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A Comprehensive Approach to the Complex Patient with Dual Diagnosis of TBI & SCI Part 1: Functional Impact, Medical Complexity and Neuropsychological and Psychological Approaches to Treatment.

Sarah Caston PT, DPT, NCS

Laurie Nash PhD, ABPP

Course Objectives

As a result of this course, participants will be able to:

- Describe at least three characteristics of individuals with dual diagnosis of SCI & TBI.
- Identify at least three common issues related to the under diagnosis of SCI & TBI.
- List two medical complexities and at least two co-morbid health conditions within the population with SCI & TBI to the development of a plan of care.
- Describe at least two psychological and at least two neuropsychological concerns related to the patient.
- Identify at least three psychosocial factors that influence patient outcomes in dual SCI & TBI diagnoses.

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Statement of Conflicts of Interest

- We may have conflicts
- We have many interests
- But we have no conflicts of interest

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<u>This is Part 1 of a 2 Part course</u>

<u>Part 1:</u> Discusses etiology of patients with dual diagnoses, medical comorbidities, & neuropsychological considerations for treatment

<u>Part 2:</u> Emphasizes differences in intervention development, discusses treatment "pitfalls" to avoid, & highlights individual strengths therapists can capitalize on in their sessions

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Management of Patients with Dual Injuries: Requires Comprehensive Neurorehabilitation Treatment Teams

- Proficiency in treating a person with dual neurologic injury requires an in-depth understanding of the unique physical, psychosocial, and behavioral complexities that accompany these diagnoses
- Interdisciplinary teams include MDs, Administration, Nursing, PCTs/ Nurse Techs, Neuro/Rehabilitation Psychology, PT, OT, Recreation Therapy, ST, Dietary, Respiratory Therapy, Chaplaincy

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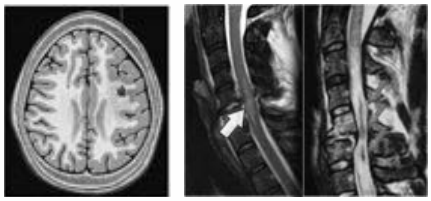
Dual Diagnosis Definitions

Dual diagnosis of TBI & SCI occurs in patients having clinical & diagnositic features of both disorders resulting from trauma.

- Typical causes of trauma include:
  - Motor vehicle accidents
  - Rapid acceleration/ deceleration
  - Bicycling accidents
  - Direct blunt force
  - Assault
  - Sports injuries



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Classification of Brain Injury

- Mild, mild complicated, moderate or severe
- Glasgow Coma Score (GCS)
  - Motor, verbal & eye response scores
- Duration of post traumatic amnesia (PTA)
  - Length of time between injury & when patient is able to consistently remember ongoing events
- Duration of loss of consciousness (LOC)

From O'Sullivan Physical Rehabilitation Ch 19 TBI p. 863

Glasgow Coma Scale

Activity	Score
Eye Opening	
Spontaneous	4
To speech	3
To pain	2
No response	1
Best Motor Response	
Follows motor commands	6
Localizes	5
Withdraws	4
Abnormal flexion	3
Extensor response	2
No response	1
Verbal Response	
Oriented	5
Confused conversation	4
Inappropriate words	3
Incomprehensible sounds	2
No response	1

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Classification of Brain Injury

TBI Severity	Mild	Mild Complicated	Moderate	Severe
Initial Contusion	Documented / per patient hx	Documented / per patient hx	Documented / per patient hx	Documented / per patient hx
Initial GCS Score	13 - 15	13-15	9-12	3-8
PTA Duration	< 24 hours	< 24 hrs	< 1 week	> 1 week

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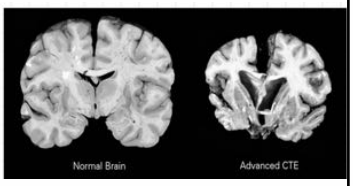
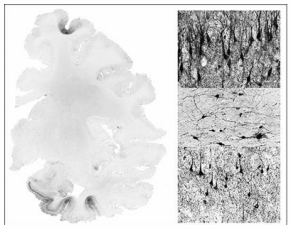
Advanced Imaging Findings

