

Management of severe traumatic brain injury

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Disclosures

I am a full-time employee at The University of Tulsa

KSHA is providing an honorarium for my participation today

I am a Certified Brain Injury Specialist Trainer through the ACBIS/BIAA

No other financial or non-financial relationships to disclose



Learning Objectives

1. Describe medical, neurobehavioral, and psychosocial factors that can impact intervention in individuals with severe traumatic brain injury
2. Identify appropriate assessment tools to help guide treatment of cognitive-communicative sequelae after severe TBI
3. Summarize the evidence-based treatment approaches used to address cognitive-communicative sequelae of severe traumatic brain injury

What do we mean by severe TBI?

| Criteria | Mild | Moderate | Severe |
|--------------------|------------------|---------------------------|--------------------|
| Structural imaging | Normal | Normal or abnormal | Normal or abnormal |
| LOC | Up to 30 minutes | 30 minutes up to 24 hours | 24 hours or more |
| AOC | Up to 24 hours | > 24 hours | > 24 hours |
| PTA | 0-1 day | Between 1-7 days | >7 days |
| GCS | 13-15 | 9-12 | 3-8 |

Recreated from the VA/DOD Clinical Practice Guideline for the Management of Concussion-Mild Traumatic Brain Injury; The Management of Concussion-mild Traumatic Brain Injury Working Group, 2016

TBI Outcomes

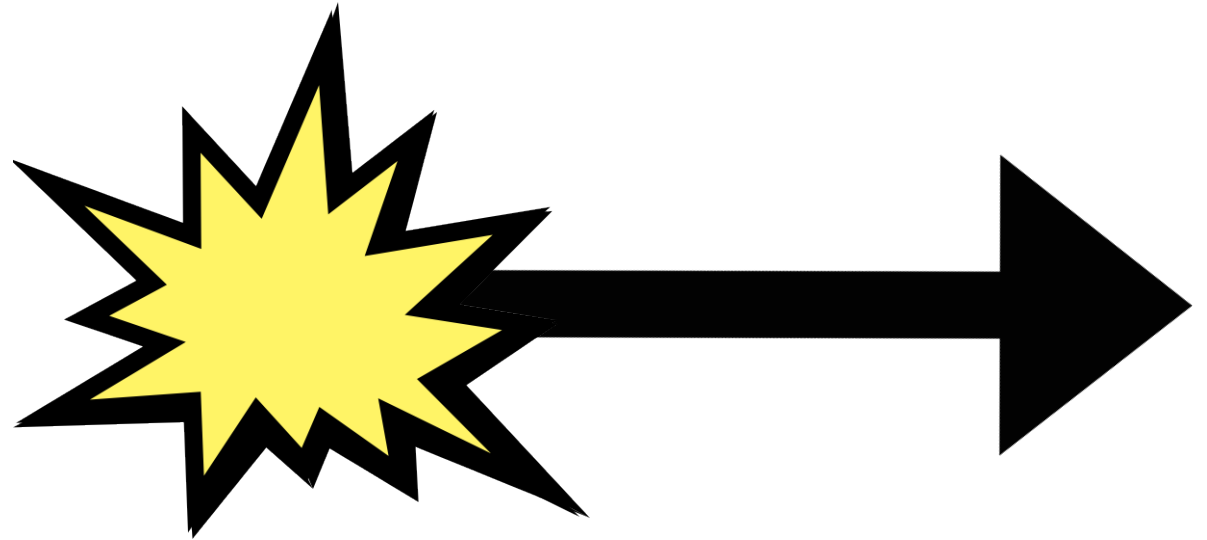
Chronic condition

Increased morbidity and mortality

Frequent comorbidities

Complicated continuum of care

Persistent cognitive, physical,
psychosocial deficits



Behavioral and psychosocial complications/comorbidities

BEHAVIORAL

| | |
|---------------------------------------|---|
| Aggression | Flat affect/inability to recognize emotions |
| Agitation/irritability | |
| Apathy | |
| Denial of deficits and/or anosognosia | Impulsivity |
| Disinhibition | Lability |
| Eating disturbances | Poor initiation |
| | Poor judgment and reasoning |

PSYCHOSOCIAL

| |
|---|
| Depression |
| Anxiety |
| Substance abuse |
| Other psychiatric disorders |
| Social isolation/reduced social network |
| Caregiver burden |
| Reduction in participation |

Continuum of care?

