[a]Dept. of Neurosurgery, Kizawa Memorial Hospital/Chubu Medical Center for Prolonged Traumatic Brain Dysfunction, Minokamo, Gifu, Japan, [b]Dept. of Neurosurgery, Kizawa Memorial Hospital, Minokamo, Gifu, Japan, [c]Dept. of Clinical Brain Sciences, Graduate School of Medicine, Gifu University, Minokamo, Gifu, Japan, [d]Clinical laboratory, Kizawa Memorial Hospital, Minokamo, Gifu, Japan

ABSTRACT

Objectives: Visualization of brain activities in patients with chronic disorders of consciousness is required owing to difficulty in observation of their responses or intentions. This study focused on obtaining overviews of brain activity in the resting state from spontaneous magnetoencephalography (MEG) data by mapping dominant areas of various frequency bands on the whole cerebrum. In addition, the distributions of the maps were compared between vegetative state (VS) and minimally conscious state (MCS).

Methods: Nine patients (eight men, one woman; mean age: 43.0 ± 16.2 years; duration after injury: 21.2 ± 11.1 months; VS 4, MCS 5) were retrospectively analyzed.

Acquired MEG data were recorded with eyes-closed for 5 minutes under pass-band 0.1–330 Hz and sampling frequency of 1 kHz. In the 300 seconds recording time, the middle 100-seconds period was analyzed using Brainstorm, a software working based on Matlab.

After pre-processing (consisting of checking quality of the power spectrum density, Notch filter, Band-pass filter), the power maps were created by estimating the average power of the target period for six frequency bands, namely δ (2–4 Hz), θ (5–7 Hz), α (8–12 Hz), β (15–29 Hz), low-γ (30–59 Hz), and high-γ (60–90 Hz). The power maps were displayed in individual cortex images abstracted from the T1 magnetic resonance image with rainbow colors from blue to red and the maximum set as the median absolute power value among all patients in the frequency band.

Then, the more active areas (yellow and red regions) were visually scored as 0 (<10% red or <50% yellow), 0.5 (>10% and <50% red or >50% yellow), and 1 (>80% red) per 1 lobe of each view from 4 directions (bottom, right, left, top). The total full score was 20 per 1 patient. Patients' scores (added scores in each direction and the total scores of the four directions) were collected, and differences between the VS and the MCS groups were evaluated.

Results: In the slow waves, the scores of the δ wave at the bottom of the brain were slightly higher in VS than in MCS (p-value = 0.149, Mann–Whitney test). Among fast waves, the total scores of the α wave were marginally lower in VS than in MCS (p-value = 0.186, t-test). Both γ waves showed higher scores at the bottom of the brain in MCS than in VS (p-value = 0.056, p-value = 0.089, respectively, t-test).

Conclusions: In the present study, the difference in the brain activity between VS and MCS tended to appear at the bottom of the brain. It was speculated that the comparison of dominant frequency bands at the bottom of the brain could be useful in the estimation of the status of disorders of consciousness caused by severe traumatic brain injury following car accidents.

115 Using a Multifaceted Clinical Concussion Assessment Battery for Adults with Persistent Concussion Symptoms

Kelsey Bryk[a], Scott Passalugo[b], Thomas Buckley[c]

[a]University of Manitoba, Winnipeg, Canada, [b]Boston Children's Hospital, Boston, United States, [c]University of Delaware, Newark, USA

ABSTRACT

Background: A multifaceted battery of post-concussion assessments has been established and utilized in clinical and research settings to acutely assess symptoms, cognitive function, balance, clinical reaction time, and oculomotor function. These have been helpful for acute assessments; however, it remains unclear if they are useful in an adult population with persistent concussion symptoms (PCS). It is estimated that 15–40% of mTBI patients will experience symptoms that persist beyond the normal 10–14-day clinical recovery timeline. The purpose of this study was to identify neurocognitive deficits using a multifaceted clinical post-concussion assessment battery in adults with PCS.

Methods: A sample of 15 adults with PCS (11 females; age: 43.9 ± 11.8 years) and 24 healthy control subjects (16 females; age: 42.1 ± 10.3 years) were recruited. PCS patients sustained a diagnosed mild traumatic brain injury (mTBI) at least 3 months prior to testing; control subjects could not have sustained an mTBI in the last 12 months or have a history of PCS. Participants completed the Rivermead Post-Concussion Symptoms Questionnaire (RPSQ) and the following clinical assessments: Clinical Reaction Time (CRT), King-Devick (KD) Test, and the Vestibular Ocular Motor Screening (VOMS) assessment which includes a measure of near point convergence (NPC); an NPC greater than 5 cm is considered abnormal. A symptom increase of >2 indicates VOMS failure. Independent samples *t*-test were performed on all dependent variables to compare PCS patients and controls; an alpha level was set a priori at .05.

Results: PCS patients reported a significantly worse number ($p < .001$) and severity ($p < .001$) of symptoms on the RPSQ. PCS patients also demonstrated significantly slower average CRT (PCS: 238.3 ± 47.3msec, CI: 212.1–264.5; Controls: 208.3 ± 18.0msec, CI: 200.7–215.9; p = .035), longer KD time to completion (PCS: 74.8 + 51.1 sec, CI: 46.5–103.1; Controls: 46.7 ± 9.0 sec, CI: 42.8–50.5; p = .010), and significantly greater NPC on the VOMS (PCS: 16.8 ± 13.7 cm, CI: 9.3–24.4; Controls: 5.2 ± 8.9 cm, CI: 1.5–9.0; p = .001) than healthy control participants with medium to strong effect sizes (0.385–0.530). Additionally, 10 of 15 (66.7%) PCS patients had an abnormal average NPC of greater than 5 cm, whereas 8 of 24 (33.3%) of healthy controls had an abnormal average NPC of greater than 5 cm. Twelve of 15 PCS patients failed VOMS, whereas no control subject failed VOMS ($p < .001$).

