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# Proceedings of SRR

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## **Cognitive tests as predictors of fitness to drive in people with dementia**

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**Background:** Previous studies have suggested that cognitive tests could be used to advise people with dementia when they should give up their driver's licence. However specific criteria have not been validated in comparison with 'on road' assessment.

**Method:** Thirty-three healthy elderly people (median age 67 years) and 42 people with dementia (median age 73.5) were assessed on a battery of cognitive tests, including measures of memory, concentration, reasoning and perceptual abilities. They were assessed on the road by a driving instructor blind to the cognitive test results. Participants were graded as safe or unsafe to drive.

**Results:** All of the healthy elderly drivers assessed on the road (31) were found safe. Ten of the drivers with dementia were found to be unsafe, 27 were safe and five did not complete the road test. There were significant differences ( $p < 0.05$ ) between healthy elderly and patients with dementia on all except one of the cognitive tests. There were no significant differences between safe and unsafe drivers with dementia on the cognitive tests. Discriminant function analysis indicated that 92% of participants with dementia could be correctly classified as safe or unsafe to drive on the basis of performance on seven tests.

**Discussion:** Performance on individual cognitive tests was not associated with safety to drive. However, a combination of measures was able to differentiate safe from unsafe drivers. Pro-

spective testing of the predictive equation derived with this sample is needed.

**Conclusion:** Cognitive assessment may be used to identify patients with dementia who are likely to be unsafe to drive and require further assessment.

## **Constraint of the hemiparetic upper limb in stroke survivors following discharge from rehabilitation**

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**Background:** Constraint-induced therapy is a relatively new concept that appears to have promising results. This study aimed to investigate the effects of the constraint component in isolation, on the function of the hemiparetic arm of stroke patients, in the home environment.

**Method:** Twenty-nine stroke survivors (mean age 60.3 years, mean chronicity 43.4 months) were randomized into the control ( $n = 15$ ) or intervention group ( $n = 14$ ). Upper limb activity was measured pre and post intervention and at six month follow-up by researchers blind to the group allocation, using an activity monitor, Wolf Motor Function Test (WMFT), Motor Activity Log (MAL), Motor Assessment Scale and Barthel Index.

Both groups were encouraged to use their affected arm as much as possible, were required to wear the activity monitor for 8 h on each week day over a two-week period and had the MAL administered daily. In addition, the intervention group wore a padded mitt on the unaffected limb for 8 h per day.

The Mann–Whitney *U*-test, Wilcoxon signed ranks test and an ANOVA were used in analysis.

**Results:** No significant difference was found between groups on any of the outcome measures. However significant within-subjects results were found for the MAL ( $p=0.014$ ) and WMFT ( $p=0.001$ ) which persisted to six-month follow-up.

**Discussion:** Although no significant effect of the constraint device was demonstrated, all subjects improved on several measures, which may be due to raised awareness to use the hemiparetic limb.

**Conclusion:** Constraint on its own may be of no benefit, although small numbers limit conclusions.

## Internal construct validity of the Rivermead Head Injury Follow up Questionnaire (RHFUQ)

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**Background:** The Rivermead Head Injury Follow Up Questionnaire (RHFUQ) was developed to evaluate functional and social outcomes following head injury. It comprises 10 items with a 5-point rating scale, ranging from 0 (no change) to 4 (a very marked change). Currently there is little evidence of its reliability and validity, we therefore set out to evaluate the internal construct validity of the scale.

**Method:** Three hundred and fifty-eight patients referred for a skull X-ray completed the RHFUQ 3 to 6 months following their head injury. Data were fitted to the Rasch model to assess internal construct validity, including differential item functioning (DIF) by age and gender.

**Results:** RHFUQ scores ranged from 0 to 40 (27% floor, 1.7% ceiling). Response categories were collapsed for 5 out of 10 items due to disordered thresholds. Examination of the RHFUQ at test level showed absence of DIF by gender and age. Overall fit to the model was adequate. ( $\chi^2=61.5$ ,  $p=0.042$ ). Principal components analysis (PCA) of the residuals showed the first residual factor accounting for just 22% of the variation.

**Discussion:** In this predominantly mild head injury group, lower response options 'no change, but more difficult' and 'a mild change' were not discriminating

on five items. There may be scope for removing the 'no change, but more difficult' response option to improve the overall psychometric properties of the scale.

