Activities for Stimulation of Persons with Low Arousal

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Objectives

• Common Impairments after TBI
• Outcome scales
• Rancho Los Amigos Levels 1-4
• Sensory stimulation including value and research
• Activities to improve arousal
  – Tips for use in clinic or home
Brain Injury:
Traumatic and Non-Traumatic

• Traumatic Brain Injuries
  – Penetrating open injury
  – Closed head injury
  – Contusion
  – Intracerebral hemorrhage
  – Subdural hematoma
  – Epidural hematoma
  – Diffuse axonal injury

• Non-Traumatic Brain Injuries
  – Brain tumors
  – Infarction
  – Anoxia
  – Cerebral aneurysms
  – Subarachnoid hemorrhage
  – Encephalitis
Therapeutic Areas of Concern in Patients with Brain Injury

- Cognitive deficits
- Visual deficits
- Physical and Functional deficits
- Behavioral issues
Cognitive Deficits

• Attention
• Memory
• Problem solving
• Executive Function
Visual Deficits

• Nystagmus
• Visual field cut
  – Hemianopsia
• Diplopia
• Perceptual
  – Neglect
  – Objection Recognition
  – Depth perception
Physical Deficits

- Weakness
- Poor head/trunk control
- Spasticity
- Swallowing
Behavioral Deficits

- Restlessness
- Confusion
- Decreased insight
- Verbal Aggression
- Physical Aggression
Glasgow Coma Scale

- Brief measure of brain injury severity
- Assesses the function of the cerebral cortex, the upper brainstem, and the reticular activating system
  - eye-opening response
  - verbal response
  - motor response
- International use in ERs and trauma units
- Total score usually documented
  - Mild = 13-15
  - Moderate = 9-12
  - Severe = 3-8
  - 3-4 = very severe

Glasgow Coma Scale

- [www.glasgowcomascale.org](http://www.glasgowcomascale.org)
Disability Rating Scale

• “The scale is intended to measure accurately the general functional changes over the course of recovery”

• Cognitive ability not physical ability

• Proven reliable and valid

• Self administered or scored through interview with client or family member


  » http://www.tbims.org/combi/drs
## Disability Rating Scale

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>Instructions</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arousalability, Awareness and Responsivity</strong></td>
<td>Eye Opening</td>
<td>0 = spontaneous, 1 = to speech, 2 = to pain, 3 = none</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communication Ability</td>
<td>0 = oriented, 1 = confused, 2 = inappropriate, 3 = incomprehensible, 4 = none</td>
<td></td>
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<tr>
<td></td>
<td>Motor Response</td>
<td>0 = obeying, 1 = localizing, 2 = withdrawing, 3 = flexing, 4 = extending, 5 = none</td>
<td></td>
</tr>
<tr>
<td><strong>Cognitive Ability for Self Care Activities</strong></td>
<td>Feeding</td>
<td>0 = complete, 1 = partial, 2 = minimal, 3 = none</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Toileting</td>
<td>0 = complete, 1 = partial, 2 = minimal, 3 = none</td>
<td></td>
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<tr>
<td></td>
<td>Grooming</td>
<td>0 = complete, 1 = partial, 2 = minimal, 3 = none</td>
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</tr>
<tr>
<td><strong>Dependence on Others</strong></td>
<td>Level of Functioning</td>
<td>0 = completely independent, 1 = independent in special environment, 2 = mildly dependent, 3 = moderately dependent, 4 = markedly dependent, 5 = totally dependent</td>
<td></td>
</tr>
<tr>
<td><strong>Psychosocial Adaptability</strong></td>
<td>Employability</td>
<td>0 = not restricted, 1 = selected jobs, 2 = sheltered workshop (non-competitive), 3 = not employable</td>
<td></td>
</tr>
<tr>
<td><strong>Total DR Score</strong></td>
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</tbody>
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JFK Coma Recovery Scale - Revised

- Original scale 1991 (Giacino et al)
- Developed to characterize and monitor patients’ functioning at Rancho Levels I – IV
- Revised 2004 (Kalmar and Giacino)
- Measurement and evaluation
- Used widely in clinical and research settings
- Discriminate minimally conscious state from vegetative state
- Differentiate volitional from random, coincidental movement

www.tbims.org/combi/crs/index.html
JFK Coma Recovery Scale – Revised

• 23 Items with 6 subscales
  – Auditory Function
  – Visual Function
  – Motor Function
  – Oromotor/Verbal Function
  – Communication
  – Arousal

• Hierarchical: lowest item is reflexive, highest item is cognitively based
# JFK COMA RECOVERY SCALE - REVISED ©2004

**Record Form**

<table>
<thead>
<tr>
<th>Patient:</th>
<th>Date:</th>
</tr>
</thead>
</table>

### AUDITORY FUNCTION SCALE
- 4 - Consistent Movement to Command *
- 3 - Reproducible Movement to Command *
- 2 - Localization to Sound
- 1 - Auditory Startle
- 0 - None

