

# Indications and expectations for neuropsychological assessment in epilepsy surgery in children and adults: Executive summary of the report of the ILAE Neuropsychology Task Force Diagnostic Methods Commission: 2017-2021

Sallie Baxendale<sup>1</sup>  | Sarah J. Wilson<sup>2,3</sup> | Gus A. Baker<sup>4</sup> | William Barr<sup>5</sup> | Christoph Helmstaedter<sup>6</sup> | Bruce P. Hermann<sup>7</sup> | John Langfitt<sup>8</sup>  | Gitta Reuner<sup>9</sup> | Patricia Rzezak<sup>10</sup> | Séverine Samson<sup>11,12</sup> | Mary-Lou Smith<sup>13</sup>

<sup>1</sup>Department of Clinical and Experimental Epilepsy, Institute of Neurology, University College London, London, UK

<sup>2</sup>Melbourne School of Psychological Sciences, The University of Melbourne, Melbourne, Victoria, Australia

<sup>3</sup>Comprehensive Epilepsy Program, Austin Health, Melbourne, Victoria, Australia

<sup>4</sup>University Department of Neurosciences, Walton Centre for Neurology and Neurosurgery, Liverpool, UK

<sup>5</sup>Departments of Neurology and Psychiatry, New York University School of Medicine, New York, New York

<sup>6</sup>Department of Epileptology, University of Bonn, Bonn, Germany

<sup>7</sup>Department of Neurology, School of Medicine and Public Health, University of Wisconsin–Madison, Madison, Wisconsin

<sup>8</sup>Departments of Neurology and Psychiatry, University of Rochester School of Medicine, Rochester, New York

<sup>9</sup>Medical Department, University of Heidelberg, Heidelberg, Germany

<sup>10</sup>Institute and Department of Psychiatry, University of São Paulo Faculty of Medicine Clinics Hospital, São Paulo, Brazil

<sup>11</sup>Epilepsy Unit, AP-HP Pitié-Salpêtrière-Charles Foix Hospital, Paris, France

<sup>12</sup>Neuropsychology and Auditory, Laboratory PSITEC, University of Lille, Lille, France

<sup>13</sup>Department of Psychology, University of Toronto Mississauga and Neurosciences and Mental Health Program, Hospital for Sick Children, Toronto, Ontario, Canada

## Correspondence

Sallie Baxendale, Institute of Neurology, UCL, Queen Square, Chesham Lane, Chalfont St Peter, Buckinghamshire SL9 0RJ, UK.

Email: s.baxendale@ucl.ac.uk

The role of the neuropsychological assessment in the presurgical evaluation of epilepsy surgery candidates has evolved over time, and this is now a mandatory part of the preoperative evaluation of epilepsy surgery patients. A comprehensive neuropsychological assessment provides a baseline against which changes in postoperative function can be identified and expectations of postoperative change can be managed. The presurgical assessment also contributes to seizure lateralization, localization, and characterization, and provides evidence-based predictions of cognitive risk associated with the proposed surgery, including screening for amnesic risk. Baseline neuropsychological scores should be interpreted in the light of the results from all of the other presurgical

evaluations to evaluate their lateralizing or localizing significance in terms of underlying pathology. Many different factors can combine to create the same profile of strengths and weaknesses within a neuropsychological profile. It is only when the neuropsychological test scores are interpreted through the lens of the full clinical history of the patient and the results of other investigations that the lateralizing and localizing significance of the neuropsychological profile becomes clear. The results from the presurgical neuropsychological assessment create the evidence base for preoperative counseling. This counseling should include explorations of the risks, benefits, and likely cognitive costs of surgery and explorations of patient and family expectations of surgical treatment.

A neuropsychological assessment should comprise standardized measures of cognitive function. In the surgical setting, in addition to formal neuropsychological test scores, behavioral measures of function are useful, together with subjective ratings of the patients' difficulties. The latter are particularly important given the generally poor correlation between performance on formal neuropsychological tests and memory complaints. It is also important to ascertain baseline levels of social cognition and behavioral executive functions, particularly prior to frontal lobe resections. The presurgical neuropsychological assessment should also include formal measures of mood and health-related quality of life. The measures used to establish these baselines should be standardized on appropriate populations to provide a reliable and accurate measure of the impact of the patients' epilepsy on the core domains of day-to-day function.

