The Current Status of Pediatric Neurology: Navigating against the COVID-19 Pandemic*

On December 31, 2019, a cluster of severe pneumonia infection of uncertain etiology was reported in Wuhan, China which later was determined to be due to a novel coronavirus and was termed the SARS-CoV-2 causing COVID-19 infection. In a media briefing by WHO Director General Dr. Tedros Adhanom Ghebreyesus on the 11th of March 2020, he acknowledged the increasing number of cases of COVID-19 outside of China which had increased 13-fold and the number of affected countries had tripled. With approximately 118,000 cases identified in 114 countries and 4,291 people who lost their lives from this virus, WHO declared COVID-19 a pandemic.[1]

In the Philippines, as of the 2nd day of March 2020, there were 43 admitted cases classified as "persons under investigation" (PUI) with no confirmed cases. By the 15th of March 2020, with the hope of controlling the spread of the infection, Metro Manila and several provinces were placed in community "lockdowns" and international travel coming in and going out of the Philippines was curtailed. By the 20th of March 2020, there were already 230 confirmed cases and 18 deaths nationwide.[2]

The Philippine General Hospital (PGH) was designated as the COVID 19-referral hospital for the National Capital Region. The medical and surgical wards were retrofitted in preparation for the first group of patients diagnosed with COVID-19 to be admitted. By the first day of April 2020, PGH officially began operating as the COVID-19 referral center. However, by this time, the country has lost several medical practitioners who were either affiliated with the Philippine General Hospital and/or were University of the Philippines-College of Medicine alumni – adult cardiologists Dr. Francisco Lukban and Dr. Raul Jara, anesthesiologist Dr. Greg Macasaet, pediatric surgeon Dr. Leandro Resurreccion, and pediatrician and then current Philippine Pediatric Society President Dr. Salvacion Gatchalian.

In the neurosciences, the Division of Pediatric Neurology, one of the busiest divisions of the Department of Pediatrics, had to adapt to the COVID-19 pandemic in service delivery, teaching, and research.

Figures 1-3 show the comparison of 2019 to 2020 census of inpatient admissions/referrals to the Neurology Service and outpatient consultations. To give way for the creation of a COVID Pediatric team of residents for COVID-related admissions, the 15 Pediatric Neurology Service beds were dissolved and were put under the General Pediatrics Service. There was a 61.7% drop in inpatient cases from 193 patients in 2019 to 74 patients in 2020 with a maximum of 208 inpatients in the month of January to a minimum of 23 inpatients in the month of June.[3,4]

In the Outpatient Department, the Neurology Service usually sees 340 to 617 patients with a mean of 453 patients per month. There was a 39.9% drop in consultations from a total of 5434 patients in 2019 to 3264 patients in 2020. In the first year of the pandemic, the service saw a mean of 102 outpatients per month which was made possible thru the introduction of telemedicine in the month of May and resumption of limited face-to-face consultations in September.[3,4] However, by year end of 2022, the inpatient census had steadily increased back to 62% of the pre-pandemic times and the outpatient consultations which used to be 94% by telemedicine in 2021 became 78% teleconsultations and 22% face-to-face consultations by 2022.[5,6]

The most common neurologic disorders that got admitted as inpatients remained the same throughout the past four years but on a smaller scale. These were central nervous system (CNS) malformations, CNS infections and CNS tumors, all returning to 62% of pre-pandemic numbers by the year end of 2022. Paroxysmal disorders, the top diagnosis which totaled to 822 cases in 2019, remained low at 143 cases in 2020 perhaps because the control of seizures can be done acutely at the emergency room thus not necessitating admission or managed remotely by teleconsultation. Referrals for neurologic manifestations of systemic diseases remained constant and returned to 98% of pre-pandemic times comparing 2019 to 2022 (Figure 4).[3-6]

eISSN 2094-9278 (Online)
Published: April 30, 2024
https://doi.org/10.47895/amp.v58i7.10243

* *Delivered for the Drs. Jesse and Libby de Leon UPCM Class 1969 Professorial Award Lecture.*

