BJPsych | The British Journal of Psychiatry (2016) 209, 84–86

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Edited by Kiriakos Xenitidis and Colin Campbell

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ECT, cognitive function and neuropsychological testing

Patients are often concerned about possible negative effects of electroconvulsive therapy (ECT) on their cognitive performance, and as a result may sometimes be referred for neuropsychological testing. It can frequently prove difficult to advise patients, not only because of the emotion surrounding ECT, but also because of the complexities involved in interpreting neuropsychological test results in this clinical group, where many variables affect test scores, including of course depression itself. Kirov *et al*[1] report potentially very important data from their excellent long-term study to inform how we advise our patients about ECT, cognition and neuropsychological testing. These data are largely very reassuring, particularly in view of the number of important known confounds they controlled for in their study, and were mostly in accordance with previous findings. However there remain a few issues pertaining to specifically neuropsychological testing that may need further exploration in future studies.

The first issue relates to the accepted current practice in cognitive assessment, that in order to more meaningfully interpret an individual patient's neuropsychological test performance, and specifically detect likely significant change, patients need to be compared against their own pre-morbid level of general cognitive ability (or 'norm'). To achieve this, clinicians use tools such as language-based tests, demographic formulas or the 'best performance method' described by Lezak *et al*[2] to determine pre-morbid intellectual function. Although there were baseline assessments as part of the protocol, the present study does not provide any such data regarding the more individual comparison standard of a patient's pre-morbid general cognitive ability. It is acknowledged, however, that these data might be difficult to obtain and interpret for many patients in this clinical population.

Clinically meaningful change on test performance, as opposed to statically significant change, can sometimes be difficult to detect. Furthermore, change on a given test with repeated testing can be more difficult to identify if the baseline scores are already well below average – the well-known 'floor effect' seen when testing patients with widely distributed low performance over different cognitive domains. In Kirov and colleagues' study, their Trail Making Test data, when compared with normative data,[3] seem to be potentially already below average at baseline. Again, this might have been a function of participants' depression or other factors that are known to affect performance on a test with high sensitivity such as the Trail Making Test, rather than an already present cognitive impairment related to brain injury. Nevertheless, this possible difficulty with interpreting test performances that may be below the norm at baseline probably needs consideration in the design of future studies.

Potentially related to the above point, it would be helpful to know a bit more about the cognitive performance of a specific subgroup of participants. How many of the 199 patients in the reported study who had never had ECT prior to baseline cognitive testing were there, and when analysing the data from this subgroup what were the findings? While the paper does report a large number of assessments, of which the highest number (122) were with patients who had never had previous ECT, the actual number of patients with no previous ECT was not entirely clear. Perhaps in future studies it would be possible to assess ECT-naive patients for pre-morbid general intellectual ability as a comparison standard to inform the interpretation of subsequent serial neuropsychological test performances. Finally, ECT-naive patients may also, at baseline testing, potentially be further away from floor-level normative data, which could, if showing no significant change over time, provide further evidence to build on the findings from the current landmark study. Such findings may further reassure patients, their families and clinicians when considering cognition and ECT.

1 Kirov GG, Owen L, Ballard H, Leighton A, Hannigan K, Llewellyn D, et al. Evaluation of cumulative cognitive deficits from electroconvulsive therapy. *Br J Psychiatry* 2016; **208**: 266–70.

2 Lezak MD, Howieson DB, Bigler ED, Tranel D. *Neuropsychological Assessment* (5th edn). Oxford University Press, 2012.

3 Tombaugh TN. Trail Making Test A and B: Normative data stratified by age and education. *Arch Clin Neuropsychol* 2004; **19**: 203–14.

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doi: 10.1192/bjp.209.1.84

Authors' reply: We agree with most points Dr Coetzer raised, especially that future studies should include more sensitive tests, as there could be subtle cognitive functions that are affected by ECT, which our tests didn't pick up. We fully support the need to obtain comprehensive baseline assessments with as many cognitive tests as possible. These should be repeated around each new course, or at regular intervals for maintenance ECT. This will serve as a safety measure if deterioration is noticed, and give reassurance if no problems are found. The latest Electroconvulsive Therapy Accreditation Service (ECTAS) guidelines reflect this change in practice and recognise the need for standardised assessment pre- and post-ECT. The current guidelines on cognitive testing are not prescriptive about the assessment tool used. At each revision of the ECTAS guidelines, there is much debate about cognitive assessments and we can only encourage the use of more comprehensive tests.

Regarding Dr Coetzer's suggestion that pre-morbid performance be used as a baseline, this is another excellent suggestion, but the comparison might not always be meaningful. Cognitive performance changes with age, with the development of vascular or degenerative changes in later life, due to the depression and other illness-related factors. We therefore feel that assessments closer to the start of the ECT session would be more meaningful for comparison purposes. Baseline assessments are likely to be performed at a time when the patient is depressed, causing further problems. We can't see an easy way out of this problem, therefore we suggest that repeated assessments after each course (i.e. at times when patients are relatively free from depression) will provide a better picture of any potential effect from repeated ECT courses.

Regarding the question on how many patients who had never had ECT were included for testing, the number is indeed 122, as

https://doi.org/10.1192/bjp.209.1.84 Published online by Cambridge University Press