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Perception of Neurosurgery Residents and Attendings on Online Webinars During COVID-19 Pandemic and Implications on Future Education

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■ **BACKGROUND:** Online education has provided an important tool to continue medical education during the COVID-19 pandemic. Our study aimed to evaluate trainee and attending perceptions of online webinars as an educational tool in neurosurgery.

■ **METHODS:** We conducted a cross-sectional survey study. A web-based 19-question survey was distributed to the people who attended the webinar series that was carried out by the Saudi Association of Neurological Surgery from March 29, 2020 to May 31, 2020. Candidates were identified through their registration e-mails. The survey was distributed June 5–8, 2020.

■ **RESULTS:** A total of 156 responses were received (survey response rate: 60%). The overall satisfaction rate among residents and attendings (board-certified neurosurgeons) was similar (>80%). However, only 56.4% of attendings reported they were comfortable with online webinars compared with 81.2% of residents (P value <0.0001). Seventy-five percent of residents found online lectures more useful than traditional in-person lectures compared with 52% of attendings (P value = 0.01).

■ **CONCLUSIONS:** Online educational webinars provide an educational value that can be considered as an adjunct to traditional (in-person) education methods. Among trainees, the satisfaction of neurosurgery webinars was encouraging

to consider as an education method. More objective research and progress are required to adopt and refine existing online didactic and neurosurgical teaching tools while creating more engaging future distant learning models.

INTRODUCTION

The novel Coronavirus Disease 2019 (COVID-19) was declared a global pandemic on March 11, 2020, by the World Health Organization (WHO).¹ As the pandemic continued to spread, it radically affected health care delivery and medical education. With the imposed physical distancing recommendations and the fear of COVID-19 spread, the majority of medical conferences, in-person teaching activities, and seminars were canceled.

Online education initiatives started to form with lecture series, webinars, and virtual conferences to assist in filling the gap in medical education created by circumstances at hand.² The flexibility of teleconferencing methods allowed educators to reach their audience wherever they were. There was overwhelming literature in the past few months describing online education during the COVID-19 pandemic.²⁻¹⁰ However, there are limited data from the participants regarding their attendance and satisfaction toward neurosurgery webinars.

Key words

- COVID-19
- Neurosurgery
- Neurosurgical residents
- Online teaching
- Postgraduate medical education
- Survey
- Webinars

Abbreviations and Acronyms

COVID-19: Coronavirus Disease 2019

SANS: Saudi Association of Neurological Surgery

WHO: World Health Organization

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The Saudi Association of Neurological Surgery (SANS) initiated a series of neurosurgery teaching webinars, through the SANS Academy for Education, directed toward residents and attendings. The webinar series spanned across all neurosurgical subspecialties and were given by board-certified neurosurgical faculty. As we share our experience, we aim to evaluate the residents and attendings perception of online webinars as an educational tool during the COVID19 pandemic compared with traditional in-person teaching.

METHODS

SANS Academy conducted 26 online webinars from March 29, 2020, to May 31, 2020. The teleconferencing software Zoom (Zoom Inc., San Jose, California, USA) was used to deliver and record the webinars. All sessions were presented by board-certified neurosurgeons. The webinar sessions covered the majority of neurosurgical subspecialties including spine, vascular, skull-base, oncology, pediatrics, functional, and epilepsy neurosurgery.

Survey Development

We conducted a cross-sectional survey study. We built an anonymized web-based survey that consisted of 19 questions grouped into 3 domains: general questions, audiovisual evaluation questions, and questions comparing the traditional (in-person) and online webinar teaching in neurosurgery. A meeting of all authors was held to formulate and assess the feasibility of the survey. Questions consisted of either multiple-choice questions or 5-level Likert scales.

Survey Distribution

Participants were identified through their e-mails used to register for the webinars and were practicing in Saudi Arabia. All residents and attendings (board-certified neurosurgeons) received an e-mail invitation to participate in the survey between June 5 and 8, 2020. Out of the 260 registered postgraduate trainees and attendings who were contacted, 156 responded (response rate 60%).

