The Significance of the Increased Incidence of New Onset Seizures and Epilepsy After a COVID-19 Infection

Author(s):
Wyatt Bensken¹; Terence J. O'Brien, MD²,³

Corresponding Author:
Wyatt Bensken, wpb27@case.edu

Affiliation Information for All Authors: 1. Department of Population and Quantitative Health Sciences, School of Medicine, Case Western Reserve University, Cleveland, OH 2. Department of Neuroscience, The Alfred Centre, Central Clinical School, Monash University, Melbourne, Australia 3. Department of Medicine, The Royal Melbourne Hospital, The University of Melbourne, Melbourne, Australia

Equal Author Contribution:

Contributions:
Wyatt Bensken: Drafting/revision of the manuscript for content, including medical writing for content
Terence J. O’Brien: Drafting/revision of the manuscript for content, including medical writing for content

Neurology® Published Ahead of Print articles have been peer reviewed and accepted for publication. This manuscript will be published in its final form after copyediting, page composition, and review of proofs. Errors that could affect the content may be corrected during these processes.

Copyright © 2022 American Academy of Neurology. Unauthorized reproduction of this article is prohibited
With over 600 million people infected worldwide,\(^\text{1}\) including 95 million\(^\text{2}\) in the United States as of September 2022, the lasting health consequences of the coronavirus disease 2019 (COVID-19) pandemic must be examined. Research has already highlighted several short- and long-term neurologic consequences of COVID-19 including fatigue, headache, memory impairment, and other neurological sequelae.\(^\text{3,4}\) With such a wide-reaching effect, there is a need to continue investigating the development of neurological outcomes among individuals who were infected with COVID-19 to prepare the neurology workforce for a potential increase in patients and proactively identify opportunities to improve health outcomes.

In this issue of Neurology, Taquet et al. use data from a network of linked electronic health records (EHR), that include over 81 million patients, to examine the incidence of new onset epilepsy and seizures in the 6-months following a COVID-19 diagnosis.\(^\text{5}\) The authors
found that the overall incidence of new onset seizures was 0.69% and the incidence of new onset epilepsy was 0.30%. While these are relatively low overall, the authors found that when matched to comparable patients who were hospitalized with influenza, those who had COVID-19 had a significantly higher incidence of both seizures and epilepsy. Critically, the authors found that relative to post-influenza the incidence of epilepsy was higher among those who were not hospitalized, underscoring the potential for neurologic sequelae in even mild cases of COVID-19. These findings are particularly strong given the use a large network of EHR data, totaling 81 million patients to identify two matched cohorts of 152,754 patients each who had been diagnosed with COVID-19 or influenza respectively, and the consideration to match to a comparable disease of influenza.

The findings from this study have immediate implications for clinical practice for both generalists as well as neurologists. First, it is important to consider, among those with COVID-19, if there are other risk factors that may increase the risk for seizures or epilepsy. Furthermore, although the incidence of new onset seizures and epilepsy post-COVID infection was low, in view of the large number of people world-wide who have been infected with COVID-19 the neurology workforce should be prepared for a significant increase in the number of patients with seizures and epilepsy.

This study had some limitations that are worth noting that also provide directions for extensions upon this foundational work. First, the limited 6-month follow-up post-COVID-19 means that seizure and epilepsy the began after this time will have been missed, and the longer-term disease course was also unable to be studied, including whether the epilepsy persisted and the incidence of anti-seizure medication resistance. Given the several reports highlighting the cardiovascular6 and stroke7 risk that results from COVID-19 we must examine if there will be an increased prevalence of epilepsy that result from stroke which commonly manifest after more than 6 months. Further, these findings were strengthened by their use of a large and geographically diverse dataset. However, the use of these large databases precludes more detailed characterization of patients, including their seizure type, other clinical factors, and outcomes, and the authors were not able to address the influence of COVID-19 vaccination status or SARS-CoV-2 variant infection on the incidence of seizures and epilepsy in these cohorts. It would be important for future studies to examine if there are more specific phenotypes of acute COVID-19 (e.g., neurological involvement) that were associated with a greater risk for
seizures or epilepsy, and the influence of other factors (e.g., comorbidities, social determinants of health, environmental exposures) on risk and outcomes. Finally, the study was unable to determine whether the incidence of new onset seizures and epilepsy in the comparator group, post-influenza infection, was different to that of the baseline risk of the general community. If it was also increased, then the impact of COVID-19 infection could be even greater than the hazard ratio of 1.55 and 1.87 for seizures and epilepsy respectively reported in this study.

Finally, it is critical to consider how the findings from Taquet et al. indicate the potential for increasing the existing disparities in epilepsy prevalence. Minoritized (i.e., non-White) and lower socioeconomic populations have up to two times the risk of COVID-19 infection. Therefore, the implications of the findings from Taquet et al. for an increase in the incidence of seizures and epilepsy may disproportionately affect these already disadvantaged communities. Furthermore, the elevated relative incidence of seizures and epilepsy post-COVID-19 was found in this study to be even greater in children than adults, and so this may even further exacerbate the already disproportionate impact of these in developing countries. Overall, Taquet et al. provide us with important new knowledge about the implications of the COVID-19 pandemic to increase the incidence of new onset epilepsy and seizures; knowledge that can be operationalized to improve care and outcomes for these patients.

References


The Significance of the Increased Incidence of New Onset Seizures and Epilepsy After a COVID-19 Infection
Wyatt Bensken and Terence J. O'Brien
Neurology published online November 16, 2022
DOI 10.1212/WNL.0000000000201651

This information is current as of November 16, 2022

Updated Information & Services
including high resolution figures, can be found at:
http://n.neurology.org/content/early/2022/11/16/WNL.0000000000201651.citation.full

Subspecialty Collections
This article, along with others on similar topics, appears in the following collection(s):
All epidemiology
http://n.neurology.org/cgi/collection/all_epidemiology
All Epilepsy/Seizures
http://n.neurology.org/cgi/collection/all_epilepsy_seizures
Alzheimer's disease
http://n.neurology.org/cgi/collection/alzheimers_disease
Assessment of cognitive disorders/dementia
http://n.neurology.org/cgi/collection/assessment_of_cognitive_disorders_dementia
Cognitive neuropsychology in dementia
http://n.neurology.org/cgi/collection/cognitive_neuropsychology_in_dementia
COVID-19
http://n.neurology.org/cgi/collection/covid_19
Dementia with Lewy bodies
http://n.neurology.org/cgi/collection/dementia_with_lewy_bodies
Incidence studies
http://n.neurology.org/cgi/collection/incidence_studies
Neuropsychological assessment
http://n.neurology.org/cgi/collection/neuropsychological_assessment

Permissions & Licensing
Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
http://www.neurology.org/about/about_the_journal#permissions

Reprints
Information about ordering reprints can be found online:
http://n.neurology.org/subscribers/advertise