DISCUSSION POINTS IN THE MANAGEMENT OF PATIENTS WITH LOW COGNITIVE FUNCTIONING

PRESENTED BY:

ABIGAIL MAGNER PT, DPT

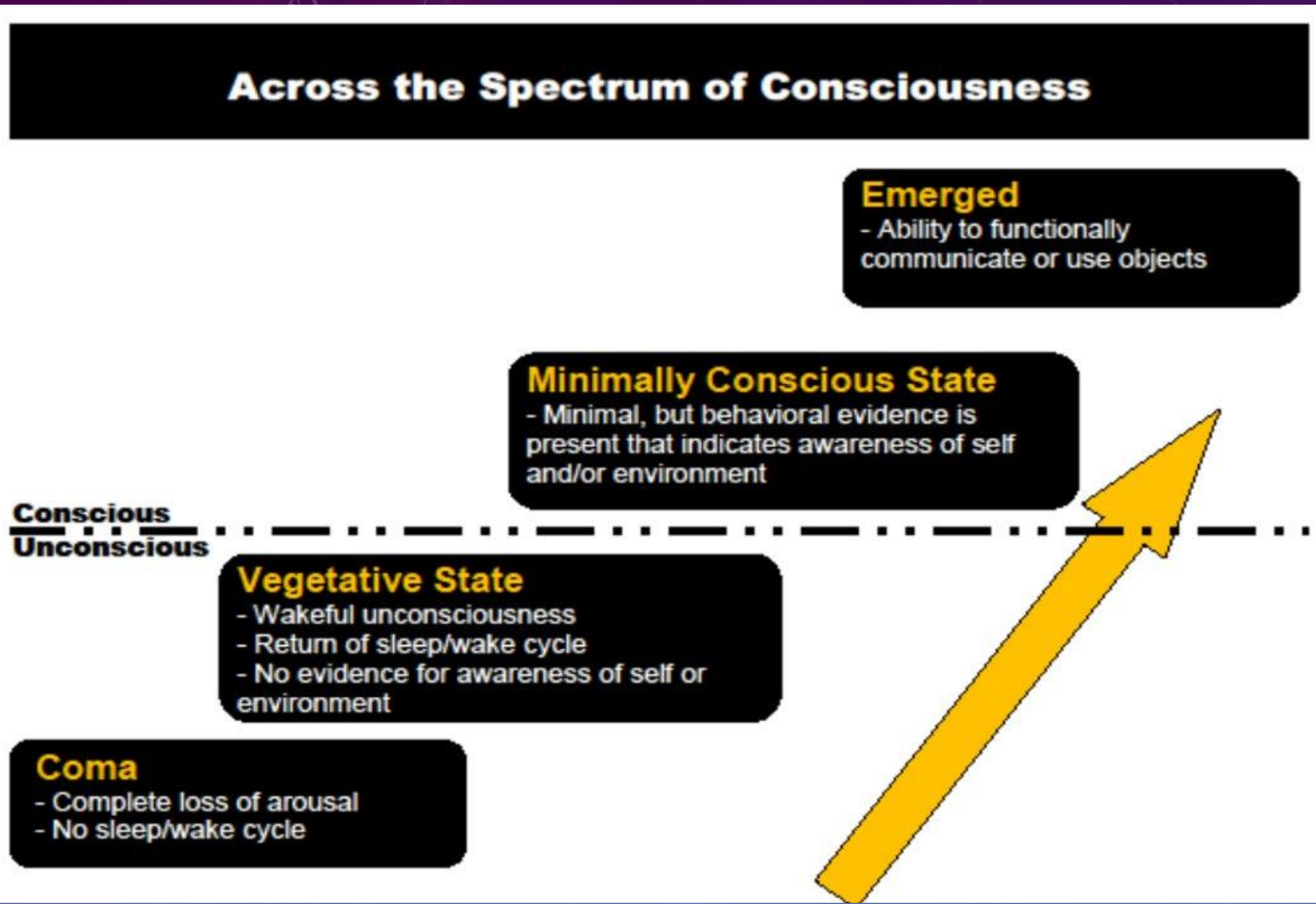
LESLIE MCKEE MA, CCC-SLP, BCS-S

BRIAN TOMER MOT/L

OBJECTIVES

- The audience will be able to state the different levels of consciousness
- Will be able to document patient’s response to stimulation
- Utilize different stimulation to increase patient's arousal
- will be able to utilize appropriate outcome measures related to DOC

1. What is DOC -> mechanisms of injury
2. practice guidelines -> outcome measures
3. mobilization
4. swallowing and communication
5. documentation



Comprehensive Roadmap to Managing Patients with Disorders of Consciousness. Presented by: Patrice Perrin, PT, DPT Kelly Betts, PT, DPT,

Current DOC Classification

DoC	Diagnostic criteria
Coma	No arousal (eyes closed)
Unresponsive wakefulness syndrome (UWS; vegetative state)	Arousal (eyes opened) with no internal and/or external awareness [32], [33]
Minimally conscious state *minus* (MCS-)	Arousal with signs of internal and/or external awareness (e.g., visual pursuit) [24]
Minimally conscious state *plus* (MCS +)	Arousal with language-related signs of consciousness (i.e., command-following, intentional communication, intelligible verbalization) [34]
Emergence from the minimally conscious state (EMCS)	Arousal with recovery of functional communication and/or use of objects [24]

Aubinet et al., 2021

MINIMALLY CONSCIOUS STATE

Minimal or inconsistent awareness

Rancho Level	Clinical Correlate
I	No Response
II	Generalized response
III	Localized response
IV	Confused-agitated
V	Confused-inappropriate
VI	Confused-appropriate
VII	Automatic-inappropriate
VIII	Purposeful and appropriate

Ranchos Level II: Generalized response

minimal, intermittent responses to external stimuli. Responses are non-purposeful and are often delayed. These responses are often the same regardless of the stimuli presented.

Ranchos Level III: Localized Response

specific but inconsistent responses to external stimuli. These responses are generally related to stimuli provided. More wakefulness is present.

GLASCOW COMA SCALE

Examines Three Domain

- **Eye Opening (possible 1-4 points)**
- **Verbal Responses (possible 1-5 points)**
- **Motor Responses (possible 1-6 points)**

Mild Head Injury (13 – 15)

Moderate Head Injury (9-12)

Severe Head Injury (3-8)

6 or lower LOOP gets consulted

11 is the highest a patient can be while on a ventilator

INJURY CATEGORIES

Traumatic brain injury – the result of a severe head injury

Non-traumatic brain injury – caused by a health condition

Progressive brain damage – gradually damaged over time

ENCEPHALOPATHY = NON TRAUMATIC

"Encephalopathy" damage or disease that affects the brain.

Hypoxic/ischemic encephalopathy - Brain doesn't get enough oxygen

- Cardiac arrest, carbon monoxide poisoning, drug overdose, or near-drowning.

Metabolic encephalopathy- Another health condition, makes it difficult for the brain to work.

- Diabetes, liver disease, kidney failure, or heart failure,

Hashimoto's encephalopathy -Thyroid condition called Hashimoto's disease.

Chronic traumatic encephalopathy - repeated head injuries

OTHER INJURIES TO CONSIDER

Bleeding -Bleeding can cause swelling and compression.