Age	
26–35 years, number (%)	109 (69.9)
36–45 years, number (%)	18 (11.5)
More than 45 years, number (%)	29 (18.6)
Gender	
Male, number (%)	114 (73.1)
Female, number (%)	42 (26.9)
Current position	
Residents	101 (64.7)
Junior (PGY 1–3)	71 (45.5)
Senior (PGY 4–6)	30 (19.2)
Attendings (board-certified neurosurgeons)	55 (35.3)

Ethics, Consent, and Permissions

Consent to publish anonymized and aggregated data was obtained as part of the general consent for study participation.

Statistical Analysis

Participants were divided into 2 groups: postgraduate residency trainees and board-certified neurosurgeons. We performed the Pearson chi-squared test or Fisher exact test to compare responses between groups. Statistical significance was set at $P < 0.05$. All tests were 2-tailed, and statistical tests were performed using Stata 14 statistical software (StataCorp, College Station, Texas, USA) for statistical analysis.

RESULTS

We included 156 responses in the study. Nearly half of the responders, 101 (55.2%), were residents. Male gender constituted 114 (73.1%) of the survey participants (Table 1).

The sessions' average duration was between 60 and 90 minutes. Most (92%) of the training residents felt the session duration was adequate compared with 38 (69%) of attending physicians. Seventeen (31%) of attendings thought that the duration of the webinar sessions was long. Additionally, 124 (79.5%) of the participants believed that the best time for conducting the webinars was during the evening (after 8 p.m.). The majority of participants considered the audiovisual of the webinars and the used platform as above average to excellent (Figure 1).

When asking participants about their comfort level during webinars compared with traditional lectures, attendings were less comfortable than residents (56.4% vs. 81.2%, P value < 0.0001). A similar observation was noted when asked about the comfort in asking questions, and residents were more comfortable than attendings asking questions (60.4% vs. 38.2%, P value = 0.03). Furthermore, 75.3% of residents felt that online webinars were more useful than traditional lectures compared with 52.7% among attendings (Table 2).

Looking at the webinars as an educational tool, only 12.7% of attendings compared with 39.6% of residents believed it should replace the current teaching method. In comparison, 56.4% of attendings felt it should be an adjunct tool for the present teaching curriculum (Figure 2). The overwhelming majority of participants from all groups were satisfied with webinar teaching (Figure 3).

Looking at reported attendance among residents, 89.1% reported attendance of teaching through webinars of more than 50%, compared with 78.2% of attendance during the in-person neurosurgical academic teaching over the past year (Figure 4).

DISCUSSION

The effect of the COVID-19 pandemic has altered the conduction of medical education and training.^{7,10-12} The paradigm shift in the education model during the COVID-19 pandemic was necessary to support future neurosurgery education. These circumstances required adapting and using technologies in ways that may have been considered uncomfortable in the past.⁴ Our study showed that residents were more comfortable than board-certified neurosurgeons in attending and asking questions during online webinars when compared with traditional lectures (81.2% vs. 56.4%). At the same time, 75.4% of residents indicated that online

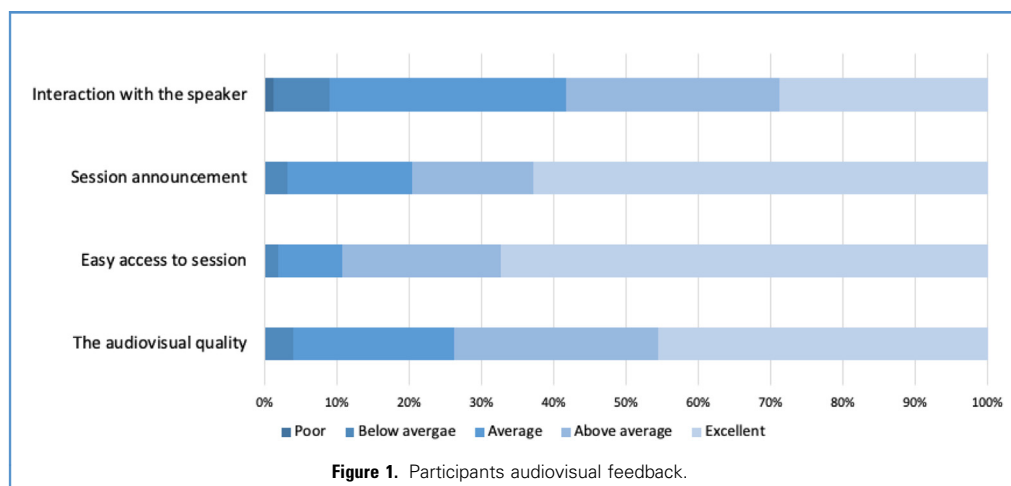


Figure 1. Participants audiovisual feedback.