- Recurrent severe concussions/ TBIs:
  - Show cortical atrophy on imaging
  - Associated with tau neurofibrillary degeneration
- Newer technologies (proton spectroscopy, advanced DTI & fMRI) show microstructural, metabolic, & functional changes (Raz et al. 2011, Grossman, et al 2012)
- Damage to thalamus & internal capsule are correlated with cognitive impairments
  - Degeneration may be observed ongoing as far as 1 year post injury (Grossman, et al. 2012)





Images from: Concussion and long term effects http://flipper.diff.org/app/items/info/6711

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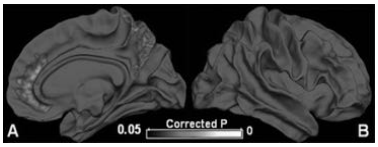
Issues with Imaging and TBI diagnosis

- Patients who have signs and symptoms of mild TBI often **do not have** positive imaging results
- Volume changes (decreases) in both white and gray matter have been reported as far as 1 year post concussive events
- Degeneration can continue in individuals who have had multiple contusions (Yongxia Zhou, PhD, et al. 2013)
- Zhou's study compared individuals with mTBI to healthy controls 1 year post injury
  - Results revealed significant differences in brain volume between controls and those with mTBI; signifying neuronal damage in areas directly affected by contusions *as well as in remote areas from initial site of injury*
  - corpus callosum, cingulate gyrus, hippocampus, thalamus, & fornix.



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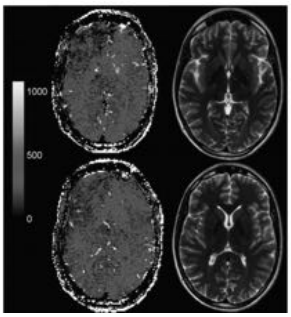
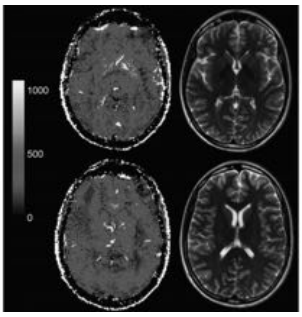
Normal Scans: Abnormal Activity

- Significant differences in MFC MRI imaging observed in mTBI vs. controls; significant presence of iron deposits in gray matter of the thalamus & basal ganglia (Raz et. al 2013)

Healthy Control Participant



Patient with mTBI, GCS=13, "Normal" imaging results



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Complexities with Incidence of TBI & SCI Co-occurance

- ICD codes to classify brain injury traditionally use LOC & PTA criteria
- Using just PTA, up to 50% of TBIs go undiagnosed
  - especially when other trauma is present
- Emerging literature on concussion & mild TBI (mTBI) demonstrates that additional diagnostic factors play a key role in diagnosis (Macciochi et al, 2007 & 2012, Kushner 2014)
- SCI & TBI co-occurrence rates of 16-24% based on **imaging alone.** (Macciochi, et al 2012)
- When PTA is added as diagnostic criteria, rates increase to 42% and 50% (Macciocchi 2008)
  - ~25% of these individuals have TBI severity higher mild (Kushner et al. 2014)

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Complexities with Incidence & Diagnosis

- Co-occurring TBI often missed when SCI or other injury is prioritized for life saving needs (Kushner 2014)
- At times initial paramedic/ ER report does not include durations of LOC or PTA
- Signs/sxs of co-occurring TBI may not be evident until patient is ready for inpatient rehabilitation
- At that point, behaviors are often misperceived as non-compliant, unable to learn, poor coping, or poor motivation/apathy/attitude

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Impact on LOS & Long Term Outcomes

