Measures of neuropsychological assessment as indicators of success in neuropsychological rehabilitation: an exploratory correlational study

Mendes L.[1], Barbosa F.[2], Reis, L.P.[3]

[1]Portugal Psychosocial Rehabilitation Lab, FPCEUP/ESTSP–IPP, Porto, Portugal
[2]Laboratory of Neuropsychophysiology, Faculty of Psychology and Educational Sciences, University of Porto, Portugal
[3]School of Engineering, University of Minho - DSI, Portugal, LIACC - Artificial Intelligence and Computer Science Lab, UP
[1]*lilianapvmendes@ifr.pt*

Introduction

Neuropsychological assessment not only allows diagnosing possible neurocognitive impairments in domains such as attention, working memory, and executive functions, but can also provide useful information for the neuropsychological rehabilitation. By applying a set of valid neuropsychological tests to individuals with Acquired Brain Injury (ABI), and subsequently studying how patients' performance in rehabilitation programs relates with measures that are commonly provided by these tests, we may obtain valuable predictors of individual success that can be considered in neuropsychological rehabilitation.

Bearing this in mind, it is important to identify which measures of neuropsychological assessment can best guide the therapists in the selection of neuropsychological rehabilitation tasks, and in adjusting its difficulty to the potential of each person with ABI.

Methods

Eight ABI participants, with age range from 21 to 57 years old, went through a neuropsychological assessment comprising the following tests: Montreal Cognitive Assessment – MoCa, Wechsler Memory Scale - 3rd edition (WMS III), Trail Making Test - Forms A and B (TMT-A and TMT-B), D2 Test, Wisconsin Card Sorting Test - WCST, and STROOP Colour-Word test. The sequence of the tests was balanced between subjects to control for order effects.

Subsequently, all participants took part in a neuropsychological rehabilitation program comprising several Attention, Working Memory and Executive Function Tasks, organized in increasing levels of difficulty. The level that each participant was able to successfully achieve in each cognitive domain was considered a measure of individual performance in the rehabilitation program. These data were retrospectively correlated with the initial scores

of the neuropsychological assessment in order to identify which ones relate the best with the participants' performance in the rehabilitation program.

Results

The results show a significant correlation between MoCa scores and performance in the working memory tasks. We also found strong associations between D2 and STROOP scores, and the rehabilitation of working memory. Finally, WMS-letters and numbers scores were strongly correlated with the level that participants were able to achieve in Executive Function tasks at the end of the neuropsychological rehabilitation program. No other test scores were significantly correlated with performance in the neuropsychological rehabilitation

Table 1: Correlation coefficients between measures of neuropsychological assessment and performance on tasks of different cognitive domains of the rehabilitation program.

	Attention	Working memory	Executive function
MOCA	-0.19	0.72**	0.65*
TMT-A	0.39	-0.85	-0.78
TMT-B	-0.03	-0.84	-0.81
WMS III_Total Spacial	0.36	0.41	0.31
WMS III_Letters and Numbers	0.04	0.76**	0.73*
STROOP_ Colour-Word	-0.49	0.79**	0.86*
WSCT_Perseverative Errors	-0.08	-0.37	-0.30
WSCT_Complete Numbers Categories	0.28	0.29	0.12
D2_Gross Results	-0.06	0.77**	0.59

*p<.05
**p<.01

Conclusions

From this exploratory retrospective correlation study, we found that results from MoCa, STROOP and D2 might provide good predictors of patients' performance on working memory rehabilitation, while the WMS-letters and numbers subscale may predict how well ABI patients perform Executive Function tasks. Neurocognitive rehabilitation is a difficult endeavour, particularly when it is not well adjusted to individual weaknesses and strengths. This adjustment must be based on a proper neuropsychological assessment. Therefore a better understanding of the information that can be extracted from neuropsychological measures allows a smoother adjustment of

cognitive rehabilitation exercises and helps establishing feasible goals for each individual.

Acknowledgements: neuropsychological rehabilitation, neuropsychological assessment.

References

(1) Ben-Yishay, Y. (2000). Post acute neuropsychological rehabilitation: A holistic perspective: In A.L. Christensen and B. Uzzell (Eds.) International Handbook of Neuropsychological Rehabilitation. Kluwer Academic/Plenum, Publishers: New York.

(2) Cicerone, K.D., Dahlberg, C., Kalmar, K., Langenbahn, D.M., Malec, J.F., Bergquist, T.F., Felicetti, T., Giacino, J.T., Harley, J.P., Harrington, D.E., Herzog, J., Kneipp, S., Laatsch, L., & Morse, P.A. (2000). Evidence-Based Cognitive Rehabilitation: Recommendations for Clinical Practice. *Archives of Physical Medicine and Rehabilitation, 81,* 1596-1615.

(3) Meulemans, T. & Seron, X. (2004). *L´examen neuropsychologique dans le cadre de l´expertise médico-légale*. Belgique: Pierre Mardaga.

(4) Prigatano, G.P. (2005). Disturbances of self-awareness and rehabilitation of patients with traumatic brain injury – A 20 year perspective. *Journal of Head Trauma Rehabilitation, 20(1),* 19-29.

(5) (Wilson, B. (2003). The theory and practice of Neuropsychological Rehabilitation: an overview. In Wilson, B. (Ed.), *Neuropsychological Rehabilitation – Theory and Practice* (pp. 1-10). Lise, The Netherlands: Swets & Zeitlinger.