webinars, compared with traditional lectures, were more useful compared with 52.7% among attendings (see Table 2). These interesting observations are essential to identify, as we may need to adjust our educational delivery for a longer time, given the unpredicted future of this pandemic or similar ones.

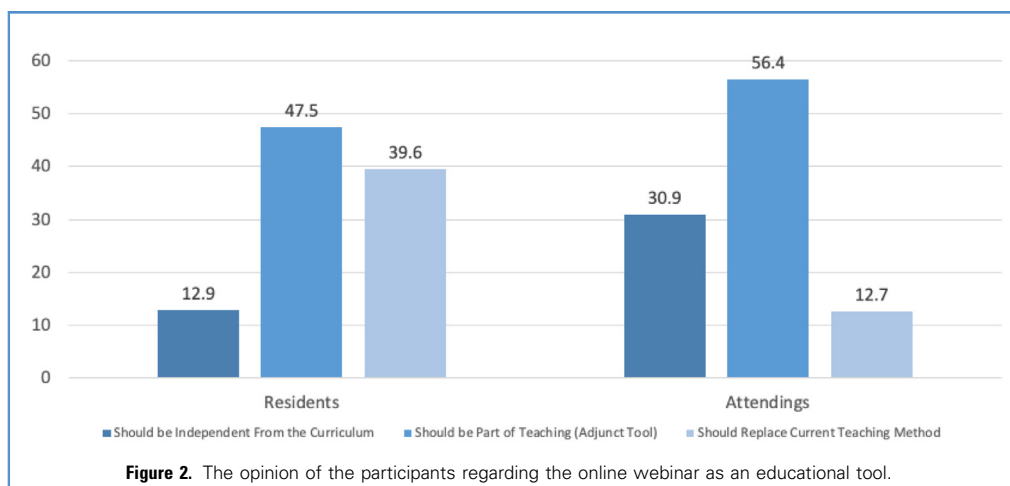
Zoia et al³ reported the impact of the COVID-19 pandemic on Italian neurosurgical education and training. They concluded that the pandemic significantly affected postgraduate training, but educators responded promptly to attempt to mitigate the impact.

Their response ranged from decreasing working hours while maintaining safe surgical exposure to emergency surgeries. At the same time, they translated the reduced operative and clinical duties to more educational and scientific activities.³ Multiple programs in North America and Europe adopted a similar approach.^{3,4,13,14}

Through an online survey, Figueroa et al¹⁵ reported that 86% of participating residents in the survey in the country of Chile started using online education during the COVID-19 pandemic. Online

Table 2. Participants' Feeling Toward Online Webinar Compared with Traditional Teaching Methods

Variable	Residents Number = 101	Attendings Number = 55	P Value
Comfortable during online webinars compared with traditional lectures			<0.0001
Yes	82 (81.2)	31 (56.4)	
Maybe	13 (12.9)	9 (16.4)	
No	6 (5.9)	15 (27.3)	
Comfortable to ask questions and interact during online webinars compared to traditional lectures			0.03
Yes	61 (60.4)	21 (38.2)	
Maybe	23 (22.8)	19 (34.6)	
No	17 (16.8)	15 (27.2)	
Online webinars more useful compared to the traditional lectures			0.01
Yes	76 (75.3)	29 (52.7)	
Maybe	18 (17.8)	17 (30.9)	
No	7 (6.9)	9 (16.4)	
Online webinars should continue after the pandemic			0.45
Yes	95 (94)	49 (89.1)	
Maybe	3 (3)	4 (7.3)	
No	3 (3)	2 (3.6)	

