Maintaining Hope: Prognosis after Traumatic Brain Injury

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Guy Fried M.D. Tuttleman Educational Lecture Series
Predicting Outcome can be difficult
Common Statements/Questions

• When will my husband be 100 percent back to normal again?
• The neurosurgeon assured me he would make a full recovery.
• How long will it take for him to get back to how he was before?
• How many weeks before she goes back to school?
• How long until he gets back to work?
Are we asking the right questions?
Acute vs. Chronic Disease Model

- Acute: resolves within seconds to months
  - Broken Bones, Torn ACL, Treatable Cancer
- Chronic Disease Model: long term effects can be managed to minimize impact on quality of life
  - High Blood Pressure, Diabetes Mellitus, Traumatic Brain Injury
Brain Function

• Perceives and interprets the environment
• Provides a sense of self
• Relates how the self interacts with the environment
• Places context to present actions in relation to previous experience
• Allow us to think in the theoretical while continuing to live in the present
Brain Injuries alter...

- Perception/Attention
- Interpretation
- Short Term Memory
- Abstract thinking
- Planning
- Multitasking
Brain Injuries also alter...

- Family Dynamics
- Extended Family Dynamics
- Work Dynamics
- Economic Plans
- Dreams/How we envisioned the future
International Classification of Functioning

Body Structure/Function

Activity

Participation
Body Structure/Function

- Restriction of physical movement or cognitive limitations
  - Left sided weakness
  - Slurred or broken speech
  - Left sided visual field deficit
  - Short Term Memory deficits
  - Decreased ability to tolerate when things don’t go as expected
Activity

• Inability to put on a shirt
• Difficulty tying shoes with one hand
• Needing help with cueing in busy environments
Participation = Family & Societal Roles

- Being a father
- Being a spouse
- Being a baseball coach
- Fulfilling a work role
- Attending School
Rehabilitation

• Works to facilitate recovery of motor and cognitive functions to minimize restrictions in Body Structure/Function
• Maximize Activity, sometimes in a new or different way or with a new or different approach
• Understand unique challenges associated with fulfilling societal roles, synthesizing the connection between multiple body structures and activities.
Defining Brain Injury

- Focal Injuries
- Diffuse Injuries
- Associated additional trauma
  - Hypoxia/Anoxia
  - Vascular Infarcts
  - Pressure related Injuries
Classifying Brain Injury

• Glasgow Coma Scale
  • Three Areas: Motor, Visual, Eye Opening
Glasgow Coma Scale

- Motor-6 points
- Vision-5 points
- Eye Opening-4 points
Glasgow Coma Scale

- Score is minimum 1 for each category
- Total possible score: 3-15.
- Severe (3-8)
- Moderate (9-12)
- Mild (13-15)
Advantages of GCS

• Quick to administer
• Widespread, commonly done by EMTs in the field, by ER docs upon arrival, and hourly in ICU
• Can measure declining function and alert medical team when further diagnostic testing/intervention is required
• There is a correlation that the lower the GCS score, the more likely they are to have more restrictions in body structures/function, activity and participation.
Disadvantages of GCS

- Poor individual correlation between GCS and outcome
- Wide recovery variability within group
Rancho Los Amigos Recovery Scale

- I-Coma
- II- Generalized Response
- III-Localized Response State
- IV Confused and Agitated
- V-Confused and Inappropriate
- VI-Confused and Appropriate
- VII- Automatic and Appropriate
- VIII- Purposeful and Appropriate
Coma

- Body does not respond in any way to external stimuli
- No spontaneous eye opening
Post Traumatic Amnesia (PTA)

• An anterograde period where TBI patients are unable to form new memories
  • Remote memory is usually INTACT
• Can last from hours to months
• For patients requiring acute rehabilitation, they often are admitted still in PTA
PTA

- Galveston Orientation and Amnesia Test
- Standardized test looking at Date/Time/Year, Memories before and after injury
- Score of greater than 75 for two consecutive days signals exit from PTA
PTA

- Patients often emerge from PTA during acute rehabilitation
- We have more control of knowing exactly when that happens
- It is a much stronger predictor of overall future functioning than indicators/variables measured in the acute phase of injury
Glasgow Outcome Scale

- 1-Death-Self explanatory
- 2-Vegetative State—Unaware of self and environment
- 3-Severe Disability—Unable to live Independently
- 4-Moderate Disability—Able to live Independently
- 5-Mild Disability-Able to return to work/school
Glasgow Outcome Scale Extended

- 8-Upper Good Recovery
- 7-Lower Good Recovery
- 6-Upper Moderate Disability
- 5-Lower Moderate Disability
- 4-Upper Severe Disability
- 3-Lower Severe Disability
- 2-Vegetative State
- 1-Death
Outcomes Related to GOS/GOSE

- Corral et al, 2011, 214 pts, all with severe injuries
  - GCS 3-5 did statistically worse than GCS 6-8
  - 35% mortality rate
  - Between 6 and 12 months, 30% of those in GCS 6-8 group and 12% in GCS 3-5 group showed improvement of GOS

Initial CT and outcome

- CT scans did not have individual prognostic value for recovery, except if subarachnoid hemorrhage was present.

