Training in Neurology: Rapid implementation of cross-institutional neurology resident education in the time of COVID-19

Daniel J. Weber, DO, Dara V.F. Albert, DO, MEd, Bhooma R. Aravamuthan, MD, DPhil, Miya E. Bernson-Leung, MD, EdM, Danish Bhatti, MD, and Tracey A. Milligan, MD, MS

Neurology® 2020;95:883-886. doi:10.1212/WNL.0000000000010753

Correspondence

Dr. Weber
daniel.weber@health.slu.edu

Abstract

In-person resident didactics are traditionally limited to the faculty within a single institution. Tele-education efforts have been implemented in neurology to various degrees historically, but the coronavirus disease 2019 (COVID-19) pandemic has necessitated a broad and immediate overhaul in neurology didactic training. To respond to the immediate need for resident didactics, we created a rapid onset, volunteer tele-education didactic series publicized on online forums to the American Academy of Neurology A.B. Baker Section via Synapse and the Women Neurologists Group via Facebook. We describe how, with just 1 week of lead time, we created an ongoing neurology lecture series featuring faculty from across the country lecturing on a diverse range of neurology topics. The series is ongoing and draws upwards of 120 residents per lecture. Tele-education offers unique benefits to enhance the education of all neurology trainees everywhere.

MORE ONLINE

COVID-19 Resources

For the latest articles, invited commentaries, and blogs from physicians around the world

NPub.org/COVID19

Introduction

Neurology is traditionally taught in-person through bedside teaching and live face-to-face lectures. However, the use of tele-education in the form of live or recorded online lectures as a means to supplement in-person neurology residency didactic curricula has been discussed in graduate medical education circles for years. There is considerable evidence to support similar outcomes between in-person lectures and online or video lectures in medical education.¹⁻³

The traditional in-person educational method limits residents' exposure to the faculty within their institutions. Despite uniformity of core educational requirements for residents, institutional segregation can create different educational experiences, which can be amplified with increasing degrees of medical specialization. Technology-enhanced tele-education allows exposure to a greater variety of educators than would otherwise be available at any single institution.

Due to the coronavirus disease 2019 (COVID-19) pandemic of 2020, typical in-person didactics were abruptly and completely disrupted. All in-person meetings of more than 10 people were deemed unsafe. Our residency didactics simply could not be completed the traditional way. Tele-education became an ideal way to continue education virtually. Across the nation, several programs took to online meeting platforms to replace their in-person didactics. A great advantage of online video lectures during these uncertain times is that it allows the lecturer and learners to be anywhere while maintaining safe physical distancing. The ability to record online lectures also allows asynchronous review of the information for residents unable to attend the live didactic.

In this article, we describe how we took advantage of the opportunity to rise to the challenges of continuing resident education during the pandemic by creating a cross-institutional

From the Department of Neurology (D.J.W.), St. Louis University, MO; Division of Child Neurology (D.V.F.A.), Department of Pediatrics, Nationwide Children's Hospital, The Ohio State University, Columbus; Division of Pediatric Neurology (B.R.A.), Department of Neurology, St. Louis Children's Hospital, Washington University School of Medicine, MO; Department of Neurology, Boston Children's Hospital (M.E.B.-L.), and Department of Neurology, Brigham and Women's Hospital (T.A.M.), Harvard Medical School, Boston, MA; and Department of Neurological Sciences (D.B.), University of Nebraska Medical Sciences, Omaha.

Go to Neurology.org/N for full disclosures. Funding information and disclosures deemed relevant by the authors, if any, are provided at the end of the article.

remote lecture series open to learners from around the world. We reflect on our experience thus far and offer lessons learned for others interested in similar educational innovations.

Intervention

We created an online open-access collaborative teaching platform using the web-based communication platform Zoom (San Jose, CA). This lecture series was designed to be open to all neurology and child neurology residents. With the help of volunteer faculty from the A. B. Baker Section for Neurologic Education of the American Academy of Neurology and the Women Neurologists Group on Facebook (Menlo Park, CA), we took this lecture series from an idea on March 17, 2020, to its first lecture on March 24, 2020.