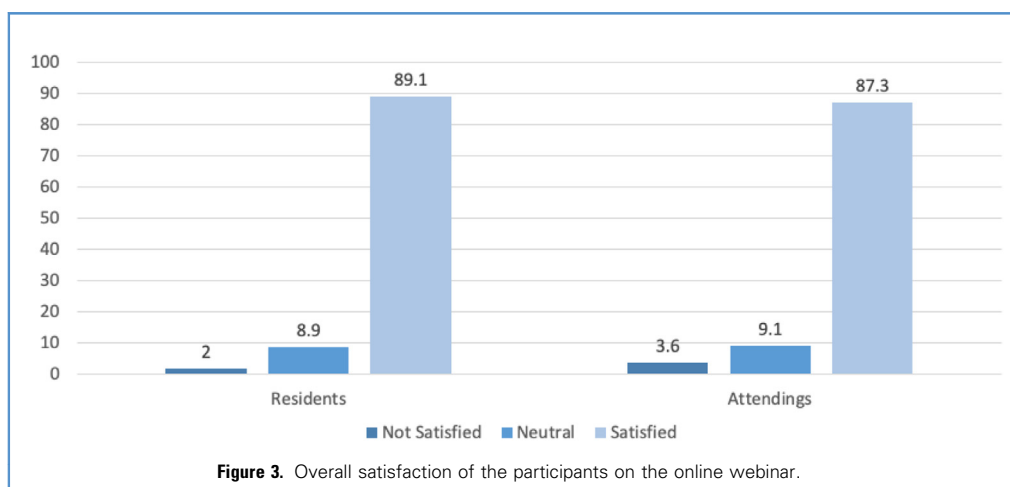


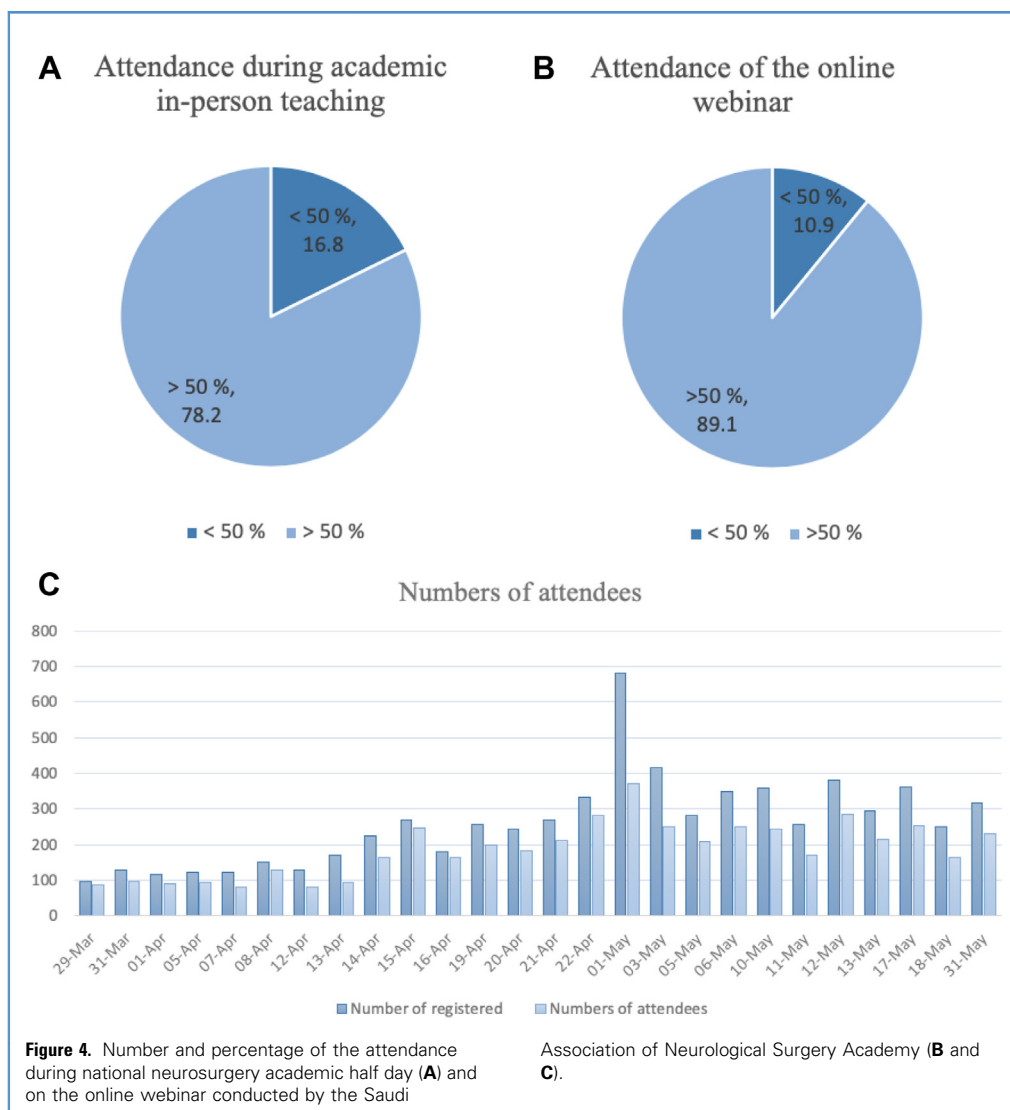
education methods included teaching webinars, which had a high satisfaction rating (mean grade 8.1 out of 10). The majority preferred to continue new web-based educational platforms after the pandemic. Interestingly, despite this high satisfaction rate, only 30% believed that web-based platforms should replace face-to-face traditional teaching once the pandemic is over. This is in agreement with our findings; 39.6% of our residents felt that these webinars should replace the traditional face-to-face curriculum-based teaching. Despite the interest in this new comfortable and easily accessible approach, the reported findings still show the value of face-to-face teaching across surgical specialties.