The scheduling of the preoperative neuropsychological assessment should be carefully planned. Clinicians should be cognizant of the proximity of the assessment to seizures and any associated sleep deprivation and the impact that these factors may have on test performance. Assessment conducted while a patient is undergoing video-electroencephalographic (EEG) monitoring is recommended wherever possible, to allow for the effect of subclinical EEG abnormalities on cognitive function.

The surgical decision-making process must be based upon up-to-date information. Ideally, in adult populations, surgical decisions should not be based on the results of neuropsychological assessments that are >18 months old. Reassessments will be required following events that are likely to have had a significant impact on cognitive function, such as a period of status epilepticus. The interval between the neuropsychological assessment and the surgical decision-making process should be shorter in pediatric populations, with an interval of no more than 1 year and ideally much less in younger children, given the dynamic development of cognitive function in this population.

Our understanding of the etiology of the cognitive and behavioral problems in epilepsy is based on a complex multifactorial model where the epilepsy syndrome, the underlying brain disorder, the characteristics of the epilepsy, and aspects of brain development must all be considered in the interpretation of neuropsychological test scores, together with the treatments for the condition. These factors and their interactions determine the patients' cognitive state prior to surgery and their prognosis afterward.

If the presurgical neuropsychological assessment indicates that the patient is at high risk of postoperative deterioration in cognitive function, cognitive rehabilitation can be implemented prior to surgery to prepare the patient for the anticipated losses; this has been termed prehabilitation, or prehab. The prehabilitation approach has the advantage of utilizing functions before they are lost to establish the compensatory cognitive routines and strategies that the patient

will need after surgery. Patients and their families should also be prepared prior to surgery for any anticipated postoperative deterioration in mood, or likely difficulties with vocational or psychosocial adjustment.

The assessment of neuropsychological and psychosocial outcomes following surgery should be an integral part of the postoperative follow-up. The same principles that inform the comprehensive nature of the preoperative neuropsychological assessment should guide the assessment of postoperative outcome. The postoperative evaluation should assess all aspects of cognitive and behavioral function, as assessed prior to surgery. In addition to all of the factors that influence an individual's neuropsychological profile in a presurgical assessment, the nature, timing, and extent of the surgery and other facets of postoperative outcome, particularly seizure control, must be considered in the interpretation of the results from a postoperative neuropsychological assessment. Neuropsychological changes following surgery are dynamic, and careful consideration should be given to the potential impact of the interval since surgery on the results of any postoperative neuropsychological assessment. The neuro-psychologist plays a key role in the postoperative rehabilitation and support of the patient and family members in their adjustment to the neuropsychological and social changes brought about by surgery and should work closely with other members of the multidisciplinary team. The checklist below summarizes the recommendations of the task force for best practice in the neuropsychological assessment of patients prior to and following epilepsy surgery today (Appendix). This paper is an executive summary of the full report of the ILAE Neuropsychology Task Force, published in *Epileptic Disorders* in June 2019<sup>1</sup>.

## CONFLICT OF INTEREST

All of the authors are currently serving on the ILAE Neuropsychology Task Force 2017-2021. C.H. reports grant support from the EU, honoraria from UCB, Eisai, GW Pharma, and Precisis for counseling and advisory board activities, travel support from Desitin, a honorarium for editorial work for the journal *Seizure* (Elsevier), honoraria from insurance companies and court for testimonies, license fees from UCB and Eisai. None of the other authors has any conflict of interest to declare. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

