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Virtual conferences and e-learning in dermatology during COVID-19 pandemic: Results of a web-based, global survey

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Abstract During the pandemic, virtual conferences became the norm. We conducted a cross-sectional global study to assess dermatologists' responses to virtual conference and e-learning program attendance, as well as to discuss the status of such events during the pandemic. This web-based, global survey included 733 dermatologists. Primary outcomes are percentages of responders answering questions. Assessment of the relationship between two categorical variables was performed with the chi-square test. A substantial percentage of responders were willing to attend a virtual meeting (70.6%) or webinar (80.2%), or to conduct a webinar (47.3%). Among participants who provided resident or fellow training before the pandemic, 38% responded that they did not have any teaching systems in place during the pandemic. Virtual conference attendance was significantly associated with video conference attendance before the pandemic, webinar attendance, teledermatology (TD) use during the pandemic, future TD use, having training systems in place for residents or fellows ($P < .001$ for each), and North American location of participant ($P = .001$). Webinar attendance was associated with North American location, conducting webinars ($P < .001$ for each), and future TD use ($P = .024$). This pandemic has had a profound effect on dermatology conferences and e-learning programs. Attending video conferences and webinars or other online training was associated with TD use and future use, which indicates that these technologies are all here to stay.

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Introduction

Coronavirus disease 2019 (COVID-19) was declared a pandemic by the World Health Organization on March 11, 2020.^{1,2} The COVID-19 pandemic is having a huge impact on dermatology practices as well as teaching and scientific activities in the dermatologic community.^{3–6} Owing to mandated social distancing and home quarantine, as well as re-

strictions on international travel, in-person dermatology conferences were not feasible during these challenging times.⁷ Dermatologic organizations have been monitoring daily recommendations from the Centers for Disease Control and Prevention and the World Health Organization, and travel restrictions issued by authorities and medical institutions.⁸ Dr. George J. Hruza, president of the American Academy of Dermatology (AAD), had to make the difficult decision to cancel the annual 2020 AAD meeting in Colorado for the safety of attendees, patients, communities, and countries.⁹ Annual meetings of other societies and organizations, including the

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British Association of Dermatologists, International Society of Dermatology, International Academy of Cosmetic Dermatology, and American Society of Dermatologic Surgery, were canceled or postponed, and then planned virtually.¹⁰ Virtual meetings were a solution to the disruption of dermatology education caused by the cancellation of large face-to-face meetings. The transformation of live dermatology meetings into virtual ones has met with success.¹¹ We detail below the first virtual annual AAD meeting.

AAD virtual meeting

The AAD quickly adapted by creating the AAD Virtual Meeting Experience (VMX).¹² As a pioneer in virtual meetings, the AAD used VMX to bring together dermatologists, residents, and other health care providers from across the globe for this educational meeting.¹³ AAD VMX featured 14 expert-led sessions on important topics and included numerous scientific sessions and a plenary session, in a format similar to previous live meetings. More than 900 posters were displayed virtually, which allowed attendees to read about cutting-edge research on clinical trials and case reports. A new exhibit hall with more than 30 exhibitors was created and allowed interactions with meeting participants. Lastly, the AAD devoted a special section of the meeting to resident education that featured board preparation courses, self-assessment of dermatopathology, networking sessions, and access to the AAD job board.

We present the results of a cross-sectional global study that assessed dermatologists' attitudes to virtual conferences and e-learning programs, such as webinars, and evaluated the availability of training systems during this pandemic. Finally, we discuss the future of virtual conferences and e-learning.

Methods

Survey instrument and administration

We conducted a cross-sectional web-based survey using a questionnaire prepared on Google forms. It was disseminated to contacts of principal investigators (ie, board-certified dermatologists) on social sites from April 1 to 20, 2020. Reminder e-mails were sent to increase participation. The survey instrument was pilot tested to ensure proper flow, salience, and acceptability of the questions. The questionnaire was validated by all investigators. This was an anonymous survey; there was no process of data linkage and recording or dissemination did not generate identifiable information. An exemption was obtained from R. D. Gardi Institutional Review Board.