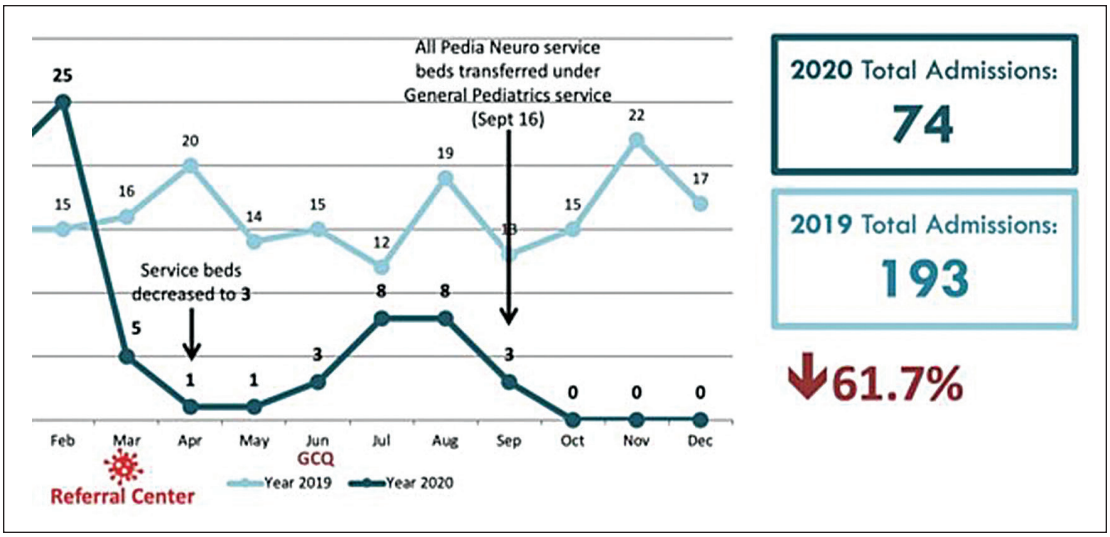

Figure 1. Comparison of inpatient admissions to Pediatric Neurology Service beds in 2019 and 2020.

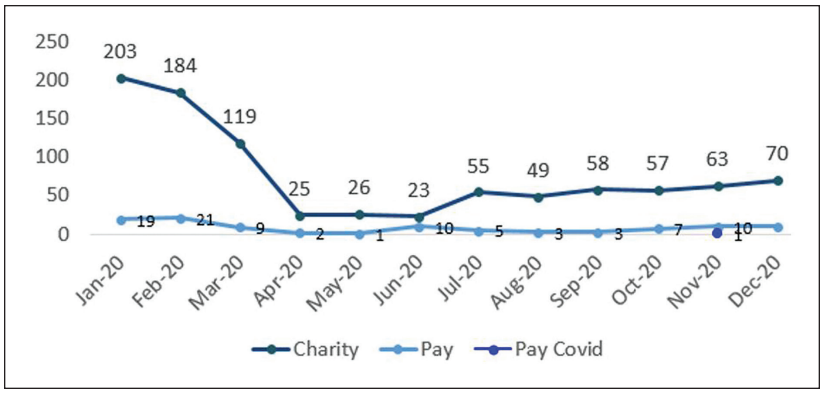

Figure 2. Monthly Neurology referrals from January to December 2020.

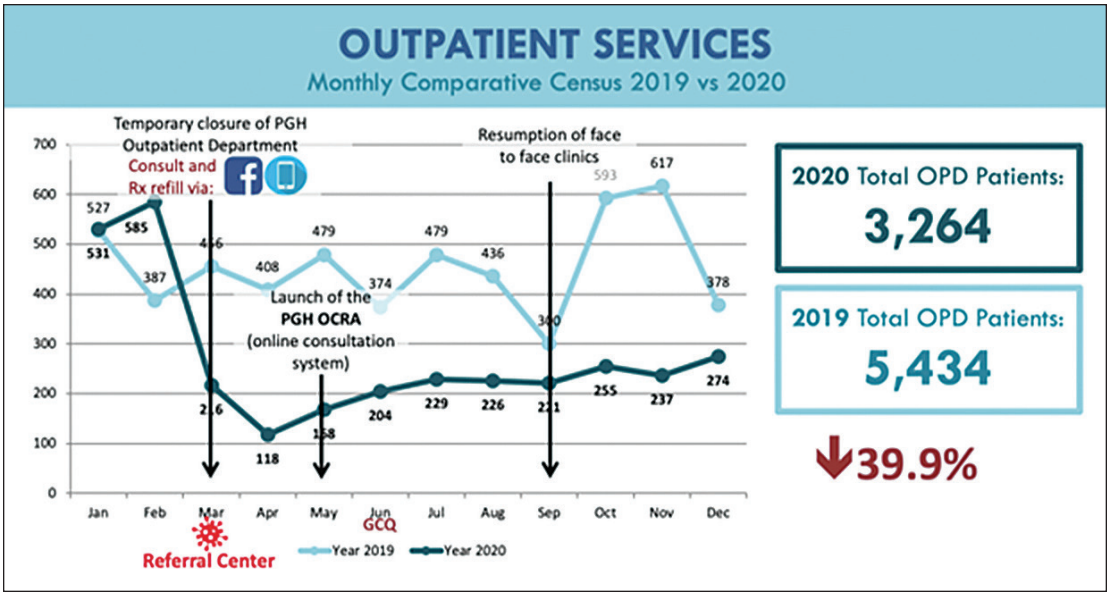

Figure 3. Comparison of monthly census in the Outpatient Department in 2019 and 2020.

