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# The Impact of Video Conference on Orthopaedic Resident Education: A Survey

# The Impact of Video Conference on Orthopaedic Resident Education: A Survey

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**ABSTRACT**

Methods: A 16-question anonymous survey was distributed nationally to orthopaedic residents and faculty. The survey collected basic demographic information such as, level in training, gender, and age. We then asked the respondent to rate their agreement or disagreement with 8 statements on a Likert scale (1-5) about video conferencing regarding orthopedic education. Likert scale responses were evaluated using basic descriptive statistics. Respondents were divided into groups of faculty and residents. Residents were subdivided into junior residents (PGY-1s and PGY-2s) and senior residents (PGY-3s, PGY-4s, and PGY-5s). A Wilcoxon rank sum test was used for the Likert scale type questions and a Fisher's exact test was used for the pros/cons questions to evaluate for a difference in responses between groups.

Results: A total of 123 residents or faculty responded to the survey. One was excluded because only the demographics section was completed, leaving 122 respondents. Respondents were found to prefer the traditional didactics compared to the new virtual format (p

Conclusions: Orthopaedic residents and faculty do not prefer the new virtual didactic format compared to the traditional approach.

Level of Evidence: Level IV Cross-Sectional Study

## INTRODUCTION

For the last several decades, e-learning and remote learning via video conferencing has played an increasing role in medical education. As a result of the COVID-19 pandemic, many residency programs have accelerated their use of virtual platforms to accommodate social distancing guidelines. To comply with new guidelines, programs have had to consider alternatives to traditional modes of education. Programs across the country are now heavily relying on video conferencing platforms to continue didactic education for large resident groups[1–3].

Since the advent of the Covid pandemic in March of 2020,there have been multiple institutions assessing the quality of education and the faculty/resident response to the new virtual education format. Overall satisfaction with e-learning compared with in-person learning was higher among trainees than attendings with 51.4% of trainees favoring e-learning, as opposed to 32.2% of attendings (P=0.006)[4] . Videoconferencing has been used in a variety of medical subspecialties in different ways. The Harvard Combined orthopedic residency program published their virtual PGY-1 skills course which included modules consisting of video conference lectures and low fidelity skills modules designed to be completed at home with equipment purchased from a hardware store or online. They reported that all residents that participated were satisfied with the course and felt that it should be a permanent part of their education[5] . An et al. also reported institutional adjustments to the orthopedic curriculum such as fracture conferences and weekly grand rounds being moved to online zoom conferencing[6] . The pandemic has also prompted an increase in collaboration across programs with video conferenced lectures and discussions led by expert attending faculty with residents and fellows in geographically remote locations[7] .

The literature to date overwhelmingly supports remote learning; however, many studies on the topic were performed in settings designed to optimize the remote learning environment and in many cases were supplemental to in person learning. With Covid-19 social distancing guidelines, orthopedic surgery programs have had to adapt to remote learning in a less controlled fashion. We hypothesized that residents and faculty favor in person didactics. We also hypothesized that programs using video conferencing as a supplement rather than a primary mode of didactics would be preferable . Gathering information about the perception of virtual learning is important in order to try and make improvements to the curriculum. The use of video conferencing is likely to stay in the post-pandemic era and identifying ways to improve the educational

**METHODS**

A 16-question anonymous survey was sent to orthopaedic residency coordinators at ACGME accredited programs to distribute to their orthopaedic residents and faculty. Survey responses were recorded in Redcap. The survey contained questions assessing demographics including role in the program (resident or faculty), gender, and age. We also asked about the primary platform for video conferencing at the respondent's institution and the percentage of current didactics given via video conferencing. We then asked the respondent to rate their agreement or disagreement with 8 statements on a Likert scale (1-5) about video conferencing regarding orthopedic education . The final 2 questions asked about the pros and cons of video conferencing with multiple common options listed as well as a free response. On these questions respondents were encouraged to check all that apply.

Likert scale responses were evaluated using basic descriptive statistics. Respondents were divided into groups of faculty and residents and residents were divided into junior residents (PGY-1s and PGY-2s) and senior residents (PGY-3s, PGY-4s, and PGY-5s). A Wilcoxon rank sum test was used for the Likert scale type questions and a Fisher's exact test was used for the pros/cons questions to evaluate for a difference in responses between groups. We also used the same methods to evaluate for a difference in responses between respondents that reported a high percentage of video conferencing (more than 50% of total didactics) versus a low percentage (less than 50% of total didactics).

