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RUSK REHABILITATION

PHARMACOLOGICAL MANAGEMENT OF TRAUMATIC BRAIN INJURY REHABILITATION

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GENERAL PRINCIPLES

- Mechanisms of injury and deficits can change from the acute care setting to the rehabilitation setting
- Start low, go slow
- Tailor medication use to the patient's presentation
- Minimize side effect risk
  - Only difference between side effects and desired effect is the fact that you want the desired effect
- Avoid unnecessary polypharmacy

GENERAL PRINCIPLES

- Augmentation is better than switching medications
- Medication and non-pharmacological treatments both have their place
- Sometimes best treatment is to withdraw harmful medications
- Consistent and reliable assessment tools are crucial to effective management

TBI REHABILITATION MANAGEMENT NEEDS

- Dysautonomia
- Poor Arousal
- Fatigue
- Poor Initiation or Interaction
- Executive Function Deficits
- Agitation
- Personality Changes
- Neuropsychiatric Syndromes
- Headache
- Neuropathic Pain
- Spasticity and Myoclonus
- Insomnia or Altered Sleep/Wake Cycle

DYSAUTONOMIA

- Sympathetic response system in overdrive
- Monitor vital signs and physical exam closely as often occurs in patients at lower functional level
- Can cause fevers, diaphoresis, tachycardia, and hypertension that can cause harm to the patient if severe
- Address/treat the noxious stimuli causing the response
  - Causes may be simple or complex
  - Address/treat the symptoms

DYSAUTONOMIA

- Medications to consider
  - Opiates
  - Benzodiazepines
  - Beta Blockers
  - Antiepileptics
  - SNRIs

POOR AROUSAL, POOR INITIATION, FATIGUE

- Disorders of Consciousness and/or Lethargy
- Decreased mental endurance (neurofatigue)
- Importance of good sleep hygiene, diet and exercise
- Possibly exacerbated by neuropsychiatric syndromes
- Monitoring and Assessment Tools
  - CRS-R
  - Bush Francis Catatonia Scale
  - Neuropsychological Testing

POOR AROUSAL, POOR INITIATION, FATIGUE

- Stimulant medications
  - dopamine agonists (Amantadine, NEJM 2012)
  - norepinephrine agonists
  - NMDA receptor antagonists?
- Neuropsychiatric medications
- Catatonia?
  - Benzodiazepines
  - Zolpidem

Coma Recovery Scale – Revised ©2004
Record Sheet

This form should only be used in conjunction with the CRS-R Administration and Scoring Manual which defines guidelines for standardized application of the scale

Patient:				**Diagnosis:**							**Etiology:**					
Date of onset:				**Date of Examination:**												
Date																
Week	**Admission**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
AUDITORY FUNCTIONS																
4 Consistent Movement to Command *																
3 Reproducible Movement to Command *																
2 Localization to Sound																
1 Auditory Startle																
0 None																
VISUAL FUNCTIONS																
5 Object Recognition*																
4 Object Localization: Reaching*																
3 Visual Pursuit *																
2 Fixation*																
1 Visual Startle																
0 None																
MOTOR FUNCTIONS																
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 FUNCTIONS																
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 without stimulation																
1 Eye opening with stimulation																
0 no arousal response																
TOTAL SCORE																

Denotes emergence from MCS**
Denotes MCS*

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EXECUTIVE FUNCTION DEFICITS

- Common difficulty seen even with milder TBI cases
- Patients often have mixed strengths and weaknesses
- Assessed with neuropsychological testing
- Psychiatric syndromes can also trigger or exacerbate cognitive and executive function deficits

EXECUTIVE FUNCTION DEFICITS

- Stimulant medications
  - dopamine agonists
  - norepinephrine agonists
  - NMDA receptor antagonists?

- Antidepressants
  - SSRIs
  - SNRIs
  - Bupropion

AGITATION

- Due to pattern of injury often seen in TBI, behavioral issues often occur
- Can range from fairly benign to aggressive or combative behavior
- Often seen in the post-traumatic amnestic/confusional state
- But aggressiveness, disinhibition, irritability and emotionally labile presentations can occur in later stages of TBI recovery as well
- As agitation can be episodic, consistent reporting is important to avoid missed events
  - Agitated Behavior Scale

