TRAUMA OVERVIEW 2013

Andrea Williams, PhD, RN

UW Level One
Slides Provided by: Andrea O’Flaherty, MSN, RN
OBJECTIVES

- Identify & categorize trauma patients
- Discuss trauma morbidity & mortality in the United States
- Describe the Wisconsin Trauma System
- Discuss the differences in types of traumatic injuries based on mechanism of injury
- Perform a primary and secondary trauma assessment
- Describe the importance of and devices available for spinal immobilization and splinting, rapid extrication & moving endangered patients
- Explain trauma scoring scales
- Differentiate Trauma Center designations and transport of patients to the most appropriate hospital
The purpose: “To reduce death and disability resulting from traumatic injury by decreasing the incidence of trauma, providing optional care of trauma patients and their families and collecting and analyzing trauma-related data” (DHS 118.01)
ACS Verified Level 1 and 2 Trauma Centers:

- **Adult Level 1**: UWHC & Froedhert
- **Adult Level 2**: Eau Claire, Green Bay x 2, Janesville, La Crosse, Marshfield, Neenah, Wausau
- **Pediatric Level 1**: AFCH & CHOW
- **Pediatric Level 2**: Marshfield

**Level 3 and 4 Centers**: 112 State verified

- 91% of 124 WI hospitals

© DHS, www.dhs.wisconsin.gov/trauma/classification.htm
Level 1: Capable of Providing Care for Every Type of Injury.
- Has services such as neurosurgery, orthopedic surgery, plastics, rehab, hand surgery,
- Research, Education, and Prevention

Level 2: Able to Provide Definitive Care - may have to send very complex patients to a Level 1 facility
- No research requirement, May not have residency or offer same educational opportunities as Level 1 facilities.
LEVELS 3 & 4

Level 3: Can Stabilize and Manage Less Complex Trauma Patients
- Transfers trauma patients to Level 1 or 2 facility for most surgical and/or intensive care needs

Level 4: Stabilization and ATLS Until Patient Can Be Transferred
- May not have surgeon available at all times.
UWHC’S & AFCH ROLE

- Definitive trauma care provider for most of Western and Mid-Wisconsin trauma patients.
- Train ER residents and surgery residents in the care of trauma patients
- Research
- Trauma Leadership
- Injury Prevention
- Advanced Trauma Life Support
- Trauma Registry
Jan – March 2013

UWHC TRAUMA POPULATION

AGE

- >= 65: 25%
- 55 to 64: 16%
- 45 to 54: 16%
- 35 to 44: 12%
- 25 to 34: 15%
- 18 to 19: 4%
- 20 to 24: 12%

Patient Sex

- Male: 61%
- Female: 39%
LEVEL 1 BY DAY OF WEEK
 Activation Levels

- **Level 1**: Mostly physiologic, some mechanism (GCS <8, SBP <90, airway compromise, penetrating trauma...)
- **Level 2**: Some physiologic, mostly mechanism (roll over, ejection, falls >20ft, HR>100...)

Case/Peer Review

- All deaths
- Filters
  - Admits to Non-surgical services,
  - severely injured Level 2 traumas, infections, readmissions
ACS – COT REQUIREMENTS AND STANDARDS

- **Documentation**
  - Surgeon arrival time
  - Alcohol Screening and Brief Interventions
  - Complete Vitals
  - Blood Product Administration
  - Complications
  - Follow Up
  - Incidental Findings

- **Process Improvement / Patient Safety**
  - Continuous – using trauma registry data
  - Across the Continuum of Care (Pre Hospital, ED, Inpatient, Rehab)
  - Current Projects: Communication Simulation, Reducing LOS in ED, ongoing assessment of Leveling Criteria
  - Also: Use of Hover Mats in patients on spinal precautions, Use of TXA in massive transfusion, and improving transport from referring facilities
WHO IS THE TRAUMA TEAM?