**RESULTS**

A total of 123 respondents responded to the survey. One was excluded because only the demographics section was completed, leaving 122 respondents. Of these respondents, 78 (63%) were residents and 44 (36%) were faculty. We did not have any fellow residents (PGY-6) respond. Resident respondents were evenly distributed across PGY years. 82% were male and 18% were female. As expected, most residents fell into the 20-30 and 30-40 age groups and the faculty represented a wide range of ages. Zoom was by far the most common platform reported as being used at their institution, accounting for 74% of the respondents. Microsoft teams (12%) , GoToMeeting (5%), Cisco Webex (7%), and BlueJeans (1%) were the other platforms reportedFigure 1 . 30% of respondents reported that video conference accounts for 100% of their current didactics with a total of 84% reporting that it accounts for greater than 50%. Perceptions of video conferencing among the respondents were overall negative. The results of the survey are displayed inFigure 2. When presented with the statement "I prefer the new video didactics compared to the in-person format" 63% either strongly disagreed or disagreed. Similarly, respondents overwhelmingly disagreed that using video platforms has improved the quality of orthopaedic education (66% strongly disagreed and disagreed) and agreed that it is more difficult to focus and engage in didactics over video conference than in person (72% strongly agreed and agreed). Most agreed that "it is more difficult to communicate in a large group setting over video conference than an in-person conference" (73% strongly agreed and agreed). A summary of the Wilcoxon/Kruskal-Wallis scores among all respondents of the survey is shown in Table 1 with only residents and faculty preferring traditional didactic methods as being significant.

When asked about the positives of video conferencing, convenience to meet from home or a remote location was the most cited (95%). Other positives included ability to revisit sections of a recorded lecture (36%), ability to connect with individuals in other geographic regions (62%), and ease of access to materials and articles (51%). Free text responses included ease of making notes/taking screenshots of lecture and easier accessibility to the lecture. The most cited negative was decreased in person interaction

with faculty and residents (84%). Other negatives included difficulty interpreting images off a mobile device (41%), technical issues (60%), hesitancy to ask questions (50%), determining who is present in the meeting (57%), and possibility of hacking attempts (19%). Free text responses included: tougher to have discussion with multiple people, and generalized comments about an overall decrease in quality. Responses were similar between faculty and resident groups and between junior residents and senior residents, indicating that attitudes were similar across the board.Table 2 summarizes the resident versus faculty differences in the survey. The only significant difference between resident and faculty opinions was that faculty was more likely to cite technical problems being an issue. As far as junior versus senior residents opinion of the virtual didactics, the only significant differences between the groups was that senior residents preferred traditional didactics to the new virtual format and senior residents preferred a tactile element to didactics.Table 3 summarizes the differences between residents and faculty in the survey.

## CONCLUSION

Residents and faculty prefer traditional in person didactic methods to video platform use. Faculty was more likely to agree than residents on technical problems being an issue with video use.

## DISCUSSION

Although our survey data showed that residents/faculty prefer the traditional didactic format, with the continued social distancing guidelines in place due to Covid, online learning will be a part of the curriculum indefinitely. Our survey's intent was to identify the pros and cons of online based learning and identify potential room for improvement. We must be mindful of the fact that just because we have more information available online does not mean we are learning more, and online watching is not online learning[8] .

Based on our survey, residents and faculty alike enjoyed the convenience of meeting remotely, connecting with other institutions and the ability to revisit and access presented materials. This is in line with other studies prior to the Covid outbreak showing that flexible learning options lead to higher satisfaction in students[8–11] . Building on the positive aspects of the online learning platform, we believe we could further improve orthopaedic education by having a more standardized national video-based curriculum. This is not a novel idea, as a study performed by Tabakin et al. has already called for a national video-based curriculum for Urology residents citing the potential for international collaboration amongst experts and a cost-effective way of educating residents[9] .

Although Covid-19 has made remote learning a necessity, this form of learning has been a promising

mode of delivery of education for years. Crawshaw et al. showed that having general surgery residents watch a brief, narrated video before the surgical procedure improved their intraoperative performance[12] . Additionally, van Det et al. reported videos, coupled with conventional educational teaching, improved learning and were weary to implement into daily practice at very little cost[10] . The notion of multiple modality, or hybrid model education, is further supported by the belief that humans usually retain only 10-15% of what is read, 10-20% of what is heard, and 20-30% of what is seen. However, the use of a combination of both audio and video materials increases a person's retention capacity to 40-50%[11] .