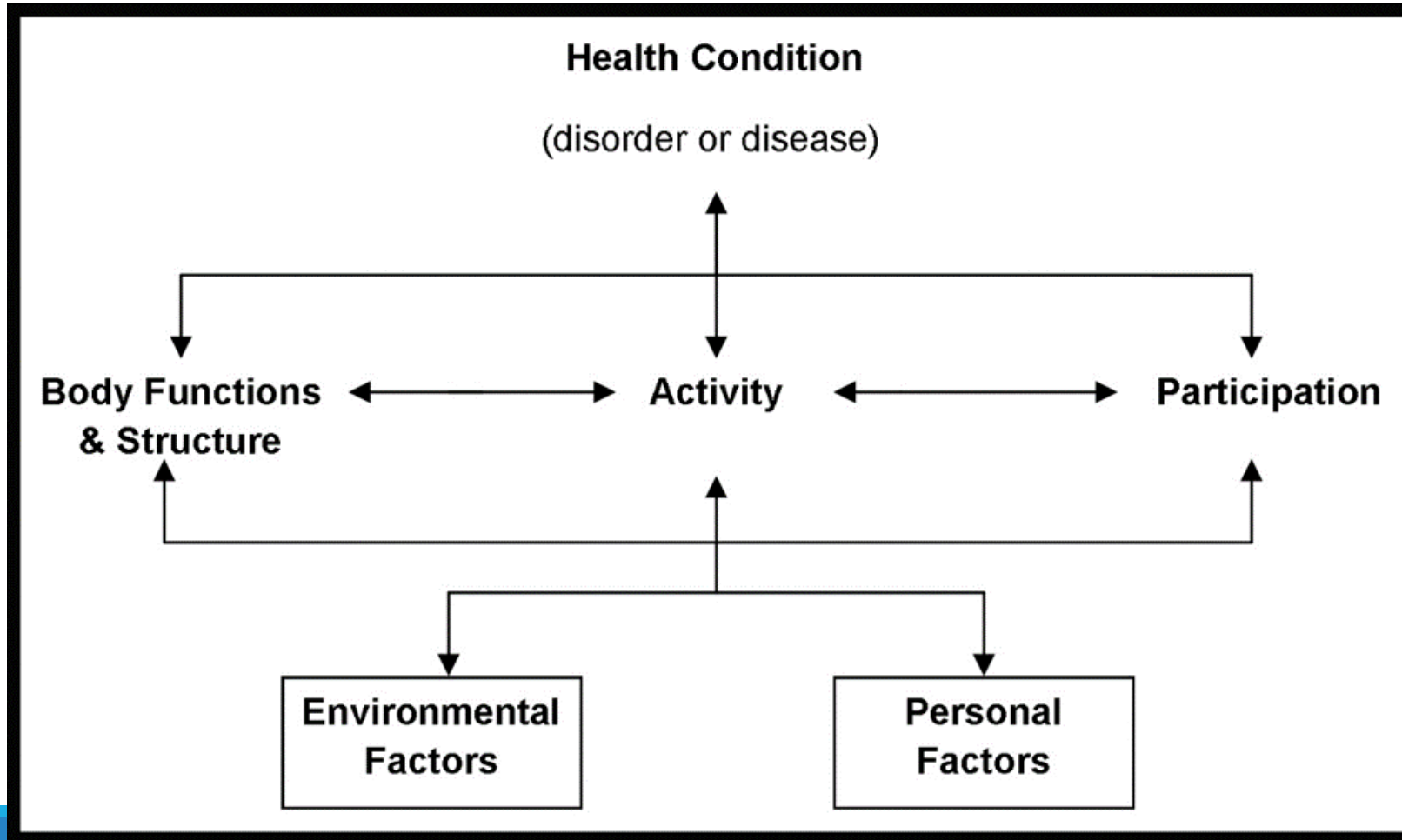
Determined by...

- Funding source
- Bed availability
- Ability to participate in therapy
- Medical needs
- Challenging behaviors
- Support system



Principles of assessment and treatment

WHO's ICF: Implications for assessment



Environmental and personal factors?

Medical status, including history of brain injury

Premorbid cognitive-linguistic skills

Education, occupation, socioeconomic, cultural, and linguistic background

Auditory, visual, motor, cognitive (e.g., arousal), emotional, behavioral status

Review of auditory, visual, motor, cognitive, and emotional status.

