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Objective: To apply the new IC-CoDE cognitive diagnostic taxonomy (Norman et al., 2020) to a large cohort of people with temporal lobe epilepsy (TLE) in India. The IC-CoDE taxonomy of cognitive diagnoses for 1,409 English-speaking adults with TLE from seven epilepsy centres in the U.S. has been published (McDonald et al., 2022). Initial results suggest that the IC-CoDE produces stable cognitive phenotypes across centres; however, its international applicability, including the suggested impairment cut-off needs to be considered across cultures and languages to avoid misclassification. The aim of this study was to apply the IC-CoDE to a population, outside of the U.S., diverse in language representation (i.e., bi/multi-lingual), assessment tools, normative data, and educational and cultural backgrounds to determine whether the same cognitive phenotypes and their relative frequencies would emerge.
Participants and Methods: Data from 549 adults with TLE (mean age=27.14 (8.04), 60.47% males) from a tertiary referral hospital in Mumbai, India who had undergone a comprehensive neuropsychological evaluation (minimum two tests in at least 4 of the 5 cognitive domains: memory, language, executive function, attention/processing speed and visuospatial) were analysed using the IC-CoDE criteria. The base rate of impairment for individual tests was calculated using a cutoff of 1.5 standard deviations (S.D.) below the normative mean. The cognitive diagnostic criteria were applied, and the distribution and base rate of cognitive phenotypes was compared to the published taxonomy data from the U.S. (McDonald et al., 2022).
Results: In comparison to the U.S. cohort, the India group was relatively younger, lower in the education level, had a younger age at seizure onset and a shorter duration of the epilepsy. Application of the IC-CoDE taxonomy using a 1.5 S.D. cutoff revealed an Intact cognitive profile in 48% of patients, Single Domain impairment in 32%, Bi Domain impairment in 15% and Generalised impairment in 5%. These findings were mostly comparable to percentages reported in the U.S. cohorts with Intact profile (47%; c2= 0.158, p=0.690), Single Domain (29%; c2= 46.26, p<0.01), Bi Domain (16%; c2= 0.298, p=0.585) and Generalised (8%; c2= 5.347, p=0.021) impairment. However, the most common impairment in the Single Domain group for the bi/multilingual India population was Memory (38%) followed by Attention (20%) and then Language (13%), diverging from the distribution in the U.S. data with maximum impairment in Language (49%) followed by Memory (32%) in the Single Domain Group.
Conclusions: These findings demonstrate that the IC-CoDE can be applied internationally, and the broad taxonomy of cognitive diagnosis holds even in a culturally, linguistically diverse population. Differences in rates of impairments across specific domains emerged with language relatively preserved in the India bi/multilingual population, and memory more frequently impaired than observed in the multi-centre U.S. sample. These findings may reflect differences in demographics, rates of bi/multilingualism, normative data, language tools, or underlying neuropathology, which should be further explored to determine their impact on cognitive profiles.

Categories: Epilepsy/Seizures
Keyword 1: cross-cultural issues
Keyword 2: epilepsy / seizure disorders
Keyword 3: cognitive functioning
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3 Latent Wechsler Profiles in Presurgical Pediatric Epilepsy

https://doi.org/10.1017/S1355617723004290 Published online by Cambridge University Press

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Objective: The Pediatric Epilepsy Research Consortium (PERC) Epilepsy Surgery Database Project is a multisite collaborative that includes neuropsychological evaluations of children presenting for epilepsy surgery. There is some evidence for specific neuropsychological phenotypes within epilepsy (Hermann et al, 2016); however, this is less clear in pediatric patients. As a first step, we applied an empirically-based subtyping approach to determine if there were specific profiles using indices from the Wechsler scales [Verbal IQ (VIQ), Nonverbal IQ (NVIQ), Processing Speed Index (PSI), Working Memory Index (WMI)]. We hypothesized that there would be at least four profiles that are distinguished by slow processing speed and poor working memory as well as profiles with significant differences between verbal and nonverbal reasoning abilities.
Participants and Methods: Our study included 372 children (M=12.1 years SD=4.1; 77.4% White; 48% male) who completed an age-appropriate Wechsler measure, enough to render at least two index scores. Epilepsy characteristics included 84.4% with focal epilepsy (evenly distributed between left and right focus) and 13.5% with generalized or mixed seizure types; mean age of onset = 6.7 years, SD = 4.5; seizure frequency ranged from daily to less than monthly; 53% had structural etiology; 71% had an abnormal MRI; and mean number of antiseizure medications was two. Latent profile analysis was used to identify discrete underlying cognitive profiles based on intellectual functioning. Demographic and epilepsy characteristics were compared among profiles.
Results: Based on class enumeration procedures, a 3-cluster solution provided the best fit for the data, with profiles characterized by generally Average, Low Average, or Below Average functioning. 32.8% were in the Average profile with mean index scores ranging from 91.7-103.2; 47.6% were in the Low Average profile with mean index ranging from 80.7 to 84.5; and 19.6% were in the Below Average profile with mean index scores ranging from 55.0-63.1. Across all profiles, the lowest mean score was the PSI, followed by WMI. VIQ and NVIQ represented relatively higher scores for all three profiles. Mean discrepancy between indices within a profile was as large as 11.5 IQ points. No demographics or epilepsy characteristics were significantly different across cognitive phenotypes.
Conclusions: Latent cognitive phenotypes in a pediatric presurgical cohort were differentiated by general level of functioning; however, across profiles, processing speed was consistently the lowest index followed by working memory. These findings across phenotypes suggest a common relative weakness which may result from a global effect of antiseizure medications and/or the widespread impact of seizures on neural networks even in a largely focal epilepsy cohort; similar to adult studies with temporal lobe epilepsy (Hermann et al, 2007). Future work will use latent profile analysis to examine phenotypes across other domains relevant to pediatric epilepsy including attention, naming, motor, and memory functioning. These findings are in line with collaborative efforts towards cognitive phenotyping which is the aim of our

