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COVID-19 Perspectives

Neuro-ophthalmology in the Era of COVID-19: Future Implications of a Public Health Crisis

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The novel coronavirus 2019 (COVID-19) pandemic has disrupted neuro-ophthalmic care, research, and education across the globe. Neuro-ophthalmology faces unique challenges, given our dependence on aspects of the physical examination and on immediate diagnostic testing. Impaired access impedes our ability to differentiate benign conditions from vision- and life-threatening neurologic emergencies. Detailed history and some examination components, such as visual acuity and pupillary examination, are feasible; however, visual field testing and ophthalmoscopy are difficult or impossible to perform remotely. Decisions regarding diagnostic testing and therapeutic interventions must weigh urgency versus COVID-19 exposure risk. We review changes precipitated by COVID-19, emphasizing those with the potential to outlast the immediate pandemic.

Clinical Care

Video Visits

A central strategy for neuro-ophthalmic clinical care has been rapid implementation of virtual visits except for emergencies.[1] At NYU Langone Health, institution-wide data show that more than 5000 video visits were conducted daily within 1 month of the pandemic onset, a timeframe that included institutional rollout of an Epic telehealth platform (Epic Systems Corp, Verona, WI) with physician onboarding.[2] At Columbia University Irving Medical Center, 2000 virtual visits were performed daily after establishing Epic as the medical record in February 2020. At the Singapore National Eye Centre, plans are underway for video consultation clinics for several subspecialties, including neuro-ophthalmology. Remotely capturing the neuro-ophthalmologic examination has been a major challenge. In the United States, a multi-institutional physician working group meets weekly to discuss examination techniques and digital applications. Visual acuity can be tested with a printable near card or EyeHandbook application (Cloud Nine Development LLC, Overland Park, KS), and afferent pupillary defect testing can be successful with a patient-performed swinging flashlight test. Ocular motor range and detection of nystagmus also can be easily assessed virtually. Telemedicine has many challenges and several benefits, including protection of patients, physicians, and the general public from virus exposure,[3,4] as well as patient and physician convenience.[2] Notably, variable access to technology has the potential to worsen health disparities. Despite this concern, we anticipate virtual visits will be integral to future practice, including for assessment of evaluation urgency.

Long-term impact: Initial patient encounters likely will remain in person, but virtual visits may play an important role for follow-up. In the United States, it remains to be seen if current reimbursement policies from Medicare, Medicaid, and private insurance will remain in force after the pandemic subsides.[5] We are piloting remote automated visual fields with the Melbourne Rapid Fields Neural Lite program (Glance Optical Pty Ltd, Melbourne, Australia), shown to strongly reflect results of Humphrey Visual Fields with good test–retest reliability.[6] This technology may enable remote monitoring of visual field defects between in-person visits.

In-Person Visits

Essential examination components such as ophthalmoscopy and ocular alignment quantification can be evaluated reliably only in person. Techniques are being explored to perform these maneuvers remotely, but are not ready for implementation.[7–9] Recent studies have used artificial intelligence for optic disc analysis.[10,11] OCT and visual field assessment can be carried out remotely, but the technologies are in early stages of deployment.

Long-term impact: "Combined visits," in which patients have in-office testing and a physician virtual visit may evolve, because they may improve access to neuro-ophthalmologic care.

Consultation

Teleneurology consultation has been explored most thoroughly in stroke.[12] However, new technologies engendered by the pandemic have future applications. For example,

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NYU Langone Health now has access to Epic functionality allowing direct clinician-to-clinician video connection at the bedside for real-time subspecialty consultation.

Long-term impact: Video conferencing may facilitate our involvement in complex neuro-ophthalmic cases. Reimbursement models will be key in determining whether this strategy thrives. Some existing models are the teledizzy services in early development in the United States and Europe.[13]

Research

Although clinical trial enrollment has been impacted by minimal in-person evaluation, researchers have pivoted toward data analysis from home while maintaining Health Insurance Portability and Accountability Act standards. Investigators have adopted online work management platforms for team members.

Long-term impact: Online work management platforms will remain useful. Observational studies have been inspired by implementation of virtual visits, for example, the inter-institutional Telemedicine Experience in Neuro-Ophthalmology in the Era of COVID-19 Pandemic study captures patients' and physicians' perspectives to optimize this model and identify symptoms that are easily addressed virtually. At the Singapore National Eye Centre, the ongoing Epidemiology of Neuro-Ophthalmic Disorders in Asians will capture patients demonstrating neuro-ophthalmologic manifestations of COVID-19 and also will allow patients to consent for their data to be used for future research.

Education

All conferences and lectures have transitioned to remote learning. Although this poses challenges, it opens new vistas for educational innovation. For instance, virtual visits allow for simultaneous evaluation by fellows and attending physicians. Virtual divisional business meetings, conferences, and happy hours to bolster morale have been critical. Having no choice but to adopt virtual platforms has taught us that, although there is no replacing face-to-face interaction, we can successfully unite educationally and socially while also maintaining distance.

Long-term impact: We anticipate instituting video-based bedside neuro-ophthalmology teaching. If a neuro-ophthalmic patient is admitted to any hospital within one of our health systems, we can connect to residents at the bedside for integrated teaching during predetermined didactic sessions. A virtual curriculum in the preclinical years has been operational in the United States since at least 1997, and the time is now to bring virtual teaching into resident education.[14] This virtual platform will be useful in the future for residents rotating at other hospitals because of travel constraints as well as grand rounds sessions that could be broadcast to satellite locations adjacent to or remote from the primary teaching hospital.

Conclusions

Transition to life in the era of COVID-19 has been challenging, but out of this difficult period arise many opportunities to improve on our practices from "before." Neuro-ophthalmology is a unique and anatomically based subspecialty at the intersection of 2 fields and is well positioned to implement innovative changes to clinical practice and the education of future physicians after the acute threat of COVID-19 has resolved. There will be no going back, but we do see a new path going forward.

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