Client and family goals and concerns

More considerations for assessment

Periodic, ongoing assessment

Use direct report from family and patients, naturalistic observation, and performance-based measures

Include tests with good ecological validity

Use dynamic assessment and hypothesis testing

Treatment principles

- ✓ Shaping
- ✓ Graded cueing (push for self-monitoring)
- ✓ Distributed practice
- ✓ Errorless learning
- ✓ Remediation v. compensation
- ✓ Intervention **MUST** include intentional generalization
- ✓ Functional interventions
- ✓ Family involvement
- ✓ Assistive technology for cognition
- ✓ Limited evidence for transfer across cognitive domains

Timing of Intervention - early works!

Early and aggressive multidisciplinary neurorehabilitation

- Shorter length of coma
- Shorter length of stay in trauma/rehab
- Higher Rancho scores, less impairment
- Greater rates of return to home

Systematic early orientation program

- Longer PTA, better GOSE outcome at 12 months

Early multisensory stimulation

- 75 minutes per day, 14 days
- Better functional outcome (GOSE, DRS) at 12 months)

Early multisensory stimulation for patients in a coma

- Family-delivered stimulation (30 minutes per day) led to higher levels of consciousness within the first week
- Therapist-delivered stimulation (100 minutes per day) led to higher levels of consciousness
- Nurse v. family delivered stimulation (80 minutes per day)- family-delivered led to higher level of consciousness, basic cognitive functioning, and sensory functioning.

Intensity of Intervention- more can facilitate recovery

Greater time may be associated with...

- Improved self-care, continence, mobility transfers, locomotion, communication, psychosocial functioning, and cognition at discharge from rehabilitation
- Greater likelihood of return to work at 24 months
- Better community integration after 16 weeks (20 v. 15 hours of therapy)

But might be an increase in RATE v. extent of recovery (some differences exist only in first few months)

Pharmacological management of severe TBI

- Fluid and electrolyte management
- Osmotic diuretic
- Pain control and sedation
- Pentobarbital coma
- Seizure prophylaxis
- Neuromuscular blocking agents
- Antithrombotic agents
- Antimicrobial agents
- Stress ulcer prophylaxis

Role of the SLP

- Observe and document adverse effects (e.g., decreased arousal)
- Communicate any observed status changes (e.g., increase in frequency of seizures)
- Provide cognitive training related to medication management

Rancho Los Amigos Levels of Cognitive Functioning Scale

| | |
|---------|------------------------|
| Level 1 | No Response |
| Level 2 | Generalized Response |
| Level 3 | Localized Response |
| Level 4 | Confused-Agitated |
| Level 5 | Confused-Inappropriate |
| Level 6 | Confused-Appropriate |
| Level 7 | Automatic-Appropriate |
| Level 8 | Purposeful-Appropriate |

Key tool for family education

- <https://sunnybrook.ca/uploads/1/programs/trauma-emergency-care/rancho-los-amigos-scale-of-cognitive-recovery-acc.pdf>

Guides general treatment goals

- Stimulate
- Structure
- Compensate/Remediate

Assessment of disorders of consciousness

Standardized assessments should be used for serial assessment

e.g., Coma Recovery Scale–Revised (CRS-R), looks at auditory, visual, motor, oromotor/verbal, communication, arousal

Signs of emerging consciousness

Visual tracking, non-stereotypic motor responses, emotional responses

Spaulding Rehabilitation

Network is an excellent source of resources!