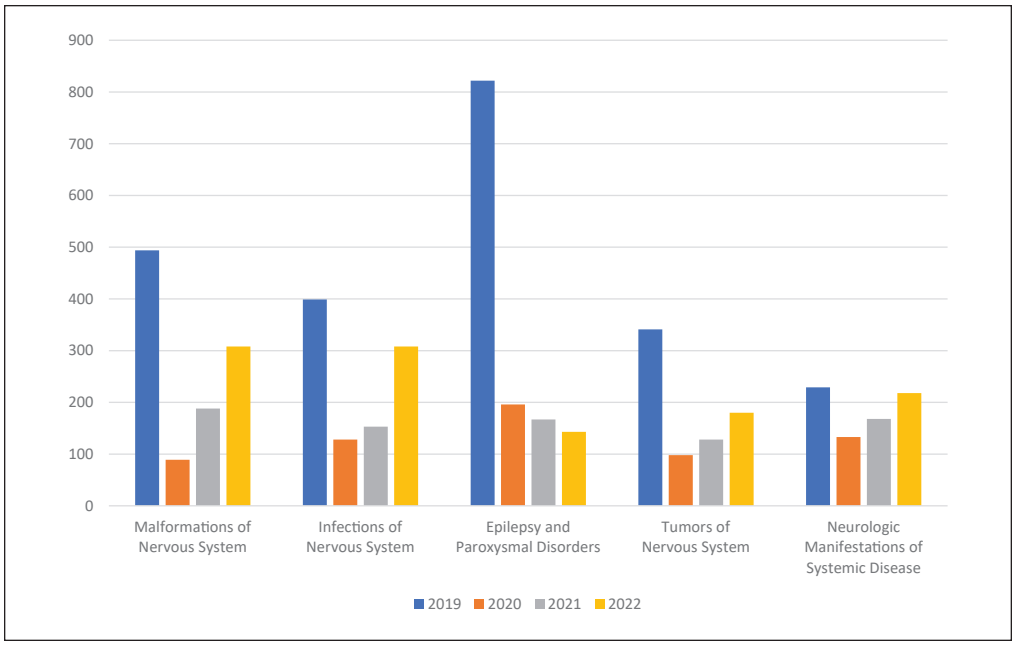

Figure 4. Top five conditions for referrals to the Pediatric Neurology Service 2019-2022.

Table 1. Pediatric Neurology Service Annual Census for 2019-2022

	2019	2020	2021	2022
Consultations				
Inpatient Admissions	2040	831	1135	1282
OPD Consultations	5434	3264	3890	2689
Total Consultations	7474	4095	5025	3971
Neurodiagnostic Procedures				
EEG	1067	394	354	666
EMG-NCV	47	15	30	34
Evoked Studies	137	49	12	58
Total Neurodiagnostic Procedures	1251	458	396	758
Top Neurosurgical Procedures				
Cerebrospinal Fluid Diversion	210	132	114	171
Repair of Congenital Brain Anomalies and Spine Dysraphism	66	51	45	45
Brain Tumor Excision	36	45	40	30
Evacuation of Abscesses and Hematoma	26	24	11	35
Total Top Neurosurgical Procedures	338	252	210	281

In the Outpatient Department, epilepsy was the second most common reason for consultation to the general sick child clinic. Assessment for neurodevelopmental disorders like autism, global developmental delay, speech delay, and attention deficit hyperactivity disorders also topped the list.

