EARLY MANAGEMENT OF PENETRATING HEAD INJURIES

Peter B. Letarte MD, FAANS, FACS
DISCLOSURES

• Dr. Letarte does not have significant financial relationships to report.

• Dr. Letarte is a Captain in the United States Navy. The opinions expressed in this talk are his alone and do not represent those of the Department of Defense or the United States Navy.
WHAT IS THIS TALK ABOUT?
GUN SHOT WOUNDS TO THE HEAD
WHAT IS THIS TALK ABOUT?
ATTITUDE
WHAT DO YOU THINK WHEN YOU SEE THIS?
WE HAVE A 32 YEAR OLD MALE WITH A GUNSHOT WOUND TO THE HEAD......
Figure 11. Traumatic brain injury rates by cause of injury and survival status - Arizona, Colorado, Minnesota, Missouri, New York, Oklahoma, and South Carolina, 1994.
FIREARM RELATED TBI IS LETHAL

• 90.4% Mortality

• Many assume that the remaining 9.6% will have unacceptable outcomes
90.4% = 100%

• Q: Why Didn’t You Resuscitate Him?
• A: He was a Gunshot Wound to the Head
ATTITUDE
PROVIDER’S TENDENCY TO UNDER RESUSCITATE COGNITIVE ERROR

• Kaufman- 1992
  • “False Pessimism Rate”
  • Providers “Cut” often in error

• 90.4% = 100%
90.4% = 100%

Why Do We Think This?

- What we know about gunshot wounds, we learned at the movies
- We don’t understand the pathophysiology of wounding
- We don’t understand the natural history of wounding
- We don’t know the clinical predictors of outcome
- We don’t know surgical best practices
- It easier and “more cost effective” to give up
WHAT IF YOUR PATIENT LOOKS LIKE THIS?
WHAT IF HE IS YOUR SHIPMATE?
WHAT IF THEY GO TO ONE OF YOUR SCHOOLS?
PROVIDER’S TENDENCY TO UNDER RESUSCITATE COGNITIVE ERROR

- Kaufman- 1992
  - “False Pessimism Rate”
  - Surgeon’s “Gut” often in error
- $90.4\% = 100\%$
### Field GCS Scores

<table>
<thead>
<tr>
<th>GCS Score</th>
<th>NNMC Admission GCS Score</th>
<th>Discharge GOS Score</th>
<th>6-mo GOS Score</th>
<th>1-y GOS Score</th>
<th>2-y GOS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (n = 114)</td>
<td>8.6 (3.8) n = 114</td>
<td>3.1 (0.8) n = 112</td>
<td>3.6 (1.1)* n = 89</td>
<td>3.9 (1.2)* n = 76</td>
<td>4.0 (1.2)* n = 62</td>
</tr>
<tr>
<td>GCS score 3–5 (n = 36)</td>
<td>6.1 (2.9) n = 36</td>
<td>2.4 (0.8) n = 34</td>
<td>2.8 (1.1) n = 29</td>
<td>2.9 (1.3)* n = 23</td>
<td>3.0 (1.5)* n = 20</td>
</tr>
<tr>
<td>GCS score 6–8 (n = 25)</td>
<td>7.8 (3.0) n = 25</td>
<td>3.0 (0.5) n = 25</td>
<td>3.6 (0.8)† n = 16</td>
<td>4.1 (0.9)† n = 14</td>
<td>4.2 (0.9)† n = 10</td>
</tr>
<tr>
<td>GCS score 9–11 (n = 14)</td>
<td>8.9 (3.3) n = 14</td>
<td>3.1 (0.4) n = 14</td>
<td>4.2 (0.9)† n = 11</td>
<td>4.4 (0.7)† n = 10</td>
<td>4.4 (0.8)† n = 10</td>
</tr>
<tr>
<td>GCS score 12–15 (n = 39)</td>
<td>11.2 (3.7) n = 39</td>
<td>3.7 (0.6) n = 39</td>
<td>4.2 (0.7)‡ n = 33</td>
<td>4.5 (0.6)* n = 29</td>
<td>4.6 (0.6)* n = 22</td>
</tr>
</tbody>
</table>

Fisher’s exact test.
* p < 0.0001.
† p < 0.01.
‡ p < 0.05.