- Nott et. Al 2014 conducted a case matched cohort study investigating differences between individuals with TBI, SCI and both TBI and SCI (dual dx)
- Findings:
  - Patients with dual diagnoses remained in acute care
    - Approx. 3 weeks longer than patients with SCI
    - Approx. 2 months longer than patients with TBI
- Both SCI and Dual Dx groups stayed 100 days longer in inpatient rehab than TBI group
- Authors emphasize the importance of ***increased*** LOS for individuals with dual dx
- Allows extended time & opportunity to learn adaptive and compensatory techniques

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Investigating Outcomes

- Nott's study also found that at 3.6 years post rehabilitation, all participants reported secondary medical complications including muscle aches, fatigue, reduced sexual function, depression, bowel & bladder dysfunction, & sleep disturbance
- Contributory outcome factors include: environmental barriers, social support, behavioral challenges, cognition, & brain injury severity
- May lead to reduced community integration, relationship distress, additional health care needs/costs, & reduced overall quality of life

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Effect on Rehabilitation Outcomes

- Evidence indicates significant reductions in FIM outcome scores (gross motor, ADL & cognition) for patients with dual diagnosis
- Greater difficulties with functional tasks (transfers, bed mobility, dressing) due to poor motor planning, spatial awareness, & decreased executive function (Kushner 2014)
- Effects of TBI on motor recovery may be more apparent in those with paraplegia vs. those with tetraplegia
  - likely due to a ceiling effect on motor recovery potential
- Cognition & memory FIM scores significantly lower compared to controls
- Negative effects on insight/performance self-evaluation & correction

(Sommer and Witkiewicz 2004)

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Medical Complexities in the Patient with Dual TBI & SCI

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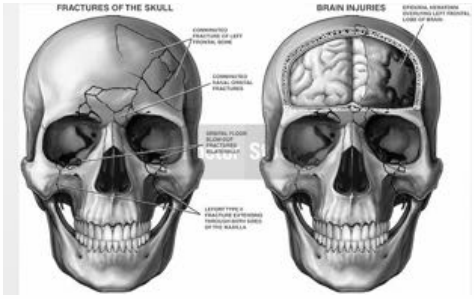
Physical Complexities in Dual Injury

- Skull fractures
  - especially at the base of the skull or frontal bone may result in CSF leakage.
- Temporal bone fractures
  - may result in hearing loss, facial palsy.
- Orbital fractures
  - may result in double vision and CN 3, 4, and 6 deficits



Head Injury - Skull Fractures and Hematoma on the Brain. Image from:
© 2012 Nucleus Medical Art/Doctor Stock

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Physical Complexities in Dual Injury

- Vascular trauma to vertebral & carotid arteries
  - increased risk for rupture or hypoxic brain injury
- Eye lacerations & injuries
- Post concussive symptoms
  - headache, dizziness/vertigo, hearing loss, significant neck pain (difficult to differentiate in patients with cervical SCI)
- Increased seizure risk
- Hydrocephalus

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Physical Complexities in Dual Injury

- Significantly increased risk for heterotopic ossification (HO)
- Spasticity & tone management
  - Many antispasmodic agents also have side effects of drowsiness, altered conciousness, decreased seizure threshold, detrimental neuropsychological effects which may amplify symptoms

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Physical Complexities in Dual Injury

- Dysphagia
  - Increased risk for patients with cervical SCI + TBI, tracheostomies, or ventilation
- Cervical fusions
  - resulting in instrumentation blockage or abnormal cervical lordosis
- Metabolic dysfunction
  - neuroendocrine dysfunction resulting in hyponatremia; risk for seizures and encephalopathy; adrenal insufficiency, diabetes insipidus, hypothyroidism

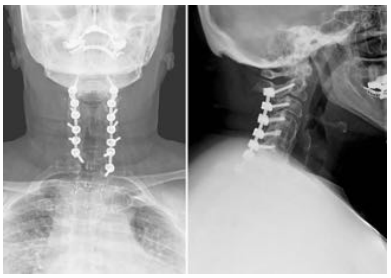

Image from: http://orthoinfo.aaos.org/topic.cfm?topic=A00539

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Psychological, Neuropsychological, & Psychosocial Considerations in Dual Diagnosis