Neurodiagnostic procedures like electroencephalograms, nerve conductions, and evoked potential studies continued to be performed during the pandemic but at a much smaller number. The most common neurosurgical procedures namely CSF diversions, repairs of spinal dysraphism, and tumor excisions returned to 70-80% of pre-pandemic levels by the end of 2022 and with more evacuation of abscess or hematoma done in 2022 compared to previous years. Table 1 summarizes the division census for the years 2019 to 2022.[3-6]

In the early part of 2019, the University of the Philippines Manila Interactive Learning Center (UPM ILC) offered the "*iTuro: Iba't Ibang Timpla" Faculty Grant for Blended Learning* to encourage the faculty to learn how to create video recording teaching modules. The advent of the pandemic accelerated the use of blended learning as a mode of teaching and online classrooms were created. I created the **Pediatric Neurology Zoom Teaching Rounds**, a weekly interactive session

with rotating clinical clerks and interns in the pediatric department, discussing common pediatric neurological disorders. I also created the **Pediatric Neurological Examination Online** which was cascaded to all pediatricians thru a plenary lecture delivered in the Biennial Convention of the Child Neurology Society Philippines and an online preconvention workshop during the annual convention of the Philippine Pediatric Society in 2019.

The Division of Pediatric Neurology since 2001 annually conducts a **Seizure Management Workshop**, an interactive workshop discussing the recognition and management of epilepsy, status epilepticus, neonatal seizures, and febrile seizures. This workshop was offered to and attended by residents of Pediatrics, ER Medicine, Neuroscience, and Family Medicine. Thru the online platform, the division was able to carry out the workshop beyond PGH which included the Community Pediatrics Group from Marikina, in Zamboanga Medical Center, in the National Children's Hospital, pediatricians coming from South Luzon Hospitals, Laguna, and the Metro-Manila West Integrated Residency Training Hospitals.

To be able to reach our patients, the PGHPEDIANEURO Facebook page was created. It became the social media arm of the division to deliver important announcements and messages, including parent and caregiver teaching modules on the management of epilepsy at home.

The years of the pandemic afforded the faculty members and trainees of the division opportunities and time to complete research for publication. Table 2 summarizes the list of publications from 2021 to 2022.[5,6]

Lastly, it is not surprising that COVID-19 would present with neurological manifestations and children with pre-existing neurological conditions will present with COVID infection. This question was posted to all pediatric neurology training institutions which included PGH, Philippines Children's Medical Center (PCMC), and University of Santo Tomas (UST), and became a research project of the Child Neurology Society Philippines, Inc. Our data showed that we had 156 COVID referrals and/or admissions with a 1.6:1 male to female ratio and mostly in the 1 to 4 and 5 to 9 years age group (Figure 5).

Table 2. Pediatric Neurology Faculty and Trainee List of Research Publications 2021-2022

Research Publication Title	Journal	Authors
Auto-immune encephalitis in a tertiary hospital in the Philippines	Journal of Clinical Neuroscience June 2021	Reyes, Espiritu, Agabao, Abejero, Salonga-Quimpo
The association of online search interest with polio cases and vaccine coverage: an infodemiological and ecological study	European Journal of Pediatrics 2021	Layug, Espiritu, Castillo Jamora
Spectrum of Pediatric Acquired Demyelinating Syndromes (PADS) of the central nervous system in a tropical developing country: a 10-year retrospective study	Journal of Clinical Neuroscience 2022	Castaneda, Espiritu, Tan
Diagnosis of pediatric stroke in resource-limited settings	Seminars in Neurology Dec 2022	Tan, Layug, Singh, Parakh
Short-term outcomes of the use of intraventricular Ribavirin in Filipino patients with subacute sclerosing panencephalitis	Acta Medica Philippina May 2022	Lukban, Salonga, Deveza, Gan, Silao, Chua
Parental health-seeking behavior of Filipinos with Duchene muscular dystrophy	Asia Pacific Journal of Pediatrics and Child Health Sept 2022	Agabao, Layug, Castillo
Case of anti-NMDA receptor encephalitis in a female adolescent with favorable response to second-line treatment with cyclophosphamide	British Medical Journal Aug 2022	Barbadillo, Quimpo, Gan

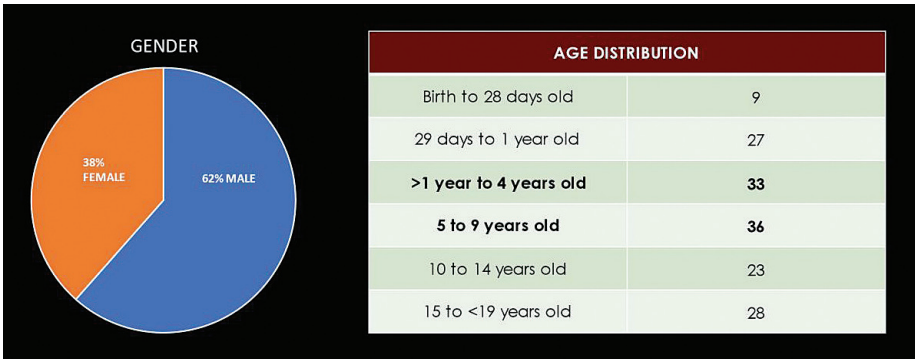

Figure 5. Age and gender distribution of COVID admissions with neurological disorders.

