Neurobehavioral Function in Adults Recovering Consciousness after Severe Traumatic Brain Injury: A Scoping Review

Jennifer Weaver, MA, OTR/L, CBIS1; Ann Guernon, MS, CCC-SLP/L, CCRC2; Trudy Mallinson, PhD, OTR/L, FAOTA1; Theresa Pape, DRPH, MA, CCC-SLP/L; Tom Harrod, MLSIS1

1The George Washington University, Washington, DC; 2Center for Innovation in Complex Chronic Healthcare, Edward Hines VA Hospital, Hines, IL; 3Manoianjoy Rehabilitation Hospital, Wheaton, IL

Study Aims
- This scoping review aims to report the findings of current literature examining the assessment of neurobehavioral function and recovery along the continuum of disorders of consciousness (DOC) from coma to full consciousness.
- This study is designed to capture the range of constructs researchers have used to measure NBF during recovery of consciousness.
- The research question for this review was: “What constructs are most frequently used to assess neurobehavioral function in adults recovering consciousness after severe TBI?”

Analytic Framework
- A scoping review examines the extent and nature of the research, identifies gaps in the literature, and may establish the significance of commencing a full systematic review (Lovat, Coulthard, & O'Brien, 2010).
- The scoping review methodological framework for this study followed that of Arksey & O'Malley (2005): 1) identify the research question, 2) identify relevant studies, select studies, 3) chart the data, 4) collate, summarize and report results.
- Thematic analysis focuses on different topics within a subject and their inter-relationships by interpreting the articles. Analysis used to thematically group the articles and content extracted.

Background
- Approximately 10% of the 1.7 million traumatic brain injuries (TBI) that occur each year in the US are considered severe and result in significant disability (CDC, 2016).
- As of 2015, there is no approved drug or device to treat TBI.
- Challenges in demonstrating the effectiveness of drugs and treatments for TBI is the lack of sufficiently precise outcome assessments that are approved as federally qualified endpoints.
- The Glasgow Coma Scale (GCS) and Glasgow Outcomes Scale (GOS) are the most commonly-used measures of neurobehavioral function (NBF) in TBI clinical trials.
- Clinical Outcome Assessments (COAs) are “reported” assessments influenced by human choices, judgment, or motivation and may provide direct of indirect evidence to treatment benefit.
- Four types of COAs: Patient-reported outcome (PRO), Clinician-reported outcome (ClinRO) measures, Observer-reported outcome (ObsRO) measure, Performance outcome (PerfO) measures.
- FDA Federally Qualified Endpoint Measures: Roadmap to patient-focused outcome measurement includes:
- Understanding the disease
- Conceptualizing treatment benefit
- Selecting/Developing outcome measures

Methods
- Indicators and measures
  - Indicators
    - Neurobehavioral rating scales detect behavioral signs of consciousness, while biomarkers are perceived as being more precise measures of the disease not impacted by human factors
    - COAs and biomarkers have potential to measure treatment effect
  - Direct measures

- Figure 1. Search criteria for scoping review adapted using Health Evidence™ (2009)
- Two databases, Scopus and PubMed, were searched using 21 search terms generated from three main concepts: “traumatic brain injury” (n=3), “neurobehavioral function” (n=18), and “outcomes” (n=12).
- Study inclusion criteria:
  - Published within the past 5 years
  - Involving adult humans (>18 years old)
  - Relevant to severe TBI
  - Relevant to DOC
- The initial search identified 229 articles were identified. After the removal of duplicates, 211 articles were retained and reviewed for inclusion.
- 58 met the inclusion criteria. These articles were grouped thematically based on content related to assessment of NBF and recovery of consciousness.
- Four themes were identified: “Predicting Outcomes”, “Non-Pharmacology Treatment”, “Pharmacotherapy”, and “Neural Pathways”.
- Clinical Outcomes were identified within each article and grouped as occurrences related to “clinical outcome assessments”, “biomarkers and biomarkers”, “neuroimaging and neurophysiology”, and “other”.

Results
- Most Commonly Identified Outcome Measures Were Clinical Outcome Assessments
- Figure 2. Frequency of Themes By Article
- Figure 3. Frequency of Outcome Types
- Figure 4. Frequency of Outcome Types
- Figure 5. Frequency of the types of COAs found in the articles.

Discussion
- Current Literature Focuses on Predicting Outcomes
  - The most frequently occurring theme was Predicting Outcomes followed by Non-Pharmacological Treatment.
  - Studies primarily focused on predicting outcomes of patients with TBI. There were many fewer studies describing effective treatments for these patients.
  - The focus on predicting outcomes appears to be off target when current classification of TBI severity and type is blunt and treatments for severe TBI are limited.
- Diversity of Outcome Measures Dilutes Evidence Base
  - This study found a remarkable range in the diversity of reported COAs, biomarkers, neuroimaging and neurophysiology techniques.
  - This creates challenges in comparing results across studies and consequently limits the translation of knowledge into practice.
- Future Directions
  - This study identified a wide range of COAs measuring NBF. The extent to which these assessments address the same content domains and if some domains are poorly addressed remains unknown.
  - Treatments for patients with severe TBI could be developed in parallel with studies aimed at better understanding the brain’s pathways and response to TBI.

Limitations
Search timeframe was limited to studies within the last 5 years.

Articles in the scoping review are not read to analyze bias or the quality of the study.

Breadth of the articles is wide rather than deep.

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References