Case Managing Patients with Traumatic Brain Injury

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How do you presently manage cases??

Do you feel this way?

What are the facets of CM?
Trivia time....

How much assistance is needed following acute care hospitalization?
   Answer: 100%

How much assistance is needed following acute rehabilitation at home?
   Answer: 50-100%

How much assistance is needed following post-hospital care?
   Answer: 25%
I. The Systems of Care
II. The Disease Process
III. The Complex Brain
IV. The Evidence
V. The Steps and Criteria guidelines
I. The Systems of Care
Brain Injury System of Care (TBI Model Systems)

The majority of funding is focused here!

Most recovery happens here – 90%
Brain Injury Stats

• Traumatic Brain Injury results in dramatic changes in all levels of patient functioning.

• Historically, limited potential for recovery: Acute care followed by Acute Rehabilitation then home or SNF, sometimes nursing home without services. Costs will go up!
  • There is a 50% rehospitalization rate when transferring care to a skilled nursing facility within 90 days.
  • There is 1% rehospitalization rate when transferring care to a specialty post-hospital facility/program within 1,000 days.

• Present course >> hospital, inpatient rehabilitation (or LTAC), post-hospital rehabilitation (or skilled nursing), non-residential services including outpatient, home therapy, home and community integration.
Brain Injury Systems

- Encompasses numerous levels and services from onset throughout the lifetime – not just the hospital care model.

- Brain injury is a chronic condition (2009, 2013) that requires services and supports for the lifetime of care.
Why So Many Services

• Not just a medical event
• Not a final outcome
• Rather, the beginning of a disease and rehabilitation process

Something to consider...
If the brain is the most complex organ system of the body, why do we expect recovery to be uncomplicated?
II. The Disease Process
Individuals surviving more than one year after TBI:

- 37 times more likely to die from seizures
- 12 times more from septicemia
- 4 times more from pneumonia
- 3 times more from respiratory conditions
- Depression rate of 34% at any time post-injury
- Anxiety rate ranging from 20-70% at any time post-injury
Brain Injury as a Disease

Various Neurological Disorders

- Anosmia (loss of smell fx)
- Ageusia (loss of taste fx)
- Central auditory processing disorders
- Cerebral salt wasting
- Hydrocephalus
- Encephalomalacia
- Dysphagia
- Motor speech disorders
- Dyslexia
- Bladder dysfunction
- Movement disorders
- Migraine
- Chronic daily headache
- Hippocampal atrophy
- Neurodegenerative disease acceleration
- Oculomotor disorders
- Vestibular disorders
- Attentional disorders
- Epilepsy
- Spasticity
- Pain
Brain Injury as a Disease

Neuroendocrine Disorders (NED)

- Pan hypopituitarism *
- Hypoadrenalism *
- Hypothyroidism *
- Hypogonadism *
- Diabetes insipidus *
- Infertility *
- Impotence *
- Decreased libido *
- Obesity *
- Kidney stones
- Osteoporosis
- SIADH (Hormone secretion)
- Hyperlipidemia
- Hypertension
- Delayed gastric emptying
- GERD
- Constipation
- Cognitive dysfunction
- Immunological suppression

ACRM 2018: if a person is not progressing, check Neuroendocrine dysfunction. Higher risk of NED development post-injury if there was unstable NED in acute care.
Impact of Neuroendocrine Impairment
Anterior Pituitary produces growth hormone (GH), adrenocorticotropic hormone (ACTH), thyroid-stimulating hormone (TSH), luteinizing hormone (LH), follicle-stimulating hormone (FSH), and prolactin.