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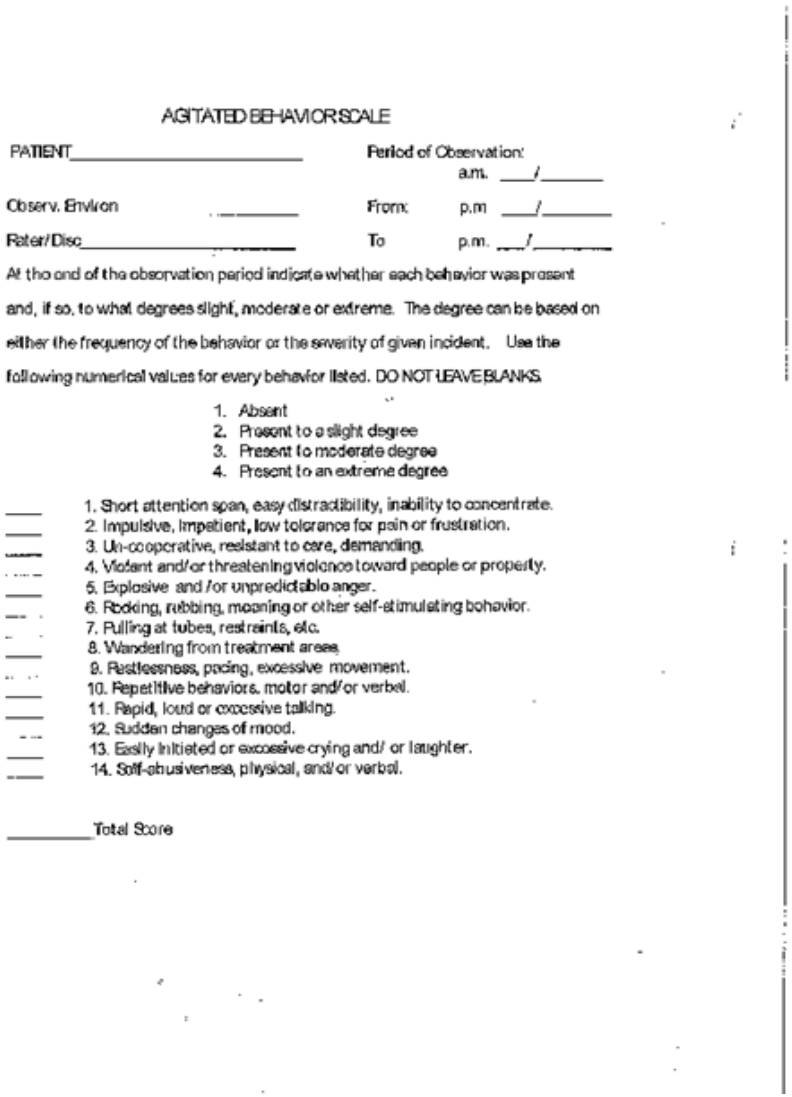
AGITATION

- Acute management
  - Intramuscular
    - Haldol
    - Benzodiazepines
    - Atypical Antipsychotics
- Chronic management
  - Atypical Antipsychotics
  - Antiepileptic Medications
  - SSRI's and Tricyclics
  - Buspirone
  - B-blockers
  - Stimulants
  - Lithium
  - Atomoxetine



AGITATED BEHAVIOR SCALE

PATIENT_____ Period of Observation:

a.m. ___/_____

Observ. Environ _____ From: p.m ___/_____

Rater/Disc_____ To p.m. ___/_____

At the end of the observation period indicate whether each behavior was present and, if so, to what degrees slight, moderate or extreme. The degree can be based on either the frequency of the behavior or the severity of given incident. Use the following numerical values for every behavior listed. DO NOT LEAVE BLANKS.

1. Absent
2. Present to a slight degree
3. Present to moderate degree
4. Present to an extreme degree

___ 1. Short attention span, easy distractibility, inability to concentrate.
___ 2. Impulsive, impatient, low tolerance for pain or frustration.
___ 3. Uncooperative, resistant to care, demanding.
___ 4. Violent and/or threatening violence toward people or property.
___ 5. Explosive and /or unpredictable anger.
___ 6. Rocking, rubbing, moaning or other self-stimulating behavior.
___ 7. Pulling at tubes, restraints, etc.
___ 8. Wandering from treatment areas.
___ 9. Restlessness, pacing, excessive movement.
___ 10. Repetitive behaviors, motor and/or verbal.
___ 11. Rapid, loud or excessive talking.
___ 12. Sudden changes of mood.
___ 13. Easily initiated or excessive crying and/ or laughter.
___ 14. Self-abusiveness, physical, and/or verbal.