---

**Long-term outcomes of combat casualties sustaining penetrating traumatic brain injury**

Weisbrod, Allison B.; Rodriguez, Carlos; Bell, Randy; Neal, Christopher; Armonda, Rocco; Doriese, Warren; Schreiber, Martin; Dunne, James R.


doi: 10.1097/TA.0b013e318270ee178

---

**Field GCS and GOS Scores**
<table>
<thead>
<tr>
<th></th>
<th>Eye</th>
<th>Verbal</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Follows Commands</td>
<td>Follows Commands</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Appropriate</td>
<td>Appropriate</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spontaneous</td>
<td>Inappropriate</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>To Voice</td>
<td>Single Words</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>To Pain</td>
<td>Sounds</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
### EXTENDED GLASGOW OUTCOME SCORE

<table>
<thead>
<tr>
<th>SCORE</th>
<th>CATEGORY</th>
<th>SYMBOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DEAD</td>
<td>D</td>
</tr>
<tr>
<td>2</td>
<td>VEGETATIVE STATE</td>
<td>VS</td>
</tr>
<tr>
<td></td>
<td>Unable to interact with environment; unresponsive</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SEVERE DISABILITY</td>
<td>SD-</td>
</tr>
<tr>
<td></td>
<td>Able to follow commands/unable to live independently</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>MODERATE DISABILITY</td>
<td>MD</td>
</tr>
<tr>
<td></td>
<td>Able to live independently; unable to return to work or school</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>GOOD RECOVERY</td>
<td>GR</td>
</tr>
<tr>
<td></td>
<td>Able to return to school</td>
<td></td>
</tr>
</tbody>
</table>

---

[00083] Table 3. Categorization of the Extended Glasgow Outcome Scale

<table>
<thead>
<tr>
<th>SCORE</th>
<th>CATEGORY</th>
<th>SYMBOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Death</td>
<td>D</td>
</tr>
<tr>
<td>2</td>
<td>Vegetative State</td>
<td>VS</td>
</tr>
<tr>
<td>3</td>
<td>Lower severe disability</td>
<td>SD-</td>
</tr>
<tr>
<td>4</td>
<td>Upper severe disability</td>
<td>SD+</td>
</tr>
<tr>
<td>5</td>
<td>Lower moderate disability</td>
<td>MD-</td>
</tr>
<tr>
<td>6</td>
<td>Upper moderate disability</td>
<td>MD+</td>
</tr>
<tr>
<td>7</td>
<td>Lower good recovery</td>
<td>GR-</td>
</tr>
<tr>
<td>8</td>
<td>Upper good recovery</td>
<td>GR+</td>
</tr>
</tbody>
</table>
Long-term outcomes of combat casualties sustaining penetrating traumatic brain injury

Weisbrod, Allison B.; Rodriguez, Carlos; Bell, Randy; Neal, Christopher; Armonda, Rocco; Doria, Warren; Schreiber, Martin; Dunne, James R.


doi: 10.1097/TA.0b013e318270e179

<table>
<thead>
<tr>
<th>Field GCS</th>
<th>NNMC Admission GCS Score</th>
<th>Discharge GOS Score</th>
<th>6-mo GOS Score</th>
<th>1-y GOS Score</th>
<th>2-y GOS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (n = 114)</td>
<td>8.6 (3.8) n = 114</td>
<td>3.1 (0.8) n = 112</td>
<td>3.6 (1.1)* n = 89</td>
<td>3.9 (1.2)* n = 76</td>
<td>4.0 (1.2)* n = 62</td>
</tr>
<tr>
<td>GCS score 3-5 (n = 36)</td>
<td>6.1 (2.9) n = 36</td>
<td>2.4 (0.8) n = 34</td>
<td>2.8 (1.1) n = 29</td>
<td>2.9 (1.3)* n = 23</td>
<td>3.0 (1.5)* n = 20</td>
</tr>
<tr>
<td>GCS score 6-8 (n = 25)</td>
<td>7.8 (3.0) n = 25</td>
<td>3.0 (0.5) n = 25</td>
<td>3.6 (0.8)† n = 16</td>
<td>4.1 (0.9)† n = 14</td>
<td>4.2 (0.9)† n = 10</td>
</tr>
<tr>
<td>GCS score 9-11 (n = 14)</td>
<td>8.9 (3.3) n = 14</td>
<td>3.1 (0.4) n = 14</td>
<td>4.2 (0.9)† n = 11</td>
<td>4.4 (0.7)† n = 10</td>
<td>4.4 (0.8)† n = 10</td>
</tr>
<tr>
<td>GCS score 12-15 (n = 39)</td>
<td>11.2 (3.7) n = 39</td>
<td>3.7 (0.6) n = 39</td>
<td>4.2 (0.7)‡ n = 33</td>
<td>4.5 (0.6)* n = 29</td>
<td>4.6 (0.6)* n = 22</td>
</tr>
</tbody>
</table>