Persistent, then chronic v. permanent vegetative state

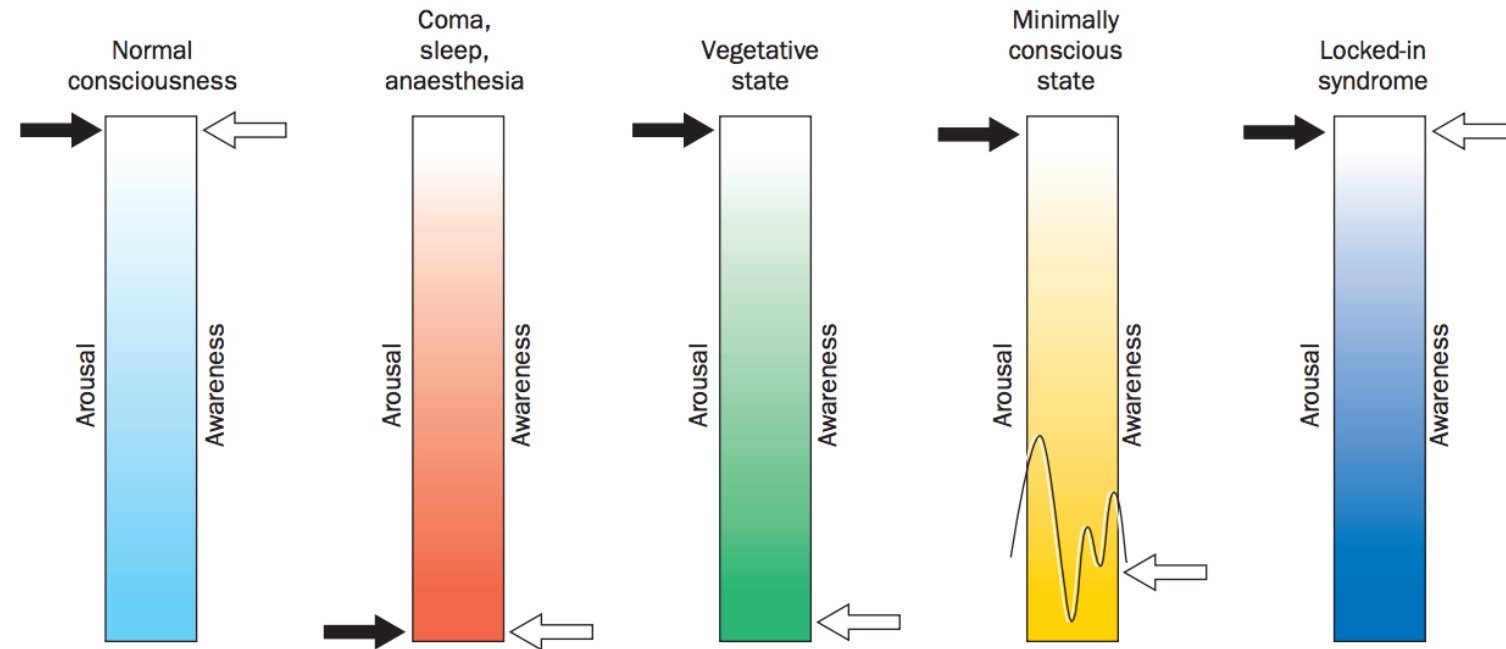


Figure 2. Arousal and awareness, the two components of consciousness in coma, vegetative state, minimally conscious state, and locked-in syndrome.

From Laureys, Owen, & Schiff, 2004

Treatment principles for DOC

Multisensory stimulation

Environmental management

Family education and inclusion



After emergence from coma

Focus on informal, functional assessment of skills

Track amnesia, orientation, and attention

Monitor quality of language output, self-awareness

Engage in desired activities

Decrease task demands and attentional load

Address behavior through environmental change and redirection v. confrontation

Develop consistent routines (which requires family training!)

Monitor own rate and complexity when providing information/requesting information

External aids may be useful, but will require extensive support from therapist-staff-family

After behavior becomes
appropriate...

RLAS VI AND BEYOND

Assessment

READY FOR FORMAL ASSESSMENT?

- ✓ Needs to be able to sustain attention
- ✓ Needs to be able to offer a reliable response
- ✓ Needs to not be extremely confused or agitated

IMPORTANT TAKE-AWAYS

Scores not as important as what you observe during the assessment

- Use of strategies (spontaneous and prompted)
- Response to cues
- Frustration tolerance, fatigue
- Ability to follow instructions, attend to task

Attention assessment

- Examples of formal assessment
 - Rating Scale: Moss Attention Rating Scale
 - Battery: Test of Everyday Attention
 - BUT...challenging with this population
- Additional tasks for assessment
 - Forward digit span
 - Digit symbol coding
 - Trail Making Test
 - Conners' CPT
 - PASAT



Attention treatment

- Metacognitive strategy training
 - More evidence for mild-mod, but some small studies that show benefit in the severe population
 - More detail on the specifics of MST in talk later today on executive function
- Dual task training
 - Focus on individual tasks first
 - Then, incorporate simultaneous performance
 - Do NOT expect distant generalization
- Address comorbid issues through referral
 - Depression, pain, sleep
- Environmental supports/modifications
 - Pacing, reducing distractors
 - Using ATC
- Computerized attention training (?)
 - If used, consider compensation as remediation as the mechanism
- Cognitive behavioral therapy (?)