_____Total Score

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PERSONALITY CHANGES

- Harlow 1868: Phineas Gage

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PERSONALITY CHANGES

- Lability, disinhibition, aggressiveness, apathy, paranoia, or a combination of these features can present as personality changes
- Some patients also return to earlier developmental stages with loss of self, childish behavior, concreteness, poor judgment, decreased attention, language deficits, and decreased perception
- Memory deficits are also significant problems leading to personality changes and confusion
- If a patient does not demonstrate dangerous behavior associated with these changes, there is some controversy as to how aggressively to treat these changes
- Treatment is based on the features presented

NEUROPSYCHIATRIC SYNDROMES

- Neuropsychiatric syndromes can be both a risk factor for TBI as well as triggered by TBI
- Assessment done according to psychiatry guidelines
- May need to use truncated assessment tools in light of fatigue and cognitive difficulties often seen with TBI
  - **Depression**
  - Anxiety
  - Emotional lability
  - Apathy
  - Psychosis

NEUROPSYCHIATRIC SYNDROMES

- Treat according to the appropriate psychiatric management

- Depression
  - SSRIs
  - SNRIs
  - Tricyclics

- Emotional lability
  - SSRIs
  - Tricyclics
  - Nuedexta

- Psychosis
  - Atypical antipsychotics

- Anxiety
  - Buspirone
  - Trazodone
  - SSRIs

  - Benzodiazepines?

- Apathy
  - Difficult to treat
  - Dopamine agonists
  - Cholinesterase inhibitors

HEADACHE AND NEUROPATHIC PAIN

- Very common complaints associated with TBI
  - Headache and fatigue are two of the most common persistent symptoms after TBI
- Post traumatic headaches are treated based on the primary headaches they resemble
  - Migraine
  - Tension
  - Cluster
- Neuropathic pain may or may not follow a specific distribution
  - Often difficult to treat effectively
  - Complex regional pain syndrome
  - Also look for potential other causes for pain (such as heterotopic ossification, fracture, soft tissue injury)

HEADACHE

- Treatment varies based on primary classification

- Abortive medications

- Tylenol+aspirin+caffeine
- NSAIDS
- Triptans
- Antiemetics
- Steroids
- Ergots

- Prophylactic medications

- TCAs
- Topirimate
- SNRIs/SSRIs
- Beta-Blockers
- Ca Channel Blockers
- Anticonvulsants
- Botulinum toxin
- NSAIDs
- Magnesium
- Tizanidine

NEUROPATHIC PAIN

- Neuropathic pain
  - Antiepileptics
  - SSRIs
  - Tricyclics
  - Steroids
  - Non-pharmacological modalities
  - Opiates?

SPASTICITY AND MYOCLONUS

- Hypersensitive muscle responses to stimuli
- Myoclonus usually seen in early recovery/more impaired states
- As spasticity is a dynamic process, assessment can be difficult
  - Modified Ashworth Scale (limited)
  - Modified Tardieu Scale

SPASTICITY AND MYOCLONUS

- Spasticity medication management
  - Oral agents
  - Injections
  - Intrathecal Baclofen

- Myoclonus medication management
  - Levetiracetam
  - Beta Blockers
  - Benzodiazepines
  - Opiates

INSOMNIA AND ALTERED SLEEP/WAKE CYCLE

- Often seen in TBI patients
  - Can manifest as day/night sleep pattern reversal or poorly sustained sleep
- A common cause of fatigue and lethargy
- Sleep hygiene and environmental regulation is important
- Recording sleep patterns is not always easy
  - Polysomnography not easy to implement
  - Clinical observation often limited

INSOMNIA AND ALTERED SLEEP/WAKE CYCLE

- Medications to consider
  - Trazodone
  - Melatonin
  - Mirtazepine
  - Other sleep agents

  - Anticholinergic, Antihistamine, Antipsychotics, Benzodiazepines or Zolpidem?

SUPPLEMENTS AND OVER THE COUNTER MEDICATIONS

- Just because it is herbal or OTC, does not mean it can be dismissed
  - ginkgo biloba
  - lemon balm - melissa officinalis
  - lavender - lavendula officinalis
  - sage - salvia officinalis
  - curcumin
  - folic acid
  - magnesium
  - fish oil
- Often the wild west of medications because of decreased regulation and control of these compounds or what additives are used with them

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