Continuum of Care: Post Acute Brain Injury Rehabilitation

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Traumatic Brain Injury (TBI)

- When an outside mechanical force is applied to the head and disrupts normal brain functioning.
- In short, something outside of the body causes the injury to the brain.
- Types of TBI
  - Closed Head Injury
  - Open / Penetrating Head Injury

Closed Head Injury

Skull remains intact, but inside the brain is damaged

- Motor vehicle accident (leading cause of death after TBI; rates highest 20-40 yr olds) CDC March 2010
- Fall (#1 cause of TBI; rates highest for children 0 to 4 and adults > 75 yrs) CDC March 2010
- Assault

Closed Head Injury

- Bruising and bleeding within the brain
  - Cerebral contusions (common at base of frontal lobes and anterior temporal lobes)
  - Intracranial hemorrhages (epidural, subdural and intracerebral hematomas)
- Can be skull fractures
- Diffuse Axonal Injury

Cerebral contusions

- Figure 26-4
- Neuroimaging of patient with subdural hematoma. The subdural hematoma is seen as a crescentic collection of blood (A) within the supratentorial compartment. The patient presented with headache and vomiting. The presence of a midline shift due to increased intracranial pressure is confirmed. (A. Oblique coronal head CT; B. Coronal reformation of head CT; C. Oblique sagittal head MRI; D. Coronal CT with boneWindows; E. Axial CT with boneWindows)
Acute Subdural Hematoma with Midline Shift

From http://www.cruh.lshtm.ac.uk/ctscanlarge.htm

Closed Head Injury

- Bruising and bleeding within the brain
- "Diffuse axonal injury" = Tearing/shearing and stretching of nerve cells
  - Result of damage from rapid acceleration-deceleration of the brain inside the skull
  - Results in characteristic pattern of cognitive deficits

Diffuse Axonal Injury

From http://www.cruh.lshtm.ac.uk/ctscanlarge.htm

Secondary mechanisms of injury

- Result of brain and body's response to the injury
  - Increased intracranial pressure
  - Ischemia
  - Edema
  - Infection
  - May perpetuate primary injury by furthering damage to the brain, and thus leading to poorer outcomes (Graham et al. 1987)

Open Head Injury

Object penetrates skull and enters the brain tissue

- Gunshot wound
- Knife
- Pole

Injury Severity Indicators:
Mild → Severe

Glasgow Coma Scale (GCS)
Rating scale used to assess the degree of brain injury.
Measures three responses: eye opening, verbal responses, and motor responses.

- Range is 3 (low) to 15 (high)
  - Mild Brain Injury: 13-15
  - Moderate Brain Injury: 9-12
  - Severe Brain Injury: 3-8
Levels of Care in the BI Continuum
- Shock Trauma / Neuro Intensive Care Unit
- Neuro Floor
- Acute Rehabilitation Unit
- Skilled Nursing Facility
- Long Term Acute Care Unit
- Outpatient
- Home Health
- Residential
- Community Re-Integration

Shock Trauma / NICU
- Goals:
  1. Keep individual alive
  2. Prevent secondary complications such as: ICP, decubitus, aspiration pneumonia, DVT, BP, respiratory, cardiac, and etc.
  3. Stabilize individual so they can move to next level of recovery.

Family Response
- Crisis Mode

Neuro Floor
- Goals:
  1. Stabilize, BP, HR, behavior, infections, and etc. enough to move individual to next level.
  2. Increase endurance to be able to tolerate the three hours required for acute rehabilitation.

Family Response
- Still in crisis mode
- Denial may delay processing of emotion
- Primary focus is on individual with BI, so family members may not have had the opportunity to process their own feelings

Agitation & Restlessness
- One of most early signs of injury to brain
- Early recovery period
  - Agitation, restlessness
  - Irritability
  - Poor orientation and memory (PTA)
  - Poor perceptual abilities
  - Poor judgment (safety risks)
  - Disinhibition
  - Changes in mood
  - Changes in arousal

Sherer 2009
Early Recovery after TBI

Coma

Retrograde Amnesia

INJURY

Post Traumatic Amnesia

Retrograde Amnesia

• Inability to recall events that occurred before the accident.