Blood sugar - hyperglycemia or Hypoglycemia

Infection -Infections of the central nervous system

Toxins - Substances that are normally found in the body accumulate to toxic levels

Seizures -status epilepticus (continuous seizures)

PRACTICE GUIDELINES FOR DOC

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September 04, 2018; 91 (10) SPECIAL ARTICLE

Practice guideline update recommendations summary: Disorders of consciousness

Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology; the American Congress of Rehabilitation Medicine; and the National Institute on Disability, Independent Living, and Rehabilitation Research

Joseph T. Giacino, Douglas I. Katz, Nicholas D. Schiff, John Whyte, Eric J. Ashman, Stephen Ashwal, Richard Barbano, Flora M. Hammond, Steven Laureys, Geoffrey S.F. Ling, Risa Nakase-Richardson, Ronald T. Seel, Stuart Yablon, Thomas S.D. Getchius, Gary S. Gronseth, Melissa J. Armstrong

First published August 8, 2018, DOI: https://doi.org/10.1212/WNL.0000000000005926

PRACTICE GUIDELINE RECOMMENDATION UPDATE 3 – CAREGIVER EDUCATION

- When discussing prognosis during the first 28 days post-injury, avoid statements that suggest DOC patients have a universally poor prognosis
  - Nakase-Richardson et al. (2012) - ~20% of patients with traumatic VS/UWS DOC admitted to IPR were functionally independent & capable of returning to work at 1-5 yrs post injury
  - Katz et al. (2009) – At least half of the study participants (traumatic & non-traumatic DOC) recovered to at least daytime independence at home and 22% returned to work or school

PRACTICE GUIDELINE RECOMMENDATION UPDATE 7 – LABELS

- Use of the term ”permanent vegetative state” implies irreversibility and should be discontinued given the frequency of recovery of consciousness
  - Instead, use the term “chronic vegetative state” and indicate duration of the VS/UWS
  - But only after 3 months for nontraumatic VS/UWS and 12 months for traumatic VS/UWS

PRACTICE GUIDELINE RECOMMENDATION UPDATE 8 - PROGNOSTIC COUNSELING FOR CAREGIVERS

- Associated with more favorable long-term prognosis for functional recovery:
  - MCS diagnosed within 5 months of injury onset
  - Traumatic etiology
- Associated with poorer long-term prognosis for functional recovery:
  - VS/UWS
  - Nontraumatic DOC etiology
  - Individual outcomes vary
  - Prognosis is not universally poor

PRACTICE GUIDELINE RECOMMENDATION UPDATE 2A - STANDARDIZED NEUROBEHAVIORAL ASSESSMENT

- Use measures that have been shown to be valid and reliable
  - Reliance on non-standardized procedures contributes to 40% diagnostic error rate
- Helps recognize key diagnostic features that may be otherwise missed
- Ensures consistency within & across examiners
- Fosters confidence that pt's true level of function is demonstrated vs a result of variation in one's exam techniques

PRACTICE GUIDELINE RECOMMENDATION UPDATE 2A- STANDARDIZED NEUROBEHAVIORAL ASSESSMENT

- ACRM recommends for use in clinical practice:
  - Coma Recovery Scale-Revised (CRS-R)
  - Wessex Head Injury Matrix
  - Sensory Modality Assessment and Rehabilitation Technique
  - Western NeuroSensory Stimulation Protocol
  - Disorders of Consciousness Scale
  - Sensory Stimulation Assessment Measure

CRS-R

* Denotes Minimally Conscious State Minus (MCS-)

▪ Denotes Minimally Conscious State Plus (MCS+)

† Denotes emergence from Minimally Conscious State (eMCS)

TCC Test Completion Code

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 – Localisation to Noxious Stimulation*
2 – Flexion Withdrawal
1 – Abnormal Posturing
0 – None
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 – Unarousable
TOTAL SCORE

CRS-R

- Free training modules for CRS-R accessible from Shirley Ryan Ability Lab at https://www.sralab.org/sites/default/files/downloads/2020-09/Training_Modules_20200831_v1.pdf
- Involves multidisciplinary administrators, including SLP (Roberts & Greenwood, 2019)
- Sensitive enough to detect very subtle changes in patient performance
- Criticisms:
  - Time-consuming (but a rapid version for ICU use is under development)
  - Training required (however NO CERTIFICATION NEEDED)
  - Reduced reliability for reflecting level of consciousness at single-subject level

Alternative to CRS-R

ELSEVIER

Annals of Physical and Rehabilitation Medicine

Volume 64, Issue 5, September 2021, 101432

Original article

Simplified evaluation of CONsciousness disorders (SECONDs) in individuals with severe brain injury: A validation study

Charlène Aubinet [a, b, 1], Helena Cassol [a, b, 1], Olivier Bodart [a, b, 1], Leandro R.D. Sanz [a, b], Sarah Wannez [a, b], Charlotte Martial [a, b], Aurore Thibaut [a, b], Géraldine Martens [a, b], Manon Carrière [a, b], Olivia Gosseries [a, b], Steven Laureys [a, b, 1], Camille Chatelle [a, b, 1]

SECONDS

- Based on the most prevalent signs of consciousness observed using the CRS-R
- 8 items of increasing complexity:
  - Arousal (UWS)
  - Pain localization (MCS-)
  - Visual fixation (MCS-)
  - Visual pursuit (MCS-)
  - Oriented behaviors (MCS-)
  - Command following (MCS+)
  - Intentional communication (MCS+)
  - Functional communication (EMSC)
- Includes the 5 most frequently observed CRS-R items which have been found by Wannez et al. (2017) to detect 99% of MCS pts

Simplified Evaluation of CONsciousness Disorders (SECONDs)

.....
.....

A. Observation

☐ **B. Command-following** (score 6)

3 x 3 spoken commands
10'' interval between commands
(1 x 3 written command if 0/3)
Stop if 2 commands 3/3

If command-following

Command 1: ..../3
2: ..../3
3: ..../3
Written command: ..../3
→ The patient responds at least twice for one of the commands (= score 6)

Code yes : .....
Code no : .....
Responses : .../5 o Verbal o Autobiographical
Correct : .../5 o Written o Situational
→ The patient responds (even incorrectly) to at least 3 questions (= score 7)
→ The patient correctly responds to the 5 questions (= score 8)

C. Communication

☐ **Intentional** (score 7)
☐ **Functional** (score 8)

Autobiographical questions
Name (no), birth date (yes), name (yes), birth date (no), children (yes/no)
If incorrect answer(s): Situational questions
Place (yes), wearing a hat (no), place (no), touching hand (yes), touching face (no)

Horizontal : .../2 Vertical : .../2
o Spontaneous o Mirror □ Manual eye-opening
→The patient shows at least 2 visual pursuits of at least 2 seconds (= score 4)

☐ **D. Visual pursuit** (score 4)

Person/mirror, 30 cm from face
Each movement on horizontal or vertical axes = 4''(→←↓↑)

Sup L : .../1 Sup R : .../1
Inf L : .../1 Inf R : .../1
o Spontaneous o Mirror □ Manual eye-opening
→The patient shows at least 2 visual fixations of at least 2 seconds (= score 3)

☐ **E. Visual fixation** (score 3)

Person/mirror, 30 cm from face
Present stimulus in each quadrant

If no command-following

Localization: L : .../1 R : .../1
Anticipation: L : .../1 R : .../1
→The patient touches the point of stimulation at least once with the non-stimulated hand (= score 2)
→The patient shows 2 anticipations (= score 6)

☐ **F. Pain localization** (score 2)

Inform patient
5'' pressure on nail bed
1 trial on each hand

.....
..... Nb :.....
→The patient shows at least one oriented behavior (= score 5)

☐ **G. Oriented behaviors** (score 5)

E.g., scratching, grabbing sheets, holding bed, laughing or crying contextually,...