- Suresh Agarwal, MD – Adult Trauma Medical Director
- Andrea O’Flahrity, MSN, RN – Adult Trauma Program Manager
- Ankush Gosain, MD – Pediatric Trauma Medical Director
- Mary Anderson, MSN, RN – Pediatric Trauma Program Manager
- Becky Turpin – Adult Injury Prevention Coordinator
- Nanette Peterson – Pediatric Injury Prevention Coordinator/Manager
- Adult Trauma Attendings: Drs. Orr, O’Rourke, Kudsk, Liepert, Jung, Faucher
- Pediatric Trauma Attending Physicians:
- Trauma Residents and Medical Students

AND.......
TRAUMA TEAM

- EMS, Med Flight
- Emergency Physicians
- Nurses
- Emergency, Operative Services Technicians
- F4/4, TLC, F8/4, B6/4, & Burn Staff
- Rehabilitation
- Respiratory Therapy
- PT/OT/ST
- Operative Services
- Palliative Care
- Health Psych
- Orthopedics, Neurosurgery, Anesthesia, Plastics, Cardiothoracic . . . .
Phases of Trauma Care

Pre-Incident Phase
- Prevention of intentional and unintentional deaths

Incident Phase
- Prevention through education and example

Post-Incident Phase
- Delivery of emergency care and transportation by EMS personnel
“Golden Hour”

ACS concept that deaths & complications are reduced when trauma victims receive definitive treatment within the 1st hour after injury.
Morbidity & Mortality

- **Morbidity** – Nonfatal injury - New cases where death is not the outcome
- **Mortality** – Incidence of death
- **Years of Life Lost** – Subtract the age of death from the life expectancy
- **Deaths due to trauma in the United states**
  - Motor vehicle crashes
  - Motor cycle crashes
  - Pedestrian
  - Falls
  - Mechanical forces – Struck by objects or machinery
  - Drownings
  - Electrical current
  - Intentional self-harm
  - Assaults (firearms, knives, etc.)
Blunt Trauma - Bleeding & Nonbleeding

- Motor Vehicle Collision
- Motorcycle Collision
- Recreational Motor Vehicles Collision – ATV’s, Snowmobiles
- Bicycle Injuries
- Pedestrian Injuries
  - Adult Injuries – Turn Away
  - Pediatric Injuries – Face the Vehicle
- Falls
- Agriculture Injuries
- Blast Injuries
  - **Primary Blast Injuries** – Burns & Sudden changes in pressure – displaces tissue
    - Most vulnerable tissues are: ears, lungs, CNS, GI
  - **Secondary Blast Injuries** – Struck by debris
  - **Tertiary Blast Injuries** – Victims are propelled through space
  - **Quaternary Blast Injuries** – Exacerbation of complications of existing conditions - CDC
Penetrating Trauma

Force pierces the skin & penetrates the tissue

Factors

- Velocity: High speed = more energy transfer & tissue damage
- Location of wound
- Direction of forces
- Size & type of missile
Types of Penetrating Trauma

High Velocity Missiles
- GSW
- Explosives debris

Medium Velocity

Low Velocity Missiles
- Stab wounds & impaled objects
Gunshot Wounds

- Cavitation
- Ballistics
- Ricochet
- Damage varies with bullet design, fragmentation, deformation, & tissue characteristics
- Entrance & exits sites are difficult to differentiate
Agricultural Mechanism of Injury

- Confined Spaces Hazards
- Construction Hazards
- Chemical Hazards
- Livestock Hazards
- Machine and Vehicles Hazards
Farm Animal Injuries

- Head, spine, chest, abdomen, pelvis & extremity injuries
- Bulls are unpredictable during mating & calving seasons
- Gored, crushed against fences/stalls, stomped
Agricultural Injuries

- Falls
- Crush
- Lacerations & abrasions
- Degloving
- Burns
- Amputations
- Traumatic asphyxia
Emergent Phase

Primary Assessment/Survey (ABCD)

- **A** Airway
- **B** Breathing
- **C** Circulation
- **D** Disability
- **E** Environment & Exposure
- **G** Gathering information from first responders, MIVT (Mechanism, injuries, VS, Treatment) & SAMPLE

- **M** Massive Bleeding 1st
- **A** Airway
- **R** Respirations/Breathing
- **C** Circulation
- **H** Hypothermia & Head Injury
Airway Assessment & Management

- Assess for airway patency
- Clear the airway
  - Airway maneuvers
  - Suction
  - Finger sweeps
- Protect the airway
  - GCS less than 8 = intubate
  - Bleeding into the airway – ETT
  - Surgical airways
Breathing

Can they breath? Are they breathing enough?
- Assess ventilation capability

Oxygenation

Check Thorax & Neck
- Deviated trachea – Hard to see
- ✓ Tension pneumothorax
- ✓ Chest wounds & chest wall motion
- ✓ Sucking chest wound
- ✓ Neck & chest crepitation
- ✓ Multiple broken ribs
- ✓ Fractured sternum