Posterior Pituitary stores oxytocin and antidiuretic hormone (ADH), which is produced from the hypothalamus. ADH controls the amount of water that the kidneys release, which helps to regulate the balance of water in the body. Oxytocin stimulates contraction of the uterus during and after childbirth and is responsible for the release of milk for breast feeding. Labs to show normal function include Prolactin.
**Anterior Pituitary testing:** growth hormone (GH), Insulin-like Growth Factor – 1 (IGF-1); adrenocorticotrophic hormone (ACTH – stimulates production of cortisol); thyroid-stimulating hormone (TSH and free T4 - thyroxine); luteinizing hormone (LH); follicle-stimulating hormone (FSH). *Stress response and mood changes may occur from this level of dysfunction.*

**Posterior Pituitary testing:** antidiuretic hormone (ADH), which is produced from the hypothalamus. ADH controls the amount of water that the kidneys release, which helps to regulate the balance of water in the body. Oxytocin stimulates contraction of the uterus during and after childbirth and is responsible for the release of milk for breast feeding (Prolactin).
Brain Injury as a Disease

Psychiatric Complications –
Primary vs. Secondary

- Suicide
- Suicidal ideation
- Mania
- Hallucinations
- Agoraphobia
- Delirium
- Personality change

- Psychosis
- Depression (34%)
- Anxiety (11-70%)
- Accelerative Episodic Dyscontrol
- Substance abuse
- Abulia
Brain Injury as a Disease

Sexual Dysfunction
- Erectile dysfunction
- Hypersexuality
- Transvestism
- Altered sexual preference
- Fetishism
- Hyposexualism
- Precocious puberty
- Dysmenorrhea

Sleep Disorders
- Sleep apnea/Hypopnea
- Periodic limb movement disorders
- Hypersomnolence
- Insomnia

Coronary Disease
- Coagulopathies
- Hypertension
- Hyperlipidemia
III. The Complex Human Brain
The Human Brain

• Exquisitely complex

• Controls/reacts to every major system and human function

• No two injuries are alike

• Some symptoms emerge soon after the injury, others months later
Lobes of the Brain
Requires Experts

Core Team
- Person Served
- Rehabilitation Physician
- Rehabilitation Nursing
- Neuropsychologist
- Case Manager
- Occupational Therapist
- Physical Therapist
- Speech Therapist
- Behavior Specialist/ Analyst
- Counselor/Psychologist
- Recreation/Leisure/Community

Consultants
- Endocrinologist
- Neurologist
- Neuro-Opthalmologist
- Orthopedist
- Psychiatrist
- Special Educator
- Neurosurgeon
Other Key Players

- Parents, spouse, significant others
- Siblings
- Employer, business partner
- Friends extended family
- Insurance case manager
- Claims Adjustors - reinsurers
- Health Insurance Medical Director
- Workers Comp Case Manager
- Attorneys
- Immigration Officials
IV. The Evidence
Neuroscience

• Neuroplasticity: The ability of the brain to change in response to experience.

• Experience leads to changes in the brain, which, in turn, facilitate new learning, which leads to further neural change.

• Neurogenesis: Growth of new neurons.
Dendritic Spreading
Brain Plasticity: Not a New Concept

• “To explain skill acquisition it is necessary to assume formation of new pathways.” Ramon y Cajal 1897

• However, until the early 1970s most neuroscientists believed that adult neurons were fixed

• Not well understood until advances in imaging (fMRI, DTI)
Diffusion Tensor Imaging
Neuroplasticity After TBI

• After brain injury (lesions, shearing) neurons spontaneously rewire. Rewiring is not a one-time event.

• **How long does it take to learn without brain injury?**

• Poor result for functional recovery without environmental stimulation of those pathways – stimulation needs to be goal directed and consistent, otherwise negative behaviors can occur at a higher rate and greater cost later.
Neuroplasticity after Brain Injury

Frost et al 2003

- Induced small ischemic strokes in monkey’s motor cortex
- Repetitive use of affected paw in food gathering tasks
- Intra-cortical micro stimulation revealed cortical reorganization in adjacent cortical areas unaffected by stroke
- Within months regain use of paw
Cortical Plasticity and Behavioral Recovery

• “Post injury plasticity has been documented at the molecular, synaptic and cellular level in animals and now with neuroimaging techniques in humans.”
  (Nudo J Rehabilitation Medicine, 2003.)
• Behavioral experience appears to be critical to cortical rewiring after brain injury. Neurons move around lesions. Diffusion Tensor Imaging.
  (Dancause et al. Journal of Neuroscience, 2005)
• Controlled primate studies: enriched structured environment improved functional outcomes.
  (Nudo et al. Science, 1996)
Evidence-Based Rehabilitation

• Controlled study supporting clinical effectiveness of attention training following TBI
  
  (Rohling et al. Neuropsychology, 2009)

• Formal TBI Rehabilitation results in an increased rate of return to the community, decreased utilization of medical services, and decreased disability.
  

