Status, Challenges and Future Directions in Pediatric Neurology Research

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Received 09 December 2021; **Accepted** 23 December 2021; **Published** 30 December 2021

Introduction

Pediatric neurology is undergoing a significant shift. The ability to diagnose neurological and neuromuscular illnesses, research their aetiology, and identify novel therapeutic targets has increased considerably as a result of breakthroughs in molecular, genetic, electrophysiological, and radiographic testing. From gene therapy to oligonucleotide and small molecule medicines to neuromodulation, the therapeutic choices are quickly developing. 1, 2, and 3 Parallel advances in electronic health records (EHRs) and patient-reported outcomes initiatives have opened up new ways to collect, aggregate, and analyse clinical data on the diagnostic process, symptom trajectory, treatment practises, health-care utilisation, and impact of paediatric neurological disorders on patient and family quality of life. The current and future needs for pediatric neurology, including clinical missions, require ongoing updated assessments. In recent years wait times for a nonurgent pediatric neurology appointments averaged four weeks, with 30% of sites reporting wait times greater than two months.

With advances in diagnosis and treatment for infants and children with neurological disorders, clinical care complexity increases, translating into increased clinical time commitments. To determine the natural history or developmental trajectories of juvenile neurological illnesses, long-term investigations are required. Because many neurological illnesses affecting children are uncommon, their research necessitates multicenter recruitment networks and enrolment periods that are longer than usual in order to obtain acceptable sample numbers. Although the burden of paediatric neurological illnesses is large in aggregate, particular diseases are frequently rare, posing unique challenges that necessitate comprehensive collaboration. Enrollment-based financing for clinical research projects, such as clinical trials, is insufficient to cover staff and infrastructure expenditures, and costs are passed on to hospitals or universities. The collection, transportation, processing, and interpretation of genetic and genomic results require centralised support.

Children have shown more physical resilience to COVID-19 than adults, but there is a cohort of vulnerable infants and young children who may experience disease burden, both in the acute phase and chronically. Children may have had early undocumented exposure to COVID-19. Even when the risk of exposure was known, developmental variables may have made the avoidance of physical proximity difficult for children. Preliminary hypotheses concerning neurotropic factors have been documented by researchers. Children with COVID-19 and comorbid physical or mental disorders may be vulnerable to exacerbations of neurotropic factors and comorbidities, the neural impact of which has been documented for other coronaviruses. Researchers are investigating COVID-19 symptom descriptions, neurotropic mechanisms at the genomic and transcriptomatic levels, neurological manifestations. The field of paediatric neurology is at a fork in the road. The ability to transform research into important clinical treatments and possibly cures, as well as the potential for quick improvements in research, make the next period one of immense opportunity. However, major roadblocks remain in the form of a commitment to meaningful financial support for paediatric neurology research, which has an impact on new researcher training, current researcher time protection, and all elements of research output.

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Cite this article: Sakyo, Sato. Status, Challenges and Future Directions in Pediatric Neurology Research. *J Neurol Neurophy*, 2021, 12(12), 569