

Application of the Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS) to Pediatric-Onset MS



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Objective

To extend the application of the Brief International Cognitive Assessment (BICAMS) to all MS subgroups we evaluated its usefulness in screening for cognitive impairment in patients with pediatric onset.

Background

The possibility of cognitive impairment is a major concern in MS, including the youngest affected with pediatric-onset MS. There is a need for brief, practical and universal assessment approaches. The BICAMS battery was developed by an international committee as a screening tool to detect cognitive deficits in MS and was validated for use in adults. It includes three tests: Symbol Digit Modalities Test (SDMT) supplemented with the learning trials from the California Verbal Learning Test (CVLT) and the Brief Visuomotor Retention Test-Revised (BVMT-R). An interactive website (www.bicams.net) provides normative scores for those 18 years and older.

Methods

Outpatients at the Lourie Center for the Pediatric MS with a presenting diagnosis of pediatric-onset MS were consecutively recruited to complete a modified version of the BICAMS during routine clinic visits. The adult BICAMS battery was modified by replacing the CVLT-II with the Rey Auditory Verbal Learning Test (RAVLT). While both are verbal list learning tasks, the same RAVLT form can be used in patients as young as 8 years, and the RAVLT also more alternate forms available. Performances were compared to published age-normative data. The BICAMS recommended criterion for cognitive impairment is for at least one of the overall three tests scoring below average.

Results

There were 50 participants with a confirmed diagnosis of pediatric-onset MS. Ages ranged from 10 to 25 years, with a mean of 18.7 ± 3.5 years and a median of 19.1 years. EDSS scores ranged from 0.0 to 4.0 with a median of 1.25. Average disease duration was 4.4 ± 3.2 years.

Referencing published age-normative data provided, z-scores were calculated for the SDMT, RAVLT, and BVMT-R scores, as shown in Table 1. Impairment on a test was defined by scores falling at least one standard deviation below the normative mean. Overall impairment rates are shown in Table 1 and Figures 1.

Using the BICAMS recommended criterion for impairment, fifty-two (52%) of the sample was impaired on at least one test, while 19% were impaired on two or more tests. This rate of impairment is slightly lower range of the rate that has been reported in adult samples (58%). Conversely, when a composite score is created with a mean z score for the three tests, 20% of the sample falls below the average range. This composite rate of impairment is lower than the prior studies of cognitive impairment in pediatric MS using larger testing batteries (in the 30% range).

Among those with only one impaired test (33% of sample), the single impaired test varied: SDMT 21%, RAVLT 36%, BVMT-R 43%, suggesting that the BVMT-R may be the most sensitive to detecting any level of impairment.

Table 1. Mean z scores on the BICAMS measures (n=50).

	Mean z-score	SD	Min	Max
SDMT	-0.37	1.23	-2.76	3.54
RAVLT Total Learning	-0.26	1.39	-3.71	2.19
BVMT-R Total Learning	-0.24	1.28	3.99	1.84

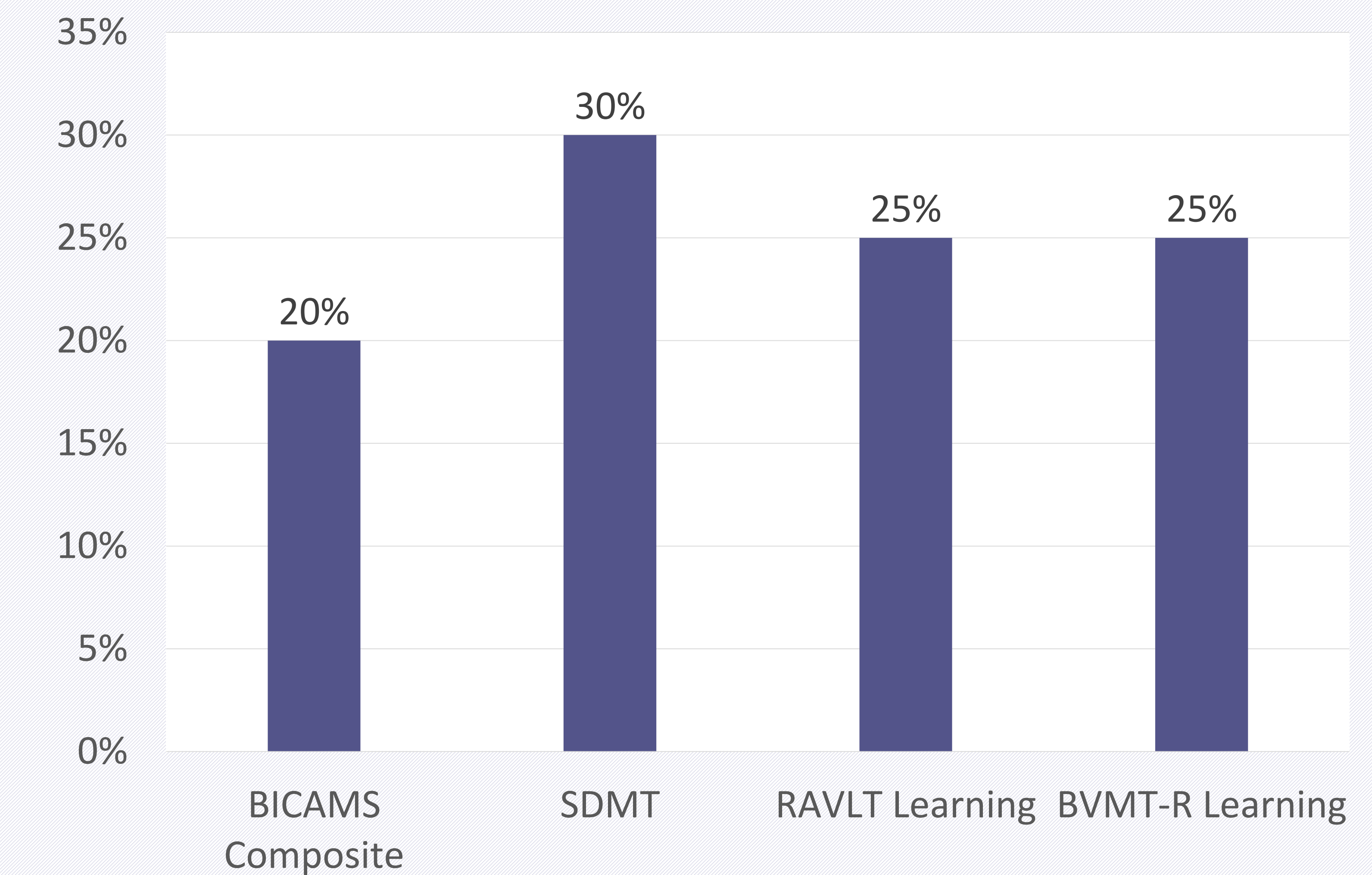


Figure 2. Impairment rates on the BICAMS measures.

Conclusion

- The BICAMS battery is can be readily applied to those with pediatric onset MS
- For a pediatric onset population, A verbal learning task such as the RAVLT that can be uniformly administered across the full age span offers advantages over the CVLT
- The BICAMS impairment rate among a pediatric onset MS sample is slightly lower than that of adult MS (52% vs. 58%).

References

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