A Team Approach to the Management of Patients in Altered States of Consciousness

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Coma

A state of extreme unresponsiveness, in which an individual exhibits no voluntary movement or behavior. Furthermore, in a deep coma, even painful stimuli are unable to affect any response, and normal reflexes may be lost.
Vegetative State

A coma-like state characterized by open eyes and the appearance of wakefulness.

Minimally Conscious State

A severe alteration in consciousness that does not meet the diagnostic criteria for either coma or a persistent vegetative state, in which patients respond to some sounds and unpleasant stimuli and have a sleep-wake cycle but do not attend to their environment consistently.
Recommendations for behavioral assessment of neurocognitive responsiveness.

1. Adequate stimulation should be administered to ensure that arousal level is maximized.
2. Factors adversely affecting arousal should be addressed (e.g., sedating medications and occurrence of seizures).
3. Attempts to elicit behavioral responses through verbal instruction should not involve behaviors that frequently occur on a reflexive basis.
4. Command-following trials should incorporate motor behaviors that are within the patient’s capability.

Recommendations for behavioral assessment of neurocognitive responsiveness. (cont.)

5. A variety of different behavioral responses should be investigated using a broad range of eliciting stimuli.
6. Examination procedures should be conducted in a distraction-free environment.
7. Serial reassessment incorporating systematic observation and reliable measurement strategies should be used to confirm the validity of the initial assessment. Specialized tools and procedures designed for quantitative assessment may be useful.
8. Observations of family members, caregivers, and professional staff participating in daily care should be considered in designing assessment procedures.
Pharmacologic Interventions

- CNS stimulants
  - Amantadine  Dopaminergic
  - Bromocriptine  Dopaminergic
  - Levodopa  Dopaminergic

- CNS depressants
  - Zolpidem (ambien)  Sedative, nonbenzodiazepine
  - Baclofen  GABA agonist
Other Medical Interventions

• Deep Brain Stimulation
• Hyperbaric oxygen therapy

Assessing the child in an altered state of consciousness: What are we looking for?

• Medical and Nursing Assessments
• Psycho-Social Assessments – Psychology and Social Work
• Dietary/Nutrition
• Therapy discipline assessments
  • Respiratory Therapy
  • Physical Therapy
  • Occupational Therapy
  • Recreation Therapy
  • Speech Language Pathology
Nursing

• Completes Neuro checks at least twice a day. (Includes checking pupils for reaction and size, checking extremities for strength/weakness, checking if patient is alert, disoriented, lethargic, etc.)
• Assesses need for a patient companion: If the patient is intermittently confused, especially if they pose a threat to harm themselves, pull at medical equipment, try to get out of bed, or any other unsafe behavior.
• Assesses skin integrity
• Assesses the environment for low stimulation
• Family Needs Assessment

Respiratory

• Work with medical team to assess the child’s current respiratory
• Work with medical team to wean from mechanical supports
• Assess need for additional respiratory treatments

Registered Dietician

• Assesses a patient’s nutritional needs, develop and implement nutrition programs.
• Works with team for transitions from continuous feeds, to bolus, feeds, and weaning of tube feeds.
Therapy Discipline Assessments: What are we looking for?

- **Occupational Therapy**
  - Tolerance for sensory input and general handling through physical signs, changes in vital signs, level of alertness
    - Tactile
    - Vestibular
    - Auditory
    - Proprioceptive
  - ROM
    - Tone
  - Positioning
    - Assessment for splinting needs
  - Impairments in activities of daily living
    - Includes assessment of self-feeding with SLP
  - Equipment needs
    - Feeding equipment, ADL equipment, positioning equipment
  - Strength
    - Observations of movements in limbs, trunk and head

- **Physical Therapy**
  - Tolerance to mobility and general handling through physical signs (ex: facial grimacing, posturing), changes in vital signs (HR, RR, BP), level of alertness
    - Rolling, supine<->sit
    - Sitting upright (edge of bed, in w/c)
    - Standing via tilt table or standing frames
  - ROM
    - Assess baseline measurements to monitor for contractures
  - Strength
    - Observations of movements in limbs, trunk and head
  - Response to simple motor commands
  - Positioning and equipment needs assessment
Therapy Discipline Assessments: What are we looking for?