Memory assessment

Common sample tools:

Wechsler Memory Scale

Rivermead Behavioural Memory Test

California Verbal Learning Test

Memory for Intentions Test

Consider the type of memory that you are assessing:

- Encoding
- Retention of information
- Recognition

Remember that memory relies on attention and executive skills!

Remember to watch for patterns:

- Primacy v. recency
- Verbal v. nonverbal
- Semantic v. episodic

Memory treatment

Focus is on COMPENSATION, and not remediation

Internal compensatory strategies

- Awareness and intention added to the encoding phase of memory
- Relies on those with *relatively intact executive function skills*
- Often unsuccessful for those with a more severe disorder

External compensatory strategies

- Environmental supports and reminders
- Must consider preferences/premorbid experiences with similar devices, other comorbidities
- TRAIN the use of these strategies
 - Distributed practice
 - Multiple exemplars
 - Don't expect generalization to occur
 - Use errorless learning, spaced retrieval



NOTE:
Spaced retrieval can be successful in learning specific information (but not with generally improving memory)!

EXECUTIVE FUNCTION

We will explore this in depth this afternoon.

Specifically for severe TBI:

- Get report from family and patient (e.g., BRIEF-A)
- Consider how awareness will have impact on other interventions
- Heavier reliance on external cues and ATC as compared to metacognitive interventions



Cognitive-communication

ASSESSMENT

We know that these deficits can have widespread effects on an individual post-onset

We know that cog-comm skills can be situationally dependent!

Largely informal assessment

- Monologic and **conversational discourse**

Rating scale example:

- LaTrobe Communication Questionnaire
 - Conversational tone, effectiveness, flow, engagement, partner sensitivity, and conversational attention/focus
 - Both self and other-report

TREATMENT

- Common features of good interventions
 - Individualized, meaningful goals
 - Instructional methods that are appropriate
 - Planned generalization
 - Communication partner inclusion
 - Measuring functional outcomes
- Group training can be beneficial

- Sample curriculum
 - TBI Connect/TBI express
 - Togher et al., 2013; Togher et al., 2016

Behavioral concerns

Due to....

“Preinjury adjustment problems

Impairments tied directly to the injury

Post-injury evolution of symptoms and adjustment

Poorly conceived interventions (e.g., overly restrictive settings and procedures against which individuals may choose to react)”

Common intervention strategies:

- ABA
- PBIS
- CBT

Positive behavior interventions and supports: Principles

1. The person is the core of all intervention and support efforts
2. Interventions and supports are organized around personally meaningful activities
3. Contextual supports are critical to success
4. Reduction of supports is part of the plan
5. Positive everyday routines are the context for pursuit of meaningful goals
6. Components of life must be integrated
7. Assessment is ongoing and context-sensitive
8. Feedback must be context-sensitive and meaningful
9. Behavioral supports are positive and proactive
10. The ultimate goal for participants is effective self-regulation within a meaningful life

Other considerations

Glasgow Outcome Scale-Extended

Disability Rating Scale

Mayo-Portland Adaptability Inventory

Community Integration Questionnaire

Craig Handicap Assessment and Reporting Technique (SF)

QOLIBRI

Many available here:

<http://tbims.org/combi/list.html>

Address family concerns

- Family needs questionnaire
- Support groups and resources
 - <https://www.biausa.org/>
 - <http://biaks.org/>
 - <https://msktc.org/tbi>
 - <https://usbia.org/>
 - [https://www.kdads.ks.gov/commissions/home-community-based-services-\(hcbs\)/programs/tramatic-brain-injury](https://www.kdads.ks.gov/commissions/home-community-based-services-(hcbs)/programs/tramatic-brain-injury)
 - <http://www.mindsmatterllc.com/>

