Different Measures of Behavioural Involvement in Amyotrophic Lateral Sclerosis Yield Varying Rates of Behavioural Change

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Introduction

Amyotrophic Lateral Sclerosis (ALS), also known as Motor Neuron Disease (MND), is a progressive and life-limiting neurodegenerative disease which can involve behavioural change.

There are five commonly reported disease-specific screening tools of behavioural change but it is not clear how they differ in rate of detection of behavioural impairment.

Aims

This study set out to investigate the extent to which these measures similarly identify behavioural impairment by examining

i) intercorrelations between scores on the measures completed about the same people with ALS, and

ii) the percentage of people with ALS characterised as impaired on each measure.

Method

The following behavioural screens were completed by 35 carers of people with ALS:

- behavioural component of the ALS-Cognitive Behavioural Screen (ALS-CBS-b) [1]
- behavioural component of the Edinburgh Cognitive and Behavioural ALS Screen (ECAS-b) [2]
- ALS-Frontotemporal Dementia Questionnaire (ALS-FTD-Q) [3]
- Beaumont Behavioural Inventory (BBI) [4]
- MND Behavioural Instrument (MiND-B) [5]

Analysis

Total scores for each measure underwent Spearman correlation analysis.

Classifications of impairment (behavioural impairment [ALSbi] or ALS Frontotemporal Dementia [ALS-FTD]) were determined using published cut-offs. Agreement between measures was determined using Cohen's kappa coefficients.

Results

Associations between the screening tools

The behavioural measures were significantly intercorrelated ($p<0.05$ in all cases) but with differing strengths of association (see Table 1).

The association between the ALS-CBS-b and ALS-FTD-Q was weak to moderate (r=0.41) while other associations between the ALS-FTD-Q, MiND-B, BBI, and ALS-CBS-b were moderate to strong (0.57-0.79).

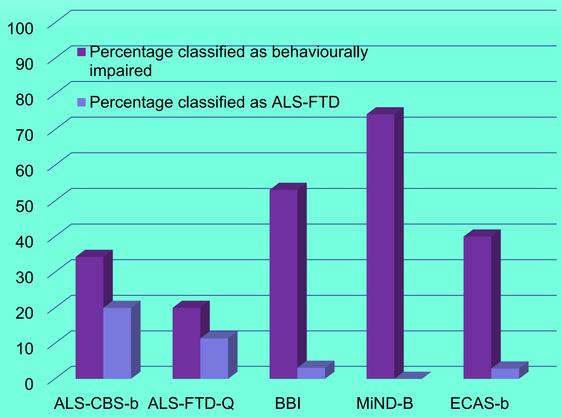

Figure 1: Percentage of the ALS sample classified as behaviourally impaired /ALS-FTD by the different screening tools

Screen 1	Screen 2	Spearman's correlation coefficient (r)	Cohen's kappa coefficient (κ)	
			ALSbi classification	ALS-FTD classification
ECAS-b	ALS-CBS-b	0.36*	0.146	0.211*
ECAS-b	BBI	0.53**	0.442*	1***
ECAS-b	Mind-B	0.44**	0.167	NA
ECAS-b	ALS-FTD-Q	0.48**	0.286	0.371**
ALS-CBS-b	BBI	0.79***	0.569***	0.207
ALS-CBS-b	Mind-B	0.57***	0.207	NA
ALS-CBS-b	ALS-FTD-Q	0.41*	0.058	0.255
BBI	Mind-B	0.60***	0.154	NA
BBI	ALS-FTD-Q	0.60***	0.275	0.368**
MiND-B	ALS-FTD-Q	0.69***	0.159	NA

*Table 1: Spearman's correlation and Cohen's kappa coefficients for the relationships between screening tools for behavioural impairment. ***p<0.001, **p<0.01, *p<0.05*

While the ECAS-b was moderately associated with the BBI (r=0.53), the ECAS-b was only weakly to moderately associated with the ALS-CBS-b, MiND-B and ALS-FTD-Q (0.36-0.48).

The association between ALS-CBS-b and ALS-FTD-Q scores (r=0.41) was similarly in the weak to moderate range.

The ECAS-b and ALS-CBS-b had the weakest intercorrelation (r=0.36) while the BBI and the ALS-CBS-b had the strongest intercorrelation (r=0.79).

Differences between rates of classification of behavioural impairment

Percentages of the sample classified with behavioural impairment (ALSbi) by the measures ranged between 20.0% (ALS-FTD-Q) and 74.3% (MiND-B; see Figure 1 and Table 1).

Percentages of the sample classified with ALS-FTD by the measures ranged between 2.9% (ECAS-b) and 20% (ALS-CBS-b).

Agreement of classification between measures (Cohen's kappa) was mostly fair to moderate (0.21-0.57) although generally better for classifications of ALS-FTD than for milder behavioural impairment.

Between the ECAS-b and BBI there was complete agreement on the classification of ALS-FTD (k = 1.0).

Conclusion

Existing measures of behavioural change in people with ALS may yield very differing conclusions and cannot be assumed to be interchangeable.

Variability in the detection of impairment between measures may result from differing item content, behaviours sampled or cut-off scores for impairment.

This inconsistency between measures may lead to inappropriate healthcare provision and discrepancies in research conclusions.

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