• Acute rehabilitation utilizing a dedicated TBI program resulted in decreased LOS, improved cognitive skills, and improved return to home rates. (Mackay: Arch Physical Medicine & Rehabilitation 1992)
Post-Acute Rehabilitation

- TBI patients > 3 months post-injury demonstrated improvement in behavior, physical ability, functional skills, and independent living. Maintaining improvements 18 months post-completion.

(Malec: Brain Injury 1993; Mills: Brain Injury, 1992; Ashley & Cervelli, 2009)
Research in Progress (2015) - Changed Perspective

Instrumental Activities of Daily Living

Physical Skills:
- Audition
- Dizziness

Communication Skills:
- Motor Speech
- Verbal Comm.

Cognitive Skills:
- Fund of Information
- Initiation

Neurobehavioral Management:
- Irritability
- Inappropriate Social

Adjustment:
- Depression
- Anxiety
- Family
- Sensitivity to Sxs

Family Sensitivity to Sxs
V. The Steps
Step 1: Begin with the End

• Assess the patient’s rehab potential
  – History: social and medical
  – Physician/professional assessments
  – Therapist input (TBI experience)

• Understand treatment options: Acute rehab, outpatient, residential, home services

• Goal of Discharge
Step 2: Know the Funder

- **Casualty carriers** i.e. workers comp: often obligated to provide medical care and treatment necessary to restore individual as much as possible to previous level (may involve lifetime care)
- **HMOs**: contractual limitations for rehabilitation services (e.g. 30 to 90 days for inpatient rehabilitation)
- **Accident & Health insurance carriers**: operate as PPO
  - May substitute benefits (SNF benefits traded for post-acute rehab, superior outcomes)
  - Some carriers rewriting to preclude substitutions
Know the Funder

- Public Payers
  - Medicare
  - Medicaid (variable from state to state)
  - Medicaid waiver programs (community coverage)

In some cases, managing may be combining funders to achieve the outcomes...

Private with public pay; use of social security benefits, etc.
Funding Services

Costs elevate with fragmented care, not coordinated care.

Any country that has healthcare is worried about cost, regardless of the type of payer system.
Step 3: Know the Provider

• CARF Accredited in TBI?
• Joint Commission
• Organized TBI team of professionals
• Access to special services
• Follow-up services - Continuum

What does CARF accredit?
Program areas accredited by CARF are:

- Aging Services
- Behavioral Health
- CCRC
- Child and Youth Services
- DMEPOS (Durable Medical Equipment, Prosthetics, Orthotics, and Supplies)
- Employment and Community Services
- Medical Rehabilitation
- Opioid Treatment Programs
- Vision Rehabilitation Services
Know the Provider

- **Acute Rehabilitation (TBI Team)**
  - PT, OT, Speech, Neuropsychology, Nursing, In-house CM, PM&R

- **Residential for Extended Rehabilitation**
  - PT, OT, Speech, Neuropsychology, Nursing, In-house CM, PM&R
  - Post-hospital rehabilitation (community integration programs)
  - Neurobehavioral specialty programming
  - Medically complex/LTAC

- **Outpatient Services**
  - PT, OT, Speech, Neuropsychology, PM&R management

- **Day Services for Chronic Management**
  - Focus is on productive behaviors/activity; social/leisure development

- **Supported Living**
  - Structured and focused on TBI management
Know the Provider

- Home and Community-Based Services
  - Case management
  - Homemaker services
  - Home health aide services
  - Personal care
Step 4: Know the Family

- Understand the stress – Caregiver burnout is real!
- Too complex to absorb in a single educational session
- Provide multiple sessions across time (the miracles: survived, movement, recognition, talking, walking) no family can be completely prepared for the long term
- “Mobile mourning”
- Provide resources
- Involve in decision making
- Experts may need to persuade (return to work or school too early almost certain failure)
Case Management Goals