Address return to employment and leisure activities

References

- American Speech-Language-Hearing Association. (2019). Traumatic Brain Injury in Adults. Accessed at <https://www.asha.org/Practice-Portal/Clinical-Topics/Traumatic-Brain-Injury-in-Adults/>.
- Coelho, C., Ylvisaker, M., & Turkstra, L.S. (2005). Nonstandardized assessment approaches for individuals with traumatic brain injuries. *Seminars in Speech and Language, 26*(4), 223-241.
- Feeney, T.J. (2010). there's always something that works: Principles and practices of positive support for individuals with traumatic brain injury and problem behaviors. *Seminars in Speech and Language, 31*(3), 145-161.
- Giacino, J.T., Katz, D.I., Schiff, N.D., Whyte, J. Ashman, E.J., Ashwal, S., Barbano, R., Hammond, F.M., Laureys, S. Ling, G.S.F., Nakase-Richardson, R. Seel, R.T., Yablon, S., Getchius, T.S.D., Gronseth, G.S., & Armstrong, M.J. (2018). Practice guideline update recommendations summary: Disorders of consciousness. *Neurology, 91*, 450-460.
- Klingshirn, H., Grill, E., Bender, A., Strobl, R., Mittrach, R., Braitmayer, K., & Müller, M. (2015). Quality of evidence of rehabilitation interventions in long- term care for people with severe disorders of consciousness after brain injury: A systematic review. *Journal of Rehabilitation Medicine, 45*, 577-585.
- Kolakowsky-Hayner, S.A., Reyst, H., & Abashian, M.C. (Eds.) (2016). *The Essential Brain Injury Guide, 5th Ed.* Vienna, VA: Brain Injury Association of America.
- Königs, M., Beurskens, E.A., Snoep, L., Scherder, E.J., & Oosterlaan, J. (2018). Effects of timing and intensity of neurorehabilitation on functional outcome after traumatic brain injury: A systematic review and meta-analysis. *Archives of Physical Medicine and Rehabilitation, 99*, 1149-59
- Laureys, S., Owen, A.M., & Schiff, N.D. (2004). Brain function in coma, vegetative state, and related disorders. *Lancet Neurology, 3*(9), 537-546.
- The Management of Concussion-mild Traumatic Brain Injury Working Group. (2016). VA/DoD clinical practice guideline for the management of concussion-mild traumatic brain injury, 2.0. Accessed at <https://www.healthquality.va.gov/guidelines/Rehab/mtbi/mTBICPGFullCPG50821816.pdf>.

References

Ponsford, J., Bayley, M., Wiseman-Hakes, C., Togher, L., Velikonja, D., McIntyre, A., Janzen, S., & Tate, R. (2014). INCOG recommendations for management of cognition following traumatic brain injury, part II: Attention and information processing speed. *Journal of Head Trauma Rehabilitation, 29*(4), 321-337.

Rivera, J.O. (2014). Pharmacological management of traumatic brain injury and implications for speech language pathology. *Seminars in Speech and Language, 35*(3), 196-203.

Sander, A. (2002). The Level of Cognitive Functioning Scale. The Center for Outcome Measurement in Brain Injury. <http://www.tbims.org/combi/lcfs> (accessed August 20, 2019).

Sohlberg, M.M., & Mateer, C.A. (2001). *Cognitive rehabilitation: An Integrative Neuropsychological Approach (2nd ed)*. New York: Guilford Press.

Steel, J. & Togher, L. (2018). Social communication assessment after TBI: A narrative review of innovations in pragmatic and discourse assessment methods, *Brain Injury, 33*(1), 48-61.

Togher, L., McDonald, S., Tate, R., Power, E., & Rietdijk, R. (2013). Training communication partners of people with severe traumatic brain injury improves everyday conversations: A multicenter single blind clinical trial. *Journal of Rehabilitation Medicine, 45*, 637-645.

Togher, L., Wiseman-Hakes, C., Douglas, J., Stergiou-Kita, M., Ponsford, J., Teasell, R., Bayley, M., & Turkstra, L. (2014). INCOG recommendations for management of cognition following traumatic brain injury, part IV: Cognitive communication. *Journal of Head Trauma Rehabilitation, 29*(4), 353-368.

Togher, L., McDonald, S., Tate, R., Rietdijk, R., & Power, E. (2016). The effectiveness of social communication partner training for adults with severe chronic TBI and their families using a measure of perceived communication ability. *NeuroRehabilitation, 38*, 243-255.

Velikonja, D., Tate, R., Ponsford, J., McIntyre, A., Janzen, S., & Bayley, M. (2014). INCOG recommendations for management of cognition following traumatic brain injury, part V: Memory. *Journal of Head Trauma Rehabilitation, 29*(4), 369-386.