Fisher’s exact test.

*p < 0.0001.

†p < 0.01.

‡p < 0.05.
HARVEY CUSHING

- Army Neurosurgeon in France 1917-1918
- Reduced Operative Mortality from 50% to 29%
MORTALITY

- Cushing 29% Operative Mortality
- Multiple early studies (1986-1992) cited 91% mortality
- Kaufman 1986- 71% mortality at point of injury
- Siccardi 1991- 73% mortality at point of injury
- Aarabi 2014- 76% mortality at point of injury
AARHABI
PREDICTORS OF OUTCOME IN CIVILIAN GUNSHOT WOUNDS TO THE HEAD 2014

• Retrospective study or outcomes of gunshot wounds to the head in the State of Maryland.

• Acute care hospital
  • Mortality 65%
  • Good outcomes 35% at 3 years

• Add point of injury and pre hospital data
  • 75% did not reach hospital
  • Increases mortality to 91%
DIRTY HARRY EFFECT
(WHAT YOU LEARNED AT THE MOVIES)

• That people die instantly
  • They don’t
• 75% will rapidly die in the field
RAPID TRANSPORT IS NOW AVAILABLE IN BOTH THE CIVILIAN AND MILITARY WORLDS

• Some in the field and ED are in the process of dying
  • 90% mortality

• Some in the field and ED have already survived and ARE THE SURVIVORS
  • 20% Mortality
  • First use of rapid evacuation from point of injury to high level care
    • vs Field Hospital
    • 30 minutes
  • First use of readily available CT
IF YOU ARE THE FIRST ONE THERE HOW WILL YOU KNOW?
CASE STUDY

- 32 yo male found in the drivers seat of a car with a Gun Shot Wound to the head. No weapon found in the car.
- GCS 10, SBP > 90, Respirations 10-15
- Patient with CSF Rhinorrea
32 YO WITH WOUND TO RIGHT FORHEAD
THERE IS USUALLY ENOUGH TIME TO DIE LATER
ATTITUDE
EVIDENCE BASED MEDICINE

• Classification of Evidence

• Guidelines for the Management of Penetrating Brain Injury
  • Journal of Trauma Injury, Infection, and Critical Care 2001, 51 (2) S1- S 86
32 yo male found in the drivers seat of a car with a Gun Shot Wound to the head. No weapon found in the car.

- GCS 10, SBP > 90, Respirations 10-15
- Patient with CSF Rhinorrea
• Older Patients Do Worse
  • CLASS III
• Odds Ratio 3.45-11.0
• Pathology or Response?
  • Very few older patients in studies
    • Exclude “DOA”
CASE STUDY

• 32 yo male found in the drivers seat of a car with a Gun Shot Wound to the head. No weapon found in the car.

