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## Letter to the Editor: Impact of COVID-19 on Neurosurgery and Review of the Literature



### LETTER:

The first reported case of the novel 2019 coronavirus (COVID-19) was on December 31, 2019 in Wuhan, China.<sup>1</sup> Soon, cases were reported in Europe and North America. To date in the world, there have been more than 88 million reported cases and more than 1.8 million reported deaths.<sup>2</sup> Within the United States to date, there have been more than 21 million reported cases and more than 370,000 reported deaths.<sup>2</sup> The loss of human life, impact on families, and economic impact on countries have been catastrophic. Social distancing, mask wearing, and avoiding group gatherings have become a new normal and have greatly impacted the way of life around the world. In addition, COVID-19 has significantly impacted health care, specifically neurosurgery. Herein, we report our perspective of the impact of COVID-19 on neurosurgery at academic health centers.

Neurosurgery is a discipline of surgery and medicine requiring remarkable discipline and commitment to the field and to the patients it serves. Goals of leading academic neurosurgery departments include neurosurgical care (preoperative consultation, operative technique, postoperative care); research; and training the next generation of leaders in the field.

COVID-19 has caused specific disruptions to this academic paradigm. Specifically, necessary restrictions on physical distance between health care providers and patients (to prevent transmission and cross infection) limits the ability of neurosurgery teams (faculty, residents, nurses, operating room [OR] staff, physical assistants) to immediately and directly coordinate neurosurgical care. In addition, limitations for in-person evaluations have led to an increase in virtual consultations and patient encounters. In addition, limitations for in-person Grand Round presentations have led to more virtual presentations and collaboration among colleagues.

Legislation of state governments has limited elective surgeries and focused on neurosurgeons treating emergent cases such as ruptured intracranial aneurysms.<sup>3</sup> Patients who are candidates for elective surgeries may forego in-person examinations in the hospital or neurosurgery clinic or even in-person neuroimaging studies due to fear of contamination. For such patients, monitoring by the neurosurgery team is essential. Hence governing bodies have made changes to increase access to telemedicine for neurosurgery patients. Namely, this includes reversing restrictions on telemedicine reimbursement only for patients in rural communities and having a medical license in the state of the patient location.<sup>3</sup>

More specifically, some neurosurgery techniques should be carefully evaluated in the context of the COVID-19 pandemic. For instance, the endoscopic endonasal approach should be carefully considered due to the chance of virus particles within the nasal sinuses spreading and infection of physicians and staff.<sup>4</sup> Also, some neurosurgery teams may find themselves spending less time in the OR and more time conducting research remotely. Finally, due to the far-reaching impact of COVID-19, it has been

estimated that many neurosurgery departments have experienced a decrease in surgical procedures conducted. Notably, the University of Miami published recently that their neurosurgical cases have diminished by roughly 75%.<sup>5</sup>

Colleagues at the University of California San Diego also published their experience of COVID-19 and its impact on the neurosurgery service.<sup>6</sup> The authors retrospectively reviewed their cases between November 2019 and July 2020 and found that during the COVID-19 pandemic, operative volume was only mildly diminished.<sup>6</sup> Specifically, the authors found that initiation of an OR triage plan resulted in a mild decrease from 6.9 to 5.8 mean daily cases.<sup>6</sup> In addition, the University of Miami undertook in-house testing and daily symptomatic screening of patients, staff, and visitors.

Colleagues at Emory similarly noted an impact on their department and academic activities.<sup>7</sup> The authors noted that between March 16 and April 15, 2020, 145 total neurosurgical cases were performed. Compared with previous years, this was noted to be an 80% reduction in case volume and 66% decrease in hospital revenue (from \$6.6 million to \$2.2 million). Most significantly, operative volume of functional neurosurgery was reduced by 84%, followed by spine surgery with a 78% reduction in volume. The pandemic was also noted to have caused an unprecedented toll of neurosurgical resident and fellow experience. Academic activities were noted to have transitioned to Zoom meetings including weekly Morbidity and Mortality and central nervous system lectures.

Similarly, a previous study of our institution, the University of Pittsburgh Medical Center, noted dramatic changes.<sup>8</sup> An action plan was instituted to reduce the risk of resident exposure to the virus while maintaining excellent patient care. Particularly, this included dividing the 28-resident team to 14 residents with hospital coverage including call, clinic work, OR, on-line lectures and 14 residents to quarantine days including mandatory on-line lectures, academic work, and conferences. ORs were standardized to limit resident over-coverage and, where possible, attending neurosurgeons would complete cases independently. Similarly, to other institutions, the cancellation of elective surgeries dramatically reduced patient volume.<sup>8</sup>

To date, the impact of COVID-19 on the world and more specifically on neurosurgery has been tremendous. The global burden from loss of human life, economic ramifications, and changes in academic health care centers cannot be entirely quantified. The emergence of the Pfizer, Moderna, and Johnson and Johnson vaccines is playing a crucial role in this rapidly changing landscape. The Moderna vaccine displayed roughly 94.5% effectiveness in November 2020, and the Pfizer vaccine has displayed nearly 95% efficacy in preventing symptomatic COVID infection after 2 doses.<sup>9</sup> Notably, as of December 14, 2020, Allegheny County reported 40,874 confirmed COVID-19 cases and 665 deaths.<sup>10</sup> As of February 13, 2021, Allegheny County has registered 83,520 residents with partial COVID-19 vaccination coverage and 38,121 residents with full coverage.<sup>10</sup> As Allegheny County is still in phase 1a, the highest priority is provided to health care workers and patients with high-risk medical conditions. At the University of Pittsburgh Medical Center as of January 12, 2021, 41,790 front-line

health care workers, representing roughly 50% of clinical staff, have received at least 1 dose of a COVID-19 vaccine.<sup>11</sup>

Moving forward, hopefully the deployment of vaccines throughout health care centers will not only curtail the virus and prevent transmissibility but also resume normalcy within neurosurgery. Specifically, for the first time since World War II, the AANS annual meeting was postponed. Similarly, the ABNS postponed written and oral examinations. As vaccines continue to be deployed, it is expected that resistance to COVID-19 will develop and more neurosurgical-related activities such as conferences, grand rounds, patient care, etc. will be back to in person. The COVID-19 pandemic, an ever-changing situation, with unfortunate genetic variants that continue to threaten patients and health care providers, may be a new normalcy for the foreseeable future. However, academic neurosurgery will continue to respond with its commitment to research, training, and the patients it serves.

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