Statistical analysis

A total of 733 responders were included in this study (Table 1). Numbers and percentages of respondents that an-

Table 1 Practice demographics

Characteristic	Survey distribution*
Years in practice	
≤10	330 (45.0)
11-20	205 (28.0)
>20	198 (27.0)
Continent	
Asia	349 (47.6)
North America [†]	137 (18.7)
Central/South America	131 (17.9)
Europe	102 (13.9)
Other	14 (1.9)
Population density of practice	
Urban	576 (78.6)
Suburban	137 (18.7)
Rural	20 (2.7)
Practice Setting	
Private	346 (47.2)
Private and hospital	249 (34.0)
Tertiary hospital	91 (12.4)
General hospital	47 (6.4)

* Data are reported as number (%) of respondents. Percentages are rounded to the decimal place.

[†] Includes predominantly US participants.

swered questions related to conference format before and during the pandemic are provided in Table 2. Participants were also asked about providing resident or fellow training during the pandemic. In addition, we tried to identify statistically significant associations for the following variables: attending virtual conferences, attending webinars, and having training systems in place for residents or fellows (Table 3). Assessing the relationship between two categorical variables was performed with the chi-square test. Threshold of significance (respective *P* value) was adjusted for multiple comparisons by using the false discovery rate.¹⁴ Statistical analysis was performed using Stata 15.1 (StataCorp, College Station, Texas, USA).

Results

Demographic data

Table 1 shows practice demographics. Forty-five percent of responders were within 10 years of practice. Almost half (47.6%) of responders were located in Asia. A similar proportion (47.2%) of participants was involved exclusively in private practice, and three-fourths (78.6%) practiced in an urban area.

Descriptive findings

The percentage of meetings that were performed in person was reduced from 90.3% before the pandemic to 8.3% during

Table 2 Virtual conferences, webinars (e-learning), and training systems

Question	Survey distribution*
Before the pandemic, which of the following formats did you regularly use to attend dermatology conferences? (may choose more than one option) (n = 733)	
• In-person	662 (90.3)
• Video call (virtual conference)	95 (12.9)
• Phone call	6 (0.81)
Which of the following formats will you use to attend dermatology conferences during the pandemic? (may choose more than one option) (n = 733)	
• In-person	61 (8.3)
• Video call (virtual conference)	518 (70.6)
• Phone call	280 (38.1)
During the pandemic, would you like to attend online webinars or other online training? (n = 733)	
• Yes	588 (80.2)
Are you willing to volunteer your time to conduct webinars/online teaching during the pandemic? (n = 733)	
• Yes	347 (47.3)
During the pandemic, conferences should be: (n = 733)	
• Cancelled	234 (31.9)
• Postponed	373 (50.8)
• Performed as planned	9 (1.2)
• Decided on a case-by-case basis	117 (15.9)
Do you have systems in place to ensure that trainees and fellows continue to receive training? (n = 442)	
• Yes	274 (62)
• No	168 (38)
If YES in previous question, what are those systems? (n = 274)	
• Webinars	90 (32.8)
• Virtual rounds	19 (6.9)
• Providing online access to journals/textbooks	28 (10.2)
• All of the above	144 (52.5)

* Data are reported as number (%) of respondents. Percentages are rounded to the decimal place.

Table 3 Statistically significant associations*

Variables†	P values‡	
Attending video conferences	North American location	0.001
	Attending video conferences before pandemic	< .001
	Attending webinar/other online training	< .001
	Teledermatology use	< .001
	Teledermatology video type	< .001
	Future teledermatology use	< .001
	Having training systems in place for residents/fellows	< .001
Attending webinars	North American location	< .001
	Conducting webinars/other online teaching	< .001
	Future teledermatology use	0.024
Having training systems in place for residents/fellows	North American location	0.019
	Teledermatology use	< .001
	Teledermatology video type use	0.001
	Future teledermatology use	0.028

* Chi-square test performed unless otherwise noted.

† All variables refer to activities during the pandemic unless otherwise noted.