Listen for Breath Sounds

Re-Evaluate – ETT placement
Circulation

- Direct pressure for external bleeding
- Massive Bleeding – Direct pressure & consider need for tourniquets
- Initiate IV’s/IO’s & Fluid Resuscitation
  - Two large bore IV’s based on injury sites
  - Fluid bolus
  - Asses blood volume status
  - JVD
  - Quality of heart tones
- Pressure determination d/t radial & carotid pulse presence
- Beck’s Triad?
- Hypovolemia?
- Shock?
Hemorrhagic Shock

- **Class I** 15% blood loss <750ml
  Vital signs, urine output, LOC unchanged
- **Class II** 15-30% blood loss 750-1500mls
  HR & RR increasing
- **Class III** 30-40% blood loss 1500-2000ml
  Greater changes in AHR, RR, BP, decreased urine
- **Class IV** 40% + Greater than 2000mls
  Vital signs unstable, diminished urine output, CNS changes
Disability

- Brief neuro assessment
- Pupil size, shape & reactivity
- Limb movement
- GCS

**Hypotension is the greatest threat to the Central Nervous System**
- Close monitoring of vs, fluid replacement, to prevent hypotension and insure tissue perfusion

**Prevent Further Injury to the Spinal Cord**
- Immobilization – Cervical collar, backboard

**Consider neurogenic shock**
- Loss of sympathetic tone (vasodilatation, hypotension)
Exposure

- Completely remove clothing
- Logroll to inspect posterior
# Glasgow Coma Scale

<table>
<thead>
<tr>
<th>Eye Opening</th>
<th>Best Motor Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous eye opening</td>
<td>Follows commands</td>
</tr>
<tr>
<td>Eye opening to command</td>
<td>Localizes painful stimuli</td>
</tr>
<tr>
<td>Eye opening to pain stimulus</td>
<td>Withdraws from pain</td>
</tr>
<tr>
<td>No eye opening</td>
<td>Abnormal flexion to pain</td>
</tr>
<tr>
<td></td>
<td>Abnormal extension to pain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Best Verbal Response</th>
<th></th>
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<tbody>
<tr>
<td>Oriented, appropriate answers</td>
<td></td>
</tr>
<tr>
<td>Confused</td>
<td></td>
</tr>
<tr>
<td>Inappropriate response</td>
<td></td>
</tr>
<tr>
<td>unintelligible noises</td>
<td></td>
</tr>
<tr>
<td>No verbal response</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Best Motor Response</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Follows commands</td>
<td>6</td>
</tr>
<tr>
<td>Localizes painful stimuli</td>
<td>5</td>
</tr>
<tr>
<td>Withdraws from pain</td>
<td>4</td>
</tr>
<tr>
<td>Abnormal flexion to pain</td>
<td>3</td>
</tr>
<tr>
<td>Abnormal extension to pain</td>
<td>2</td>
</tr>
<tr>
<td>No motor response</td>
<td>1</td>
</tr>
</tbody>
</table>
Secondary Assessment/ Head-To-Toe Examination

- **Face**
- **Eyes**
  - Adie’s pupils - 1 eye blindness
  - Horne’s syndrome - Deviations
  - Occulomotor paralysis – Artificial eyes
- **Ears**
- **Mouth**
- **Nose**
- **Neck**
- **Chest**
- **Abdomen**
- **Pelvis**
- **Perineum**
- **Limbs**
- **Posterior**
## Trauma Scoring Systems

### Revised Trauma Score 1980

<table>
<thead>
<tr>
<th>A. Ventilatory Rate</th>
<th>B. Systolic BP</th>
<th>C. Glasgow Coma Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-29 breaths/minute</td>
<td>&gt;89 mm Hg</td>
<td>13-15</td>
</tr>
<tr>
<td>&gt;29 breaths/min</td>
<td>76-89 mm Hg</td>
<td>9-12</td>
</tr>
<tr>
<td>6-9 breaths/min</td>
<td>50-75 mm Hg</td>
<td>6-8</td>
</tr>
<tr>
<td>1-5 breaths/min</td>
<td>1-49 mm Hg</td>
<td>4-5</td>
</tr>
<tr>
<td>0 breaths</td>
<td>No Pulse</td>
<td>&lt;4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Trauma Score = A + B + C
Transport to Appropriate Care