The majority of residents in our study were between 26 and 35 years (98/101, 97%), which makes them part of the millennial generation. Studies on generational learning have described Generation Y, the millennials generation, to prefer multitasking and collaborative work, and, more importantly, they are comfortable with technology and the Internet.¹⁶⁻¹⁸ These results are in line with generational learning theories as our survey shows

that residents were satisfied with the newly introduced webinars. When asked about webinars as educational tools, most of the residents felt they should be either an adjunct tool to formal teaching or a replacement for the current curriculum, 47.5% and 39.6%, respectively. On the contrary, only 12.7% of attendings felt it should replace the existing curriculum; instead, 30.9% thought it should be independent of the curriculum (see [Figure 2](#)). The utilization and incorporation of online webinars in the future as part of the formal teaching model in surgical education still require further research and assessment of its ability in knowledge retention and participant satisfaction.

Other medical training programs have reported on timing and technical considerations of webinars during the COVID-19 pandemic. Odedra et al⁷ reported the impact of COVID-19 on radiology residents in Canadian programs. They stated that the majority of their residents ranked webinars as a preferred educational source. They showed a 95.3% satisfaction level of neutral or above for Zoom web conferences. Our study demonstrated similar





satisfaction among participants with a 96% average or above in audiovisual feedback. Comparable results are seen in interaction with speakers and ease of access to the webinars (see [Figure 1](#)). More than 80% of the participant across the different demographics were satisfied with the online platform used (see [Figure 3](#)). Ninety-two percent of the trainees felt that webinar sessions' duration of 60–90 minutes was adequate compared with 60% of attending physicians. The majority of the participants, including residents and attendings, preferred webinars to be in the evening hours.

Limitations

Our study has few limitations, including the cross-sectional survey nature of the study, which carries its inherent limitations and probability of bias. Additionally, with our response rate of (60%) and the e-mail distribution over a short time, we are prone to voluntary response bias. Another limitation is the timing of the study, the COVID-19 pandemic period, as further work must be

done when normalization of surgical operative and clinical duties resumes. Furthermore, our survey was not validated, as it is challenging to perform survey validation as a psychometric analysis tool in such short and constrained time. As such, the results should be inferred as more descriptive than inferential.