0-25% / 25-50% / 50-75% / 75-100%
Spontaneously / Auditory / Tactile / Pain stimulations
→ The patient shows at least one eye-opening during the whole assessment (= score 1)

H. Arousal

☐ **Eye-opening** (score 1)
☐ **No arousal** (score 0)

Report the percentage of eye-opening time and administered stimulations

Diagnosis : Coma (0) / UWS (1) / MCS- (2-5) / MCS+ (6-7) / EMCS (8)

SIMPLIFIED EVALUATION OF CONSCIOUSNESS DISORDERS (SECONDS)

- Requires only a mirror
- Shorter to administer (Median = 7 min was 2.5 faster than average CRS-R)
- “Almost perfect” agreement with CRS-R
- ”Almost perfect” intra- and inter-rater reliability
- Well-suited to ICU and acute care
- Potentially shorter training
- Criticisms: CRS-R gives more detail and precision on the pt’s overall state, including reflexes

PRACTICE GUIDELINE RECOMMENDATION UPDATE 2B - SERIAL ASSESSMENT

- Multiple standardized neurobehavioral evaluations over time may improve diagnostic reliability & accuracy given the inconsistency and variability of behavioral response in DOC
- Helps to detect progress/regression
- Insufficient evidence to dictate specific frequency recommendations
  - CRS-R: Weekly testing optimal
  - SECONDS: At least 5 SECONDS in short time frame (~10 days)

PRACTICE GUIDELINE RECOMMENDATION UPDATE 2B - SERIAL ASSESSMENT

- Frequency should be based on clinical judgment, considering:
  - Reported changes in arousal and responsiveness
  - Removal/cessation of diagnostic confounders
  - Length of time since last assessment
- Timing of assessment might yield different behaviors
  - Cortese et al., (2015) reported a 30% probability of observing behaviors suggestive of MCS in patients diagnosed with VS/UWS when evaluations are done in the AM

PRACTICE GUIDELINE RECOMMENDATION UPDATE 2C- INCREASE AROUSAL BEFORE ASSESSMENT

- Increase arousal before assessing level of consciousness any time diminished arousal is observed/suspected
- Traditional ways
  - Turn on lights/open blinds
  - Wash face with warm/cold washcloth
  - Perform oral care
  - MOBILITY TO EDGE OF BED!!!
- CRS-R Arousal Facilitation Protocol

CRS-R AROUSAL FACILITATION PROTOCOL

GUIDELINES

1) The goal of this intervention is to prolong the length of time the patient maintains arousal (i.e. eye opening)

2) The protocol is administered any time the patient is observed to:

   - Exhibit sustained eyelid closure **AND/OR**

   - Stops following commands for a period of at least one minute

3) Readminister the arousal facilitation protocol when

   - Sustained eye closure re-occurs **OR**

   - Behavioral responsiveness ceases despite sustained eye opening

Updated by Bodien et al, 2020

PRACTICE GUIDELINE RECOMMENDATION UPDATE 2C- INCREASE AROUSAL BEFORE ASSESSMENT

http://www.tbims.org/crs/CRSR_Training_Modules.pdf - minute 8:39 – 9:14

INTERVENTIONS

Deep Pressure:

1) Present deep pressure stimulation unilaterally to the face, neck, shoulder, and sternocleidomastoid muscles. The muscle should be firmly grasped at its base between the thumb and forefinger. While squeezing the muscle firmly, it should be "rolled" back and forth through the fingertips three to four times. This procedure should be repeated sequentially working from the facial musculature to the sternocleidomastoid. The examiner should assure that there are no intravenous lines, local injuries (e.g. fractures, contusions, decubiti) or systemic complications (e.g. heterotopic ossification) before administering deep pressure.

2) Administer same on contralateral side.

STRATEGIES FOR OPTIMIZING BEHAVIORAL ASSESSMENT OF DOC PATIENTS

- Ensure adequate arousal
- ID medical contributors to low responsiveness
- Consider impact of environmental factors
- Avoid attributing purposeful intent to reflexive or generalized responses
- Conduct a sufficiently adequate evaluation
- Don't over- or under-consider family's/staff's observations
- Conduct repeated assessment

Bodien et al, 2022

NEW BEHAVIORAL SIGNS OF CONSCIOUSNESS UNDER INVESTIGATION

- Resistance to eye opening
- Spontaneous eye blink rate
- Auditory localization
- Auditory startle reflex habituation
- Olfactory sniffing
- Efficacy of swallowing/oral feeding
- Leg crossing
- Facial expression to noxious stim
- Subtle motor response

Mat et al, 2022

WHAT SHOULD BE OUR EXPECTATIONS?

WHAT SHOULD WE BE LOOKING FOR?

SMALL BEHAVIORS/RESPONSES AND THEIR TIMING MATTER

GOALS OF TREATMENT

- Monitor the patient's progression and report back to the treatment team
- Stimulate the Reticular Activating System to increase the level of arousal and awareness
  - "a diffuse network of nerve pathways in the brainstem connecting the spinal cord, cerebrum, and cerebellum, and mediating the overall level of consciousness."
- Prevent sensory deprivation associated with prolonged immobility and dependence, minimize secondary impairments
- Facilitate increased response frequency and consistency through structured sensory input
- Facilitate the ability to follow commands and to communicate meaningfully
- Facilitate the oral skills required for safe swallowing