• Proper utilization of resources to:
  – Reduce dependency
  – Maximize health outcomes
  – Maximize productive activity
  – Maintain life satisfaction

Team approach, not silo approach to care.
Case Management of TBI

- Considerations
  - Consequences of the injury
  - Broad array of practitioners
  - Family concerns
  - Payor concerns
  - Ethical dilemmas associated with costs
Criteria Guidelines...
<table>
<thead>
<tr>
<th>Admission Guideline</th>
<th>Medical Status</th>
<th>RLA</th>
<th>Volitional Aggression</th>
<th>Inappropriate behaviors</th>
<th>Inappropriate verbalizations</th>
<th>Time since Injury</th>
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</thead>
<tbody>
<tr>
<td><strong>PHCN Criteria:</strong> neurological injury, disease, or illness</td>
<td>Stable medically including being afebrile, negative for infection, trach capped, bolus G-tube feeding, possibly insulin dependent with appropriate protocols in practice</td>
<td>IV - VII</td>
<td>Not volitionally aggressive; may be mild to moderate involutionally aggressive based on Rancho Level</td>
<td>Impulsive, behavior inappropriate for the situation, easily frustrated, attentional deficits,</td>
<td>Mild - easily redirected by staff or loved ones; inappropriate verbalizations may be due to residual confusion</td>
<td>Range = 1 to 24 months since injury and following acute hospital and acute rehabilitation hospital discharge</td>
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<tr>
<td>NBI Criteria: neurological illness, disease, or injury that results in behavior impairment interfering with social functioning</td>
<td>Stable medically including being afebrile; negative for infection, insulin protocol with medications but no injectables</td>
<td>IV - VIII</td>
<td>Mild to Severe aggressive; may be volitionally aggressive; or may be involitionally aggressive based on the Rancho Level</td>
<td>Impulsive, behavior inappropriate for the situation, easily frustrated, attentional deficits, aggressive to others and destructive of property</td>
<td>Mild-Moderate-Severe levels; inappropriate verbalizations require structure, cues, and redirection; verbalization tends to be impulsive, and inappropriate in most contexts</td>
<td>&gt; 8 months since time of injury with minimal residual confusion (e.g., if patient is perpetually in Rancho IV-V due to injury severity)</td>
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<td>Day Trx Criteria: must live in the community independently or semi-independently</td>
<td>Stable medically but may include comorbid medical complications or conditions; aging effects</td>
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<td>RLA</td>
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<tr>
<td>VI - VIII</td>
<td>Mild but redirectable, and minimally socially interfering</td>
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<td>Inappropriate behaviors</td>
<td>Easily redirected by staff, and does not require law enforcement for behavior control</td>
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<td>Inappropriate verbalizations</td>
<td>Easily redirected by staff or others</td>
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<td>Time since Injury</td>
<td>Based on need, could be any time after the hospital where high structure is not required for success</td>
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<td><strong>H&amp;C</strong> Criteria: must live in the community either independently or with family but still needs assistance with identified concerns</td>
<td>Stable medically but may include comorbid medical complications or conditions; aging effects.</td>
<td>VII - VIII</td>
<td>Mild but redirectable and minimally socially interfering</td>
<td>Easily redirected by others</td>
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<td>Anytime following acute rehabilitation, post-acute rehabilitation, or following outpatient services for skills generalization</td>
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<td>* SL Criteria: longer term need for assistance with basic care, access, medical management, daily living needs</td>
<td>Stable medically but may include comorbid medical complications associated with other diseases and aging effects</td>
<td>VI-VIII</td>
<td>Mild only but redirected; there are supported living brain injury facilities that can also provide service for the mildly behavioral intense</td>
<td>Need to be easily redirected by staff or loved ones</td>
<td>Easily redirected by staff or others</td>
<td>&gt; 2 years duration of injury, and after neurorehabilitation with residual assistance needed for basic care, daily living activities</td>
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