDAP FOR OPEN WOUNDS, PAIN MEDICATION, ETC.**
- **IF PATIENT BECOMES UNSTABLE, GO BACK TO PRIMARY SURVEY**
 - **MAY HAVE TO GO TO THE OR BEFORE SECONDARY SURVEY PERFORMED**

DECIDE ON ADVANCED IMAGING AND MANAGEMENT

- **CT SCANS ARE HELPFUL BUT MAY NOT BE AVAILABLE IN MANY DEVELOPING COUNTRIES**
- **MAY NEED TO RELY ON ULTRASOUND, X-RAY OR SERIAL EXAMS/OBSERVATION**

KNOW YOUR SITE SPECIFIC RESOURCES

- **DECIDE QUICKLY IF PATIENT NEEDS EMERGENT TRANSFER TO HIGHER LEVEL OF CARE**
- **CAN SOMETIMES HAVE SOMEONE START THIS PROCESS WHILE RESUSCITATION/STABILIZATION IS OCCURRING**
- **KNOW WHERE THE SPECIALIST RESOURCES ARE LOCATED IN YOUR REGION**
 - **HAVE TRAUMA CARE NETWORK AGREEMENTS WITH OTHER SITES**

NOW TIME TO PRACTICE!

- **SPLIT UP INTO GROUPS OF 4-6**
- **ONE PERSON WILL BE FACILITATOR**
- **DESIGNATE TEAM ROLES TO STABILIZE THE PATIENT**

CONCLUSION

- **TRAUMA IS A MAJOR PUBLIC HEALTH PROBLEM WORLDWIDE**
- **YOU DON'T HAVE TO BE A SPECIALIZED SURGEON TO LEARN HOW TO STABILIZE A TRAUMA PATIENT**
- **WHEREVER YOU SERVE, YOU CAN IMPROVE THE CAPACITY TO CARE FOR THE CRITICALLY INJURED**
- **PRAY AND ASK GOD IF HE IS CALLING YOU TO SERVE THOSE WHO ARE IN CRISIS OR TRAUMATIZED**

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