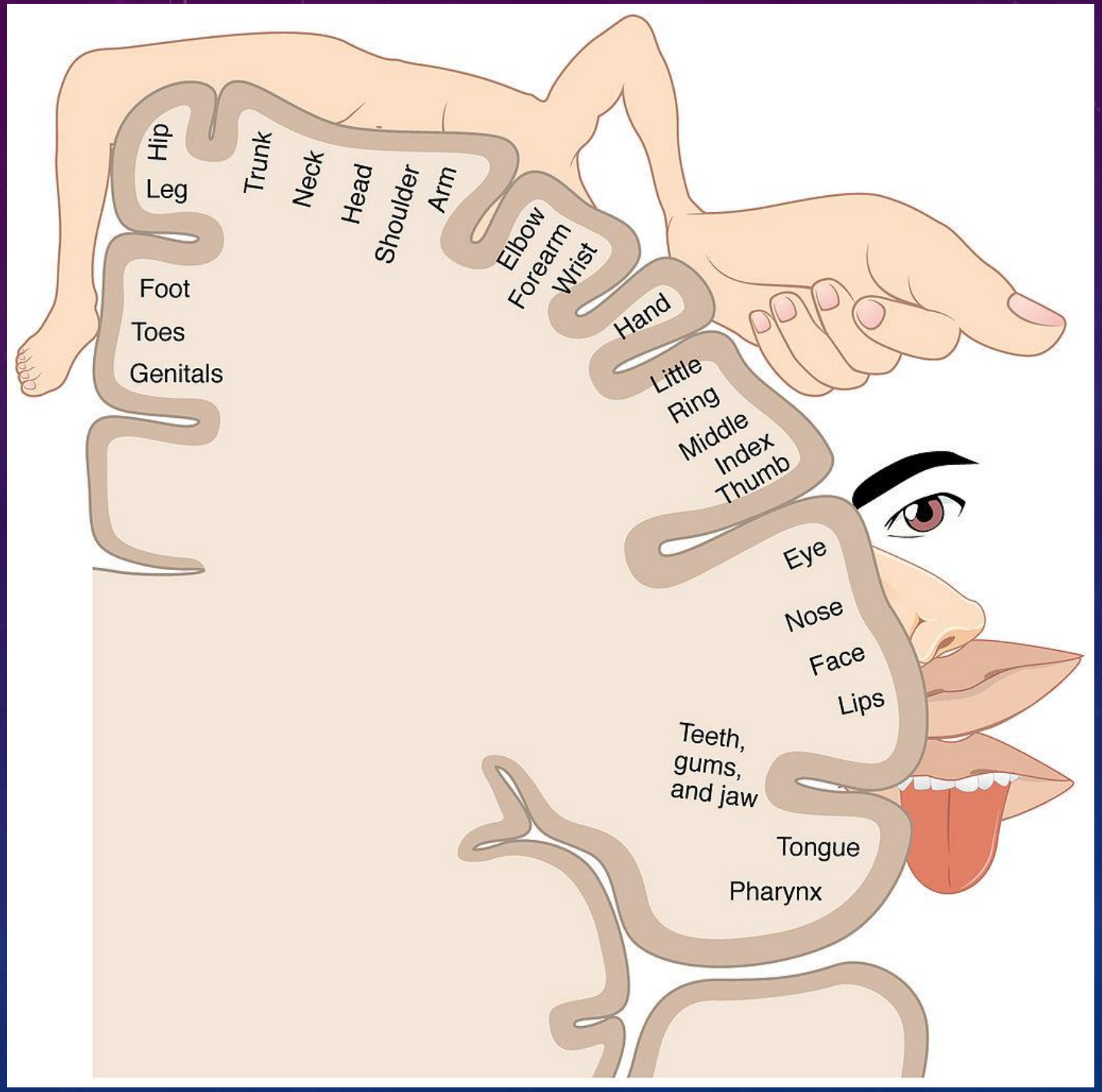
TREATMENT FOCUS POINTS

Focus of treatment	Examples
Response based	Did you elicit a response: yes or no?
Tolerance for stimuli or intervention	Time frame &/or physiological changes. Fatigue or agitation?
Risk management	Prevent skin breakdowns, contractures, trach care and minimizing cardiopulmonary compromises
Caregiver/staff development	Caregiver education on POC, participation in therapy session and suggestions for family to interact/carryover

SENSORY STIMULATION

- The JFK Coma Recovery Scale - Revised is great resource for treatment ideas/sensory stimulation

Modality	Examples
Visual	mirror, familiar photographs, bubbles, scenery or setting changes
Auditory	pre-recorded voices of family members and friends, favorite music, environmental noises.
Olfactory	fragrances such as shampoos, favorite perfume/cologne, spices, environmental scents
Gustatory	ice chips, lemon swabs, cotton-tipped applicators dipped in different flavors, etc.
Proprioceptive Vestibular	positioning, weight bearing, joint approximation &compression, normal alignment, ROM activities/rolling, supine-sit, rocking
Tactile	textures, facilitate OR inhibit, remember homunculus?


Hip
Leg
Foot
Toes
Genitals
Trunk
Neck
Head
Shoulder
Arm
Elbow
Forearm
Wrist
Hand
Little
Ring
Middle
Index
Thumb
Eye
Nose
Face
Lips
Teeth, gums, and jaw
Tongue
Pharynx

IMPORTANCE OF RELEVANT STIMULI FOR THERAPY

Personally relevant stimuli (with emotional, autobiographical or self-related characteristics) increase responsiveness compared to neutral stimuli

- Loved one's voice - live or recorded messages
- Patient's own first name or nickname
- Familiar faces – live or in personal photos
- Familiar objects brought in from home (cell phone, iPad, brush, lipstick, ball cap, etc)
- Favorite perfume
- Favorite dessert
- Favorite music
  - Playing preferred music at start of session may increase responsiveness to subsequent therapeutic stimulus
  - Faster tempo music (vs slow tempo vs white noise) played prior to session may enhance behavioral responses during therapy session

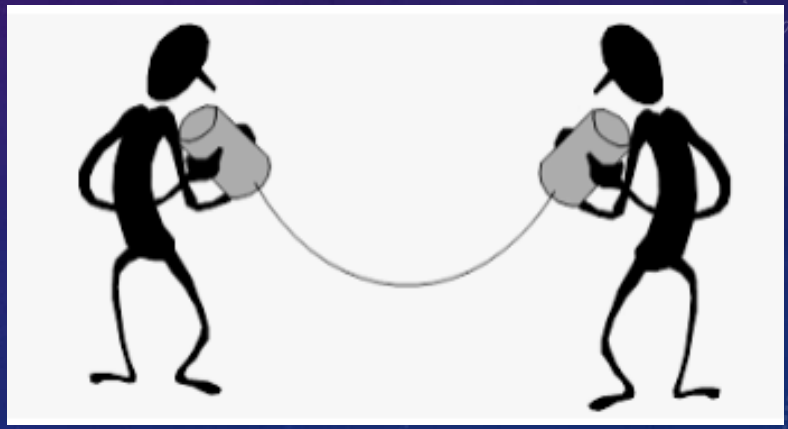
- Sautet et al., 2022

VISION

- The importance of vision, visual attention & tracking
  - Vision is the “gate way” to the way our mind interprets the world
    - Eyes Open vs. Eyes Closed
      - With or without stimuli
      - Blink/Startle Reflexes
    - Scanning
      - Non-Purposeful
      - Purposeful -> Tracking
    - Visual Attention
      - Attending to an object or sound
      - Reaching for an object

COMMUNICATION CAN BE MANY THINGS

- Nonverbal
  - Can be purposeful and non-purposeful
    - Smiling
    - Grimacing
    - Crying
    - Laughing
    - Eye contact
  - Shaking/nodding head (nonverbal yes/no)
  - Gesturing
  - Writing
- Verbal
  - Non-purposeful vocalizations
  - Sounds in response to a stimulus
  - Intelligible verbalizations



AUDITORY RESPONSES

- Startle to sound
- Localization to sound
- Purposeful responses to question and commands

MOTOR FUNCTIONING

- Reflexes
- Responses to noxious stimuli
  - Posturing vs Withdrawal
  - Length of time to respond to stimulus
  - Corresponding verbalization or facial expression
- Non-purposeful movements
- Purposeful movements
  - Reaching for objects
    - Pulling at wires and lines
  - Holding objects appropriately
    - Proper accommodation for shape and size
- Utilizing objects appropriately

CONSIDERATIONS

- What systems are working/not working?
  - There can be many confounders – more than just one or two areas
  - Can be extraordinarily difficult to answer!
- Many confounders may mask conscious awareness
- Underlying central and peripheral deficits
  - Aphasia (expressive, receptive, global)
  - Neuromuscular abnormalities
    - Dystonia (Hyper/Hypotonicity)
  - Muscular abnormalities
    - Fractures
    - Generalized weakness
  - Apraxia/Ataxia
  - Sensory deficits
    - Generalized sensation
    - Proprioception
    - Visual-perceptual deficits (neglect)
    - Hearing impairments
- Systemic medical complications
  - Sleep-wake cycle
- Medication side effects
  - Sedative affects