Conclusion: While PCS research has tended to focus on symptoms that patients experience, limited research has examined cognitive impairments in these patients using objective assessments. Our results suggest that patients with PCS have

persistent and subtle cognitive impairments that can be assessed using commonly used clinical post-concussion assessments. Therefore, while measurements of symptoms are typically used to distinguish adults with PCS from healthy individuals, cognitive assessments may also assist in further identifying and quantifying subtle deficits.

116 Practice-Based Evidence. How Well do We Collect Routine Clinical Data and What do Rehab Practitioners Think About the Process? A Service Evaluation

Peter Tucker[a], Emma Brooks, Sophie Gosling

[a]Recolo UK Ltd, Bath, United Kingdom

ABSTRACT

Background: The international collaboration of the Common Data Elements (CDE) group recommend best outcome measures for research in paediatric ABI population (McCauley et al., 2012). Routinely collected clinical data on children can be flawed, uncertain, proximate and sparse 'FUPS' (Wolpert & Rutter, 2018).

Recolo UK Ltd provides community-based neuropsychological rehabilitation for children, young people and young adults. Associates collect data from their assessments and reviews to identify impairments and monitor outcome, using measures recommended by CDE (Gosling, 2015).

Aims to ask: Are the gaps in the clinical dataset? Why? What are barriers and challenges to data collection?

Method: Two phases: frequency counts of data and practitioner interviews. Clients have a wide range of age (0–18 yrs), brain injury type and severity. In clinical practice, associates assessed 267 children with brain injury and their families.

Measures: a) PedsQL, FAD, BRIEF, SDQ, CASP. b) Interview scripts.

Procedure: a) Frequency analysis of questionnaires collected 2013–2019; b) Six associates recruited as 'participants' for semi-structured interview. A purposive sampling method was adopted. Thematic Analysis (Braun & Clarke, 2006) performed.

Results: a) There are large gaps in the database. The totals completed measures at baseline ranges from n = 163–41 (PEDS-FIM-parent; PEDSQL core-child). Most commonly reviewed once were PEDS-FIM, PEDS-QL, and SDQ (n = 35, 34, 28 respectively). b) Five key themes were identified from the interview scripts: impact of outcome measures on clients; construct of outcome measurement; culture of goal setting; helpful aspects of outcome measurement; barriers to data collection.

Conclusions: There were gaps in data collection. The interviews describe barriers and facilitators to data collection. Recommendations are given to address the issues by increasing knowledge and skills, improving the technology and including nomothetic (goals) and idiographic (questionnaire) outcomes.

117 How Good are our Goals? Understanding SMARTness in a Paediatric Neuropsychological Rehabilitation Service

Peter Tucker[a], Katie Byard[a], Sophie Gosling[a], Rebecca Ashton[a], Fergus Gracey[b]

[a]Recolo UK Ltd, Bath, United Kingdom, [b]University of East Anglia, Norwich, United Kingdom

ABSTRACT

Background and aims: Goal setting is a key ingredient in rehabilitation with children and young people (Ylvisaker, 1998). It should be a core competency of any member of a rehabilitation team (Wade, 2009). Goals in rehabilitation should be SMART (Specific, Measurable, Achievable, Realistic and Timed).

This study employed a service evaluation in order to: 1. Examine reliability of goal quality rating items according to established SMART criteria; and 2. Identify goals associated with poorer 'SMARTness' to inform goal setting and audit practice.

Method: As part of a service evaluation cycle, a project was undertaken to evaluate the quality of a sample (n = 100) of anonymised paediatric neuropsychological rehabilitation goals. The text of each goal was rated by four senior practitioners within the service according to criteria set within a goals questionnaire (Grant & Ponsford, 2014). Five items relating to SMARTness were used, with a highest possible score 20.

Results: SMART tool total scores were normally distributed (mean = 12.36; sd = 3.19; range 5–20). Calculation using all five items provided a 'good' inter-rater reliability (ICC = 0.824). Items on the tool attracting low IRR included 'does the goal assess criteria that are process oriented?' (ICC = 0.288). 77% of the goal sample had 'high' to 'excellent' IRR. 68% of these goals (n = 53) were rated as having a high level of SMARTness. 32% (n = 24) were rated as low in SMARTness. Goals with low IRR included those with: generalised wording, e.g. 'to attend all Southend Utd activities as they are planned'; ambiguous goal difficulty, e.g. 'to sit my exams (first mocks then GCSEs) in a way that helps me do my best whilst managing energy levels well'; and poorly defined tasks, e.g. 'mum to be receiving appropriate therapy for depression by X.' Goals rated reliably low on SMARTness had poor goal specificity, e.g. 'to find out good things about my brain, what I do and to like myself.'

Conclusions: Rehabilitation practitioners can use this tool to quantify SMARTness of rehabilitation goals set with children, young people and their families. Not all individual items on the tool have adequate reliability and require modification. It is yet to be determined how SMARTness of goals relate to their meaningfulness to the client or their achievement in rehabilitation.