**Conclusion:** The RHFUQ displayed good fit to the Rasch model and items can be summated to indicate the extent of change in functional and social participation following a head injury.

PCA of the residuals confirmed the assumption of local independence and unidimensionality.

## Rasch analysis of the Nottingham Sensory Assessment

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**Background:** Sensory impairment is common after stroke, yet sensory assessment is problematic and often not standardized. The revised Nottingham Sensory Assessment (NSA) is a standardized scale which has good intra-rater and acceptable inter-rater reliability. However its construct validity has not been investigated.

**Method:** Patients with a first stroke were recruited on admission to two Nottingham rehabilitation units. The NSA, an ordinal scale which measures tactile sensations (light touch, temperature, pressure, tactile localisation, and bilateral simultaneous touch) in nine body areas, and proprioception and stereognostic ability, was administered on admission and at 2, 4 and 6 months after stroke. Rasch analysis was used to examine the construct validity of the NSA.

**Results:** Seventy patients were recruited (mean age 71 years (SD 10.00), 36 men). Rasch analysis was conducted on the four NSA subscales (upper limb, lower limb, stereognosis and proprioception). From a total of 59 items, 13 required rescoring and 21 were deleted as they did not fit the Rasch model. The summary fit statistics were nonsignificant for the four subscales. All items functioned consistently over time (ANOVA  $> 0.01$ ).

**Discussion:** The subscales fit the Rasch model, indicating that items belonged to the same construct and the scales had the attributes of order and additivity.

**Conclusion:** The internal construct validity of the NSA is adequate. Patients' total scores for the subscales

can now be calculated. Removing items that did not fit the Rasch model shortened the NSA, providing a more practical assessment tool.

## Stroke patients' experiences of shoulder pain

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**Background:** The literature implies that ineffective care contributes to the development and persistence of post-stroke shoulder pain. As this has not been systematically researched, this qualitative study investigated stroke patients' experiences of shoulder pain and its communication in hospital settings.

**Method:** A purposive sample of 6 women and 10 men with shoulder pain; all patients on a stroke or rehabilitation unit, participated in four focus groups. The subjects were aged 36–81 (median 58) years and time since stroke onset was 3–60 (median 15) weeks. Between them, they had knowledge of 19 different inpatient settings. Two researchers stimulated discussion about pain onset, its impact and clinicians' awareness of it using a topic guide. Discussions were audiotaped, transcribed and coded. Interpretative phenomenological analysis revealed patients' beliefs about their condition and explained pain behaviours in the context of their care.

**Results:** Several patients believed they had been repeatedly injured; sometimes by nurses, without realizing it at the time. Though some interventions were perceived as therapeutic, ignorance of shoulder pain could generate resentment and fear of movement, causing patients to reject intervention. Some became experts in their condition but were deterred from instructing clinicians about it for fear of being thought patronizing. Communication about pain was sporadic and formal assessment rare.

**Discussion:** Education and training of clinicians is needed to raise awareness of shoulder pain and improve handling skills. Regular inquiry about pain symptoms during everyday contact and periodic formal assessment could improve care.

**Conclusion:** Clinicians' ignorance of shoulder pain contributes to stroke patients' distress. This should be redressed.

## The construct validity of the Subjective Index of Physical and Social Outcome (SIPSO)

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**Background:** Studies on stroke subjects aiming to improve their well-being or community support have not been shown to be effective when measures of disability and handicap have been employed. This paper examines the construct validity of a new outcome measure, the Subjective Index of Physical and Social Outcome (SIPSO).

**Methods:** A cross-sectional survey of 445 people (57% male, median age 56) with stroke (1–10 years ago), recruited via NHS stroke registers and young stroke groups (response rate 53%). The SIPSO consists of a physical and social component subscale, each with five items with five response categories. The SIPSO was incorporated into a needs assessment questionnaire. Construct validity was examined using Rasch analysis.

**Results:** *Physical component:* One item required rescaling; two items displayed uniform DIF by gender; this was adjusted for by splitting the items; the resultant subscale fitted the Rasch model ( $\chi^2 = 49.02$ ,  $p = 0.21$ ). *Social component:* Three items required rescaling; two items displayed uniform DIF by gender in opposite directions; a top down purification approach demonstrated that this was canceled out at the test level; the subscale fitted the Rasch model ( $\chi^2 = 41.42$ ,  $p = 0.08$ ).