ACHIEVING SUCCESS

- How do we accommodate our approach to “reach” the patient
- Make sure you are giving enough time for the patient respond
- Avoid multiple sources of stimuli
  - ONE person providing commands/speaking
  - Minimize distractions within the room

ADDITIONAL CONSIDERATIONS

- Frequency of Acute Care Rehab
- Consistency
- Co-care with SLP
- Signs of overstimulation
  - Restlessness
  - Elevated vitals
  - Decreased alertness

HIERARCHY OF FUNCTION - LEVELS OF AWARENESS

- Primitive Reflexes
  - Necessary for Survival
  - Directed from the brainstem and do not involve thought
  - Painful Stimuli
- Wakefulness
- Awareness of Environment
  - Importance of Vision
  - Purposeful Movements
- Automatic tasks
  - Tasks “hard wired” into our everyday life
- Basic command following
- Complex command following

Diagnostic Criteria for the Different Levels of Consciousness

Condition	Description of Consciousness	Visual Function	Motor Function	Auditory Function	Communication
Coma	Persistent unconsciousness	Eyes always closed	Reflexive and postural activity	No startle reflex to sound	Not present
	Absence of Sleep/Wake Cycle				
	Purposeful response to environmental stimuli is not present				
Unresponsive Wakeful Syndrome	Persistent unconsciousness	Reflexive startle	Periodic non-purposeful or reflexive movements	Reflexive Startle	Brief non-purposeful or reflexive vocalizations, crying or smiling
	NO sustained, reproducible, purposeful responses to external stimuli	Brief, non-purposeful visual fixation	Withdraws/postures from noxious stimuli	Brief, reflexive orienting to sound	No language comprehension
	Periodic eye opening				
	No voluntary activity				
Minimally Conscious State (MCS)	Partial consciousness	Purposefully reaching for objects	Localizing response to noxious stimuli	Verbalization/gestures in response to questions/comments	Intelligible verbalization
	Inconsistent but reproducible & clear awareness of self or environment	Pursuit or fixation in direct response to a visual stimulus	Touching/holding an object that accommodates the object's shape & size		Verbal or gestural yes/no responses (accuracy is not required)
	Inconsistent but reproducible & clear responses to stimuli				Crying, smiling or laughing to visual or verbal stimuli
Emerged from MCS	Consistent behavioral evidence of self/environment		Reliable, functional object use		Reliable, interactive communication
	Full consciousness				
	Functional object use				

MOBILIZATION

- Supine vs Edge of Bed Session
  - Benefits of Mobilizing Edge of Bed
    - Stimulation of the Reticular Activating System
      - Increase the level of arousal and awareness
    - “Change the patient’s level”
    - Increased proprioceptive/kinesthetic feedback
    - Opportunities for weight bearing
    - Prevent sensory deprivation associated with prolonged immobility and dependence
    - Minimize secondary impairments
      - Enhance respiratory capabilities
      - Skin breakdown
    - Increased opportunities to provide sensory stimulation
  - Risks of Mobilizing Edge of Bed
    - Potential hazards to mobilizing a patient who is minimally responsive
    - Safe patient handling
    - Line management
    - Additional resources
      - Ask Respiratory Therapy or nursing to assist

MOBILIZATION - CONSIDERATIONS

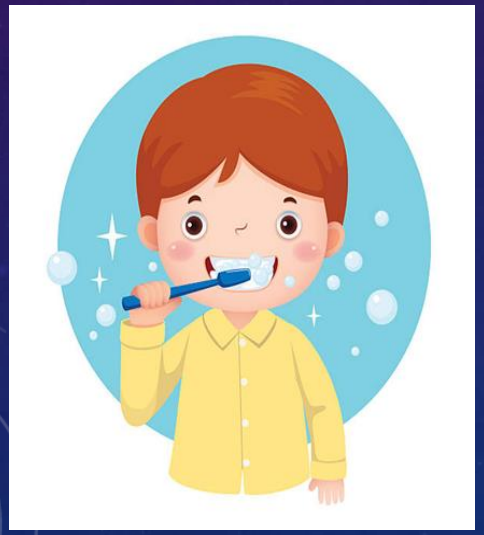
- Level of agitation – RASS Score
  - Is the patient sedated? How heavily?
- Neurostorming
- Airway
  - Intubated vs Trach vs Nasal Cannula
- Bracing
  - Neurosurgical
  - Orthopedic
- Weight bearing restrictions
- Tone

ADDITIONAL CONSIDERATIONS - HEAD CONTROL

- Importance of Head Control
  - Neck Protection
  - Posture
  - Impact on Sensory Stimuli/Vision
- Effects on Respiratory Status

ORAL CARE

- Oral care provides a preventative effect against pneumonia (Kaneoka et al, 2015)
- Thorough and often
- Not all oral cleaning tools work equally effectively
- Recommended before initiation of PO trials
- Engage pt in this meaningful & routinized ADL



ORAL ASSESSMENT

- Oral secretion management
- Oral/facial commands may be first command follow-through observed
- Oral hypersensitivity (mouthcarematters.hee.nhs.uk)
  - Most common signs are withdrawal behaviors such as:
    - Reduced tolerance to touch around face/mouth
    - Startling
    - Biting/grinding teeth
    - Grimacing
    - Pursing of lips
  - Oral care difficult, therefore increased oral hygiene issues & increased pneumonia risk as result
  - May lead to oral trauma, trismus, and difficulties with swallowing and speech

ORAL HYPERSENSITIVITY

Desensitisation procedure

1. Ensure patient is sitting upright with optimal positioning for a stable base. You may need to give extra support with pillows etc.
2. Explain what you are going to be doing for each step. E.g. "I am going to stroke your cheek now". Try to use a calm, reassuring voice.
3. In order to gradually get accustomed to touch, start with the hands. Touch the person's hands firmly.
4. Then touch the top of the arms, again firmly.
5. Touch the shoulders firmly with both hands.
6. Touch the top of the head with both hands.
7. Support the jaw from the front with one hand. Maintain this contact throughout the oral care procedure, as this will give stability.
8. Press firmly above upper lip before you introduce the toothbrush in the mouth.
9. Press firmly below lower lip before you introduce the toothbrush in the mouth at the lower gums.
10. If patient shows hypersensitivity at any stage, stop, go back to the previous step and continue. This technique is designed to build tolerance and should not be rushed.

For further support or for advice on specific patients, please speak to the treating Speech & Language Therapist who may be able to help.

SWALLOWING ASSESSMENT IN DOC

- Best Practice Recommendations for SLP in the care of DOC pts support assessment and intervention for swallowing to commence with MCS pts as soon as medically stable (Roberts & Greenwood, 2019)
- Incidence of dysphagia during FEES in DOC pts was 99% in 92 pt sample (Melotte, Maudoux et al., 2021)
  - No UWS pt had an effective oral phase of swallowing
  - No UWS pt could be fed entirely orally
  - No MCS pt consumed regular consistency food

SWALLOWING A SIGN OF CONSCIOUSNESS?