Faculty were allowed to select the topic with the sole instruction of attempting to avoid redundancy. All available lecture slots were filled by the end of the day of our first lecture. Due to the interest, we extended the series through the end of May. These slots were likewise filled rapidly by board-certified neurologists.

Results

From our first lecture on March 24 through May 1, we hosted 29 lectures with a total of 3,013 attendee visits from trainees throughout the United States and beyond. In the first week of lectures (Tuesday, March 24–Friday, March 27), we averaged 83 attendees per lecture. In our last 4 lectures prior to the preparation of this publication (Tuesday, April 28–Friday, May 1), that average had climbed than 50% up to 126 attendees per lecture.

These lectures have been given by 27 different specialists from around the country, representing 24 institutions in 19 states. They were on topics spanning the breadth of neurology (data available at [dx.doi.org/10.17632/dg65wscf9s.1](https://doi.org/10.17632/dg65wscf9s.1)). This included topics that may not be easily covered at all institutions, such as pediatric stroke and neuro-oncologic emergencies. Lecturers have incorporated live Q&A, PollEverywhere questions, and use of synchronous chat features to make the didactics more interactive.

Lessons learned

Rather than choosing to invite lecturers, we instead chose a more open-source approach and allowed lecturers to join on a

Table Benefits, barriers, and lessons learned from the online learning program

	Residents	Faculty	Program directors
Benefits	<ol style="list-style-type: none">1. Exposure to subspecialty topics not available locally2. Exposure to different pedagogical methods3. Opportunity to interact with other programs4. Additional online resource for learning5. Potential for forming community of learning	<ol style="list-style-type: none">1. Opportunity to teach to a wider audience2. Opportunity to interact with other programs3. Career development opportunity with skill development and building resume4. Opportunity to teach for faculty who may lack local opportunities	<ol style="list-style-type: none">1. Access to subspecialty experts who are not available within the department2. Resident exposure to pedagogical methods from other programs3. External support for didactic curriculum4. Potential for cross-institutional interactions
Challenges	<ol style="list-style-type: none">1. Time zone differences2. Program commitment to allow time for attending the lectures3. Conflict with local lectures, meetings, and clinical responsibilities	<ol style="list-style-type: none">1. Lack of skills for virtual teaching2. Lack of familiarity with the online platform3. Lack of recognition at local program for these efforts	<ol style="list-style-type: none">1. Integration to local curriculum and resident schedules2. Understanding significance and effectiveness of the participation3. Lack of control (ability to participate in the program development and execution)4. Inability to implement residents' feedback on the program
Lessons learned	<ol style="list-style-type: none">1. Need speaker feedback for quality of lectures2. Increasing interactions and incorporating active learning3. Adding case-based or discussion sessions, breakout rooms, round tables4. Formal feedback process for the residents to participate in program development	<ol style="list-style-type: none">1. Providing formal recognition as invited national speakers2. Some vetting process for presenters3. Better registration process to be a speaker4. Better ways to recruit speakers5. Developing a core cohort of speakers	<ol style="list-style-type: none">1. Involving program directors early on may enhance engagement2. Learning surveys3. Better program structure and organization4. More clear effectiveness needs to be studied5. Program director feedback process needs to be developed
Actionable items	<ol style="list-style-type: none">1. Establish process to collect feedback from residents2. Create a simple postlecture speaker feedback survey3. Incorporate active learning sessions4. Survey timing of sessions5. Provide resource for residents to reach out to their program directors and involve them	<ol style="list-style-type: none">1. Introduction video on basics of online teaching (how-to video)2. Develop a speaker signup platform/process3. Develop a dissemination plan for recruitment4. Offer certificate of recognition5. Ask for recording lectures6. Identify tools and technologies for hosting and recording7. Provide feedback to the speakers and have a reinvention process	<ol style="list-style-type: none">1. Conduct learning and engagement survey2. Establish a process of feedback and updates3. Identify areas of need and focus for most programs4. Understand integration with the local programs