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A Holistic, Person-Centered Approach to Rehabilitation

Psychological

- Mood & affect changes, personality changes, adjustment, grief, anxiety, fear, loss, depression, joy, relief, satisfaction with life, value-finding, reflection, self-medicating, spirituality, ongoing care needs

Neuropsychological

- Cognition, behavior, impulsivity, lability, flat affect, ambivalence, need for environmental changes, return to work or school, family role changes, independence, ongoing care needs

Psychosocial

- Financial changes, family issues, parenting, dating, relationship issues, sexuality, dependency, community re-entry

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Patient-Specific Issues

Demographic Variables

- Age
  - Effects of aging on recovery and cognition
- Health history
  - Medical history & follow up needs
  - Health condition at time of injury
  - Substance use history
  - Psychiatric/Psychological/Personality interactions
- Culture/Ethnicity/Diversity
  - What issues & goals are important to the patient?
  - Family support, community resources

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Patient-Specific Issues

Cont. Demographic Variables

- Premorbid level of functioning
- Level of education, cognitive reserve
- Education history- learning disorders, ADHD
- Occupational history
- Premorbid problem-solving abilities
- Exposure/availablity to resources & healthcare

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Neuropsychological Considerations

- In acute rehabilitation, patients may still be in post-traumatic amnesia (PTA)
  - Disorientation/ Not fully, consistently oriented
  - Ongoing memory impairment
  - Problems with attention/concentration
  - Difficulty with emotional regulation
  - Perseveration
  - Need for increased structure, supervision, low-stimulus environment
  - Difficulty processing complex information about their injury or rehabilitation
  - Will need ongoing neuropsychological assessment

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Neuropsychological Considerations

- Continue to monitor/evaluate cognitive functioning
  - Cognition can fluctuate/be effected by sleep, medication effects & changes, UTI, pain, etc.
- When to consult Neuropsychology
  - What is your referral question?
    - Treatment recommendations? Compensatory strategies?
    - Recommendations for return to community?
    - Return to driving, work, college, parenting, supervision needs, finances, medication management….
  - Family education & training
- Decision-Making Capacity
  - Cognitive capacity for specific decision-making (financial, medical procedures, childcare)

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Neuropsychological Testing

- Effort/Validity Testing
- Attention/Concentration
- Language (expression, comprehension, reading, writing)
- Memory (auditory, visual, short-term, long-term, recognition)
- Cognitive Processing Speed
- Psychomotor Processing Speed
- Visuoperception
- Executive Functioning
- Emotional Functioning
- Personality Functioning

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Neuropsychological Testing

- All summarized for treatment recommendations, family education, & training
- When possible, based on norm-referenced statistics
  - Age, gender, right/left handedness, level of education…
  - Espcially helpful for undiagnosed brain injury
- Assists with family understanding & adjustment to injury
  - Memory problems vs. “He never listens!"
  - Attention/Concentration problems vs. “She doesn’t even try!”
  - Language expression difficulties vs. “He doesn’t talk with me any more.”

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Family & Community Considerations

- Need for flexibility & compensatory strategies for patient & family
- Family structure/role changes
- Family caregiving & self-care
- Impact of family health history
  - Medical & psychiatric/psychological issues
- Importance of family education & training across the spectrum of rehabilitation
- How to let go, as patients improve
  - Safely increasing independence (e.g., Supervision Rating Scale)

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Patient & Family Considerations

- Injuries impact relationships with family members
- The Patient's Parents
  - May become parents again, caring for their child
  - Dashed hopes for their child
  - Changes the plan for their own future (e.g., retirement)
  - Realization that responsibility for the care & well-being of that child will outlive themselves
- The patient's children & siblings
- Reduction in parental attention
- Increases in responsibility → "parentified child"
- Common issues of shame, fear, guilt, embarrassment, loss, grief