‡ Only statistically significant P values are shown. All P values have been adjusted for multiple comparisons.

the pandemic ($P < .001$). More than two-thirds (70.6%) of respondents were willing to attend a virtual meeting replacing an in-person one. Approximately 80.2% of respondents were willing to attend webinars (e-learning) and 47.3% to conduct them. Of those participants providing resident or fellow training before the pandemic, 38% responded that they didn't have any teaching systems in place during these challenging times. The remaining used webinars and, less often, virtual rounds and providing online access to journals or textbooks for training purposes.

Comparative statistics

Virtual conference attendance was significantly associated with attendance of video conferences before the pandemic, webinar attendance, teledermatology (TD) use during the pandemic, future TD use, having training systems in place for residents or fellows ($P < .001$ for each), and North American location of participant ($P = .001$) (Table 3). Webinar attendance was associated with North American location, conducting webinars ($P < .001$ for each), and future TD use ($P = .024$). Training system availability for residents or fellows during the pandemic was significantly associated with North American location ($P = .019$), TD video type ($P = .001$), TD use ($P < .001$), and future TD use ($P = .028$).

Discussion

The results of this web-based survey indicate a substantial adoption of virtual conferences by 70.6% of dermatologists (Table 2). Similarly, approximately 80.2% of dermatologists were willing to attend webinars and a substantial percentage (47.3%) to conduct them. More than one-third of participants did not have teaching systems in place during these trying times, whereas 62% used webinars, virtual rounds, and other systems to continue providing resident or fellow training. This finding indicates a substantial gap in resident and fellow training during the crisis to be considered by academic dermatology departments. Virtual conference and webinar attendance and having systems in place for training residents and fellows were associated with North American location of the responder (Table 3). The status of virtual conferences and e-learning programs during this pandemic is detailed below. We also discuss the future of distance learning.

Virtual conferences

Virtual conferences have gathered increasing importance and became the norm during the pandemic. Bans on international travel; social distancing measures; and the increasing need for knowledge exchange, academic cooperation, and interaction within the international medical community have made virtual conferences a mandatory need and are embraced widely.^{7,15} Dermatologists became acclimated very fast to this new reality, and as shown in our cross-sectional

study, 70.6% of participants were willing to attend a virtual conference that replaced a face-to-face meeting.

Virtual conferences have merits and disadvantages. From the economic perspective, attendees can save on expenditure for travel and accommodation, albeit this is at the cost of personal human interaction. Additionally, there are less costs for logistics and booth development, and the entire carbon footprint is reduced; cost reduction makes virtual meetings sustainable.^{10,15,16} In traditional conferences, the physical dimensions of the venue place strong restrictions on the number of talks, and virtual conferences do not have this downside.¹⁶ Also, they can be viewed in the comfort of one's home at the attendee's convenience.⁷ During these critical times, virtual meetings ensure that dermatologists stay connected and share knowledge across broad audiences. Another advantage is the access to recorded material that enables participants to revisit lectures or information missed or deemed of particular importance.

Additionally, virtual meetings are a very compact and clear source of information. An advantage for the speaker of an online event, such as a continuous medical education conference, is that they can have better control over content and data, making sure that they match their audience interests.⁷ There is evidence that video conferences are not inferior to face-to-face education.¹⁷ Virtual meetings can offer as much interaction as traditional meetings, because attendees can use posts or chats or even connect one-on-one with speakers before, during, and after the session.^{7,15} Chat rooms with speakers provide time for additional questions and debate, which increases the chances of social interaction.¹⁵ Finally, the interaction of industry with health care professionals in virtual meetings is fully transparent and traceable.⁷ Although sponsoring opportunities remain intact, renting booth space to interact with medical professionals is not required, and there are no incentives to attend industry-sponsored symposia.