Swallowing behaviors may be sign of consciousness & should be considered for level of consciousness diagnosis

- An effective oral phase (lip prehension, lingual propulsion, and no post-swallow oral residue) involves some voluntary activity controlled by multiple brain regions and was present in some MCS pts but no UWS pts (Melotte, Maudoux, et al., 2021)
- Initiation of swallowing (opening mouth and attempting to stick out tongue) can be an early indication of conscious behavior & perhaps be evidence of conscious awareness (Wang et al., 2019)

PRE-SWALLOW STIMULATION WITH DOCS

- Disorders of Consciousness Scale [DOCS] (Pape et al., 2011 – accessible on sralab.org) includes a "Taste & Swallowing" subscale that measures pt's response to pre-swallow stimulation & pt's ability to swallow within 15-20 seconds of stim
  - Cotton tipped applicator dipped in 1 of 2 different tastes (I.e juice, soda, mouthwash, flavor extracts)
  - Apply small amt of taste to lower lip & gums with applicator; stimulate top of tongue if pt opens mouth
  - Present stimulus for 3-5 seconds, then wait 15-20 seconds for a response
  - Wait additional 30-60 seconds before presenting next taste
  - Can present the same taste multiple times to get pt's best response

PRE-SWALLOW STIMULATION WITH DOCS

Using finger tips, provide firm pressure slowly downward along the masseter to the corner of the lips

DOCS TASTE AND SWALLOWING SCORING

Scoring Procedure:

***0 = No Response (NR)**:* No active movement or vocalization following the presentation of the stimuli

1 = Generalized Response (GR):

- Suckling
- Jaw movement
- Chomping / chewing motion
- Muscle tensing or other movements unrelated to the area stimulated Deviation of oxygen saturation level from baseline range
- Deviation of heart rate from baseline range

2 = Localized Response (LR):

- Oral motor movements, such as licking lips or lip compression
- Tongue pumping or movement
- Swallowing within 15-20 seconds of application of the stimuli
- Patient swipes at the examiner's hand, as an attempt to inhibit input
- Changes in facial expression appropriate to stimuli

INSTRUMENTAL SWALLOW ASSESSMENT

- DOC pts participating in an instrumental swallow study have better oral intake outcomes than those who don't (Checklin et al., (2022)
- Melotte, Maudoux, et al. (2021) showed FEES can be done successfully with UWS and MCS (n=92)
- Systematic review by Checklin et al. (2022) reported FEES has potential to be a safe and feasible instrumental option for DOC pts, however limited evidence and more study needed
  - Stress importance of monitoring discomfort and adjusting accordingly
- High rate of absent cough reflex suggesting high risk for silent aspiration in DOC, so instrumental swallow study is imperative (Melotte, Maudoux, et al., 2021)
- FEES helped to support decannulation in some by confirming good saliva management & absence of stenosis or laryngeal paralysis (Melotte, Maudoux et al., 2021)

› Front Neurol. 2021 Apr 29;12:662634. doi: 10.3389/fneur.2021.662634. eCollection 2021.

The Development and Validation of the SWADOC: A Study Protocol for a Multicenter Prospective Cohort Study

Evelyne Mélotte [1 2 3], Marion Belorgeot [4], Roxanne Herr [5], Jessica Simon [6], Jean-François Kaux [1], Steven Laureys [2 3], Leandro R D Sanz [2 3], Aude Lagier [7], Dominique Morsomme [7], Frederic Pellas [4], Olivia Gosseries [2 3]

Affiliations + expand

PMID: 33995257 PMCID: PMC8116670 DOI: 10.3389/fneur.2021.662634

	Items	Level 0	Level 1	Level 2	Level 3
Oral phase	1. Initiation of mouth opening	☐ Mouth opening impossible or only with the therapist's active assistance	☐ Mouth opening upon lip stimulation	☐ Mouth opening upon presentation of spoon	☐ Mouth opening upon command (min 2/3)
	2. Endo-buccal secretions	☐ Substantial amount of secretions (80%–100%)	☐ Moderate amount of secretions (20%–80%)	☐ Few secretions (0%–20%)	☐ Moist mouth but without significant secretions
	3. Lip prehension	☐ No lip prehension (no reaction or tightening of lips)	☐ Incomplete lip prehension spontaneously or upon verbal stimulation	☐ Appropriate lip prehension but not consistently or only upon verbal stimulation	☐ Consistently correct, spontaneous lip prehension
	4. Tongue propulsion	☐ No tongue movement: passive movement of the bolus to the pharyngeal level, stagnation in mouth or expulsion when drooling	☐ A few tongue movements but not sufficient to propel the bolus	☐ Pathological tongue propulsion, possibly with post-swallowing stasis	☐ Appropriate tongue propulsion
Pharyngeal phase	1. Initiation of saliva swallowing reflex	☐ No saliva swallowing spontaneously or upon stimulation	☐ Saliva swallowing only upon stimulation	☐ Saliva swallowing spontaneously and upon stimulation	☐ Saliva swallowing upon command (min 2/3)
	2. Latency of swallowing reflex triggering upon stimulation	☐ No triggering or cannot be completed	☐ > 10 seconds	☐ 5 to 10 seconds	☐ 0 to 5 seconds
	3. Tracheostomy	☐ Tracheostomy with inflated cuff	☐ Tracheostomy with cuff, ongoing deflation	☐ Tracheostomy without cuff or with permanently deflated cuff	☐ Tracheostomy with ongoing weaning, or no tracheostomy
	4. Bronchial congestion	☐ Frequent bronchopneumonia or heavy congestion	☐ Moderate congestion	☐ Little congestion	☐ No congestion

SWADOC-scored – oral phase: /12 **SWADOC-scored – pharyngeal phase:** /12 **SWADOC-scored – total:** /24

THERAPEUTIC PO TRIALS

- Assess awareness of approaching utensil/cup, PO acceptance, manipulation, oral clearance & concern for pharyngeal impairments
- If MCS pt is able to accept food/liquid or receive spoon in mouth with decent consistency, consider instrumental swallow study to determine if therapeutic trials are appropriate for pt (Brady & Pape, 2011)
  - When supported by FEES/MBS findings, they found therapeutic trials to be safe
- Won't meet nutritional needs but could have effect on long-term outcomes of QOL
  - A meaningful activity that may help pt's recovery
  - Positive effect on family adjustment as they see pt achieve partial recovery of a meaningful function
- Patient's readiness for swallow tx may fluctuate day to day

ROLE OF LANGUAGE IN CONSCIOUSNESS ASSESSMENT

- "Language plays a key role in the communication of consciousness and in the interaction of in individual with his or her surroundings . In the absence of such a skill, the level of consciousness may be difficult to determine accurately and could easily be underestimated" (Schnakers, et al, 2015)
- Aphasia incidence
  - Up to 30% in stroke
  - Up to 15% of TBI
- Hypometabalism of up to 50% in areas related to language processing found in most MCS pts, irrespective of lesion location

ROLE OF LANGUAGE IN CONSCIOUSNESS ASSESSMENT

- Schnakers et al. (2015) gave CRS-R to non-DOC aphasic stroke pts
  - Determined of 29 CRS-R items, 10 involved receptive language skills & 4 involved expressive language skills
  - 25% of aphasic stroke pts (n=24) & 54% of globally aphasic stroke pts (n=11) did not reach the maximal CSR-R total score of 23
  - 3 globally aphasic pts scored as is MCS, despite no history of coma
  - Both criteria for emergence from MCS (functional communication & functional object use) are affected by presence of language impairments
- Some studies have found evidence that suggests covert cortical processing in UWS pts
- Behavioral tools to more specifically assess language abilities in DOC pts, both evaluating item recognition based on visual fixation (Aubinet et al., 2022)
  - Cognitive Assessment by Visual Election (CAVE) - Murray, 2018
  - Brief Evaluation of Receptive Aphasia (BERA) - Aubinet et al, 2021

BEST PRACTICE ELEMENTS OF DOC COMMUNICATION ASSESSMENT/INTERVENTION

- Ability to follow commands
- Establish any yes/no response and accuracy of that response
  - Head movement, eye blinking, thumbs up/down, pointing at/touching written yes/no, gazing at written yes/no, etc
- Ability to make meaningful choices
- Ability to use alternative and augmentative communication (AAC)
- Observe communication behaviors with family/friends

Roberts & Greenwood, 2019

SUGGESTED ADAPTATIONS FOR PROBABLE APHASIA OR WHEN LANGUAGE SKILLS IN DOUBT

- Present an auditory or written verbal instruction repeatedly, and score the best response
- If no response to an item administered via auditory mode & pt fails to respond, provide a written prompt. Similarly, if no response to written, provide auditory prompt.
- Re-administer any failed verbal item using a gestural or graphical presentation mode
- Use slight deviations to standardized instructions to allow for shorter or rephrased instructions using more frequent or familiar words
- Use shortest form of request, ie. "Raise your arm" and not "Can you raise your arm?"