CT Scans as predictors of future care needs

The Association of Early Computed Tomography Scan Findings and Ambulation, Self-Care, and Supervision Needs at Rehabilitation Discharge and at 1 Year After Traumatic Brain Injury

Jeffrey Englander, MD, David X. Cifu, MD, Jerry M. Wright, BA, Keitia Black, MD

ABSTRACT


ADLs. The association of subdural hematoma with ambulation, self-care, and supervision needs was related to the degree of midline shift but not to the presence of subdural hematoma. Individuals with subcortical contusions were more likely to require assistance at rehabilitation discharge for ambulation
CT scans as predictors of outcome

- 1849 enrolled, 849 followed up at 1 year
- Outcomes: FIM, Disability Rating Scale, Supervision Rating Scale measured at 1 year
CT scans as predictors of outcome

- Midline Shift of greater than 5mm was associated with worse prognosis

## Actual Percentages of Assistance

<table>
<thead>
<tr>
<th>Activity needs assistance</th>
<th>&lt;5mm</th>
<th>&gt;5mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambulation</td>
<td>17-19%</td>
<td>29%</td>
</tr>
<tr>
<td>Toileting</td>
<td>33-38%</td>
<td>47%</td>
</tr>
<tr>
<td>Lower-Body Dressing</td>
<td>39-46%</td>
<td>57%</td>
</tr>
<tr>
<td>Bladder Continence</td>
<td>19-23%</td>
<td>32%</td>
</tr>
<tr>
<td>Supervision at Rehab Discharge</td>
<td>44%</td>
<td>53%</td>
</tr>
<tr>
<td>Supervision at 1 year</td>
<td>30-39%</td>
<td>57%</td>
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Threshold Variables

• Once patients surpass a threshold, we can say with confidence certain statements about their individual outcome
Threshold Variables

- Length of Coma greater than 4 weeks
- Age >65 and in coma more than 24 hours
- PTA<2 months
- PTA>3 months
Glasgow Outcome Scale

- 1-Death-Self explanatory
- 2-Vegetative State—Unaware of self and environment
- 3-Severe Disability—Unable to live Independently
- 4-Moderate Disability—Able to live Independently
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Factors in Evaluating Potential for Rehabilitation

- Evaluation of Insults
  - Primary and Secondary Injuries
- Coma
  - Drug Induced vs. Injury Related
- Associated Precautions related to Orthopedic Injuries
  - Ability to participate and functional goals
- Objective Evidence for command following
  - Perception Bias
Memory Concerns

- Remote Memory usually not affected
  - Should recognize loved ones
  - There may be other factors involved: infection/aphasia
- Short term memory/ability to form new memories
- Undiagnosed Dementia
Language Concerns

- Aphasia (Receptive and Expressive)
- Confabulations
- Paraphasias
Visual Concerns

- Visual Fields
- Terson’s syndrome
- Visual Neglect
- Premorbid conditions (Cataracts/Glaucoma/Diabetic Retinopathy/Macular Degeneration)
Family Concerns

- Grieving process, coping mechanisms
- Understanding the role the injured patient played within their family previously is important
- Education needed regarding how to support their loved one through the process
  - Need for cognitive conservatism
As a Chronic disease model…

- Provide compensatory strategies to overcome activity and participation restrictions
- Most commonly affecting attention, memory, frontal lobe functioning
  - Logbook
  - Stable Activity Pattern to facilitate expansion of Activities and Participation and to counteract Isolation/depression
  - Techniques to manage when things don’t go as expected
Returning to Activity and Participation

• Is a Successful outcome
• Unless, you view recovery from TBI in an Acute Disease Process Model-in which case you might consider it a total failure
Conclusions

- Most people do pretty well after suffering a brain injury
- It is very difficult to see someone go through the recovery process
- We can use a few variables to help with prognosticating
  - But even these are not perfect!