PEDIATRIC GRAND ROUNDS
Moderator: Philip Fastenau, PhD
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PGR-1
Recreational Inhalant Use Resulting in Cardiac Arrest and Eight Minutes of Oxygen Deprivation: Acute and Longer-Term Neuropsychological Outcomes in the Developing Brain
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Objective: The intentional inhalation of vapors from volatile substances is a worldwide public health problem and estimated to be one of the most prevalent forms of experimental substance use in children aged between 11 and 15. Significantly, inhalant gasses can cause the myocardium cell membrane to become unusually sensitive to catecholamines which can lead to fatal cardiac arrhythmias. We report on the acute and 3-month neuropsychological sequelae of a 14-year-old adolescent girl, who had been experimenting with polysubstance use only 3 months prior. On this occasion, she inhaled the contents of a 150-ml butane canister suffering a cardiac arrest with 8-min lack of oxygen perfusion to the brain before successful out-of-hospital defibrillation and resuscitation.

Methods: Formal neuropsychological assessment occurred on days 10 and 11 during hospital admission and again at 3-month follow-up post-hospital discharge. MRI conducted on day 13 was unremarkable.

Results: During hospital admission the patient presented as highly agitated and unable to store or consolidate any new memory for a total of 7 days. Specific questioning on day 10 revealed retrograde amnesia of 48-h preceding the event. Bedsides neuropsychological testing revealed moderate-to-severe verbal memory deficit with severe memory impairment within the visuospatial domain. This was on a background of mixed executive dysfunction and the absence of any obvious psychopathology. At 3-month follow-up, in the absence of any illicit substance use, testing revealed a resolution to normal levels for visuospatial memory with no improvement in verbal memory. There was still evidence of executive dysfunction. Conclusion: Drawing from the adult field, the findings from this case are consistent with the neuropsychological literature with regard to a hypoxic-ischemic event rather than chronic inhalant and/or polysubstance abuse. This case is reported for its rarity in terms of the patient being able to be discharged back into the community and to create the awareness of the sudden and potentially devastating consequences of butane inhalant use, as well as the long-term effects of volatile substance use on the developing brain.

PGR-2
Hemiplegic Migraine: A Pediatric Case Study
Loughan A, Perna R, Hertza J, Northington S, Tyson K

Introduction: Migraine is the second most common type of headache and disabling brain disorder with prevalence estimates reaching 10.6% of children (ages 5–15 years) and 28% of adolescents (ages of 15–19 years). Despite its high incidence, migraine is commonly misdiagnosed. Evidence has pointed to a strong genetic component (familial hemiplegic migraine), but specific causative genes have not been identified. Migraine variants can have diverse presentations including focal transient neurological symptoms such as hemiplegia. The prevalence of hemiplegic migraines is 0.01%, making it a very rare disease. Limited case investigations have shown irreversible neurologic deficits and cerebellar atrophy. Methods: This proposed case will review the neuropsychological profile of a 12-year-old girl who was previously diagnosed and treated for multiple mild sports concussions. However, the diverse symptom presentation including intermittent hemiplegia, altered consciousness (12–24 h), aphasia, and cognitive dysfunction has led to diverse and at times incorrect diagnoses. In this child, symptom onset was often, but not always triggered by mild head trauma. Results: Conventional MRI (structural scans) was non-pathological, yet functional MRI found decreased left hemispheric functioning which is consistent with neuropsychological testing. Neuropsychological findings demonstrated significant score variability and impairments on multiple largely left hemisphere and executive functioning tasks.
Conclusions: Specific cognitive impairments included a variety of left hemisphere cognitive skills (verbal comprehension, reading, bilateral executive deficits) and appear to suggest multifocal left hemisphere cerebral dysfunction. A focus will be placed on the importance of the clinical interview, history of symptoms, the family medical history, and genetic factors.

**Improvements in Attention and Executive Functioning Following Short-Term Cognitive Remediation in a Young Woman Recovering from Anti-NMDA Receptor Encephalitis: A Case Study**


Objective: This case study compares neuropsychological test performance in a 16-year-old woman following anti-N-methyl-D-aspartate (anti-NMDA) receptor encephalitis and subsequent cognitive remediation. Neurometrics were completed 6 months before illness (for academic accommodations), as well as immediately following discharge and after 1 month of cognitive remediation. Data were compared in order to: (a) characterize the neurocognitive changes pre-/post-anti-NMDA receptor encephalitis and (b) to evaluate neuropsychological changes following intensive remediation. Method: The patient initially presented with psychosis, agitation, and altered mental status and was found to have anti-NMDA receptor IgG antibodies in her CSF. She was discharged after responding well to a series of rituximab infusions. Alternate forms and different, yet comparable, neuropsychological test batteries were administered to minimize the role of practice effects. Results: Baseline data revealed relative weaknesses in attention, executive functioning (EF), and visuospatial abilities (Borderline Impaired–Low Average). The patient had an existing ADHD diagnosis and was treated with Strattera and Focalin. Testing immediately following discharge revealed additional impairments in attention, EF, and non-verbal memory (Severely Impaired–Low Average). Hourly remediation sessions were provided twice weekly for 5 weeks. Attention and working memory tasks were adapted from the Attention Process Training-II Program and EF exercises focused on inhibiting impulsive responding, and strategic problem-solving, planning, and organization. Marked improvements in attention, EF, and visual memory were seen after remediation (Average–Very Superior), when compared with testing immediately after hospitalization and baseline functioning. Conclusions: Short-term, targeted cognitive remediation immediately following anti-NMDA receptor encephalitis may hasten natural recovery by facilitating improvements in attention and EF.