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**Letter to the Editor: Survey of Academic U.S. Programs Regarding the Impact of the COVID-19 Pandemic on Clinical Practice, Education, and Research in Neurosurgery**



**LETTER:**

The COVID pandemic has had a drastic global impact on clinical practice across multiple surgical specialties, with neurosurgery being no exception. With attention diverted to providing appropriate care to COVID patients, practices have had to adapt to create sufficient reserves and prepare to bear the brunt of case surges in their respective geographic locations. A precise understanding of spread and prevention has been ever-evolving, therefore a consistent response across different neurosurgery practices may not be expected. The Surgeon General of the United States recommended cancellation of all elective surgeries on March 14, 2020.<sup>1</sup> However, a few weeks following this directive, multiple state administrations lifted the embargo on elective procedures after ongoing evaluation of case numbers, and considering the potential adverse impact of persistent cancellation on other non-COVID patients and financial risk to hospitals.<sup>2</sup> Given that the surge of cases in the pandemic is expected to be changing, a consistent response devoid of confusion and variable compliance would be paramount to restrict spread and protect the public in the event of a repeat peak in cases in the future. Apart from disruption to patients as well as to practice, there have been concerns raised about the impact of the situation on resident education and research initiatives across neurosurgery.<sup>3,4</sup> With resident conferences, staff and research meetings cancelled, it is also unclear if most programs were able to successfully incorporate the virtual online mode of teaching and research into their workflow. Because it is also unknown if the worst is over, a coherent response strategy will be crucial in a post shutdown world due to the possibility of multiple outbreaks sustained across following years.

To understand how different academic neurosurgery departments across the United States responded to this devastating COVID-19 pandemic, we conducted a national survey of program leaders to determine the measures taken for ensuring patient and personnel safety and adapting to teaching and research needs. The goal was to assess the degree of variability in response, and highlight any potential shortcomings (anonymously) to facilitate discussions about the right path forward. In this report, we summarize the findings of this survey. The survey was collected between April 26 and May 10 by sharing a link via direct e-mail to the leadership (residency program directors and chairmen) of 108 academic U.S. neurosurgery departments, a list that was obtained from the residency program directory of the American Association of Neurologic Surgeons (AANS). A full copy of the survey can be accessed at: [https://docs.google.com/forms/d/e/1FAIpQLSfGYikExgay5XHX5BIOgbtZbqskv-SiIrmKCAiIVUsqzWXTw/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSfGYikExgay5XHX5BIOgbtZbqskv-SiIrmKCAiIVUsqzWXTw/viewform?usp=sf_link).

The questions were structured according to the following domains: clinical practice, education, and research. A total of 40 (out of 208) respondents completed the survey from the following states: New York (n = 6), California (n = 5), Alabama (n = 2), Illinois (n = 2), Pennsylvania (n = 2), Oregon (n = 2), Minnesota (n = 2), Maryland (n = 3), Texas (n = 2), and Connecticut, Massachusetts, Louisiana, Florida, Ohio, Virginia, Utah, West Virginia, Wisconsin, Arkansas, Michigan, Missouri, and South Carolina (n = 1 each). Most respondents identified as residency program directors (50%, n = 20), whereas the remaining identified as chairmen or both.

**PRACTICE**

Most respondents (62%) reported that they cancelled nonurgent surgeries, whereas 33% reported that although nonurgent surgeries were cancelled, they were planning to resume those procedures in the next 2–4 weeks. Two respondents reported that they employed a “volume-limiting” approach based on the level of community transmission. A minority of respondents (12%) said that their institution did not put in place a specific triage mechanism for patients who may require neurosurgical intervention based on a nuanced discussion. For patients with brain and spine tumors, a few respondents said they preferred a paneled case review with leaning toward nonsurgical intervention (9.5%), whereas 45% said that a panel review was performed with no specific leaning toward nonsurgical intervention. The majority (83.3%) of respondents reported that for patients with newly diagnosed high-grade gliomas, surgery was offered within 1–2 weeks of diagnosis. Approximately 50% of respondents said that for nonenhancing lesions presumed to be low-grade gliomas, close outpatient monitoring was preferred with surgery deferred until the COVID situation would improve. Only a minority of respondents (4.8%) preferred hypofractionation in case radiation was administered to limit patient exposure to the hospital. Also, a very small number of respondents completely deferred surgery for patients over age 65 years (7.1%).