### VISUAL FUNCTION SCALE
- 5 - Object Recognition *
- 4 - Object Localization: Reaching *
- 3 - Visual Pursuit *
- 2 - Fixation *
- 1 - Visual Startle
- 0 - None

### MOTOR FUNCTION SCALE
- 6 - Functional Object Use.
- 5 - Automatic Motor Response *
- 4 - Object Manipulation *
- 3 - Localization to Noxious Stimulation *
- 2 - Flexion Withdrawal
- 1 - Abnormal Posturing
- 0 - None/Flaccid

### OROMOTOR/VERBAL FUNCTION SCALE
- 3 - Intelligible Verbalization *
- 2 - Vocalization/Oral Movement
- 1 - Oral Reflexive Movement
- 0 - None

### COMMUNICATION SCALE
- 2 - Functional: Accurate
- 1 - Non-Functional: Intentional *
- 0 - None

### AROUSAL SCALE
- 3 - Attention
- 2 - Eye Opening w/o Stimulation
- 1 - Eye Opening with Stimulation
- 0 - Unraversable

### TOTAL SCORE

Denotes emergence from MCS.
Denotes MCS.
Rancho Los Amigos Level of Cognitive Functioning Scale

- Commonly used tool used to describe a patient's level of cognitive function across the continuum of recovery after TBI
- Used as a descriptor of patient behavior
- Eight levels range from no response to purposeful and appropriate responses
- Correlates with 24 hour CGS scores, length of coma, and duration of posttraumatic amnesia.
- Limited as a predictor of long term outcome or to monitor progress within levels
- Every patient does not go through all levels
Rancho Los Amigos Level of Cognitive Functioning Scale

• Level I - No Response
  – Patient appears to be in a deep sleep and is completely unresponsive to any stimuli
  – No response to sounds, sights, touch, movement
  – Limiting factor: arousal
Rancho Los Amigos
Level of Cognitive Functioning Scale

• Level II - Generalized Response
  
  – *Patient reacts inconsistently and non-purposefully to stimuli in a nonspecific manner*

  • Reflex response to painful stimuli
  • Increased or decreased activity
  • Physiological changes, generalized gross body movement, and/or non-purposeful vocalization
  • Same regardless of type & location of stimulation
  • Responses may be significantly delayed
Rancho Los Amigos
Level of Cognitive Functioning Scale

• Level III - Localized Response
  – Reacts specifically but inconsistently to stimuli
  – Responses are directly related to type of stimulus
    • Withdrawal or vocalization to painful stimuli
    • Turns toward or away from auditory stimuli
    • Blinks when strong light crosses visual field
    • Follows moving object passed within visual field
    • Responds to discomfort by pulling tubes or restraints
    • Responds inconsistently to simple commands.
Rancho Los Amigos
Level of Cognitive Functioning Scale

- Level IV – confused/agitated
  - *Alert and in heightened state of activity*
  - *Behavior is bizarre and non-purposeful related to environment*
    - Attempts to remove restraints/tubes or crawl out of bed
    - Motor activities without purpose
    - Gross attention is very brief, selective attention is non-existent
    - Absent short-term and long-term memory
    - May exhibit aggressive or flight behavior
    - Mood may swing from euphoric to hostile
    - Verbalizations are incoherent & inappropriate
Agitation

- Goal of intervention is to facilitate the patient’s ability to interact with their environment appropriately.
- Reduce demands on patient to account for decreased frustration tolerance and decreased attention span.
- Try to provide structure and consistency.
- Use automatic activities to promote goal directed response.
- Utilize gross motor activities or movement to dissipate agitation in a constructive manner.
- Provide simple orienting information and structure to minimize confusion.
- Provide a safe environment.
Consciousness

- Consciousness is awareness of self and surroundings
  - Controls alertness, sleep, and attention
- Sensory regulation increases neurologic signals to the reticular activation system (structure of the brainstem that alerts the brain to important sensory input from the external environment)
- Consciousness also requires communication with the thalamus and the cerebral cortex
Levels of Consciousness

• Coma
• Vegetative
• Minimally conscious
Coma

- No evidence of arousal and awareness
- No sleep-wake cycle
- Rancho I
- Rarely last longer than a few weeks
- Sustained unconsciousness, eyes remain closed, can not be aroused
- Not obeying commands, not uttering words, not opening eyes
Vegetative State

- Absence of self awareness & the environment
- Eye opening
- Sleep/wake cycle
- No awareness of environment or internal stimuli
- No purposeful movement
Minimally Conscious State

- Inconsistent but meaningful interaction with the environment
- Intentional communication
- Intelligible verbalization
- Localization to noxious stimulation
- Object manipulation
- Automatic motor response
- Consistent or reproducible movement to command
- Object recognition or localization (reaching)
- Visual pursuit or visual fixation
Sensory Stimulation

- Used to improve arousal and awareness following a TBI and to stimulate the neural recovery process in order to enhance the meaningfulness and accuracy of these behaviors
- May affect the RAS and increase arousal and attention to the level necessary to perceive incoming stimuli
- May improve the quantity and quality of responses toward purposeful activity
- May provide opportunities for patient to respond to the environment
- May heighten the patients’ responses to sensory stimuli and eventually channel them into meaningful activity
Primary Sensory Areas of the Cerebral Cortex

- Primary Somatosensory cortex receives information from tactile and proprioceptive receptors. Awareness occurs in the thalamus and post central gyrus.