Read the full report at [https://www.jle.com/en/revues/epd/e-docs/indications\\_and\\_expectations\\_for\\_neuropsychological\\_assessment\\_in\\_epilepsy\\_surgery\\_in\\_children\\_and\\_adults\\_report\\_of\\_the\\_ilae\\_neuropsychology\\_task\\_force\\_diagnostic\\_methods\\_commission\\_2017\\_2021\\_neuropsychological\\_assessment\\_in\\_epilepsy\\_surgery\\_314843/article.phtml](https://www.jle.com/en/revues/epd/e-docs/indications_and_expectations_for_neuropsychological_assessment_in_epilepsy_surgery_in_children_and_adults_report_of_the_ilae_neuropsychology_task_force_diagnostic_methods_commission_2017_2021_neuropsychological_assessment_in_epilepsy_surgery_314843/article.phtml)

## ORCID

Sallie Baxendale  <https://orcid.org/0000-0002-9930-6469>

John Langfitt  <https://orcid.org/0000-0002-7718-9716>

## REFERENCE

1. Baxendale SA, Wilson SJ, Baker GA, Barr W, Helmstaedter C, Hermann BP, et al. Indications and expectations for neuropsychological assessment in epilepsy surgery in children and adults: report of the ILAE Neuropsychology Task Force Diagnostic Methods Commission: 2017-2021. *Epileptic Disord.* 2019;21:221–34.

## APPENDIX

### Checklist

Checklist of the indications and expectations for neuropsychological assessment in epilepsy surgery in children and adults:

“Must” denotes a mandatory minimum requirement.

“Should” denotes best clinical practice.

“May” denotes helpful in some cases.

Function	Considerations
Presurgical assessment	<ul style="list-style-type: none"> <li>• Must be up-to-date</li> <li>• Function in all cognitive domains should be assessed</li> <li>• Should include objective and subjective measures of cognitive function</li> <li>• Should include formal measures of psychosocial function and health-related quality of life</li> <li>• Must also include parental/caregiver evaluations of behavior and ability in pediatric populations</li> <li>• Teacher/educator evaluations may also be helpful in some cases in pediatric populations</li> </ul>
Baseline for outcome comparison	<ul style="list-style-type: none"> <li>• The timing of the formal assessment with respect to the proximity to the last seizure and medication effects will impact on the stability of the baseline measurements and must be considered in the interpretation of results</li> </ul>
Contribution to seizure characterization, lateralization, and localization	<ul style="list-style-type: none"> <li>• Results must be interpreted in a developmental context</li> <li>• The organic/nonorganic and static/dynamic influences on function must be examined in the interpretation of results from the preoperative assessment</li> </ul>
Identification of cognitive risks associated with the procedure	<ul style="list-style-type: none"> <li>• The preoperative baseline data should be used to predict the likely cognitive outcomes and identify the primary cognitive risks associated with the procedure</li> <li>• Predictive models and nomograms may aid these predictions in adults undergoing standardized operations</li> <li>• Amnesic risk must be identified in temporal lobe surgery candidates</li> </ul>
Feedback and preoperative counseling	<ul style="list-style-type: none"> <li>• Should include explanation of the results of the presurgical assessment and education about the etiology of cognitive and functional deficits identified</li> <li>• Must include detailed discussion of any predicted cognitive changes following surgery</li> <li>• Must include discussion of the patient (and their families’) expectations of surgery</li> <li>• May include prehabilitation for anticipated cognitive losses or psychosocial difficulties</li> </ul>
Postsurgical assessment	<ul style="list-style-type: none"> <li>• Should evaluate all aspects of cognitive and behavioral function assessed prior to surgery</li> <li>• Change must be identified using reliable methods</li> <li>• The nature of the surgery and postoperative seizure outcome must be considered in the interpretation of the postoperative results</li> <li>• The timing of the postoperative assessment will have a significant impact on the results and must be considered in the interpretation of the results</li> <li>• The longer the follow-up, the more accurate the picture of postoperative outcome that emerges</li> <li>• It may take at least 5 years after the surgery for quantifiable changes in health-related quality of life to become evident in adults and for cognitive changes to emerge in children</li> <li>• Psychotherapeutic input may be required in some cases to help surgical candidates maximize their postoperative potential</li> </ul>