volunteer basis. We have demonstrated that this is a feasible method to fill a lecture series and that this method can generate a wide variety of lecture topics that cover content basics (e.g., status epilepticus) but also include topics we may not have otherwise considered (e.g., Parsonage-Turner syndrome) (full topic list available at [dx.doi.org/10.17632/dg65wscf9s.1](https://doi.org/10.17632/dg65wscf9s.1)). Volunteer lecturers were eager to teach and to reach a broader audience. Their contribution is recognized on their curriculum vitae as evidence of external speaking. This approach can continue to be used to build future online lecture series, to encourage participation from neurologists who enjoy teaching and to create content diversity.

Resident feedback has continued to be positive. We frequently receive unsolicited emails from the attendees praising the series. We have also learned there seems to be a great interest from trainees in continuing with a series like this in some fashion.

Given the quick start of the project with urgency and lack of precedence, there are clear areas for improvement. To ensure lack of redundancy and ensure coverage of all critical topics, a loose rubric of the number of lectures within given topical areas could have been provided at the outset. Online lectures also allow the opportunity to formally integrate surveys and serial assessments of attendees. An online platform for safe sharing of lecture materials and recordings could have been created at the outset. We also noted varying levels of comfort with presenting virtual lectures over an online platform that would likely change in the future and could represent an area of future faculty development efforts. We have summarized the benefits, drawbacks, and lessons learned from this program in the table.

Future directions

Rapid implementation of crowd-sourced, cross-institutional far-reaching tele-education is possible and highly desired by faculty and residents. Starting the process of tele-education has allowed us to take advantage of the traditional quality improvement plan-do-study-act cycle.⁴ We are now in the study phase, and have assembled a team to look at how we can continue to improve these lectures that we are currently giving and how we can improve content delivery to residents moving forward. There may also be a role for including medical students and other neurology learners, such as fellows, in this curriculum. Based on what we have seen thus far, there should continue to exist a curriculum given by experts that can be accessed by any trainee regardless of program. This would allow residents access to resources they may otherwise lack. A multi-institutional online didactic series also presents multiple opportunities for qualitative and quantitative education research given the large sample size available. This would allow for rigorous analysis of teaching interventions.

As the next steps, we plan to follow up this initial educational endeavor with a more formal needs assessment to craft an

ongoing cross-institutional curriculum that will enhance the knowledge of all future neurologists. This needs assessment should allow us to ensure that the curriculum we present is addressing areas that will be the most helpful and may include subspecialty topics not broadly available, interprofessional speakers, and more global topics. In the ongoing curriculum, speakers will be directly invited with a goal of keeping a broad representation of speakers from the field. We plan to use learner feedback to ensure that excellent speakers are recognized and invited back. We can use this platform to identify qualities associated with speakers who are highly rated by the residents and use that information to inform faculty selection and faculty development tools in the future.

Disruptions on the scale of a global pandemic force adaptation and innovation and can create opportunities for experimentation and change that otherwise might not have been easily achieved. Just as the global pandemic has made tele-medicine a necessity for safe patient care, so too has tele-education become a necessity for safe neurology education. Increased use of tele-education offers unique benefits to enhance the education of all neurology trainees everywhere.

Study funding

No targeted funding reported.

Disclosure

D.J. Weber, D.V.F. Albert, and B.R. Aravamuthan report no disclosures. M.E. Bernson-Leung is a former member of the Editorial Board of the *Neurology*[®] Resident & Fellow Section. D. Bhatti reports consulting/speaking for AbbVie, Accadia, Adamas, Allergan Pakistan, Merz Medtronic, and Teva Neurosciences. T.A. Milligan reports no disclosures. Go to [Neurology.org/N](https://www.neurology.org/N) for full disclosures.

