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

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Analytic Framework

Physiological

• The research question for this review was:
  “What constructs are most frequently used to assess neurobehavioral function in adults recovering consciousness after severe TBI?”

Methods

• This study is designed to capture the range of constructs researchers have used to measure NBF during recovery of consciousness.

• As of 2015, there is no approved drug or device to treat TBI.

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• 50 different COAs were identified but only 3 were reported in more than 25% of the articles (GCS, GOS/GOS-Extended, CRS/CRS-R).

• The GCS and GOS are relatively blunt measures of NBF recovery and the CRS-R has no published sensitivity to change indices.

Background

• 50 different COAs were identified but only 3 were reported in more than 25% of the articles (GCS, GOS/GOS-Extended, CRS/CRS-R).

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• 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 consciousness (CDC, 2016).

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Study Aims

• Treatments for patients with severe TBI could be effective treatments.

• Understanding the mechanisms of pathophysiology in brain injury and neuroplasticity will likely play a critical role in more precise diagnosis and more targeted treatment for these patients.

• There appears to be a gap in the literature regarding precision in severe TBI diagnoses and linking this to brain pathology in order to design more appropriate and effective treatments.

• The most frequently occurring theme was Predicting Outcomes, followed by Non-Pharmacological Treatment and Neuro-imaging & neurophysiology techniques.

• 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.

• The scoping review methodological framework for this study involved 3 broad phases: 1) define 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.

• Analyzed to thematically group the articles and content extracted

• This 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?”

Results

• The majority of incidences of COAs were reported in 10 articles.

• The most frequently reported ClinROs were:
  - Glasgow Coma Scale: 29 articles
  - Coma Recovery Scale- Revised: 21 articles
  - Glasgow Outcome Scale or GOS-Extended: 17 articles

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Diversity of Outcome Measures Dilutes Evidence Base

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Discussion

• Only a few articles were found related to “neural pathways”.

• Understanding the mechanisms of pathophysiology in brain injury and neuroplasticity will likely play a critical role in more precise diagnosis and more targeted treatment for these patients.

• There appears to be a gap in the literature regarding precision in severe TBI diagnoses and linking this to brain pathology in order to design more appropriate and effective treatments.

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

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