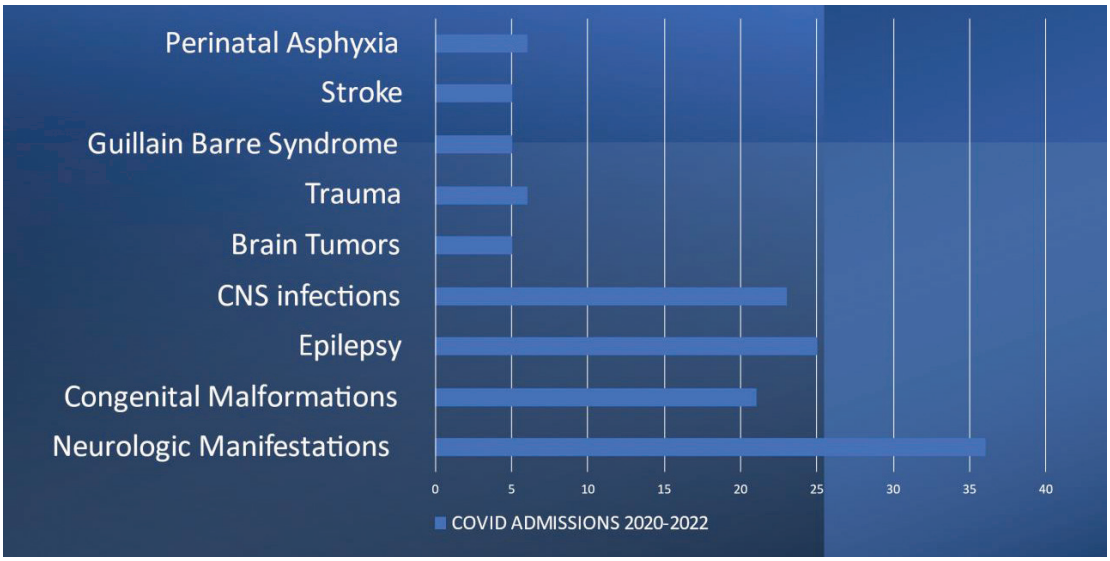

Figure 6. Spectrum of neurologic conditions admitted as COVID-related infections in 2020-2022.

One hundred thirty-nine (89.1%) of the cases were admitted and 45 (32.3%) were asymptomatic, 40 (28.8%) had mild symptoms, 20 (14.4%) had moderate symptoms, and 34 (24.5%) were severe or critical. There were nine deaths with a 6.5% mortality rate among those admitted. Figure 6 shows the spectrum of neurologic conditions that were admitted as COVID-related and referred to the Pediatric Neurology Service for evaluation and management.[7]

Navigating the practice of pediatric neurology thru the pandemic at the Philippine General Hospital was not easy, but the COVID-19 pandemic not only brought challenges, but it also provided opportunities for service, training, and research making the journey worthwhile.

Acknowledgments

We extend our sincere gratitude to Drs. Michelle Cristine B. Miranda and Ma. Amadea Teresita C. Cahanding for their dedicated efforts to the development of this Pediatric COVID-19 issue.

Marissa B. Lukban, MD
Department of Pediatrics
Philippine General Hospital
University of the Philippines Manila

REFERENCES

1. World Health Organization, WHO Director-General's opening remarks at the media briefing on COVID-19 [Internet]. 2020 Mar 11 [cited 2023 Nov]. Available from: https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020
2. Department of Health, Department of Health Situation Report [Internet]. 2023 [cited Nov 2023]. Available from: ncovtracker.doh.gov.ph
3. Pediatric Neurology Annual Report. 2019. Unpublished. Available upon request to the Division of Pediatric Neurology, Department of Pediatrics, Philippine General Hospital.
4. Pediatric Neurology Annual Report. 2020. Unpublished. Available upon request to the Division of Pediatric Neurology, Department of Pediatrics, Philippine General Hospital.
5. Pediatric Neurology Annual Report. 2021. Unpublished. Available upon request to the Division of Pediatric Neurology, Department of Pediatrics, Philippine General Hospital.
6. Pediatric Neurology Annual Report. 2022. Unpublished. Available upon request to the Division of Pediatric Neurology, Department of Pediatrics, Philippine General Hospital.
7. Department of Pediatrics, Division of Pediatric Neurology, Philippine General Hospital. Pediatric Neurology Database. 2020-2022.