Appendix Authors

Name	Location	Contribution
Daniel J. Weber, DO	St. Louis University, MO	Designed and conceptualized study, analyzed the data, drafted the manuscript for intellectual content
Dara V.F. Albert, DO, MEd	Nationwide Children's Hospital, Columbus, OH	Revised the manuscript for intellectual content
Bhooma R. Aravamuthan, MD, DPhil	Washington University in St. Louis, MO	Revised the manuscript for intellectual content
Miya E. Bernson-Leung, MD, EdM	Boston Children's Hospital, MA	Revised the manuscript for intellectual content
Danish Bhatti, MD	University of Nebraska Medical Center, Omaha	Revised the manuscript for intellectual content
Tracey A. Milligan, MD, MS	Brigham and Women's Hospital, Boston, MA	Revised the manuscript for intellectual content

References

1. Brockfeld T, Müller B, de Laffolie J. Video versus live lecture courses: a comparative evaluation of lecture types and results. *Med Educ Online* 2018;23:1555434.
2. Davis J, Crabb S, Rogers E, Zamora J, Khan K. Computer-based teaching is as good as face to face lecture-based teaching of evidence based medicine: a randomized controlled trial. *Med Teach* 2008;30:302–307.
3. Markova T, Roth LM, Monsur J. Synchronous distance learning as an effective and feasible method for delivering residency didactics. *Fam Med* 2005;37:570–575.
4. Ting HH, Shojania KG, Montori VM, Bradley EH. Quality improvement: science and action. *Circulation* 2009;119:1962–1974.

NEW EPISODE

November 10, 2020

Effect of escitalopram dose and treatment duration on CSF A β levels in healthy older adults: A controlled clinical trial (see p. 858)

In the first segment, Dr. Jeffrey Ratliff talks with Dr. Yvette Sheline about her paper on the effect of escitalopram on CSF A β . Then, Dr. Stacey Clardy speaks with Dr. Elizabeth Finger about her article on the neural effects of oxytocin on frontotemporal dementia, also from this week's issue.

Disclosures can be found at Neurology.org.

CME Opportunity: Listen to this week's Neurology Podcast and earn 0.5 AMA PRA Category 1 CME Credits™ by completing the online Podcast quiz.

Sign Up for the AAN's Axon Registry

The AAN encourages its US members to show their interest in participating in the Axon Registry, by signing up today.

Use the Axon Registry to:

- Simplify reporting requirements under MACRA's Quality Payment Program and avoid penalties while reducing your administrative burden
- Meet your MOC Part IV requirements and waive up to eight credits of Part II Self-Assessment
- Choose from 22 AAN neurology-specific quality measures that fit your practice
- Use data to understand your practice and identify where improvements can be made to patient care
- Manage your patients at a population level; look at a specific group of patients based on conditions, risk factors, demographics or outcome
- Demonstrate your value to payers when negotiating reimbursement
- Enjoy multi-year, fee-free access when you sign the agreements and integrate your EHR with the registry

Learn more at AAN.com/view/Axon and send your questions to registry@aan.com.

Neurology®

Training in Neurology: Rapid implementation of cross-institutional neurology resident education in the time of COVID-19

Daniel J. Weber, Dara V.F. Albert, Bhooma R. Aravamuthan, et al.
Neurology 2020;95:883-886 Published Online before print September 4, 2020
DOI 10.1212/WNL.00000000000010753

This information is current as of September 4, 2020

Updated Information & Services	including high resolution figures, can be found at: http://n.neurology.org/content/95/19/883.full
References	This article cites 4 articles, 1 of which you can access for free at: http://n.neurology.org/content/95/19/883.full#ref-list-1
Citations	This article has been cited by 1 HighWire-hosted articles: http://n.neurology.org/content/95/19/883.full##otherarticles
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): All Education http://n.neurology.org/cgi/collection/all_education Computer use in education http://n.neurology.org/cgi/collection/computer_use_in_education Methods of education http://n.neurology.org/cgi/collection/methods_of_education Other Education http://n.neurology.org/cgi/collection/other_education
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

Neurology® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright © 2020 American Academy of Neurology. All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.