• GCS 10, SBP> 90, Respirations 10-15

• Patient with CSF Rhinorrea
CAUSE OF INJURY

- Military vs. Civilian
- Self Inflicted vs. Assault
- Gunshot Wound vs. Blast Debris
Figure 9. Proportions of firearm-related traumatic brain injury by intent - Arizona, Colorado, Minnesota, Missouri, New York, Oklahoma, and South Carolina, 1994

- Intentional - inflicted by self: 66.5%
- Intentional - inflicted by other: 25.7%
- Unintentional: 4.3%
- Legal intervention: 0.2%
- Intent unknown: 3.3%
SUICIDE

• Multiple Studies Show Higher Mortality for Suicide
  • CLASS II
• Odds Ratio 1.63-5.83
• Pathology or Response?
  • 60% of Neurosurgeons report they are less likely to be aggressive with suicide victims
PATH

Anatomic Planes

Coronal
Sagittal
Horizontal
32 YO WITH WOUND TO LEFT FORHEAD
MODE OF INJURY

- Modes
  - Perforating
  - Penetrating
  - Tangential
COLLAPSED IN CAR, GSW TO RIGHT TEMPLE
GCS 15
28 YO FEMALE SHOT FROM BEHIND ON LEFT
28 YO FEMALE SHOT FROM BEHIND ON LEFT
THEY ALL APPEAR SIMILAR TO THIS
CALIBER OF THE WEAPON
WHAT YOU SEE
LESSONS FROM VIETNAM
CALIBER OF WEAPON

\[ E = MV^2 \]

- \( E \) = Kinetic Energy Delivered by a Projectile to the Brain
- \( M \) = Mass of Bullet
  - Need to Know Caliber
- \( V \) = Velocity of Bullet
  - Need to Know Type of Ammunition
  - Need to Know RANGE
WHEN YOU GET TO THE PATIENT

• Who will tell you what type of weapon was used?
• Who will tell you what the range was?
• Who will tell you the circumstances of the shooting?
32 YO WITH WOUND TO LEFT FOREHEAD
CALIBER OF WEAPON

• A Large Body of Laboratory Work on the Impact of Bullet Kinetics and Caliber on Lethality

• There is No Statistically Significant Data on Its Predictive Value in the Field or the ER
CASE STUDY

- 32 yo male found in the drivers seat of a car with a Gun Shot Wound to the head. No weapon found in the car.
- GCS 10, SBP > 90, Respirations 10-15
- Patient with CSF Rhinorrea
# Glasgow Coma Score

<table>
<thead>
<tr>
<th></th>
<th>Eye</th>
<th>Verbal</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Follows</td>
<td>Spontaneous</td>
<td>Follows</td>
</tr>
<tr>
<td>5</td>
<td>Appropriate</td>
<td>To Voice</td>
<td>Commands</td>
</tr>
<tr>
<td>4</td>
<td>Inappropriate</td>
<td>Spontaneous</td>
<td>Localizes Pain</td>
</tr>
<tr>
<td>3</td>
<td>Single Words</td>
<td>To Pain</td>
<td>Does Not</td>
</tr>
<tr>
<td>2</td>
<td>Sounds</td>
<td>To Voice</td>
<td>Localizes Pain</td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>None</td>
<td>Decorticate</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>None</td>
<td>Decerebrate</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
### Field GCS and GOS Scores

<table>
<thead>
<tr>
<th>Field GCS</th>
<th>NNMC Admission GCS Score</th>
<th>Discharge GOS Score</th>
<th>6-mo GOS Score</th>
<th>1-y GOS Score</th>
<th>2-y GOS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (n = 114)</td>
<td>8.6 (3.8) n = 114</td>
<td>3.1 (0.8) n = 112</td>
<td>3.6 (1.1)* n = 89</td>
<td>3.9 (1.2)* n = 76</td>
<td>4.0 (1.2)* n = 62</td>
</tr>
<tr>
<td>GCS score 3−5 (n = 36)</td>
<td>6.1 (2.9) n = 36</td>
<td>2.4 (0.8) n = 34</td>
<td>2.8 (1.1) n = 29</td>
<td>2.9 (1.3)* n = 23</td>
<td>3.0 (1.5)* n = 20</td>
</tr>
<tr>
<td>GCS score 6−8 (n = 25)</td>
<td>7.8 (3.0) n = 25</td>
<td>3.0 (0.5) n = 25</td>
<td>3.6 (0.8)† n = 16</td>
<td>4.1 (0.9)† n = 14</td>
<td>4.2 (0.9)† n = 10</td>
</tr>
<tr>
<td>GCS score 9−11 (n = 14)</td>
<td>8.9 (3.3) n = 14</td>
<td>3.1 (0.4) n = 14</td>
<td>4.2 (0.9)† n = 11</td>
<td>4.4 (0.7)† n = 10</td>
<td>4.4 (0.8)† n = 10</td>
</tr>
<tr>
<td>GCS score 12−15 (n = 39)</td>
<td>11.2 (3.7) n = 39</td>
<td>3.7 (0.6) n = 39</td>
<td>4.2 (0.7)‡ n = 33</td>
<td>4.5 (0.6)* n = 29</td>
<td>4.6 (0.6)* n = 22</td>
</tr>
</tbody>
</table>