Post Traumatic Amnesia (PTA)

• A period of hours, weeks, days or months after the injury when there is a loss of day-to-day memory. That is, the person with injury cannot learn and recall information day-to-day. Memory of the PTA period is never stored, therefore things that happened during that period cannot be recalled.

Coma is defined as: (1) not opening eyes, (2) not obeying commands, and (3) not uttering.

Factors that influence placement

• Medical status
• Funding
• Family
• Timing

LTAC

© Goals:
1. Increase endurance to be able to tolerate acute rehabilitation.
2. Allow for continued clearing cognitively for participation at next level.
3. Manage all infections or wounds that are limiting a stay in acute rehab.
4. Wean from vent if needed.

SNF

• Goals:
1. Either step up prior to acute rehab or step down after acute rehab when the intensity of acute rehab is either not tolerated or nor longer required.
2. Will address infections and wounds limiting progress.

Acute Rehabilitation

• Goals:
1. Gain independence in mobility and ADLs.
2. Address behavior issues.
3. Family training to provide safe care at home.
4. Appropriate discharge placement.

Family Response

• Struggling with initial realization of cognitive and physical impairments
• Starting to realize the severity of injury
• Still have expectations for full / significant recovery
Emergence from PTA, persistence (and emergence) of cognitive deficits

- In the early stage, few “normal” demands placed on patient. Extent and severity of memory and other behavioral deficits may not be realized.

Discharge?
But they’re not “the same”?

- As the length of stay in acute, hospital-based rehabilitation programs continue to decrease, persons are discharging earlier in their recovery course, often with more significant medical/physical, cognitive, and behavioral symptoms.
- Additional rehabilitation is often necessary for helping individuals achieve the ultimate goal of brain injury rehabilitation – community re-integration.

What is Community Re-Integration

- “Having something to do, somewhere to live, and someone to love.” (Jacobs 1993)
- “The assumption or resumption of culturally and developmentally appropriate social roles following disability.” (Corrigan, 1994)

Community Re-Integration Should Be:

- “active participation in a broad range of community involvements. It should not be viewed as a narrow series of opportunities, such as employment or independent living.” (Willer and Corrigan, 1994)

Community Re-Integration

- Barriers
  - Decreased independence: supervision, problem solving, financial, mobility, transportation
  - Decreased social network and intimacy
  - Limited participation in leisure activities
  - Increased incidence of unemployment
- Goals
  - Reduce amount of care required
  - Increasing independence in ADLs and IADLs
  - Improve social interaction skills
  - Develop productive activities
  - Assess for return to work / school
Continuing the care

- Assess and intervene on “late onset” medical complications that may compromise patient's recovery and outcome
  - Hydrocephalus
  - Seizure disorder
  - Endocrine Dysfunction
  - Psychiatric manifestations
  - Sleep disturbance
- Address safety-sensitive issues
  - Falls
  - Cognitive and behavioral consequences of injury (e.g., impulsivity, decreased safety awareness) that can have safety implications

Neuroanatomy 101: A Quick & Dirty Intro

A few “basics”

Right Side of Brain
- Visual-spatial impairment
- Visual memory deficits
- Left neglect (inattention to the left side of the body)
- Decreased awareness of deficits
- Altered creativity and music perception
- Loss of “the big picture” type of thinking
- Decreased control over left-sided body movements

Left Side of Brain
- Difficulties understanding language (receptive language)
- Difficulties in speaking or verbal output (expressive language)
- Catastrophic reactions (depression, anxiety)
- Verbal memory deficits
- Impaired logic
- Sequencing difficulties
- Decreased control over right-sided body movements
Frontal lobe

- Personality
- Decision making
- Organization
- Planning
- Self-monitoring
- Initiation
- Inhibiting behavior
- Planning movement
- Language output

Parietal Lobe

- Processes sensations like touch
- Sense of your body in space
- Visuospatial functioning
- Left vs. Right
- Facial recognition

Occipital Lobe

- Vision
- Important for reading, identifying colors
- Locating objects

Temporal Lobe

- Language
- Hearing
- Understanding words, music
- Memory

White Matter Tracts

Disruption of communication
Cognitive Problems

- Attention / Concentration
- Memory
- Slowed information processing speed
- Visuospatial impairments
- Language and Communication deficits
- Executive dysfunction
  - Problem solving difficulties
  - Poor initiation
  - Decreased organization
  - Decreased reasoning & judgment