**Speech/Language Pathology Assessment**
- Cognitive/Academic and Communication history
  - Grade level
  - Previous head injury
  - Academic Supports
  - Learning styles
  - Attention and Memory
  - Pragmatics
- Oral motor function?
  - Secretion Management
  - Functional Oral Motor Movements- volitional or reflexive
  - Acceptance of oral stimulation – gustatory, thermal, tactile

**Speech/Language Pathology Assessment**
- Current cognitive/communication function information
  - We gather this from the administration of the Coma Recovery Scale.
  - Utilize the Ranchos Los Amigos Scale
  - Orientation Log Score (O-log) – pending level of alertness
  - Have also utilized the Communication Matrix

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Therapy Discipline Assessments: What are we looking for?

**Recreational Therapy**
- Family interview
- Alertness
- Reaction to sensory stimulation/activities/likes/dislikes
- Following commands

**Making choices**
- Communication
  - Yes/no responses
  - Finger movement
  - Eye blinks
  - Verbal
  - Head nods up or down
  - Eye gaze
Interdisciplinary assessments: What are we looking for?

**Recreation Therapy and Speech/Language Pathology Assessment**
- JFK Coma Recovery Scale
  - Auditory Function – Is the child able to follow consistent movements to given simple commands.
  - Visual Function - Is a child able to visually locate a specific object and reach for it?
  - Motor Function - Can a child use an object functionally

- Communication – Does the child use gestures, vocalizations, verbalizations to communicate? Does the child show signs of intent to communicate?
- Arousal/Attention- Is the child able to maintain an alert state? Does the child have joint attention?

[http://www.tbims.org/combi/crs/CRS%20form.pdf](http://www.tbims.org/combi/crs/CRS%20form.pdf)

Interdisciplinary assessments: What are we looking for?

**Speech/Language Pathology and Occupational Therapy**
- Clinical Feeding and Swallowing Evaluation
  - Are there responses to presentation of a spoon or nuk brush?
  - Are there responses to thermal / tactile gustatory stimulation
  - How is the child managing his/her secretions?

**Inter-disciplinary Intrathecal Baclofen Pump Trial (Medicine, OT/PT)**
- To assess effectiveness of intrathecal baclofen on tone
- Utilize the Modified Ashworth Scale to assess tone at scheduled intervals throughout trial.
Interdisciplinary assessments: What are we looking for?

Speech/Language Pathology and Respiratory Therapy
• Interdisciplinary Speaking Valve Assessment
  • If cuffed, is child able to tolerate cuff deflation?
  • How long is the child able to tolerate wearing valve and setting up wear schedule.
  • Does valve placement improve olfactory responses?
  • Does valve placement improve oral/pharyngeal swallow responses?
  • Are there audible vocalizations in response to stimulation while valve is placed?

Additional assessments available to assess altered states of consciousness.

• The Glasgow Coma Scale (GCS)
• Rappaport Coma Near Coma Scale
• The Full Outline of UnResponsiveness scale (FOUR)
• The Wessex Head Injury Matrix (WHIM)
• The Sensory Modality Assessment and Rehabilitation Technique (SMART)
Team Goals for patient’s with altered states of consciousness

- Improving metabolic state, state of nourishment, respiration and skin conditions, diminishing risk of infection
- Recovery of normal circadian cycles – homelike environment that is structured with daily activities
- Improving arousal and awareness by structured stimulation of all sensory modalities
  - For MCS patients, focus on stimulation and training of cognitive functions
- Improvement of communication using various treatment techniques (speaking valve, micro-switches, eye gaze)
- Improvement of early feeding opportunities
- Improvement of normal posture and motor activities
- Improvement of capabilities of family to cope with situation and their own feelings

Treatment Techniques and Ideas

- Sensory/Environmental
- Spasticity and Contracture Management
- Mobility
- Oral Motor/Swallowing
- Cognitive/Communication
- Leisure
- Alternative Treatments
General Approaches to Treatment

The following approaches should generally be utilized by all members of the team:

- Set up a distraction free environment to encourage attention.
- Always address the patient by name
- Identify yourself and what discipline you are from.
- Talk to the patient in a normal tone of voice.
- Allow extra time for patient to answer.
- Always introduce yourself every time you enter the patient’s room
- Explain everything you are going to do BEFORE you do it.
- Looks for signs of over stimulation
- Use a structured and repetitive treatment approach
- Initiate treatment sessions using sensory stimulation that the child is responding to best to increase alertness, monitor small changes.
- Utilize optimal positioning techniques recommended by PT/OT to promote alertness and building endurance.
- Utilize patient specific preferred leisure activities
- Utilize firm static touch versus dynamic touch
- Limit talking about patient and care over the patient to a family or staff member. Include the patient in the conversations or have the conversation outside of the room.

Sensory/Environmental

According to Eilander et al. 2005

“Improving arousal and awareness by structured stimulation of all sensory modalities (vision, hearing, smell, taste, touch, posture and motion, pain and temperature) in such a way that maximal arousal was generated.”

Treatment Ideas:

- Managing environment/stimulation/rest to optimize patient arousal, behavior and safety
- Be careful during sensory stimulation. Don’t want it to be too much for the patient.
- Sensory/Brushing Program
- Vestibular Stimulation
- Oral Sensory Stimulation
- Setting up personalized sensory bag
Sensory Bag

We work with the child’s family to create a bag that can remain in the child’s room for Family and Caregivers to access throughout the minimally conscious portion of rehabilitation.

• To FEEL - feathers, hand lotion, sandpaper, paper, various small textured stones, various pieces of cloth or clothing items made of different materials (ex/ terry, silk, cotton, corduroy), wood or cardboard squares, 4”X4” on which you have glued bits of string, yarn, or made patterns with sand, small hand vibrator, small hand held fan, touch/feel books, child’s stuffed animals, sensory bean bags.

• To SMELL – Items that have different scents such as smelly stickers, chap sticks with different flavors, lotions that child or family members use, personal products that child/family uses (deodorant, perfume, cologne), essential oils.

• To SEE - flashlight, tinted film in 4”X4” sheets, (get basic colors: red, yellow, blue, you can double them up to create other colors then place across the lense of your flashlight), small mirror, shiny object such as keys, fake jewelry, phone apps with light displays, pictures of items familiar to child

• To HEAR – Ipod/CD player(s) and a variety of music and pre-taped sounds, horns, whistles, small electric keyboard, sound making toys, rattles, funny sound apps

Spasticity and Contracture Management

• Spasticity
  • Is monitored using MAS, goniometer measurements
  • Can develop over time: muscles can start flaccid then develop spasticity due to re-organization of spinal reflex pathway (Leong 2002)
  • Treatment using physical, pharmacological, surgical interventions
    • Therapists work with medical team to provide appropriate interventions to maximize recovery while managing spasticity

• Contracture management
  • Treatment must address reason for contracture
    • Neural or peripheral contributions
    • Casting/splinting – best practice for improving ROM (Wheatley-Smith et al. 2013)
    • ITB trials when conservative treatments ineffective
  • Most common sites: hips, elbow, ankles, shoulders
  • Prevention is primary strategy to address contractures
    • PROM, casting/splinting, positioning, tilt table
Mobility

• Many benefits noted to early mobilization, position changes of patients in VS and MCS
  • Helps restore bodily integrity and reduces risk of complications (Seel et al 2013)
  • Early mobilization can improve respiratory functions by decreasing time on ventilator, increase patients highest level of mobility (Klein et al 2015)
  • Postural changes have significant impact on behaviors and alertness observed in standing as opposed to supine (Elliott et al 2005; Krewer et al 2015)
• Team makes attempts to engage patient in tasks related to self-care, sitting balance, transfers, community mobility
• Examples:
  • Positioning, facilitation of sitting balance, bed mobility
  • Progression of transfers
  • Weight bearing activities, neuromuscular developmental activities, proprioceptive input, ROM
  • Strengthening: head/trunk/extremities, modalities
  • Assistive mobility equipment orientation
  • Multisystem stimulation
    • Tilt table/standing frame while engaged in selecting objects/people or demonstrating automatic motor activity

Oral Motor/Swallowing

• Optimize positioning to promote alertness, secretion management, safe swallowing
• Initiate stimulation on side that is stronger.
• Use of kinesiotaping for bruxism
• Observe if speaking valve makes a difference in oral/pharyngeal awareness and function.

