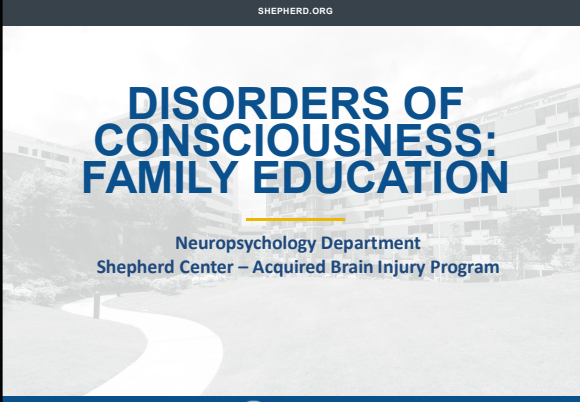



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DISORDERS OF CONSCIOUSNESS: FAMILY EDUCATION

Neuropsychology Department
Shepherd Center – Acquired Brain Injury Program




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OUTLINE

- Part 1:
 - What is a Brain Injury?
 - Neuroanatomy Basics
- Part 2:
 - What is a Disorder of Consciousness?
- Part 3:
 - Brain Injury Rehabilitation at Shepherd
- Part 4:
 - What Happens Next?
- Part 5:
 - Family Support



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CONSCIOUSNESS

Consciousness—The state of being awake and aware of one's surroundings.


A disorder of consciousness (DOC) is a diagnosis given when someone has difficulty maintaining wakefulness and/or has impaired awareness of him/herself and his/her environment due to a medical condition.


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PART 1: BRAIN 101



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ACQUIRED BRAIN INJURY (ABI)

Traumatic Brain Injury (TBI):

- Outside force impacts head hard enough to cause brain to move within the skull or the force directly hurts the brain
- Examples: motor vehicle collisions, falls, gun-shot wounds, sports, physical violence, etc.
- Closed Head Injury vs. Open Head Injury

Non-Traumatic Brain Injury (n-TBI):

- Does not involve external mechanical force
- Examples: stroke, aneurysm, insufficient oxygen (anoxia/hypoxia) or blood supply (ischemia), infectious disease, AVM, tumor, etc.


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BRAIN ANATOMY

- Brain is soft & has the consistency of a Jello mold
- Attached to the skull by small veins and meninges
- Floats in Cerebral Spinal Fluid (CSF)
 - Provides a cushion, "shock absorber"
- Enclosed environment
 - Other than veins and arteries, there is only one exit—where brain stem exits the base of the skull to become the spinal cord

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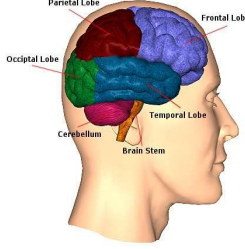
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BRAIN ANATOMY

Cortical structures on surface

- ❑ **Neo-cortex or Cortical Structures**
 - ❑ "Thinking" portion of the brain
 - ❑ Each hemisphere divided into 4 lobes
 - ❑ Frontal, temporal, occipital, parietal



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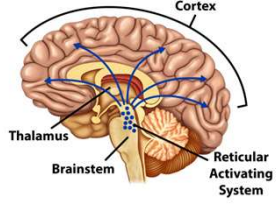
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BRAIN ANATOMY

Subcortical structures deeper in brain

- ❑ **Brain Stem**
 - ❑ Conduction
 - ❑ Life sustaining functions
- ❑ **Basal Ganglia**
 - ❑ Integration
 - ❑ Inhibition
- ❑ **Reticular Activating System**
 - ❑ Wakefulness
- ❑ **Thalamus**
 - ❑ Modulation of Activity



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STORMING

- ❑ Hypothalamic instability
- ❑ Occurs in 15-33% of severe TBI
 - ❑ Delayed response after trauma to the brain
- ❑ Autonomic nervous system poorly regulated by central brain mechanisms
 - ❑ Elevated blood pressure
 - ❑ Fever
 - ❑ Tachycardia
 - ❑ Rapid respirations
 - ❑ Sweating
 - ❑ Posturing and convulsing
- ❑ Can come and go in spurts
- ❑ Manage the symptoms as much as possible

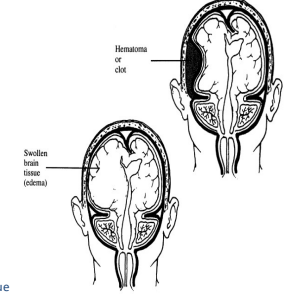
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Neuropathology of TBI

