

Pediatric neurosurgical practice during the COVID-19 epidemic

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ABSTRACT

There is little data on the nationwide impact of the COVID-19 epidemic on pediatric neurosurgery operating volumes. We examined the overall and seasonal patterns of pediatric neurosurgical operation volumes in the United States during the pandemic to pre-pandemic periods in this study, which used a nationwide database called TriNetX. COVID-19 incidence in the United States began to climb in September 2020 and peaked

between December 2020 and January 2021. There was an inverse connection between pediatric neurosurgery operating volumes and the incidence of COVID-19 patients throughout this time period. When compared to pre-pandemic years, there was a substantial decline in the number of pediatric shunt (11.7% mean change, $p = 0.006$), epilepsy (16.6%, $p 0.001$), and neurosurgical trauma (13.8%, $p 0.001$) procedures from March 2020 to May 2021.

Key Words: *Pediatric spine;*

LETTER

The seasonal research also revealed a substantial decline in pediatric spine, epilepsy, and trauma cases in spring 2020. This is the first research to indicate a nationwide drop in pediatric shunt, epilepsy, and neurosurgical trauma operating volumes during the pandemic, to the best of our knowledge. This might be attributable to changes in health-seeking behavior caused by anxiety, as well as underdiagnoses during the COVID-19 epidemic. Due of the SARS-CoV-2 (COVID-19) pandemic, the Centers for Medicare and Medicaid Services suggested deferring elective procedures in the United States on March 18, 2020. In contrast to other neurosurgery subspecialties, most pediatric neurosurgical cases are emergency or urgent, as postponed surgeries might impair cognitive development. There is little evidence available on COVID-19's nationwide influence on pediatric neurosurgery operational volumes at the time of this study. In this study, we compared the seasonal and overall patterns of pediatric neurosurgical operation volumes in the United States during the pandemic to pre-pandemic periods using a national registry, TriNetX.

TriNetX (Cambridge, MA) is a nationwide database that contains electronic medical records from 54 Healthcare Organizations (HCO) and 72 million patients across the country. From March 2020 to May 2021, TriNetX was utilised to calculate the average number of pediatric neurosurgeries done throughout each season of the pandemic. TriNetX was searched for common pediatric spine, craniotomy, shunt, epilepsy, and trauma procedures

on July 27, 2021, using Current Procedural Terminology (CPT) and International Classification of Diseases (ICD-10) codes (Supplemental data-appendix 1). The monthly mean operative volume per reported HCO for each subcategory was compared to a pooled three-month average from March 2018 to February 2019 to represent the pre-pandemic period. A descriptive analysis was carried out, and comparisons were done using a Student's t-test. COVID-19 incidence in the United States began to climb in September 2020 and peaked between December 2020 and January 2021. There was an inverse connection between pediatric neurosurgery operating volumes and the incidence of COVID-19 patients throughout this time period. When compared to pre-pandemic years, there was a substantial decline in the number of shunt (11.7% mean change, $p = 0.006$), epilepsy (16.6%, $p 0.001$), and neurosurgical trauma (13.8%, $p 0.001$) procedures from March 2020 to May 2021. In spring 2020, the seasonal study revealed a broad decline in most subcategories, with large decreases in spine, epilepsy, and trauma cases. During the summer, spine, cranial, and trauma operations returned to pre-pandemic levels, while shunt and epilepsy procedures returned to pre-pandemic levels in the fall of 2020. As COVID-19 cases began to rise in the winter of 2020, fewer procedures were performed in all five categories, with the exception of epilepsy and trauma surgeries, which saw large declines. In spring 2021, the number of surgeries grew in most subcategories, as it did in summer 2020. Spine and epilepsy surgeries increased significantly compared to pre-pandemic levels. However, compared to pre-pandemic months, there was a considerable decline in shunt procedures in spring 2021. To the best of our knowledge, this is the first study to show a decrease in pediatric shunt and epilepsy surgery volumes

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across the country during the pandemic. This might be attributed to changes in health-seeking behavior caused by fear, as well as under diagnosis. Previously, Leung et al observed a large drop in adult seizure admissions to Hong Kong hospitals owing to changes in health care consumption, which may have stopped pediatric patients from visiting their doctors as well. Furthermore, decreases in in-person clinic visits may result in restricted screening capacities, resulting in hydrocephalus and epilepsy under diagnosis. Because absence seizures and behavioral abnormalities suggestive of shunt failure may be more noticeable in academic contexts, online schooling may also contribute to lower surgery volumes. Because many lessons were held online and some pediatric patients may have had their webcams turned off, some neurological presentations may have gone unnoticed, resulting in lower surgical volumes. While earlier studies have documented lower trauma surgery volumes during COVID-19, this is the first evidence of lower pediatric neurosurgery trauma volumes throughout the pandemic. Trauma procedures were considerably reduced in the spring and winter of 2020, when COVID-19 patients were at their highest. These findings might be attributed to travel limits and stay-at-home orders, which reduce the likelihood of severe injuries such as car accidents and sports injuries. Seasonal fluctuations in operational volumes were shown to be inversely associated to the prevalence of COVID-19. As previously stated, there was a decline in operating volumes in spring 2020 and winter 2020, followed by a rebound increase in summer 2020 and spring 2021.

While lower health-care consumption might possibly explain this pattern, some elective procedures were most likely postponed owing to insufficient hospital resources. Individual institutions reported increasing neurosurgical referrals and operations as COVID-19 cases began to decline, owing to extensive waiting lists for elective surgery. This trend is significant since the Delta variety is quickly spreading across the United States. Previous peaks in COVID-19 instances were connected with a drop in operating volumes, which was most likely attributable to fear of getting the virus, reduced travel, and under diagnosis. Clinicians and academic institutions, on the other hand, have recently altered their rules to allow for in-person contacts. This, together with the availability of vaccinations, has the potential to reduce the likelihood of under diagnosis, resulting in even longer waiting lists for elective procedures once COVID-19 cases begin to diminish again. As more COVID-19 variations emerge, we recommend pediatric neurosurgeons to be prepared for these potential scenarios. The aggregate nature of TriNetX's data limits the scope of this investigation. As a result, we are unable to stratify our findings by geographic location and cannot analyze how geographic differences in COVID-19 affected pediatric neurosurgery cases. Inconsistencies and inaccuracies in coding for diagnosis and procedures by hospitals may also arise.