

Cognition Over Time in Chronic sTBI with Non-Neurologic Comorbidities in Residential Neurorehab

PRESENTERS

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INTRO

Traumatic brain injury has been associated with increased risk of many comorbid neurologic and non-neurologic disorders (Masel & DeWitt, 2010). Serial neuropsychological assessment may be used in patients with chronic, severe traumatic brain injury (sTBI) in order to monitor for cognitive changes that occur in association with comorbid non-neurologic disorders and sequelae, such as seizures or metabolic dysfunction, and to inform treatment.

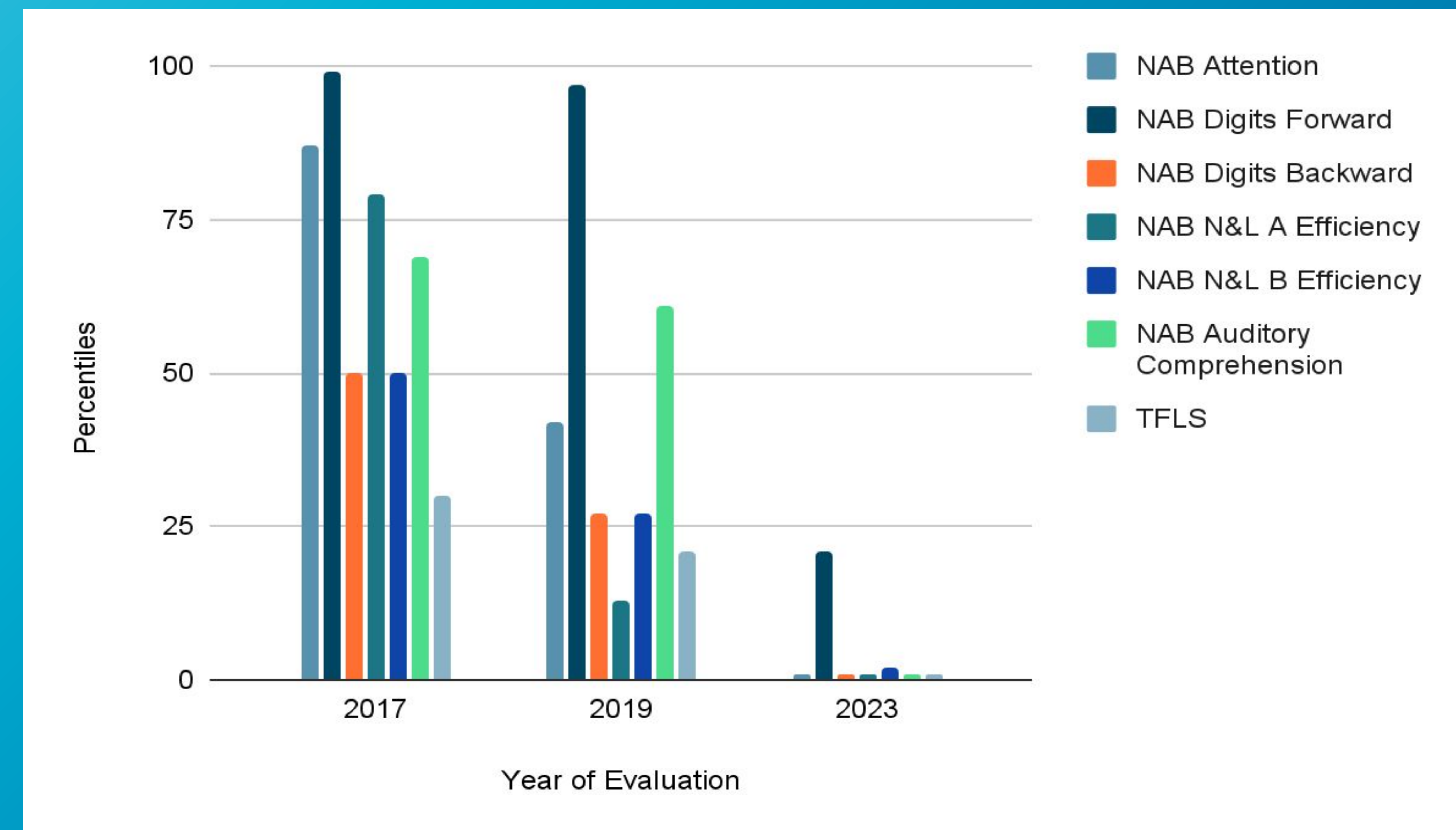
METHODS

- A 60-year-old, right-handed, White male sustained an sTBI at age 15 secondary to a motor vehicle collision and subsequently developed behavioral and substance use problems, before being placed in a long-term residential neurorehabilitation program. He later developed kidney disease, believed to be the result of long-term use of anti-epileptic drugs (AEDs) that were prescribed to control seizures that developed following TBI. He continued to experience seizures, despite taking AEDs.
- Staff at his residential program reported concern of a decline in cognition and daily functioning over the past three years.
- A neuropsychological evaluation was performed to measure current cognitive functioning.
- Results were compared to normative data, which were then compared to the patient's scores from similar evaluations performed four and six years prior. Where possible, reliable change index (RCI) data was calculated in order to identify statistically significant changes while controlling for practice effects (Duff 2012).

TBI is associated with increased comorbidities.
Serial neuropsychological assessment can establish baseline cognition, monitor for cognitive decline, identify etiologies, and offer treatment recommendations.

Declines were noted in **attention, working memory, processing speed, executive functioning, auditory comprehension, and functional living skills.**

Declines Over Time



Expressive language, memory, and visuospatial skills were generally consistent with previous evaluations.

More significant declines between 2019-2023 suggested that recent changes were not due to the TBI

RESULTS

- Significant reductions were noted across multiple cognitive domains between 2019 and 2023.