- **Contusions**
 - ❑ Blood vessels in or around brain are damaged or broken
- **Hemorrhage**
 - ❑ Bleeding from blood vessel leakage rupture
- **Hematoma**
 - ❑ Localized pooling of blood that occurs from hemorrhaging
- **Edema**
 - ❑ Swelling in brain tissue
 - ❑ Increased intracranial pressure (ICP)
 - ❑ Enclosed space
 - ❑ Increased pressure on all brain tissue



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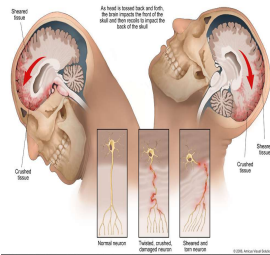
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Neuropathology of TBI

Diffuse Axonal Injury

- ❑ "Shear injury"
 - ❑ Results from rotating, twisting and tearing of axons of neurons
 - ❑ Tears capillaries & blood vessels
- ❑ Often due to coup-contrecoup injury
 - ❑ Back-n-forth contact with skull

Coup and Contrecoup Closed Head Injuries



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Neuropathology of Stroke

- ❑ Loss of brain function due to interruption in blood supply to all or part of the brain
- ❑ Results in depletion of oxygen and glucose in affected area


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Anoxia/Hypoxia


- **Anoxic Brain Injury**
 - Brain does not receive any oxygen. Cells in the brain need oxygen to survive
 - No oxygen supplied to the brain
 - Blood isn't carrying enough oxygen
- **Common causes:**
 - Cardiovascular disease or trauma, asphyxia (e.g., drowning), chest trauma, electrocution, severe asthma attack, poisoning, substance overdose
- **Common difficulties after anoxic injury:**
 - Memory loss
 - Tremor (i.e., myoclonus)
 - Visual deficits (i.e., cortical blindness)



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PART 2: DISORDERS OF CONSCIOUSNESS





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DOC Program: Brain Injury Assessment

- Severity of Initial Injury
 - Glasgow Coma Scale (GCS 3-15)
 - Length of reduced arousal
- Rancho Scale Levels
 - Only for TBI
 - Range from 1-10
 - Levels 1-3 are low-level consciousness (DOC Program)
 - Level 4-10 full Rehab program



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COMA

- For TBI—Rancho I—No Responses, Total Assistance
- Functional Abilities
 - Eyes closed
 - No response to any stimuli (visual, auditory, pain, etc.)





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VEGETATIVE (AKA UNRESPONSIVE WAKEFULNESS SYNDROME)

- For TBI—Rancho II—Generalized Responses
- Functional Abilities
 - Eyes open
 - Generalized responses
 - Reflexive behaviors
 - Grasping, but not able to let go
 - Non-purposeful movements
 - Fragments of coordinated movement
 - Responds to repeated auditory stimuli with increased or decreased activity
 - Vocalization but not verbalization





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MINIMALLY CONSCIOUS

- For TBI—Rancho III—Localized Responses
- Functional Abilities
 - Localized responses
 - Intelligible verbalization
 - Purposeful behavior
 - Turns away/to auditory stimuli
 - Blinks when a strong light crosses visual field
 - Follows moving visual stimuli
 - Following commands, but responses still inconsistent





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PART 3:

DOC PROGRAM AT SHEPHERD



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TRACKS AT SHEPHERD CENTER

Disorders of Consciousness Program

- Rancho Levels 2-3
- Passive therapies to keep body conditioned, and ready for possible progression to full rehab
- Stimulation for emergence from disorders of consciousness state

Rehabilitation Program

- 3 hours of active therapies

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OVERVIEW: DOC PROGRAM

Goal: Provide best possible environment for emergence

- Minimize complications of immobility .
- Increase quality and quantity of responses to stimuli.
- Recovery is not dependent on amount of stimulation—more is not necessarily better.

Goal: Prepare families to care for their loved one in the home or community.

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ASSESSING FOR EMERGENCE

Coma Recovery Scale—Revised

- Useful in documenting even slight improvements
 - Visual: Startle, localization, pursuit, tracking, object recognition
 - Auditory: Startle, localization, consistency
 - Oromotor: Oral movement, vocalization, verbalization,
 - Communication: Accuracy, consistency
 - Arousal

Neurobehavioral Examination (Neuropsychology)

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ASSESSING FOR EMERGENCE (IQBA)

- Patient may not meet CRS criteria due to sensory, motor, language, or processing speed deficits
- We may use an IQBA in conjunction with CRS:

Individualized Quantitative Behavioral Assessments (IQBA)

- Used to assess individual cognitive and/or behavioral abilities in patients with limited responsiveness or slowed processing speed
- Example: Wiggling fingers...is this a non-purposeful/reflexive movement or is it a purposeful/intentional movement?