Marjerus et al., 2009

SPEAKING VALVES

- "1-way tracheostomy valves" instead of "speaking valves"
- Many benefits beyond speaking
  - Allows for audible non-speech vocalizations (groan, sigh, cough)
  - Restores laryngeal/pharyngeal sensation
    - Secretion management
    - Increased swallowing
  - Restores subglottic or intrathoracic pressure
    - Swallow safety
    - Cough strength
    - Postural stability, trunk & UE power, and balance
  - Restores airflow through upper airway
    - Smell
    - Taste
  - Facilitates ventilator weaning & decannulation

SPEAKING VALVE ASSESSMENT

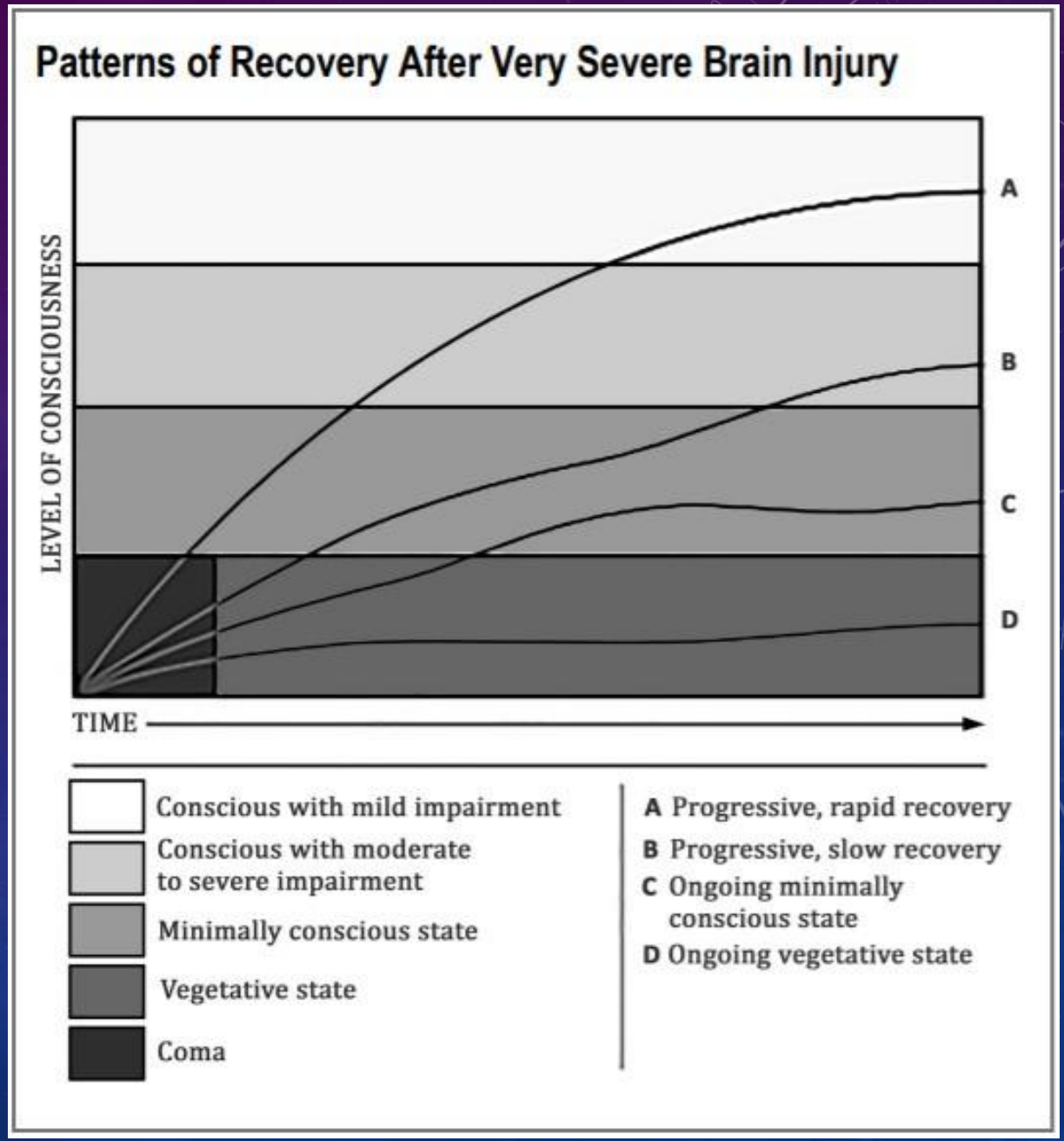
Monitor pt's tolerance:

- Physical signs of distress
- Vital signs
- Patent upper airway -
  - Assess transtracheal pressures via tracheostomy tube manometry (Johnson et al,. (2009)
    - Inspiratory pressures of between 0 and -3 cm H2O = capping recommended
    - Inspiratory pressures of more negative than –3 = speaking valve placement recommended
    - Expiratory pressures >10 = speaking valve not recommended until downsize of trach and reassessment

SPEAKING VALVE ASSESSMENT

- Advocate for trach downsize or changing out to cuffless trach if not tolerating speaking valve placement trials
- Level of consciousness may not be a factor that predicts the ability to decannulate (Enrichi et al,, 2021; Perin et al. 2017)
- Ideally want to place speaking valve before participation in any serial evals to allow for potential of improved communication, verbal, oral task performance

Started from the bottom…



DOCUMENTATION

Report ANY/ALL responses provoked by your intervention

Describe response(s) even if it is not the expected outcome.

OUR GOAL= stimulation of central nervous system .**NOT command follow**

Focus on what YOU are doing

NO NEGATIVE RESPONSES! ONLY RESPONSES!

Accuracy of task performance=
"50% accuracy in visual stimuli localization"

Speed = "7–10 seconds of delay for auditory processing of stimulation"

Time Frame, Frequency = "Responded to 3/5 of tactile input to RUE"

Number and type of cues = "Verbal/visual/tactile cues utilized to elicit increased attention to task"

Physiological variations = "patient demonstrated response to pain characterized by tachycardia and furrowed brow with painful stimuli"

WHAT DID YOU DO TO FACILITATE THE SESSION???

