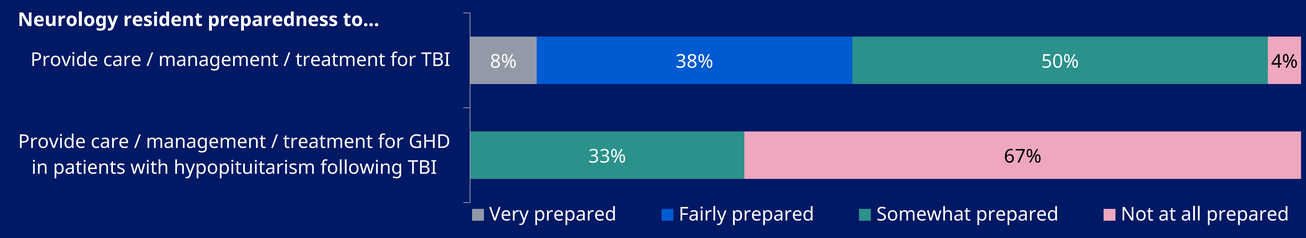
Emphasis of Exposure and Training in Neurology Residency Programs to Traumatic Brain Injury-Induced Growth Hormone Deficiency: Results of a Cross-Sectional Study

Kevin C.J. Yuen, MBChB, MD, FRCP, FACE, FEAA[1]; Nicky Kelepouris, MD[2]; Radhika Adiga, MD, PhD, BCMAS[2]; Javier Cárdenas, MD[3]

Although almost all directors believed their residents were at least somewhat prepared to manage TBI, two-thirds thought residents were not at all prepared to provide care for patients with TBI-induced GHD.



Background and Aim

- Growth hormone deficiency (GHD) is a common sequela of traumatic brain injury (TBI).[1-2]
- Prognosis is worse for patients with GHD than those without GHD following TBI[3], and its delayed diagnosis may lead to poorer outcomes and impede recovery.[4-5]
- We sought to understand how GHD following TBI is addressed in neurology residency programs and to identify knowledge gaps and opportunities to address these gaps in the curriculum.

Methods

- An online survey was conducted among neurology residency program directors in the US between January 19, 2022, and March 28, 2022. The study received an exemption from WCG Institutional Review Board.
  - Participants were recruited by email and postal mail from the American Medical Association's FREIDA database[6], for a total of 171 neurology residency programs.
- Only one respondent per residency program was permitted to participate, ensuring data consistency and representation across institutions.
- To qualify for the survey, participants were required to hold a current role in a neurology program and to be knowledgeable about the curriculum.
- Descriptive statistical analyses were performed.

Key Results

- A total of 24 neurology residency program directors completed the survey. Characteristics of the study sample and residency programs are described in **Figure 1**.
- Although almost all directors believed their residents were at least somewhat prepared to manage TBI, two-thirds thought residents were not at all prepared to provide care for patients with TBI-induced GHD (**Key Result Banner**).
- Although 75% of respondents believed neurologists should be fairly/very responsible for making the decision to refer patients for management of post-TBI GHD, only 8% felt similarly regarding responsibility for management of the condition (data not shown).
- Most program leaders reported that education on TBI-induced hypopituitarism (including GHD) is somewhat or not at all important or appropriate to include in their curricula (**Figure 2**). Only 25% reported including TBI-induced pituitary disorders in general and 8% indicated including TBI-induced GHD specifically (data not shown). Respondents indicated there was little to no coverage of key TBI-induced GHD topics in their residency programs (**Figure 3**).
- Only 13% of programs planned to expand formal education of hypopituitarism in their curricula (data not shown). The greatest barriers reported were lack of time, perceived rarity of the condition, and lack of access to trained specialists or faculty expertise (**Figure 4**).
- Respondents thought clinical guidelines for hypopituitarism post-TBI (92%), resources to expand training in curricula (71%), and resources for inter-professional education (71%) would provide the greatest impact on the development of educational curricula on this topic. Webinars (71%), online resources (71%), and continuing medical education (63%) were considered the most effective avenues for providing additional training on TBI-induced GHD (data not shown).

Summary and Conclusions

- Most program leaders feel their residents are unprepared to manage patients with GHD post-TBI.
- TBI-induced GHD is not considered particularly important or appropriate to include in neurology residency curricula, which is reflected in the lack of coverage of this topic in these programs.
- There is a need for more education and training on the management of GHD post-TBI in US neurology residency programs.
- Additional data and resources could help raise awareness of TBI-induced GHD and aid program leaders in ensuring future neurologists are prepared to effectively identify and refer or treat their patients with TBI-induced GHD.

Figure 1: Neurology respondent and program characteristics (n=24)

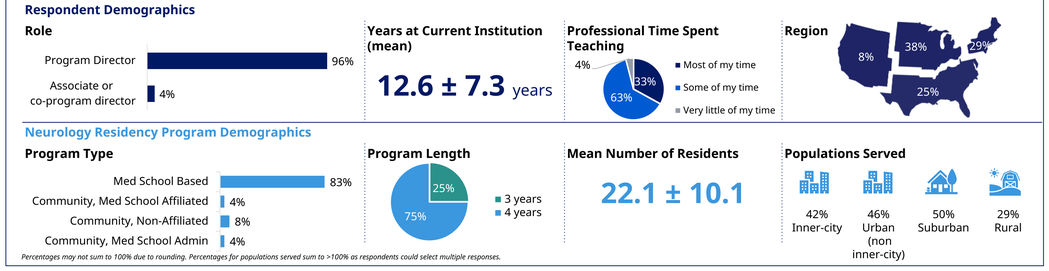


Figure 2: Importance and appropriateness of including education on hypopituitarism following TBI in neurology residency curricula