Fisher’s exact test.
* p < 0.0001.
† p < 0.01.
‡ p < 0.05.

---

**Long-term outcomes of combat casualties sustaining penetrating traumatic brain injury**

Weisbrod, Allison B.; Rodriguez, Carlos; Bell, Randy; Neal, Christopher; Armonda, Rocco; Dorlac, Warren; Schreiber, Martin; Dunne, James R.


doi: 10.1097/TA.0b013e318270e179
# GCS AND MORTALITY

## Table 4

### Relationship of GCS Score to Mortality

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>GCS Score 3-5</th>
<th>GCS Score 6-8</th>
<th>GCS Score 9-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clark et al. 1986</td>
<td>0/32</td>
<td>2/9</td>
<td></td>
</tr>
<tr>
<td>Kaufman et al. 17 1986</td>
<td>3/83</td>
<td>33/34</td>
<td></td>
</tr>
<tr>
<td>Nagib et al. 1986</td>
<td>3/29</td>
<td>11/21</td>
<td></td>
</tr>
<tr>
<td>Selden et al. 1988</td>
<td>0/44</td>
<td>1/11</td>
<td>9/10</td>
</tr>
<tr>
<td>Shaffrey et al. 1992</td>
<td>2/16†</td>
<td>19/19</td>
<td></td>
</tr>
<tr>
<td>Kennedy et al. 1993</td>
<td>3/37†</td>
<td>7/18§</td>
<td>89/95</td>
</tr>
<tr>
<td>(Levy et al. 1993**)</td>
<td>7/8</td>
<td>33/33</td>
<td></td>
</tr>
<tr>
<td>Levy et al. 1994</td>
<td>24/190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>35/431</td>
<td>73/112</td>
<td>98/105</td>
</tr>
<tr>
<td>Percent surviving</td>
<td>8.1%</td>
<td>65.2%</td>
<td>93.3%</td>
</tr>
</tbody>
</table>

* $P<0.00001$.
† Includes GCS 3 patients only.
§ Includes GCS 3 and GCS 4 patients only.
& Includes GCS 5-8 patients only.
** Pediatric patients only. Not included in totals.
Statistically significant difference between GCS 3-5 and GCS 6-15

80 patients with PENETRATING head injury.
  - Included Blast
PUPILLARY FUNCTION

- Bilaterally Fixed and Dilated - 79% Mortality
- Unilateral Fixed and Dilated - 50% Mortality
- Bilaterally Reactive - 5% Mortality
  - Shaffrey et al., J Neurotrauma 9(suppl 1):S279-S285, 1992
PUPIL REACTIVITY

- Bilaterally Fixed and Dilated Pupils are Highly Predictive of Mortality
- CLASS III
CASE STUDY

• 32 yo male found in the drivers seat of a car with a Gun Shot Wound to the head. No weapon found in the car.

• GCS 10, SBP> 90, Respirations 10-15

• Patient with CSF Rhinorrea
STANDARD RESUSCITATION

• Airway
• Breathing
  • Respiratory Depression is Associated with Increased Mortality
  • Odds Ratio 7.3
  • CLASS III
• Circulation
  • Hypotension is Associated with Increased Mortality
  • Conflicting Studies
  • Class III
DIRTY HARRY EFFECT
(WHAT YOU LEARNED AT THE MOVIES)

• That people die instantly
  • They don’t
• 75% will rapidly in the field
WHEN IN DOUBT
START THE RESUSCITATION
CASE STUDY

• 32 yo male found in the drivers seat of a car with a Gun Shot Wound to the head. No weapon found in the car.

