Glasgow Coma Scale

Presented by: Jay Wuerker, EMT-P
EMS Instructor II

This presentation made possible by:
Suzanne Martens, M.D. and the Southeastern Regional Trauma Advisory Council (SERTAC)
Trauma Review

GCS

- Glasgow Coma Scale / Score
- Predictive of head injury outcomes
- 3 categories
  - Motor
  - Verbal
  - Eye Opening
- Score 15[alert] - 3[unresponsive]

“Even a tree gets a 3”
# GCS

- GCS range 15 – 3
- Record BEST effort
- Repeat score prior to ED arrival

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GCS

- 12-9: Moderate TBI
- 8-3: Severe TBI = Coma

GCS vs. Outcomes

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<tr>
<th>GCS</th>
<th>TBI</th>
<th>“Good” Outcome</th>
<th>Any Disability</th>
<th>Moderate Disability</th>
<th>Severe Disability</th>
<th>Death</th>
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<tr>
<td>15-13</td>
<td>Mild</td>
<td>99%</td>
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<td>12-9</td>
<td>Moderate</td>
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<td>8-3</td>
<td>Severe</td>
<td>14% 35%</td>
<td>75%</td>
<td>85%</td>
<td>“Most survivors”</td>
<td>41% 60% adults</td>
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- Various answers from various studies
- In one study *all* patients who presented to the ED with a GCS of 3 and fixed and dilated pupils died
GCS vs. Admission vs. Death

Neuro Exam Shortcut

“Stick out your finger and touch your nose”

- Transporting agencies still need to document GCS in their report
GCS?

- Motor
  - Purposeful: 6
- Verbal
  - Nml? 5
  - Confused? 4
  - Mumbling? 3
- Eyes
  - Likely open if fighting: 4
- 15-13
- Mild TBI

GCS?

- Motor
  - Pain? 4
  - Posturing?
  - None? 1
- Verbal
  - Mumbling? 3
  - Moaning? 2
  - None? 1
- Eyes
  - Pain? 2
  - None? 1
- 9-3
- TBI?
- Or drunk?
GCS?

- Motor
  - Posturing:
  - Decorticate 3
  - Decerebrate 2
- Verbal
  - Moaning 2
  - None 1
- Eyes
  - None 1
- 5-4
- Severe TBI

Decerebrate posture results from damage to the upper brain stem. In this posture, the arms are adducted and extended, with the wrists pronated and the fingers flexed. The legs are stiffly extended, with plantar flexion of the foot.

GCS

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Severe TBI
BANG YOUR HEAD
JEMS Quiz

- CONCUSSION & SECOND IMPACT SYNDROME
- How EMS providers should treat & protect their patients

Concussion and Traumatic Brain Injury (TBI)

What is it?
A concussion is a traumatic brain injury that alters the way your brain functions

- Usually temporary
- Problems with headache, concentration, memory, judgment, balance and coordination

Concussion may also be caused by the head and upper body being violently shaken

Concussion may cause loss of consciousness, but most do not; some people have a concussion and don’t realize it
Leading Causes of TBI

- Falls 40.5%
  - Children age 0 to 14 55%
  - Adults over age 65 81%
- Unknown/Other 19.0%
- Struck by/against 15.5%
- Motor vehicle traffic 14.3%
- Assaults 10.7%

- Common in contact sports:
  - Every concussion injures your brain to some extent (on the cellular level), and needs time to rest and heal
Symptoms of a Concussion – may be subtle

- Headache or feeling of pressure in the head
- Amnesia – doesn’t remember the event that caused the symptoms
- Confusion – “in a fog”
- Temporary loss of consciousness
- Dizzy – “seeing stars”
- Nausea or vomiting
- Ringing in the ears
- Slurred speech
- Fatigue

Symptoms may last for days, weeks or longer
Additional, Immediate or Delayed Symptoms

- Concentration and memory problems
- Personality changes – irritability
- Sensitivity to light and noise
- Sleep disturbances
- Problems with smell and taste
- Depression

Medical Care for Concussions is Needed if:

- Loss of consciousness for more than 1 minute
- Repeated vomiting
- Seizures
- Obvious problems with physical coordination and mental functions
- Symptoms that worsen over time
Athletes or Those in Sports

- Should not return to play while signs or symptoms are present
- Should seek medical evaluation before returning

Risk Factors for Concussion:

- Participation in contact sports without proper safety equipment and supervision
- MVA
- Soldier in combat
- Physical abuse
- Falls – very young and older adults
- Previous concussion
Complications of Concussions

- Epilepsy:
  - Two times the risk of developing epilepsy within 5 years of the injury