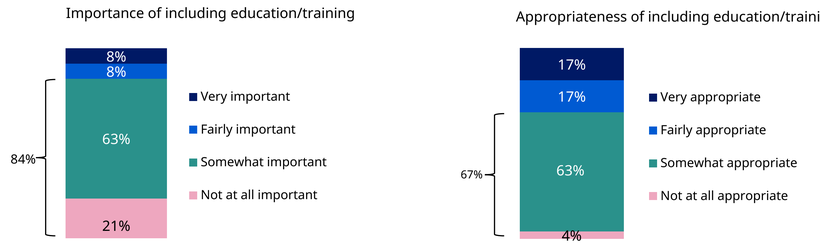


Figure 3: Coverage of GHD topics in neurology residency program curricula

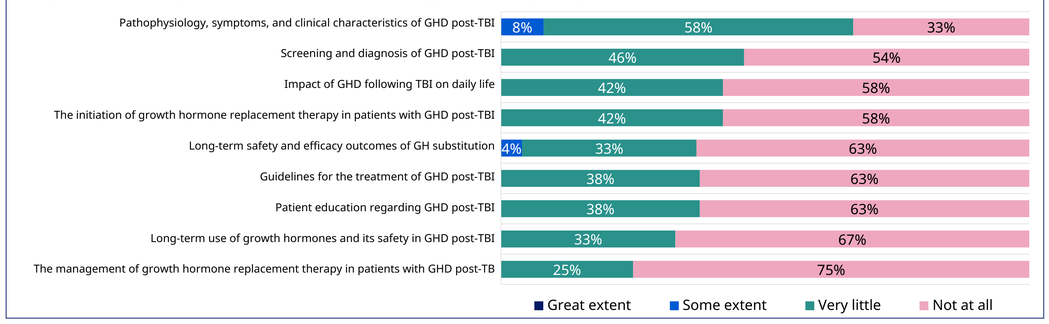
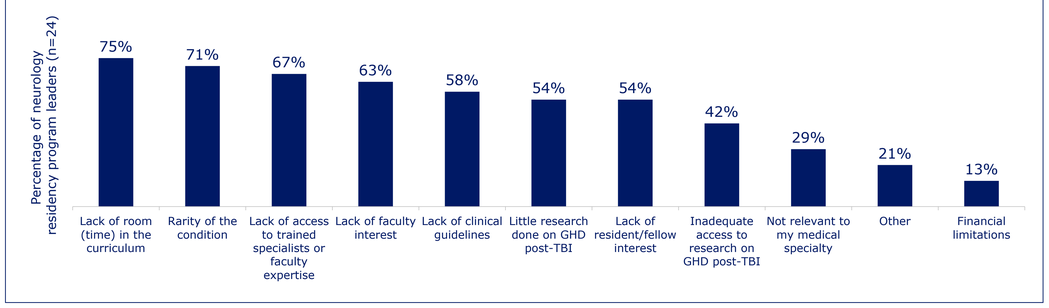


Figure 4: Moderate/large barriers to integrating post-TBI hypopituitarism education into curricula



Abbreviations: GHD, growth hormone deficiency; TBI, traumatic brain injury

References:
1. Pavlovic D, Pekic S, Stojanovic M, Popovic V. Traumatic brain injury: neuropathological, neurocognitive and neurobehavioral sequelae. Pituitary. Jun 2019;22(3):270-282. doi:10.1007/s11102-019-00957-9
2. Szarka N, Szellar D, Kiss S, et al. Effect of Growth Hormone on Neuropsychological Outcomes and Quality of Life of Patients with Traumatic Brain Injury: A Systematic Review. J Neurotrauma. Jun 1 2021;38(11):1467-1483. doi:10.1089/neu.2020.7265
3. Kgosidialwa O, Hakami O, Muhammad Zia-Ul-Hussnain H, Agha A. Growth Hormone Deficiency Following Traumatic Brain Injury. *Int J Mol Sci.* Jul 6 2019;20(13)doi:10.3390/ijms20133323
4. Yuen KCJ, Masel B, Jaffee MS, et al. A consensus on optimization of care in patients with growth hormone deficiency and mild traumatic brain injury. Growth Horm IGF Res. Jul 25 2022;66:101495. doi:10.1016/j.ghir.2022.101495
5. Kreber LA, Griesbach GS, Ashley MJ. Detection of Growth Hormone Deficiency in Adults with Chronic Traumatic Brain Injury. J Neurotrauma. Sep 1 2016;33(17):1607-13. doi:10.1089/neu.2015.4127
6. FREIDA. American Medical Association. 2021. https://freida.ama-assn.org/search/list?page=1

[1]Barrow Neurological Institute, Phoenix, AZ, USA; [2]Novo Nordisk Inc., Plainsboro, NJ, USA; [3]Rockefeller Neuroscience Institute, Morgantown, WV, USA

Disclosures: RA and NK are employees and shareholders of Novo Nordisk Inc., which funded this research and medical writing support. JC is a consultant for the National Football League. KCJY has received research grants to Barrow Neurological Institute from Crinetics, Ascendis, Corcept, and Amryt; served as an occasional advisory board member for Novo Nordisk, Ascendis, Corcept, Ipsen, Amryt, Strongbridge, Crinetics, Recordati and Xeris; and served as an occasional speaker for Corcept, Novo Nordisk and Recordati.

This study was sponsored by Novo Nordisk Inc. The authors acknowledge the medical writing assistance of Rebecca Hahn, MPH of KJT Group, Inc. (Rochester, NY, USA) Presented at Neurotrauma 2023 (Austin, TX), June 25-28, 2023.