- Primary auditory cortex receives information from the cochlea of both ears to the thalamus and superior temporal gyrus.

- Primary vestibular cortex receives information regarding head movement and position relative to gravity, located posterior to the somatosensory cortex.

- Primary visual cortex receives information from the retina, in the thalamus and calcarine sulcus (occipital lobe).
Guidelines for providing Sensory Stimulation

- Patients who are less aroused may require more intense and general stimulation at first, and as they become more responsive stimulation can be downgraded and become more specific.
- Make sure patient is comfortable.
- Eliminate distractions.
- Allow extra time for patient to respond.
- Keep sessions short, but conduct them frequently:
  - 15-30 minutes
  - Alternate periods of stimulation with periods of rest.
Guidelines for providing Sensory Stimulation

• Include the family and significant others in the program

• To improve the quality and quantity of responses as responsiveness increases, direct treatment toward increasing frequency and rate of response, the period of time that patient can maintain alertness, the variety of responses, and the quality of attention to the environment

• Try stimulating all the senses

• Select meaningful stimuli
Sensory Stimulation

- Vestibular
- Proprioceptive & Kinesthetic
- Auditory
- Tactile
- Olfactory
- Gustatory
- Visual
Position or Movement Stimulation

- Faster movements patterns tend to facilitate arousal
- Monitor patient’s BP
- Use meaningful and familiar position changes
- Avoid spinning, which may trigger seizures
- Watch for early physical protective reactions or delayed balance reactions during these activities
Vestibular Activities

• Transfers
  – Supine<>sit
  – Rolling in bed
• Rocking in a chair or on a mat
• Big ball
• Bolster
• Rocker board
Proprioceptive & Kinesthetic Activities

- Weight bearing & Joint compression
- Facilitating normal alignment
- ROM activities
- Positional changes
- Prone over a wedge
- Tilt table
- Side lying
Auditory Stimulation

- Permit only one person to speak at a time
- Assess person’s response and ability to localize the sound and where it is coming from
- Then assess a person’s response when the location of the sound changes
Auditory Activities

• Verbal Communication
  – Calling the person’s name
• Familiar songs and music from radio
• Listening to the TV
• Clapping your hands
• Ring a bell
• Whistle
Tactile Stimulation

• Tactile input can be facilitory or inhibitory

• The face, and especially the lips and mouth area, are the most sensitive

• Use unpleasant stimuli, such as a pinprick, with caution
  – Avoid ice to face or body, as it may trigger a sympathetic nervous system response, i.e. increased BP, HR, and salivation and decreased GI activity

• Vary the degree of pressure
  – Firm pressure vs. light touch
Tactile Activities

• Sternal Rub

• Various textures
  – Personal clothing
  – Blankets
  – Stuffed animals
  – Lotion

• Variety of temperatures
  – Warm and cold cloths
  – Metal spoons dipped for 30 seconds in hot or cold water
Olfactory Stimulation

- Avoid touching the skin with the scent
- Provide the stimulation for no more than 10 seconds

**There may not be a response to smell stimulation**

- The Olfactory nerve is the most commonly injured cranial nerve after TBI
- Many TBI patients have trachs, which eliminate the exchange of air through the nostrils and therefore inhibit the sense of smell
- Nasogastric tubes, can block the sense of smell
Olfactory Activities

• Pleasant odors
  – After shave, cologne, perfume, favored extracts, coffee grinds, shampoo, favorite foods

• Noxious odors
  – Use garlic or mustard
  – **Avoid vinegar and ammonia because they irritate the trigeminal Nerve
Gustatory Stimulation

• Provide stimulation to the lips and area around the mouth

• If the person demonstrates defensiveness to touch, such as pursing lips, closing mouth, or pulling away from the stimulus, gently continue stimulation techniques to decrease defensive reactions and increase level of awareness

• Be aware of diet levels and bite reflexes
Gustatory Activities

• Pleasant vs. sour tastes
  – Cotton swab dipped in sweet, salty, or sour solution
    • Avoid sweet tastes of patient has difficulty managing oral secretions since sweet tastes increase salivation

• Oral stimulation during mouth care
Visual Stimulation

• Provide normal visual orientation
  – Position patient upright in bed or wheelchair

• Eliminate distractions to allow patient to focus on visual stimuli

• Attempt visual tracking after fixation (focusing) is established
  – Tracking usually begins at midline
Visual Activities

• Tracking Objects
  – Colored light or pen
  – Familiar faces or objects
  – Photos of family members
  – Self in a mirror
QUESTIONS??
References


• www.tbims.org/combi/crs/CRS%20form.pdf

• www.tbims.org/combi/crs/index.html
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