Still, many authors maintain that the interaction between speaker and audience in traditional meetings is superior.⁷ Others see better engagement in meetings taking place "in the real world" and emphasize the importance of the quality of content rather than type of meeting.¹⁸ A weakness of virtual meetings is that they depend on implementation of technologies such as video link and high-speed internet connection that are often unavailable in developing or underdeveloped countries. Dermatologists from those areas may face difficulties in accessing a virtual meeting. A global effort to share and disseminate knowledge by eliminating such restrictions will hopefully be a priority for a long period beyond this pandemic.¹⁹

E-learning for dermatologists

During the pandemic, formal education of dermatologists was restructured to incorporate substantially more virtual and distance learning, a viable alternative to traditional teaching. Dermatologic societies, such as the AAD and American Society for Dermatologic Surgery, across the nation have

increased their online resources for medical education by adding new podcasts and webinars.²⁰ The American College of Mohs Surgery has put out a call to fellows-in-training to create PowerPoint presentations with audio overlay for inclusion in an online database and provided fellows-in-training with information about an online resource entitled “MDLive Online Dermatology Programs” (available at mdlive.net) that provides courses in dermatologic surgery and cosmetic dermatology.²⁰

Dermatology journals have stepped up to develop content for trainees and seasoned practitioners alike. The *Journal of Drugs in Dermatology* has been providing supplementary resources to its continuous medical education online library, including a webinar series and monthly podcast about COVID-19 that discuss topics such as skin manifestations related to COVID-19.²¹ The *Journal of the American Academy of Dermatology* offers free COVID-19 contributions.²² *Dermatology Weekly* is a podcast that includes interviews of authors of the journal *Cutis* and provides information on how COVID-19 affects certain patient populations and practices.²³

E-learning for dermatology residents

There has been a significant increase in the number of opportunities for e-learning for dermatology residents and medical students during the pandemic. These are most commonly provided in video and audio platforms.²⁴ An advantage of such online programs is that they can reach an international network of residents. During the pandemic, dermatology journals and organizations have offered programs designed for residents to learn outside of the formal curriculum at their home institution. These included, among others, a webinar series “Dermatology During COVID-19,”²⁵ the first annual National Dermatology Kodachrome webinar,^{26,27} a 1-day seminar that included intensive board review,²⁸ an open 2021 Real World Dermatology for Residents Virtual Conference that provides a comprehensive board review,²⁹ and a robust virtual curriculum by Women’s Dermatology Society. As COVID-19 persists, it is imperative to continue these new online programs for dermatology residents and medical students.³⁰

What does the future hold?

The quality of virtual conferences is expected to improve, and technical problems may interfere less with attendance and efficacy.³¹ A published report of best practices may help to maximize virtual conferences, including preplanning recommendations, disruption preparedness recommendations, and quality interventions, such as postevent deliverables as well as response and engagement strategies.³² Similarly, distance learning in the form of webinars and other online programs may further increase.³³ Another group noted that when it comes to creating an online learning platform, it is extremely important to incorporate a user-friendly and intuitive website design that is well maintained, as well as the inte-

gration of self-assessment features to ensure that learners are properly engaging in the material.³⁴ Other authors described helpful tips in the transition to online learning, noting the importance of more focused sessions that highlight a few main points.³⁵ Eventually, live video conferencing to the previously described self-learning module could be an important enhancement.

Given the uncertainty of when large, in-person gatherings will be permitted, virtual conferences are the new norm during the pandemic.³² Many authors indicate that when the traditional setting becomes safe again, the role of online education will be unclear. According to one observer, dermatology is a “3D specialty that cannot permanently become 2D.”³⁶ Dermatologists need to provide thorough, efficacious patient care, and the above statement emphasizes the role of physical interaction in dermatology education. Online education appears to be a substantial supplement for dermatologists, and the online platforms provided by dermatologic societies will remain an adjunct to dermatology education.

In our study, attending video conferences was related to other technology-based platforms such as TD use that already has an established role in dermatology practice (Table 3). Attending webinars and other online training was associated with future TD use in our study. Finally, TD use, TD video type use, and future use were associated with having training systems in place for residents and fellows. The above associations indicate that dermatologists are becoming overall more used to technology platforms, and this will certainly favor the survival of virtual conferences and e-learning in the future. Training systems may also improve accordingly.

Conclusions

Virtual conferences became the norm during the pandemic, and a considerable increase in online learning programs was noted. Our study showed that an overwhelming majority of dermatologists adopted virtual conferences and distant learning, especially via webinar attendance. Nevertheless, more than one-third of participants indicated that they did not have systems in place for training residents and fellows during this critical period. Attending video conferences and webinars or other online training was associated with TD use and future use, which indicates that these technologies are all here to stay.

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