• Provide a variety of forms of gustatory (taste), thermal (temperature), tactile (massage/vibration) and olfactory stimulation. Probe daily for small changes in oral/pharyngeal function/control such as visual attention to spoon, oral movements/opening to presentation of stimulation, relaxation of bite, munching, tongue mobility, timeliness/frequency of swallows, and number of swallows to clear.
• Initial goal of treatment may be to get 8-10 consecutive functional swallows following oral/sensory stimulation. Goals can be increased as child progresses.
Cognitive/Communication Treatment Ideas

• Provide simple concrete verbal instructions and allow additional response time.
  • Use simple motor commands related to different areas of body. Look for generalized movements, vocalizations, inspiration/expiration that may be associated with given command. (Do not overload the child with commands)

• Provide orientation information through visual (written/graphic) and auditory means. Leave this information in eye sight.

• Set up a functional memory book
  • family/friend photos
  • staff photos
  • biographical information
  • information re: hospital admission and therapy schedule
  • preferred leisure activities lists
  • “All About Me” information
  • daily log to record activities completed in session

Cognitive Communication Treatment Ideas

• Activities that are age appropriate and allow for functional opportunities to address visual attention, following of simple commands and simple use of common objects or gestures:
  • Greeting people
  • Making using functional gestures within activity:
    • Pointing to indicate turn taking, to identify a request or indicate what is needed to complete a task
    • Thumbs up to indicate like/dislike or yes/no
    • Head shakes for yes / no
  • ADL Activities (eating, brushing teeth, washing face, doing hair, makeup) in real time use vs. simply identifying items without using
  • Games/Leisure Activities: Examples Uno, Yahtzee, War, Old Maid, 20 questions, Go Ape, Go Fish, Every Day Sounds, Adapted Bowling, Large piece puzzles
  • Writing Activities (Large marker/Dry Erase Board)
  • Reading Activities (Magazine/books/Current Event Articles, Social Media)
  • Music Based Activities to encourage different states of regulation, stimulate auditory and vocal responses.
Cognitive Communication Treatment Ideas cont.

• Familiar Auditory Sensory Training (FAST) program
  - \C.c.ad.cchs.net\world\Shared\PEDS\THERAPY SERVICES\Rehab\A_ Team Approach to Altered States of Consciousness\Familiar Auditor Stimulation Training.docx

• Low Tech/No tech Augmentative Communication
  - Use of picture communication (no tech eye gaze, listener assisted scanning)
  - Use of gesture communication – eye movements, head movements, should movements, thumb/finger movements, leg/foot movements that may allow for a reliable y/n response system.

• Adapted technology and High Tech Augmentative Communication
  - Switch activated toys/electronics
  - Initiate use of eye gaze technology- The eyes are one of the first initial signs of motor response indicative to emergence from a minimally conscious state (Tamashiro et al 2012)

Using Eye Gaze Technology
Leisure

• Familiar sights, sounds, smells
• Music
• Parents/siblings/friends voices recorded
• Favorite video
• Favorite character in movie
• Books
• Jokes
• Walk in the building or outside for wheelchair tolerance

Alternative Treatments Approaches

Aquatic Therapy
• Bad Ragaz Techniques: This is a form of passive or active-assistive aquatic therapy that is used for flexibility and relaxation, utilizing floats for support. It incorporates PNF patterns and is always performed in a hands-on manner by the therapist.
• Also provides a sensory component to being in the water.