Small behaviors matter – please annotate

- Visual attention
- Tracking
- Eye opening
- Facial expressions
- Increased restlessness
- Sound localization
- Thermal/noxious/gustatory responses
- Head control

TREATMENT TECHNIQUE TERMS

- Adapted
- Modified (task, environment etc.)
- Adjusted
- Advanced/Progressed
- Corrected
- Elicited/Engaged
- Promoted/Prevented
- Facilitated/Inhibited
- Minimized/Reduced
- Incorporated
- Modeled
- Assessed
- Educated/Instructed/Trained
- Compensated
- De-escalated

Dot phrases:

.TBICRS

JFK Coma Recovery Scale -- Revised

Week Administered: tbicrs1: Initial Administration -- Week...

Scale	*Score*
Auditory Function	tbicrsauditory
Visual Function	tbicrsvisual
Motor Function	tbicrsmotor
Oromotor/Verbal Function	tbicrsverbal
Communication	tbicrscomm
Arousal	tbicrsarousal
Total Score	***

 # Denotes Emergence from Minimally Conscious State
***** Denotes Minimally Conscious State***

DOT PHRASE:

.TBISECONDS

Simplified Evaluation of CoNsciousness Disorders (SECONDs)

Week Administered: tbicrs1: Initial Administration -- Week...

Observation: ***

Is the patient following commands: yes

Scoring: TBI SECONDs All Options

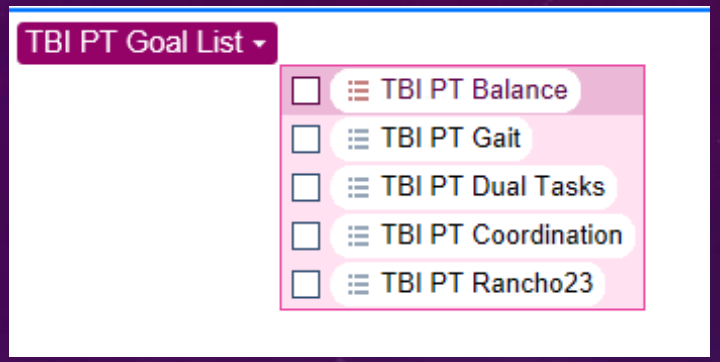
Diagnosis: TBI seconds diagnosis

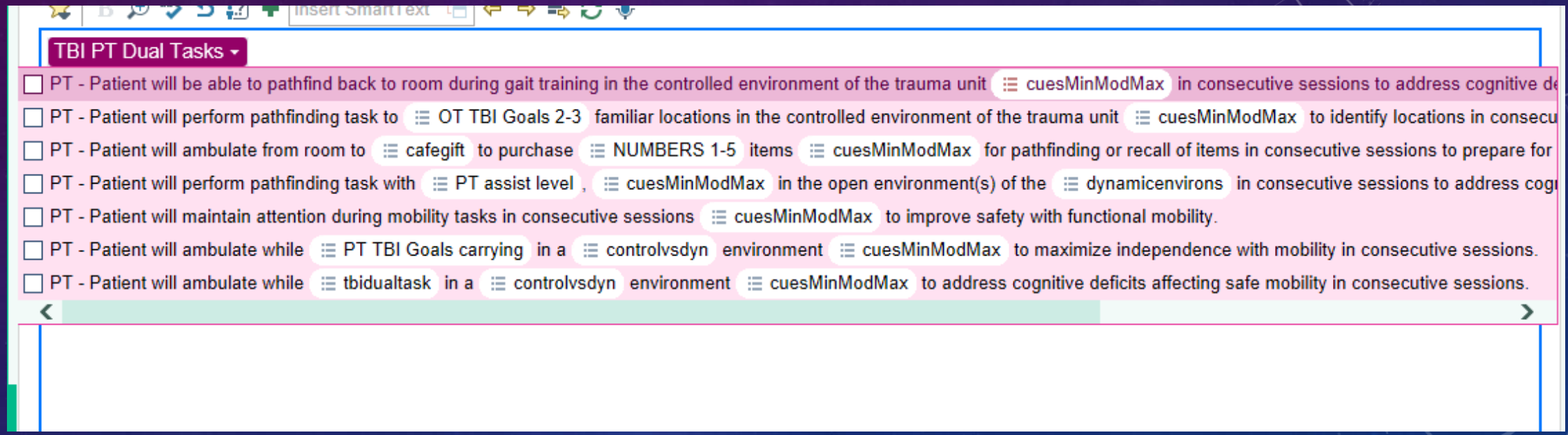
GOALS

.TBIOTGOALS

.TBIPTGOALS

.STTBIGOALS


TBI PT Goal List
TBI PT Balance
TBI PT Gait
TBI PT Dual Tasks
TBI PT Coordination
TBI PT Rancho23


TBI PT Dual Tasks
PT - Patient will be able to pathfind back to room during gait training in the controlled environment of the trauma unit cuesMinModMax in consecutive sessions to address cognitive de
PT - Patient will perform pathfinding task to OT TBI Goals 2-3 familiar locations in the controlled environment of the trauma unit cuesMinModMax to identify locations in consecu
PT - Patient will ambulate from room to cafegift to purchase NUMBERS 1-5 items cuesMinModMax for pathfinding or recall of items in consecutive sessions to prepare for
PT - Patient will perform pathfinding task with PT assist level , cuesMinModMax in the open environment(s) of the dynamicenvirons in consecutive sessions to address cogr
PT - Patient will maintain attention during mobility tasks in consecutive sessions cuesMinModMax to improve safety with functional mobility.
PT - Patient will ambulate while PT TBI Goals carrying in a controlvsdyn environment cuesMinModMax to maximize independence with mobility in consecutive sessions.
PT - Patient will ambulate while tbidualtask in a controlvsdyn environment cuesMinModMax to address cognitive deficits affecting safe mobility in consecutive sessions.

OT TBI High Level

- Pt will multi-task to OT TBI Goals 2-3 functional activities in preparation to return to home/community.
- Pt will complete way finding activity locating OT TBI Goals 2-5 destinations with-without cues in preparation to return to home/community.
- Pt will accurately attend to a cognitive task for *** minutes with OT assist level while completing functional mobility in preparation for return home.
- Pt will identify environmental safety issues with OT assist level in preparation to return to home/community.
- Pt will complete UB/LB dressing task with OT assist level , including clothing retrieval, in preparation to return home.
- Pt will complete a time management task with OT assist level and OT TBI Goals Cues cues for safe return to home/community.
- Pt will utilize a telephone with OT assist level to complete a community re-entry task for safe return to home/community.
- Pt will demonstrate insight into deficits with OT TBI Goals Cues cues for safe return to home/community.
- Pt will demonstrate socially appropriate behavior/language with OT TBI Goals Cues cues for *** minutes for safe return to home/community.
- Pt will complete community navigation in an open environment with OT TBI Goals Cues cues and OT assist level for safe return to home/community.
- Pt/family will use brain injury survivor card with OT TBI Goals Cues cues for community re-entry.

ST TBI Goals

- Attention
- Memory
- executive function
- O Log/Cog Log
- STTBIRancho23

Attention

- [ ] Pt. will sustain attention during structured task for *** minutes with assistance level .
- [ ] Pt. will complete selective attention tasks with assistance level .
- [ ] Pt. will complete divided attention tasks with assistance level .
- [ ] Pt. will complete alternating attention tasks with assistance level .
- [ ] Pt will participate in cognitive tasks for *** minutes with assistance level .

DOCUMENTATION=

SPEECH ONLY=

HIGH ACUITY COG/COMM EVAL TEMPLATE

QUESTIONS???

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