• GCS 10, SBP > 90, Respirations 10-15

• Patient with CSF Rhinorrea
COAGULOPATHY

• A single abnormal PT or PTT
  • Present 80% Mortality
  • Absent 7.4% Mortality

• Highly predictive in linear regression analysis model

• Supported by lab work
  • Polin et al, Neurosurgery Clinic of N. Am, 6(4):689-699
COAGULOPATHY

• Penetrating Injuries release extrinsic thromboplastin

• DIC can result

• Levy
  • Presence of DIC from any cause
    • 85% Mortality
COAGULOPATHY

• Is Associated with Increased Mortality
  • CLASS III
• 32 yo male found in the drivers seat of a car with a Gun Shot Wound to the head. No weapon found in the car.
• GCS 10, SBP > 90, Respirations 10-15
• Patient with CSF Rhinorrhea
MONTHS AFTER INJURY
### Long-term outcomes of combat casualties sustaining penetrating traumatic brain injury

Weisbrod, Allison B.; Rodriguez, Carlos; Bell, Randy; Neal, Christopher; Armonda, Rocco; Dorlac, Warren; Schreiber, Martin; Dunne, James R.

*Journal of Trauma and Acute Care Surgery* 73(6):1525-1530, December 2012.

doi: 10.1097/TA.0b013e318270e179

<table>
<thead>
<tr>
<th>Field GCS</th>
<th>NNMC Admission GCS Score</th>
<th>Discharge GOS Score</th>
<th>6-mo GOS Score</th>
<th>1-y GOS Score</th>
<th>2-y GOS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (n = 114)</td>
<td>8.6 (3.8) n = 114</td>
<td>3.1 (0.8) n = 112</td>
<td>3.6 (1.1)* n = 89</td>
<td>3.9 (1.2)* n = 76</td>
<td>4.0 (1.2)* n = 62</td>
</tr>
<tr>
<td>GCS score 3–5 (n = 36)</td>
<td>6.1 (2.9) n = 36</td>
<td>2.4 (0.8) n = 34</td>
<td>2.8 (1.1) n = 29</td>
<td>2.9 (1.3)* n = 23</td>
<td>3.0 (1.5)* n = 20</td>
</tr>
<tr>
<td>GCS score 6–8 (n = 25)</td>
<td>7.8 (3.0) n = 25</td>
<td>3.0 (0.5) n = 25</td>
<td>3.6 (0.8)† n = 16</td>
<td>4.1 (0.9)‡ n = 14</td>
<td>4.2 (0.9)‡ n = 10</td>
</tr>
<tr>
<td>GCS score 9–11 (n = 14)</td>
<td>8.9 (3.3) n = 14</td>
<td>3.1 (0.4) n = 14</td>
<td>4.2 (0.9)† n = 11</td>
<td>4.4 (0.7)‡ n = 10</td>
<td>4.4 (0.8)‡ n = 10</td>
</tr>
<tr>
<td>GCS score 12–15 (n = 39)</td>
<td>11.2 (3.7) n = 39</td>
<td>3.7 (0.6) n = 39</td>
<td>4.2 (0.7)‡ n = 33</td>
<td>4.5 (0.6)* n = 29</td>
<td>4.6 (0.6)* n = 22</td>
</tr>
</tbody>
</table>

Fisher’s exact test.

* p < 0.0001.
† p < 0.01.
‡ p < 0.05.
90.4% ≤ 100%

- Q: Why Didn’t You Resuscitate Him?
- A: He was a Gunshot Wound to the Head
- Q: But was he a survivor?
WHAT YOU DON’T KNOW WHEN YOU SEE THIS

• The energy of the bullet
  • Range
  • Caliber

• The path of the bullet
  • Penetrating
  • Perforating
  • Tangential
WHAT YOU DO KNOW

• GCS
• Pupil Reactivity
• Respiratory Rate and Pattern
• Blood Pressure
• Evidence of Coagulopathy
WHEN IN DOUBT
START THE RESUSCITATION
THERE IS USUALLY ENOUGH TIME TO DIE LATER
ATTITUDE