

RUDAS Report and Journal Article Abstracts

Rowland J, Conforti D, Basic D, Vratsidis F, Hill K, LoGiudice D, Russel M, Haralambous B, Prowse R, Harry J and Lucero K. (2007) A study to validate the Rowland Universal Dementia Assessment Scale (RUDAS) in two populations outside the Sydney South West Area Health Service.

A report from South West Sydney Area Health Service and the National Ageing Research Institute to the Australian Government Department of Health and Ageing. This publication was supported by funding from the Australian Government Department of Health and Ageing, under the National Dementia Support Program.

Background: Over recent years there has been a recognised need for new cognitive screening tools to be developed and validated that address identified limitations of existing tools. Limitations have included that tools appear to be influenced by factors such as education level, cultural background and language, and that some important aspects of cognitive function such as frontal lobe function are not assessed. The Rowland Universal Dementia Assessment Scale (RUDAS) was developed to address some of these limitations. Initial results published in 2004 reported high reliability and good prediction accuracy for the RUDAS. A subsequent study in 2006 indicated the RUDAS compared favourably with a commonly used screening tool (the Mini Mental State Examination - MMSE), and indicated that unlike the MMSE the RUDAS did not appear to be influenced by language, education or gender. This project, funded by the Australian Government Department of Health and Ageing through Alzheimer's Australia, involves a further stage of validation for the RUDAS.

Method: The National Ageing Research Institute coordinated recruitment in Melbourne, and the Royal Adelaide Hospital and Alzheimer's Australia SA coordinated recruitment in Adelaide. The primary aim of the project was to validate the RUDAS in regions external to the initial studies (southwest Sydney) and in a broader sample population that included those with mild/moderate cognitive impairment (as earlier studies had samples with a high proportion of people with more severe cognitive impairment). A secondary aim was to compare the RUDAS with two existing cognitive screening tools (the MMSE and the General Practitioners Assessment of Cognition – GPCOG) in its utility and ability to accurately predict cognitive impairment. Ethics Committee approval was obtained for the project.

One hundred and fifty one people met the study inclusion criteria and completed the assessment process. Participants completed a series of cognitive assessments and measures of function and depression, in addition to the RUDAS, MMSE and GPCOG.

Results: Participants had an average age of 77 years, 70% were female, and 42% were from culturally and linguistically diverse (CALD) backgrounds. Forty percent of participants had normal cognition and 60% had some form of cognitive impairment. Based on the Cognitive Dementia Rating scale, 90% of participants with cognitive impairment were classified as having questionable or mild cognitive impairment. Average scores for the full sample on the RUDAS was 23, the MMSE 25, and the GPCOG (two stage process) 7. All three cognitive screening tools were highly correlated.

All three screening tools demonstrated a high level of accuracy in prediction of cognitive impairment against the gold standard classification (DSMIV –TR criteria), and there was no

significant differences between the tools. In analyses exploring the influence of a number of potential factors on the association between scores on the various tools and prediction of cognitive impairment, CALD status was shown to affect the MMSE score, and the participant's depression score was shown to affect the GPCOG score.

Conclusions: Results from this study provide further evidence to support the use of the RUDAS in screening people for cognitive impairment. In terms of the primary aims of the project, the RUDAS was found to have high predictive accuracy in a broader population sample, that included other settings (Melbourne and Adelaide) and a range of cognitive function (including mild to moderate cognitive impairment). In terms of the secondary aim of the project, similar prediction accuracy between the RUDAS, MMSE and GPCOG was demonstrated. However, the RUDAS was not substantially affected (confounded) by other factors in predicting cognitive status, whereas the MMSE and GPCOG were both influenced by other factors. The RUDAS has some advantages in its broad application, in that it does not require presence of an informant (in contrast to the GPCOG), and it does not include items that have potential to cause difficulties for some people with lower education levels or CALD background (in contrast to the MMSE).

Basic D, Khoo A, Conforti DA, Rowland JT, Vrantisidis F, LoGiudice D, Hill K, Harry J, Lucero K, Prowse RJ. (2009) Rowland Universal Dementia Assessment Scale, Mini-Mental State Examination and General Practitioner Assessment of Cognition in a multicultural cohort of community-dwelling older persons with early dementia. *Australian Psychologist*, 44: 40-53.