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Treat the Family, Treat the Patient

- Help patient & family adjust to multi-dimensional changes
- Education at different levels of understanding
  - How to explain injury, sequalae to 8 year old vs. 16 year old
- Educate & prepare the patient & family for what is occurring now, and what *may* occur in the future
- Maximize the family's skills, abilities, knowledge, & resources
- Improving family & community adjustment to disability improves patient outcomes

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Goals for Family Interventions

- When working with patients or families, it's important to stay focused on their goals.
  - Not try to "fix them," change them, or their family dynamics
  - We typically recommend on-going, community care for that
  - In rehab, need to focus on current rehab issues & functional problem-solving
- Provide family with a sense of competence
  - Families must feel capable of managing in order to function better
  - Premorbid functioning may not have been great
  - We want to empower them, and help them to feel as competent as possible with these new challenges

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Goals for Family Interventions

- Have a united front with team goals & recommendations
- Create a corrective, supportive environment
  - Family's needs & feelings recognized & acknowledged
- Allow free expression & acceptance of the various (and often conflicting) feelings
- Normalize their reactions
  - Even when you've already done it 27 times
- Create a sense of cohesion within the family
  - Help them to get on the same page, rather than "getting sucked into drama" or contributing to additional problems within the family

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Goals for Family Interventions

- Renew the family's awareness of their strengths & resources
- If they can't identify their strengths, & you can't identify their strengths, partner with your staff psychologist, colleagues, mentors, or managers for help!

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Things to Remember for Dual Diagnosis Families

- They know their loved ones better than we do
  - But they need your eyes and expert opinions now
- Their knowledge about patient's emotional & physical needs is valuable to us & to the patient's recovery
- Their participation & involvement is helpful, and improves patient outcomes
- But they need clear guidance & education from you
- Feelings of loss, isolation, sadness, anger, guilt, fear, & frustration are common & normal.
- Well-trained, interdisciplinary teams can help them work through this.

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Self-Care is Essential for Staff Members

- Yes, I'm talking to you.
- Dual diagnosis patients are particularly complex, and require specilized skills & treatment
- One of your primary jobs is to **prevent burnout**
- Seek support & guidance from your peers
  - Positive support vs. negative support
  - Misery loving miserable company will only make you more miserable
  - Validate feelings/frustrations, then focus on **positive** solutions
  - Remind each other of what you *can* do for your patients & families
  - Remind each other of what you *can't* do (e.g.,"fix them," know your limitations & work with them)

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Take Home Messages

- Concomitant brain injuries are often missed or treated later in patients with primary SCI.
- It can be hard to remember, acknowledge, & be sensitive to injuries that you and others can't see.
- Therapists working with this population must be knowledgeable regarding the effects of comorbidities, & skilled at managing them in a safe environment.
- It is our job to educate, remind, & integrate the person's brain injury and any neurocognitive difficulties into their rehabilitation.
- You might be the first to do this, & stress the importance of it.

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Take Home Messages

- Patients with dual injury may benefit from longer acute LOS.
- Important to involve neuropsychology & speech therapy early to screen for cognitive, emotional, or psychological changes.
- Outcome disparities are significant, & more overt in patients with higher motor recovery potential.
- Mobility, social, & emotional outcomes are impacted differently in dual diagnosis.
- You have an enormous impact on your patient's future- make the most of it!
- In order to do all of this, you must take good care of yourself.

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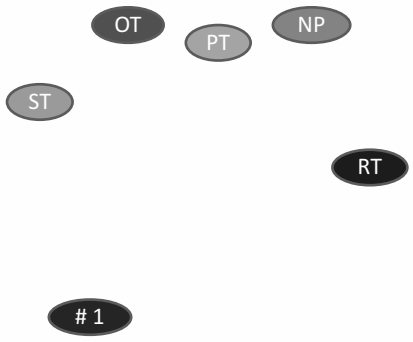
It takes a village…



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