- While general reductions due to TBI were noted on the 2017 evaluation, and variability in performance was noted in 2019, more notable and consistent declines were demonstrated between the 2019 and 2023 evaluations as seen in Table 1. This suggested that more recent decline was likely not directly due to the TBI.
- Multiple potential contributing factors to cognitive decline were identified, including ongoing seizures, late-stage kidney disease, and a possible superimposed neurodegenerative disorder.
- Results were shared with the patient's clinical team, along with recommendations.
- Results were used by the patient's therapists, residential program staff, and neurology providers to inform his treatment planning and care. For example:
 - An evaluation with speech language pathology was recommended based upon reduced auditory comprehension.
 - The residential team was encouraged to restrict auditory instructions to a single step, based upon reduced auditory comprehension
 - A recommendation to consider updated brain imaging was provided to the neurologist, in order to rule out focal lesions
 - Findings on serial testing resulted in the multidisciplinary team recommending increased support and supervision, which resulted in a move to another residential setting.

CONCLUSIONS

This case highlights the importance of serial neuropsychological testing, specifically in chronic sTBI, as multiple testing timepoints provided data for detecting acceleration in cognitive decline that would not be expected to be the result of remote TBI alone. Given all of the neurologic and non-neurologic downstream effects of chronic sTBI (such as seizures, mental health, non-neurologic medical conditions), cognitive deficits should not necessarily be expected to remain stable and declines may only be captured by having an accurate baseline with follow-up comparison through serial neuropsychological evaluations. **In this case, without serial testing, additional decline and opportunities for intervention (i.e. changes in medications, further diagnostic testing, additional support for activities of daily living) may have been missed.**

REFERENCES

- Duff, K. (2012). Evidence-based indicators of neuropsychological change in the individual patient: relevant concepts and methods. *Archives of Clinical Neuropsychology*, 27(3), 248-261.
- Masel, B. E., & DeWitt, D. S. (2010). Traumatic brain injury: a disease process, not an event. *Journal of Neurotrauma*, 27(8), 1529-1540.