Memory Symptoms

Memory symptoms are VERY common...
- Trouble recalling/missing appointments
- Trouble remembering what medications, when medications or due, or whether or not medications were taken
- Trouble recalling conversations or details of conversations
- Repetitive

⇒ Information that was well known prior to the injury is not typically forgotten
Multi-tasking

- Trouble sustaining attention for long periods of time (may have trouble reading or watching a movie)
- Increased vulnerability to distraction
- Trouble with dividing attention between multiple things at the same time, multi-tasking

Attention Symptoms

Slowed Cognitive Processing Speed

- May take longer to respond during a conversation
- May take longer to solve a problem

Symptoms

Changes in Visuospatial Functioning

- Word-finding difficulties are common
- Aphasia = language disorder
  - Difficulties with verbal expression
  - Difficulties with auditory comprehension

Changes in Language Functioning
Executive functioning

“Executive Functions”
Problems with Organization, Planning & Problem Solving

Executive dysfunction
- Organizing time and one’s environment in an effective, efficient way
- Difficulty with time management
- Difficulty with problem solving
- Difficulties with goal-setting
- Difficulties with reasoning through alternative solutions to a problem or “switching gears” when one solution doesn’t work

Perseveration / Inflexibility

Changes in Behavioral & Emotional Functioning
- Poor initiation
  - Trouble getting started
  - Not laziness or non-compliance
  - Result of changes to brain involved in activating motor sequences
- May know what need or want to do, but don’t start it
- Apathy
- Sit all day staring at TV
- Decreased interest in previous activities
- Needs cues to complete ADLs, despite physical ability to do so

Changes in Behavioral & Emotional Functioning
- Impulsivity
  - Acting without thinking
- Making quick decisions without thinking about the consequences
- Acting unsafely because doing what “comes to mind” without thinking about the possible risks
- Speaking without thinking first if the comment is right for the time, place, circumstances, etc..
Changes in Behavioral & Emotional Functioning

- **Depression**
  - Most common affective disturbance post-TBI
    - Symptoms overlap with typical TBI-related impairments
      - Poor attention
      - Sleep disturbance
      - Fatigue
      - Poor initiation

- **Anxiety**
  - Worry over changes in functioning
  - Worry over impact of injury on self and others
  - Worry over changes in finances

Changes in Behavioral & Emotional Functioning

- **Irritability or decreased frustration tolerance**
- **Disinhibition**
  - Reduced capacity to control behaviors
- **Short fuse**
- **Verbal outbursts**
- **Violent behaviors (less frequent)**
- **Inappropriate / embarrassing behaviors**

Changes in Behavioral & Emotional Functioning

- **Emotional lability**
  - Rapid changes in behavioral expression

Changes in “Social Behaviors”

- Consistent evidence that changes in social communication and behavior are a major consequence of TBI
  - Secondary to cognitive and personality changes following injury
  - Some research also suggests that the following factors play a role:
    - Premorbid (i.e. pre-injury) abilities
    - Emotional reaction to disability
    - Environmental factors

General Recovery Course after TBI

- **Injury**
- + 6 months
- + 1 year
- + 2 years

- Rapid improvement
- More gradual improvement
- Slower improvement
- Continued improvement possible

- with changes to environment, compensatory strategies, pharmacologic interventions, positive support

Community Re-Integration

- Reduce amount of care required
- Decrease supervision needs
- Increasing independence in ADLs and IADLs
- Improve social interaction skills
- Assess/intervene on cognitive symptoms
- Develop productive activities
- Assess for return to work/school
- Redefine/resume prior roles at home and in community
What does a residential community re-entry program look like?

- 24 hour supervision which decreases as individual progresses.
- Focus on independence with ADLs: bathing, grooming, dressing
- Work on IADLs: meal prep, laundry, grocery shopping, money management

Group Projects

Group Projects are...

...often inspired by pre-injury capabilities and interests and can renew a sense of self-worth and motivation in the midst of catastrophic circumstances

Natural Consequences

It is important that the person served is allowed to make mistakes (safely) – even if it means a meal is burnt!

Focus on Psychosocial Well - Being

- Individual and group counseling
- Focus on coping and adjustment to deficits and adapting to new roles
- Intervention for behavioral problems to facilitate positive changes
- Family education throughout stay

Resumption of Roles