Psychometric properties of assessment tools for cognitive impairment after mild Traumatic Brain Injury

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Introduction: Mild Traumatic Brain Injury (mTBI) is common amongst those admitted to rehabilitation hospitals. It is defined, under the umbrella term of Acquired Brain Injury (ABI) as any damage to the brain that occurs after birth. Common causes include work and motor vehicle accidents, stroke, lack of oxygen and degenerative neurological disease.
Cognitive symptoms may be missed, undiagnosed or masked by other symptoms. This can have long term consequences in which most patients experience difficulties with managing complex tasks (e.g. returning to work). Some may experience permanent disability. There is no standardized assessment tool for rehabilitation staff to use for screening of people with mTBI.

Methods: informed by Cochrane guidelines.
Selection criteria: Quantitative studies that included measurement or screening tools with mTBI patients in rehabilitation. Included studies had to be published in peer-reviewed, English language journals.

Search Strategy: Four electronic data bases (CINHAL and MEDLINE, Google Scholar and PubMed) were searched until February 2018. Search terms were based on condition, intervention and setting e.g. mTBI, cognition, measurement, inpatient rehabilitation.

Study selection: Two authors independently identified studies that fulfilled the inclusion criteria.

Data extraction: An independent researcher extracted data into a pre-determined standardised data extraction form.

Data analysis: Two authors evaluated and compared the primary studies to generate a summary of assessment tools based on the following; information about the assessment or tool, psychometric properties and implications for practice.

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Aim - To identify and evaluate a set of core outcome screening tool for assessment of cognitive deficits in people with mTBI within the inpatient rehabilitation setting

Results

From a search yield of 2,823, 45 articles were read in full, 17 articles were included for analysis and 15 assessment tools were identified. From the 15 assessment tools, 7 tools were identified with moderate to high validity and/or reliability (Table 1). The tools were predominantly self-administered questionnaires assessing cognitive, somatic and concussive domains. The psychometric properties of the assessment tools were calculated. The Rivermead Post-concussion symptoms questionnaire was the most researched but results were varied.

Table 1: identified assessment tools

Name of Assessment (number of studies)	Administered by	Number of Items Domains tested	Validity Reliability*
The Rivermead Post-concussion symptoms questionnaire (6)	Patient	16 / Cognitive, affective, somatic, concussion symptoms	Low to high (Construct) High
Swedish Post-Concussion Symptoms Questionnaire (1)	Patient	21 / Cognitive, concussion symptoms, neurological	High (Concurrent) High
Galveston Orientation and Amnesia Test (2)	Clinician	16 or 10 / Cognitive, memory	High (Construct) High
The Patient Competency Rating Scale (3)	Clinician Patient / Carer	30 / Cognitive, affective, self-care, social tasks	Moderate (Concurrent) High
Modification of Patient Competency Rating Scale (1)	Patient	19 / Cognitive, interpersonal, affective	High Moderate to (Construct) High
The Problem Checklist (1)	Patient	43 / Affective, behavioral, cognitive, physical dependency	High (Content) Not reported
The Post-concussion Syndrome Scale/Checklist/Inventory (1)	Patient	97, 9, 16 / Cognitive, affective, somatic	Low (Concurrent) High

*0.01-0.40 Low   0.41-0.60 Moderate   >0.61 High

Implications for research and practice

The construct, concurrent, content validity and reliability of assessment tools are important when evaluating cognition following mTBI. Fifteen tools were identified for use in the inpatient rehabilitation setting.

Research using psychometric testing with Rasch analysis may assist clarification of tool validity. Inter-rater reliability may also be tested in this inpatient setting.

Clinicians are recommended to begin with the Rivermead tool and be informed by their experience and expertise in tool selection.