**Discussion:** The Rasch analysis enabled us to investigate the measurement properties of the scale in depth, adjust for DIF and so resolve the lack of fit to the model.

**Conclusions:** The analysis confirmed the construct validity of the two SIPSO subscales. Further work on its responsiveness needs to be carried out. The measurement of personal experience of integration can be a vital basis for effective clinical care.

## The effect of aerobic treadmill training on walking speed, efficiency and fatigue for people with multiple sclerosis (MS): a randomized, crossover pilot study

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**Background:** Impaired walking and fatigue are reported by people with multiple sclerosis (MS) to restrict mobility and reduce quality of life. Aerobic exercise regimes may provide benefits but few target walking specifically. Aerobic treadmill training (TT) after stroke has been associated with improved walking, but not explored in MS. This study investigated whether aerobic TT could improve walking performance without increasing fatigue for people with MS.

**Method:** A randomized, crossover trial with blinded assessments. After familiarization participants were randomized to immediate (week 0–4) or delayed (week 6–10) TT, with assessments at weeks 5 and 11. Training consisted of 12 sessions up to 30 min of TT at 55–85% of age-predicted maximum heart rate. Primary measures were oxygen consumption ( $\text{ml kg}^{-1} \text{min}^{-1}$ ) and oxygen cost ( $\text{ml kg}^{-1} \text{m}^{-1}$ ) to estimate efficiency walking at self-selected speed. Secondary measures included 10-metre walk time, 2-min distance and the Fatigue Severity Scale.

**Results:** Sixteen adults with MS (aged 30–64, 13 women, 3 men) and impaired walking participated. Within-group analysis pre and post TT showed significantly improved walking oxygen consumption ( $p = 0.03$ ), oxygen cost ( $p = 0.02$ ), 10-m time ( $p = 0.03$ ) and 2-min distance ( $p = 0.02$ ). No significant change in fatigue was found.

**Discussion:** Small numbers and experimental design limit conclusions, but faster 10-m times, greater endurance and reduced energy costs suggest walking became easier. Therefore, as there was no apparent increase in fatigue, TT may have positive effects on lifestyle.

**Conclusion:** This preliminary study suggests aerobic TT can be tolerated and of benefit for some people

with MS, but further research with more participants is needed to generalize findings.

## Validation of the Stroke Drivers Screening Assessment (SDSA) for patients with multiple sclerosis

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**Introduction:** The Stroke Drivers Screening Assessment (SDSA) comprises three cognitive tests found predictive of driving in stroke patients. This study aimed to determine whether the SDSA, either alone or together with other tests, could predict 'fitness to drive' in people with multiple sclerosis (MS).

**Method:** Thirty-four MS participants (17 men) mean age 46, mean 9.3 years since onset were recruited from Derby Regional Mobility Centre and assessed on the SDSA and other cognitive tests. Their 'fitness to drive' on the public road was tested by an Approved Driving Instructor. Correspondence between the SDSA prediction and driving outcome was examined. Mann–Whitney *U*-tests were used to compare cognitive test scores between 'safe' and 'unsafe' drivers. Discriminant analysis was used to determine whether incorporating other cognitive tests increased prediction accuracy.

**Results:** Most safe drivers were correctly classified by the SDSA (specificity 68.2%) but unsafe drivers were not (sensitivity 50%). Significant differences were found between the two groups on tests of executive function (road sign recognition  $U = 65$ ,  $p < 0.01$ ), visual memory (design learning  $U = 85$ ,  $p < 0.05$ ), information processing (IP) ability (AMIPB task 'A',  $U = 70$ ,  $p < 0.05$  and 'B',  $U = 78$ ,  $p < 0.05$ ) and concentration (dot cancellation false positive errors  $U = 77$ ,  $p < 0.01$ ). When IP and design learning scores were incorporated prediction accuracy was 91% (specificity 86%, sensitivity 100%), positive predictive value 0.81, negative predictive value 1.00.

**Discussion:** The SDSA alone was not good at predicting driving performance in people with MS. Including IP and visual memory tests increased prediction accuracy.

**Conclusion:** A useful battery to identify safe MS drivers. Prospective testing needed on an independent sample.