CONCLUSIONS

During the COVID-19 pandemic, online educational webinars have provided an educational value that can be considered as an adjunct to the traditional (in-person) education method. More objective research and progress are required to adopt and refine existing online didactic and neurosurgical teaching methods while creating more engaging future distant learning models. We believe that with the millennial generation being most of today's learners, it is imperative to involve and empower young neurosurgeons to be part of the future neurosurgical curriculum and educational tool development.

REFERENCES

1. WHO Director-General's opening remarks at the media briefing on COVID-19—11 March 2020. Geneva, Switzerland: World Health Organization; 2020.
2. Zaed I, Tinterri B. Letter to the editor: how is COVID-19 going to affect education in neurosurgery? A step toward a new era of educational training. *World Neurosurg.* 2020;140:481-483.
3. Zoia C, Raffa G, Somma T, et al. COVID-19 and neurosurgical training and education: an Italian perspective. *Acta Neurochir (Wien).* 2020;162:1789-1794.
4. Sabharwal S, Ficke JR, LaPorte DM. How we do it: modified residency programming and adoption of remote didactic curriculum during the COVID-19 pandemic. *J Surg Educ.* 2020;77:1033-1036.
5. Pennington Z, Lubelski D, Khalafallah AM, et al. Letter to the editor "changes to neurosurgery resident education since onset of the COVID-19 pandemic". *World Neurosurg.* 2020;139:734-740.
6. Pelargos PE, Chakraborty A, Zhao YD, Smith ZA, Dunn IF, Bauer AM. An evaluation of neurosurgical resident education and sentiment during the coronavirus disease 2019 pandemic: a North American survey. *World Neurosurg.* 2020;140:e381-e386.
7. Odedra D, Chahal BS, Patlas MN. Impact of COVID-19 on Canadian radiology residency training programs. *Can Assoc Radiol J.* 2020, 846537120933215.
8. Kessler RA, Oermann EK, Dangayach NS, Bederson J, Mocco J, Shrivastava RK. Letter to the editor: changes in neurosurgery resident education during the COVID-19 pandemic: an institutional experience from a global epicenter. *World Neurosurg.* 2020;140:339-340.
9. Huntley RE, Ludwig DC, Dillon JK. Early effects of COVID-19 on oral and maxillofacial surgery residency training—results from a national survey. *J Oral Maxillofac Surg.* 2020;78:1257-1267.
10. Carter BS, Chiocca EA. Editorial. COVID-19 and academic neurosurgery. *J Neurosurg.* 2020:1-2.
11. Bajunaid K, Alqurashi A, Alatar A, et al. Neurosurgical procedures and safety during the COVID-19 pandemic: a case-control multi-center study. *World Neurosurg.* 2020;143:e179-e187.
12. Stambough JB, Curtin BM, Gililand JM, et al. The past, present, and future of orthopedic education: lessons learned from the COVID-19 pandemic. *J Arthroplasty.* 2020;35:S60-S64.
13. Adesoye T, Davis CH, Del Calvo H, et al. Optimization of surgical resident safety and education during the COVID-19 pandemic—lessons learned [e-pub ahead of print]. *J Surg Ed.* <https://doi.org/10.1016/j.jsurg.2020.06.040>, accessed July 1, 2020.
14. Low JCM, Visagan R, Perera A. Neurosurgical training during COVID-19 pandemic: British perspective. *World Neurosurg.* 2020;142:520-522.
15. Figueroa F, Figueroa D, Calvo-Mena R, Narvaez F, Medina N, Prieto J. Orthopedic surgery residents' perception of online education in their programs during the COVID-19 pandemic: should it be maintained after the crisis? *Acta Orthop.* 2020:1-4.
16. Mayorga EP, Bekerman JG, Palis AG. Webinar software: a tool for developing more effective lectures (online or in-person). *Middle East Afr J Ophthalmol.* 2014;21:123-127.
17. Wilson M, Gerber LE. How generational theory can improve teaching: strategies for working with the millennials. *Curr Teaching Learning.* 2008;1:29-44.
18. Mangold K. Educating a new generation: teaching baby boomer faculty about millennial students. *Nurse Educator.* 2007;32:21-23.

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