- Cumulative effects of multiple concussions leading to lasting cognitive impairment (i.e., boxers, football players)

Second Impact Syndrome

What is it?
Second impact syndrome refers to:

A. The repeated brain impacts that occur when the head forcefully strikes a stationary object
B. A second brain injury occurring before the patient has recovered from a first injury
C. The coup and contrecoup injuries that occur during brain trauma
D. A secondary injury to the brain from brain swelling after trauma

Which of the following is not a structure in the brainstem?

a. medulla oblongata
b. pons
c. diencephalon
d. midbrain
Which of the following structures control heart rate and breathing?

a. medulla oblongata  
b. pons  
c. diencephalon  
d. midbrain

The hypothalamus is responsible for maintaining:

a. body temperature  
b. reflexive eye movement  
c. involuntary smooth muscle movement  
d. respiratory rate
Damage to the frontal lobe could result in:

a. inability to concentrate
b. double vision
c. hearing problems
d. disorientation of space

A patient with expressive aphasia most likely has damage to which lobe?

a. frontal
b. parietal
c. temporal
d. occipital
What mechanism of injury causes most mild traumatic brain Injuries?

a. blunt trauma  
b. whiplash injuries  
c. penetrating trauma  
d. gunshot wounds

Which of the following GCS scores best represents a patient with a mild traumatic brain injury?

a. 4  
b. 6  
c. 12  
d. 14
Leakage of cerebrospinal fluid from the ears following head trauma may indicate:

a. basilar skull fracture
b. severe brain injury
c. concussion
d. ruptured meninges

Pupillary changes following brain trauma may indicate:

a. basilar skull fracture
b. mild brain injury
c. ruptured meninges
d. brain swelling
Following brain trauma your patient is agitated and has no emotional control. You suspect injury to the:

a. limbic system
b. basal ganglia
c. hypothalamus
d. pons

Obvious injury above the level of the clavicles should prompt you to consider:

a. endotracheal intubation
b. spinal immobilization
c. emergent transport
d. fluid bolus
Which of the following is true of mild TBI?

a. Plain X-rays can rule out significant brain trauma.
b. Surgery will often correct mild traumatic brain injury.
c. About 8% of mild TB1 patients will suffer long-term consequences.
d. Patients with a GCS score of 8-10 rarely have serious long-term problems.

Questions on the Quiz?
New Imaging Technique

- High-definition fiber tracking – Uses sophisticated computer algorithms to produce yellow, green and purple images of fibers that show breaks or damage to the cells.
- Normal MRI’s or CT don’t show the damage.
Fiber Tracking Video

New Brain Imaging Technique Reveals Damage Caused by TBI

➢ http://youtu.be/AvyVRQcHoyQ

Hyperbaric Oxygen Therapy

➢ Military TBI victims say HBOT helps them live better lives.
➢ Same treatment that is used for Diving injuries, CO poisoning, burns and other soft tissue injuries.
➢ Air Force and Army study underway.
Other Treatment

- Wounded-warrior programs at Camp LeJeune NC and Camp Pendleton CA
- Music
- DoD $19.5 million contract to Abbott Labs on August 13, 2014 to develop a kit to test for two proteins found in the blood after a blow to the head.

2011 Wisconsin Act 172

- Concussion and Head Injury in “Youth athletic activity”
- Coach, athletic official or health care provider must remove a person who exhibits signs of a head injury from a youth athletic activity.
GCS Review

GCS

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GCS

- 12-9: Moderate TBI
- 8-3: Severe TBI = Coma

Helicopter criteria sustained GCS <14
- Not a transient LOC from standing level fall or sports injury; that is a concussion

GCS?

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Triaging a trauma patient?

“Depressed or open skull fracture”

An indication for trauma triage and helicopter transport
Open & Depressed Skull Fracture

Child struck by stone thrown by lawnmower

Linear Skull Fracture

BMX crash
Fatal MCC

Open or Depressed Skull Fracture

Brain surface with skull removed and dura mater reflected.
Scalp Hematoma

S -- Skin
C -- dense Connective tissue
A -- Aponeurosis (Galea)
L -- Loose connective tissue
P -- Periosteum
Scalp Hematoma

GCS Helicopter Indication

- GCS less than 14
  - 2 point deficit
- NOT transient LOC
- NOT transient confusion

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For more information

- Internet search engine: Concussion and Traumatic Brain Injury (TBI)
- Heads Up App. For the iPhone or Android App on Google play

Random Thoughts

- The early bird may get the worm,

**BUT**
• The second mouse gets the cheese!