Reiki
• Treats the whole person including body, emotions, mind and spirit creating many beneficial effects that include relaxation and feelings of peace, security and wellbeing. Reiki is a simple, natural and safe method of healing and self improvements that everyone can use. Reiki does not conflict with other health care but rather, it may enhance its results by supporting the patients overall well being.
Alternative Treatment Approaches

**Yoga for the Special Child**
- Music and Sound Therapy
- Pranayama – breathing practices
- Eye Exercises
- Asana practice – poses
- Yoga Nidra – deep relaxation

(requires additional training for the treating clinician)

**Frequency Specific Microcurrent**
- Pairs electrical frequencies using two different channels at low level micro-amperage (uA) currents
- Frequencies correlate with specific tissues to assist in promoting healing for desired goal
  - Used to decrease pain, spasticity management

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**Myofascial Release (MFR)**
- Low load, long duration of stretch to myofascial complex in order to release restrictions within deep layers of fascia
- Includes myofascial release, myofascial movement facilitation and craniosacral therapy
- Goal: to relieve pain and decrease restricted movement
- In a systematic review by Ajimsha et al 2015, there is evidence that MFR alone or combined with other therapeutic techniques relieves pain and improve function
- No studies found addressing MFR in spasticity/pain management in the MCS population, however one study found to have improvements on children with CP demonstrating decreased spasticity and increased alertness
  - Study by Whisler et al 2012 assessed effectiveness of MFR techniques in 6 children with CP
    - 1 hour/wk for 6 weeks, each child received 30 minutes of MFR treatment and parents were taught MFR techniques during second 30 minutes; caregivers were asked to do the learned MFR techniques 2-3x/wk following the 6 week study period
    - Measurements taken at 12 wks and 24 wks follow-up using MAS and caregiver reports
    - Overall, authors reported decrease spasticity, improved body symmetry, increased alertness
Early Signs of Improvement out of MCS

• Improvements in the Coma Recovery Scale- Revised score
• Improvements in use of adapted technology absent of huge gains in motor function responses
• Improvements in key motor responses
  • Tamashiro et al 2012 assessed motor responses in patients with vegetative states to determine if there was a prediction pattern for those emerging from VS beyond MCS to a state of functional communication
    • Motor variables selected: Facial movements, oromandibular movements, head (neck), upper limbs, lower limbs, trunk
    • Found all patients who emerged from VS to state of functional communication demonstrated head control and head turning, along with visual fixation and pursuit on average by day 41 of their treatment program

References

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Creating a Sensory Stimulation Bag

Pick items that are personal to the child. Things they liked to do, items used by family members/friends, items that were in their room etc.

Locate items for different senses including sight, sound, touch, smell

Examples of items are as follows:

**To FEEL** - feathers, hand lotion, sandpaper, paper, various small textured stones, various pieces of cloth or clothing items made of different materials (ex/ terry, silk, cotton, corduroy), wood or cardboard squares, 4"X4" on which you have glued bits of string, yarn, or made patterns with sand, small hand vibrator, small hand held fan, touch/feel books, child’s stuffed animals, sensory bean bags.

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**To HEAR** – Ipod/CD player(s) and a variety of music and pre-taped sounds, horns, whistles, small electric keyboard, sound making toys, rattles, funny sound apps

We ask that this bag remains in the room for Family and Caregivers to access throughout your child’s rehabilitation stay.

Please contact this therapist with any questions re: these recommendations!

Thank you!
Familiar Auditor Stimulation Training (FAST) instructions:

1. Eligibility of Story Tellers:
   - Knew the participant for at least 1 year prior to injury
   - Experienced/participated in events with the participant
   - Interacted with the participant on routine basis for at least 1 year prior to the injury.

2. Can use up to 3 different story tellers.

3. A minimum of 8 stories across 1-3 story tellers.

4. Each Story should last approximately 5 minutes. We need a minimum of 40 minutes of recording in total.

5. Write out stories prior to recording using very descriptive details of the events/scene.

6. 3 of the stories should be about a happy event meaningful to the participant.

7. The additional 4 stories must be an event that evokes sad emotions, negative emotions, or neutral memories.

8. None of the stories should be of fearful/scary events.

9. When recording:

   Start by calling out the participant’s name 3 x’s very clearly.
   Example: Johnny Johnny Johnny
   Use normal speaking voice when telling the stories

10. Once all stories are recorded a schedule of play will be set up.