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EMERGENCE CRITERIA (CRS)

- Functional interactive communication
 - Via verbalization, writing, yes/no signals, or use of augmentative communication devices
- Functional use of two different objects
 - Generally appropriate use of at least 2 different objects on 3 consecutive evaluations
 - CRS examples
 - Brings smartphone up to ear when handed phone
 - Brings cup/spoon/fork to mouth
 - IQBA example
 - "Test the limits" by giving additional time to respond to commands/interact with items

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INTERVENTIONS

- Medications may be given as part of routine treatment:
 - Neurostimulants (e.g., Amantadine, Ritalin, Provigil)
 - Sleep medications to help with sleep/wake cycle
- Medication trials to promote consciousness
 - Ambien
 - Ativan
 - Note: Only a very small percentage of patients respond to these medication trials
- What can you do?
 - Record funny memories/stories/etc. to play to your loved one
 - Coordinate with team so these recordings can be played when you are out/during sessions
 - Ask questions, share your observations

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PART 4:

WHAT'S NEXT?



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WHAT TO EXPECT AFTER EMERGENCE

If your loved one emerges while at Shepherd:

- They will transition from DOC program to rehab program
 - They will receive three hours of *active* therapies per day.
 - Also will receive supplemental therapies as appropriate (e.g., Rec Therapy).
- Your loved one will likely still have cognitive and physical limitations after emergence.
 - Emergence is the beginning of a new phase of recovery.

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WHAT IF MY LOVED ONE DOES NOT EMERGE?

1. Care for loved one in the home.
2. Care for loved in the community (e.g., at a skilled long-term facility)
3. Discuss life-sustaining treatment options with M.D.

Not everyone will emerge at Shepherd:

- Some people emerge at home (~25%)
- Some people do not emerge (~25%)

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THINKING ABOUT DISCHARGE

- Family Training Day(s)
- Shepherd Transition Support Program
- Potential for Emergence and Return for Rehab

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NEURAL RECOVERY

- Everyone is DIFFERENT
 - Time & Biology
- Types of recovery
 - Recovery from secondary effects (brain swelling, medical complications, etc.)
 - Reorganization of brain functions
 - Nearby cells may take on additional work
- Limitations
 - We do not make new brain cells
 - Limited capacity for reorganization


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PART 5:

FAMILY SUPPORT




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Family


- Adjustment to Injury (for family)
 - Feelings of loss, sadness, anger, guilt, and frustration are common
- You do not have to go through this alone - help is available
 - Family counselor
 - Chaplain services
 - Peer Support coordinator
- Break the stress response cycle
 - Rest, eat well, get some exercise
 - Practice whatever gives you strength, peace, hope
- Manage your physical & emotional energy
 - Find people who will help you *and then let them*
 - This is your chance for a break before your loved one is discharged

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ADDITIONAL INFORMATION

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OVERVIEW: DOC PROGRAM


1.5 hours of therapies daily PT, OT, ST

- Plus neuropsych, nursing care
- Reduced therapies on weekends for rest

Plan of Care:

- Medical stabilization and health needs
- Nutrition
- Positioning & preventative care
- Cognition/communication



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DOC TREATMENT TEAM


Medical Doctor

- Designs treatment plan
- Monitors medical status and places orders for consults
- Medication management

Nursing

- Day by day duties and examination
- Medication distribution
- Bowel/Bladder
- PCTs work with nurses



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DOC TREATMENT TEAM

Case Manager

- Contact between team and family
- Management of insurance companies
- Discharge planning

Respiratory Therapy

- Tracheostomy management
- Monitor respiratory function and need for oxygen

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DOC TREATMENT TEAM


Occupational Therapy (OT)

- Rehabilitation for arms, hands, fine motor skills, vision
- Activities of daily living

Physical Therapy (PT)

- Rehabilitation for legs, torso, balance, sequencing movements
- Wheelchair fitting/training
- Transfers

Both OT and PT may work on casting limbs to address tone

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DOC TREATMENT TEAM

Speech & Language Therapy

- Swallowing
- Speech and Language
- Cognition

Neuropsychology

- Formal, standardized assessment of thinking skills
- Capacity evaluations (ex: Power of Attorney vs. Guardianship)

Nutrition

- Diet, weight
- Importance of/Education for nutrition habits for discharge

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