Accepted version

J Neurosurg Anesthesiol 2021; 33: 1-2. DOI: 10.1097/ANA.0000000000000745

The COVID-19 pandemic and perioperative neuroscience

"If we believe that tomorrow will be better, we can bear a hardship today."

Thich Nhat Hanh, Vietnamese monk

"As we look to the opportunities and challenges that a new year will bring" - so began my Editorial in the January 2020 issue of JNA.[1] Little did I know when I wrote these words exactly how great those challenges would be. The COVID-19 pandemic has impacted personal and professional lives across the globe. Neuroanesthesiologists and neurointensivists have been on the front line of the pandemic response, and this issue of the Journal includes a series of Short Reports outlining the experiences of colleagues as they rose to the challenges posed by the pandemic.

The first report describes changes in neuroanesthesia practice in the largest neurosurgery center in China very early in the pandemic.[2] The development of a 3-level system of COVID-19 risk, and separation of COVID and non-COVID cases to minimize nosocomial transmission, allowed some neurosurgical and neurointerventional services to continue while maintaining a safe environment for healthcare worker and patients. Similar arrangements are now integrated into most healthcare systems, but it is these early lessons from China and elsewhere that allowed others to be better prepared as the first wave of the pandemic spread across the globe.

As healthcare systems struggled to cope with the surge in COVID-19 cases, non-essential activity, including elective neurosurgery, was cancelled, and diverse clinical areas repurposed and staffed to manage critically ill COVID-19 patients.[3] In a retrospective process analysis, Rath and colleagues[4]

report their experience of repurposing a dedicated neurocritical care unit as part of the UK pandemic response plan. By increasing surge capacity, reducing ICU demand, and redeploying and retraining staff, this unit was able to maintain sufficient critical care capacity to manage all urgent neuroscience cases while load-sharing the management of (non-neurological) critically ill COVID-19 patients as general critical care networks risked becoming overwhelmed. Resources, equipment and real estate availability were obvious challenges, but the authors report that it was the adaptability and resilience of staff that was crucial to their successful pandemic response. Long working hours (sometimes in unfamiliar environments), access to and use of PPE, and the need to rapidly review and implement continually evolving guidelines all contribute to the high levels of stress and fear reported by healthcare workers during the pandemic.[5] Staff wellness, both physical and psychological wellness, is crucial to a successful pandemic response and tailored interventions to enhance resilience and support staff are essential components of a response plan.[6]

Although most aspects of healthcare have been impacted by the COVID-19 pandemic, the management of acute ischemic (AIS) patients undergoing endovascular treatment (EVT) presents particular challenges given the time imperative for intervention and risks associated with aerosol transmission of coronavirus during EVT.[7] Chowdhury et al.[8] report clinical practices and associated safety issues for healthcare teams in 114 tertiary stroke centers in 25 countries. In this cross-sectional survey, all responding centers had revised acute stroke protocols in response to the COVID-19 pandemic, although half reported no changes to anesthetic management during EVT. Unsurprisingly, additional measures to minimize risk to healthcare teams resulted in delays at various stages of treatment in many centers; any adverse outcome impacts of these delays were not quantified. Substantial practice variability was reported in several areas, including testing for COVID-19 and use of PPE by healthcare teams during EVT. These findings are concerning given the potential risks to healthcare providers associated with the transfer of AIS patients between several hospital locations over a short period of time, limited or no opportunity for COVID-19 testing prior to EVT, and the potential for aerosolization and higher transmission rates if urgent intubation is required during EVT.[7]

In addition to impacts on healthcare, the COVID-19 pandemic has adversely affected clinical training. Cancellation of elective neurosurgery, redeployment of trainees, cessation of in-person learning and cancellation of examinations have resulted in unprecedented disruption to neuroanesthesiology training programs. In an email-based survey, Rajan et al.[9] found that neuroanesthesiology fellowship training program directors had responded quickly to the changed environment by the introduction of innovative approaches to training, including a switch to web-based education, and initiatives to support trainee wellbeing. Residents and fellows were positive about online teaching, although they did not believe that this was an adequate substitute for "hands-on" training. While it seems certain that the 'apprentice-based' approach to neuroanesthesiology training, with in-person tuition in the operating room, will remain an essential component of training, experiences during the pandemic suggest that distance-based learning options, including high fidelity telesimulation, may be effective and flexible supplements to traditional learning methods.[10]

Just as the world will be irreversibly changed by the pandemic, many aspects of healthcare will also be different in the post-pandemic era. The next challenge for neuroanesthesiologists and neurointensivists will be to incorporate lessons learned during the pandemic to improve clinical care and outcomes for patients, and to sustain high-quality education for neuroanesthesiology training in the new normal.

References

1. Smith M. JNA is looking forward to 2020 and beyond. *J Neurosurg Anesthesiol* 2020; 32: 1
2. Jian M, Liang F, Liu H, et al. Changes in Neuroanesthesia Practice during the Early Stages of the COVID-19 Pandemic: Experiences from a Single Center in China. *J Neurosurg Anesthesiol* 2021;33:73–76. doi: 10.1097/ANA.0000000000000730
3. Lee CCM, Thampi S, Lewin B, et al. Battling COVID-19: critical care and peri-operative healthcare resource management strategies in a tertiary academic medical centre in Singapore. Anaesthesia 2020; May 3, Epub ahead of print. doi: 10.1111/anae.15074

4. Rath EP, Luoma AMV, Earl M, et al. Repurposing a Neurocritical Care Unit for the Management of Severely Ill Patients with COVID-19: A Retrospective Evaluation. *J Neurosurg Anesthesiol* 2021;33:77–81. doi: 10.1097/ANA.0000000000000727
5. Muller AE, Hafstad EV, Himmels JPW, et al. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: A rapid systematic review. Psychiatry Res 2020; 293: 113441
6. Flexman AM, Abcejo A, Ravitsian R, et al. Neuroanesthesia practice during the COVID-19 pandemic: Recommendations from Society for Neuroscience in Anesthesiology & Critical Care (SNACC). *J Neurosurg Anesthesiol* 2020;32:202-209
7. Sharma D, Rasmussen M, Han R, et al. Anesthetic Management of Endovascular Treatment of Acute Ischemic Stroke During COVID-19 Pandemic: Consensus Statement from Society for Neuroscience in Anesthesiology & Critical Care (SNACC). *J Neurosurg Anesthesiol* 2020;32: 193-201
8. Chowdhury T, Rizk AA, Daniels AH. Management of Acute Ischemic Stroke in the Interventional Neuroradiology Suite During the COVID-19 Pandemic: A Global Survey. *J Neurosurg Anesthesiol* 2021;33:44–50. doi: 10.1097/ANA.0000000000000734
9. Rajan S, Bebawy J, Avitsian R, et al. The Impact of the global SARS-CoV-2 (COVID-19) pandemic on Neuroanesthesiology Fellowship Programs worldwide and the Potential Future Role for ICPNT Accreditation. *J Neurosurg Anesthesiol* 2021;33:82–86. doi: 10.1097/ANA.000000000000073
10. Patel SM, Miller CR, Schiavi A, et al. The sim must go on: adapting resident education to the COVID-19 pandemic using telesimulation. Adv Simul (Lond) 2020; 5: 26