A minority of respondents (19%) reported that routine COVID testing was not offered to patients undergoing neurosurgery (with the exception of true neurosurgical emergencies). Regarding airway management in the operating room, although the majority of respondents said that high-level personal protective equipment (PPE) was worn by a clinician performing intubation and extubation (90%) and the number of personnel in the operating room was limited at that time (88%), a minority of groups used a powered air-purifying respirator (PAPR) (33%) at the time of airway management. With regard to endonasal procedures, approximately 42% of respondents suggested that additional levels of PPE, such as face shields, N95 masks, and PAPR, were used in case surgery could not be postponed in a known COVID-positive patient. Approximately 27% of respondents reported that all endonasal surgeries were

suspended temporarily. A small (10%) number of respondents also reported issues with shortage of PPE for neurosurgical procedures. Interestingly, all (100%) respondents suggested that outpatient services were delivered remotely via a telemedicine health portal.

### EDUCATION

For personnel/resident safety, most respondents (88%) suggested that a minimal number of residents and/or fellows were allowed in the hospital, whereas 74% also suggested that a designated alternate pool of providers and residents were available as a substitute in case those on service demonstrated COVID-19 symptoms. Approximately 79% also reported that residents seeing consults had sufficient PPE available, whereas only 52% reported use of virtual hand-offs between care teams to minimize transmission. Nearly 24% of respondents also reported that residents were redeployed to provide coverage for COVID-19 units. For resident education, a small number (12%) reported cancellation of all didactic sessions within the department, whereas the remaining suggested successful use of a video conference-based format.

### RESEARCH

For research activities, the following was observed: 41% reported additional efforts/attention directed toward resident driven research; 93% reported that all research/staff meetings were being held virtually; 57% reported that efforts were made to support remote online access for research staff to work from home; 57% reported that patient enrollment into ongoing non-COVID-related studies was suspended; 50% reported that for animal studies related to non-COVID research, breeding activities requiring increase in cage counts were suspended, whereas 41% reported that animal survival surgeries were also stopped to preserve PPE.

Ensuring seamless care delivery and maintaining the same standards of resident education and research are obvious challenges in a pandemic, in the face of preserving patient and personnel safety. Certainly, there are limitations to this survey given the low response rate (~20%). Although most departments pursued important policies, such as cancellation of nonurgent surgeries and performed COVID testing preoperatively, we did find a small number of respondents who reported not offering preoperative testing routinely. The AANS/CNS tumor section recently published guidelines to provide neurooncologic care in the COVID era.<sup>5</sup> According to these guidelines, patients with newly diagnosed high-grade gliomas should preferably receive surgery within 1–2 weeks of diagnosis, and close outpatient monitoring is recommended for nonenhancing lesions presumed to be low-grade gliomas to stratify those who require more urgent surgical intervention versus those in whom the treatment may be safely postponed. Although we found that the majority of respondents seemed to follow this recommendation for high-grade tumors, only half reported following the corresponding recommendation for presumed low-grade lesions. The small number of respondents completely deferring tumor surgery for patients over the age of 65 years was also interesting to note—especially in cases in which one considers a case in which the patient would be most definitely operated in the absence of the pandemic. Endonasal surgery has

been a conscientious issue in the face of the pandemic because of the high risk of aerosol generation and risk of transmission. There was variability observed here, with less than half reporting use of additional measures, such as PAPR, N95 masks, and face shields, in case endonasal surgery could not be postponed in a known COVID-positive patient. Although the tumor section recommended surgical intervention in case of benign tumors that cause progressive neurologic symptoms, such as worsening visual deficit in case of pituitary or skull base tumors, we found that a small percentage of respondents reported complete deferral of all endonasal procedures (27%).

Although the present survey highlighted a general regard toward following best practices, we found some inconsistencies in response. Although these inconsistencies may simply be a function of the ground reality of practicing neurosurgery in different settings in such unprecedented times, it brings forward the fact that a comprehensive and well-debated set of guidelines that address each of these issues may need to be already in place in case of a sudden resurgence of the situation. They may not necessarily be “one size fits all” due to the inherent diversity of training programs, but could certainly supplement each department's local coping strategy by highlighting general best practices toward some common goals: maintaining patient safety, protecting personnel on the frontlines, delivering complex neurosurgical care to patients who would still need it had there not been a pandemic, and maintaining existing standards of education and research for the next generation of trainees who would still be practicing when the pandemic is over. The repercussions of these changes in clinical practice and surgeon adaptation in the COVID-19 era on patient outcomes remains to be determined.

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