https://doi.org/10.1017/S1355617723004290 Published online by Cambridge University Press

PERC Epilepsy Surgery Database Project that has already established one of the largest pediatric epilepsy surgery cohorts.

Categories: Epilepsy/Seizures
Keyword 1: epilepsy / seizure disorders - surgical treatment
Keyword 2: intellectual functioning
Keyword 3: pediatric neuropsychology
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4 Preoperative International Classification of Cognitive Disorder in Epilepsy (IC-CoDE) Phenotype is Associated with Postoperative Memory Decline Following Temporal Lobectomy

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Objective: The International Classification of Cognitive Disorder in Epilepsy (IC-CoDE) is a new consensus-based taxonomy that classifies patients into one of four cognitive phenotypes (i.e., cognitively intact, single-domain impairment, bi-domain impairment, generalized impairment). The IC-CoDE has been effectively applied to patients with temporal lobe epilepsy (TLE), but little is known about the relationship between pre-operative cognitive phenotype and post-operative cognitive outcome following epilepsy surgery. The purpose of this study was to examine whether the IC-CoDE classifications are related to memory decline following surgery for TLE.
Participants and Methods: 347 patients (ages 16-66; 57% female) with pharmacoresistant TLE completed comprehensive pre- and post-surgical neuropsychological assessments. Patients were classified into IC-CoDE phenotypes based on pre-surgical pattern of cognitive impairment using a threshold of ≥1.5 standard deviations (SD) below the normative mean. Change scores were calculated from delay trial scores of the following memory tests: Rey Auditory Verbal Learning Test (RAVLT), and Logical Memory (LM) and Verbal Paired Associates (VPA) subtests from the Wechsler Memory Scale - Third Edition (WMS-III). Cutoffs were applied using epilepsy-specific reliable change indices and patients were classified within the 'decline' group if they experienced significant decline on any of the three memory measures.
Results: The distribution of IC-CoDE phenotypes in our sample were as follows: 57% intact, 29% single-domain, 10% bi-domain, and 5% generalized impairment. 108 patients (31%) demonstrated post-surgical memory decline. Patients who underwent dominant temporal lobectomy were more likely to show post-surgical memory decline compared to non-dominant temporal lobectomy. However, there was no significant difference in phenotype distribution between patients who underwent left versus right-sided resections; thus, analyses were conducted on the entire sample to increase power. Chi-square analyses revealed unique patterns of post-surgical memory decline across phenotypes, $X^2 = 8.79$, $p = .032$. There was a significantly higher proportion of patients with memory decline in the single-domain phenotype (39%) and this was followed by the bi-domain phenotype (33%) and the intact phenotype (29%). In contrast, patients with generalized impairment were unlikely to show memory decline (.06%). Within the single domain impaired phenotype, there were no differences between the specific domains impaired and memory decline. Logistic regression model was also significant; after controlling for surgery side, the IC-CoDE phenotypes significantly predicted the likelihood of a patient experiencing post-surgical memory decline; $X^2 = 8.18$, $p = .043$.
Conclusions: In addition to the IC-CoDE providing a useful cognitive classification scheme in epilepsy, the IC-CoDE phenotypes appear helpful in identifying those at risk for post-operative memory decline. Previous literature has suggested that those with better pre-surgical cognition are generally at highest risk for cognitive decline. Our results generally follow this trend, but interestingly, patients with single domain impairment were at the highest risk of memory decline, even above those in the cognitively intact group. Future studies are important to confirm this pattern in other samples and examine additional contributing factors and underlying mechanisms that may

https://doi.org/10.1017/S1355617723004290 Published online by Cambridge University Press