Early dementia can be difficult to diagnose in older persons from culturally and linguistically diverse (CALD) backgrounds. The Folstein Mini-Mental State Examination (MMSE), the General Practitioner Assessment of Cognition (GPCOG) and the Rowland Universal Dementia Assessment Scale (RUDAS) were compared in 151 older, community-dwelling persons. Receiver operating characteristic (ROC) curve analysis was used to evaluate diagnostic accuracy, while logistic regression was used to evaluate the influence of age, gender, CALD status and years of education. All three instruments were equally accurate in predicting dementia (ROC area under curve 0.92-0.97, $p > 0.05$ for all comparisons). At the recommended cut-offs, the RUDAS was best for ruling in dementia (positive $LR = 8.77$), while the GPCOG was best for ruling out dementia (negative $LR = 0.03$). All three instruments were influenced by concomitant depression. Whereas the MMSE was influenced by CALD status, the RUDAS and GPCOG were not. While the GPCOG combines participant and informant data, the RUDAS is a stand-alone measure specifically designed for, and validated in, multicultural populations.

Rowland JT, Basic D, Storey JE, Conforti DA. (2006) The Rowland Universal Dementia Assessment Scale (RUDAS) and the Folstein MMSE in a multicultural cohort of elderly persons. *International Psychogeriatrics*, 18:111-120.

Objective: To compare the accuracy of the Rowland Universal Dementia Assessment Scale (RUDAS) and the Folstein Mini-mental State Examination (MMSE) for diagnosis of dementia in a multicultural cohort of elderly persons.

Methods: A total of 129 community-dwelling persons were selected at random from a database of referrals to an aged-care team. Subjects were stratified according to language background and cognitive diagnosis, and matched for age and gender. The RUDAS and the MMSE were administered to each subject in random order. Within several days, a geriatrician assessed each subject for dementia (DSM-IV criteria) and disease severity (Clinical Dementia Rating Scale). All assessments were carried out independent and blind. The geriatrician also administered the Modified Barthel Index and the Lawton Instrumental Activities of Daily Living Scale, and screened all participants for non-cognitive disorders that might affect instrument scores.

Results: The area under the receiver operating characteristic curve (AUC) for the RUDAS [0.92, 95% confidence interval (95%CI) 0.85–0.96] was similar to the AUC for the MMSE (0.91, 95%CI 0.84–0.95). At the published cut-points (RUDAS < 23/30, MMSE < 25/30), the positive and negative likelihood ratios for the RUDAS were 19.4 and 0.2, and for the MMSE 2.1 and 0.14, respectively. The MMSE, but not the RUDAS, scores were influenced by preferred language ($p = 0.015$), total years of education ($p = 0.016$) and gender ($p = 0.044$).

Conclusions: The RUDAS is at least as accurate as the MMSE, and does not appear to be influenced by language, education or gender. The high positive likelihood ratio for the RUDAS makes it particularly useful for ruling-in disease.

Storey JE, Rowland JT, Basic D, Conforti DA, Dickson HG. (2004) The Rowland Universal Dementia Assessment Scale (RUDAS): a multicultural cognitive assessment scale. *International Psychogeriatrics*, 16:13-31.

Objective: To develop and validate a simple method for detecting dementia that is valid across cultures, portable and easily administered by primary health care clinicians.

Design: Culture and Health Advisory Groups were used in Stage 1 to develop culturally fair cognitive items. In Stage 2, clinical testing of 42 items was conducted in a multicultural sample of consecutive new referrals to the geriatric medicine outpatient clinic at Liverpool Hospital, Sydney, Australia ($n=166$). In Stage 3, the predictive accuracy of items was assessed in a random sample of community-dwelling elderly persons stratified by language background and cognitive diagnosis and matched for sex and age ($n=90$).

Measurements: A research psychologist administered all cognitive items, using interpreters when needed. Each patient was comprehensively assessed by one of three geriatricians, who ordered relevant investigations, and implemented a standardized assessment of cognitive domains. The geriatricians also collected demographic information, and administered other functional and cognitive measures. DSM-IV criteria were used to assign cognitive diagnoses. Item validity and weights were assessed using frequency and logistic regression analyses. Receiver-operating characteristic (ROC) curve analysis was used to determine overall predictive accuracy of the RUDAS and the best cut-point for detecting cognitive impairment.

Results: The 6-item RUDAS assesses multiple cognitive domains including memory, praxis, language, judgement, drawing and body orientation. It appears not to be affected by gender, years of education, differential performance factors and preferred language. The area under the ROC curve for the RUDAS was 0.94 (95% CI 0.87–0.98). At a cut-point of 23 (maximum score of 30), sensitivity and specificity were 89% and 98%, respectively. Inter-rater (0.99) and test-retest (0.98) reliabilities were very high.

Conclusions: The 6-item RUDAS is portable and tests multiple cognitive domains. It is easily interpreted to other languages, and appears to be culturally fair. However, further validation is needed in other settings, and in longitudinal studies to determine its sensitivity to change in cognitive function over time.