Residents/faculty tended to prefer their own traditional didactics to the new virtual format, felt they did not pay as much attention over the online platform, missed having in-person communication, and had technical problems with the lectures. Some free text comments in our survey bluntly stated that they felt the new online format was poor and a detriment to education. It is difficult to quantify what exactly has made the in-person didactic experience so effective over the years. Some of the animosity toward the new format may be due to the abruptness of the changes. One of the limitations of our study was the low response rate. There are roughly 4,000 residents in ACGME accredited orthopaedic residencies making our overall response rate to the survey <5%. We attempted to send out several e-mail reminders through the program coordinators to prospective survey respondents. Perhaps our response rate may have been improved through use of an incentive for completing the survey. Another interesting aspect of this survey was despite the preference for in person didactics, there was an acknowledgement that video conference improved the quality of education. While the definition of "quality" was not defined in our survey, residents in our own institution cited less interruptions, more content covered, and more structured presentations. However, in-person didactics provides a feeling of comradery and socialization that is difficult to replicate on an online platform.

The use of video conferencing has been accelerated due to the pandemic. There are elements that have been readily embraced by residents and faculty but there are some areas that may be improved upon. Our survey outlines the areas we may improve upon to educate residents and faculty more effectively. Moving forward, virtual didactics may need to incorporate a more hands-on approach and implement surgical skill modules into the virtual presentation. One of the criticisms of the new virtual format from the senior residents was the lack of hands-on practice. Losing out on valuable anatomy lab didactic time during pivotal surgical years can be detrimental to chief resident development. There are already program models that have shown promise and programs should investigate adopting some of the tactics in the future. Another way for improvement is to develop a hybdrid approach to balance virtual and in person teaching. Residents and faculty at our institution have embraced some of the conveniences of meeting virtually and we have have shown increased virtual attendance compared to the traditional format (journal club,

education committee). Perhaps the solution moving forward is strategically utilizing in-person versus virtual practices based on the content that needs to be delivered. We believe that virtual didactics are going to be prevalent in the post-pandemic era and that we should try to embrace some of the conveniences of the technology while not losing sight of training the next generation of competent surgeons with the necessary hands-on skills.

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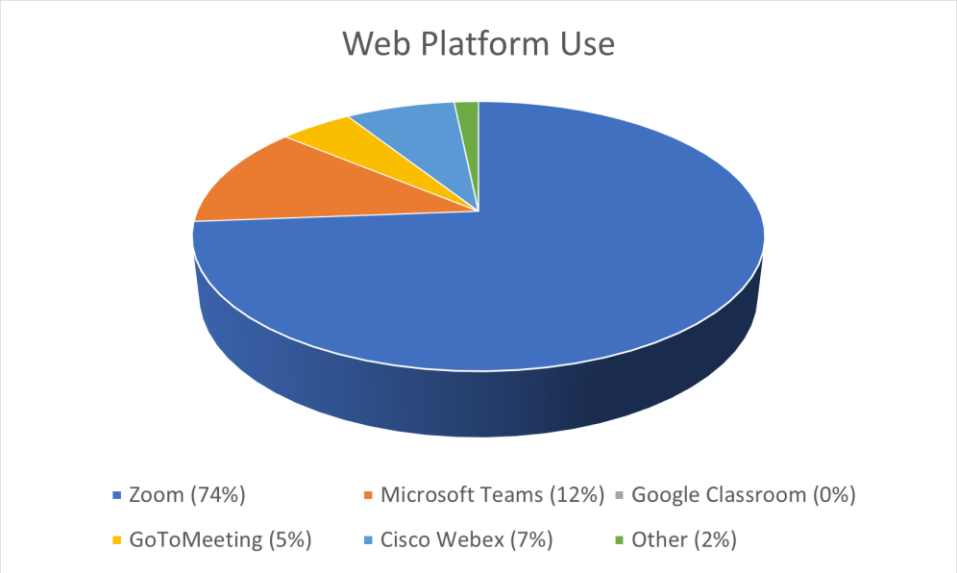


**Figure 1** Online platform use

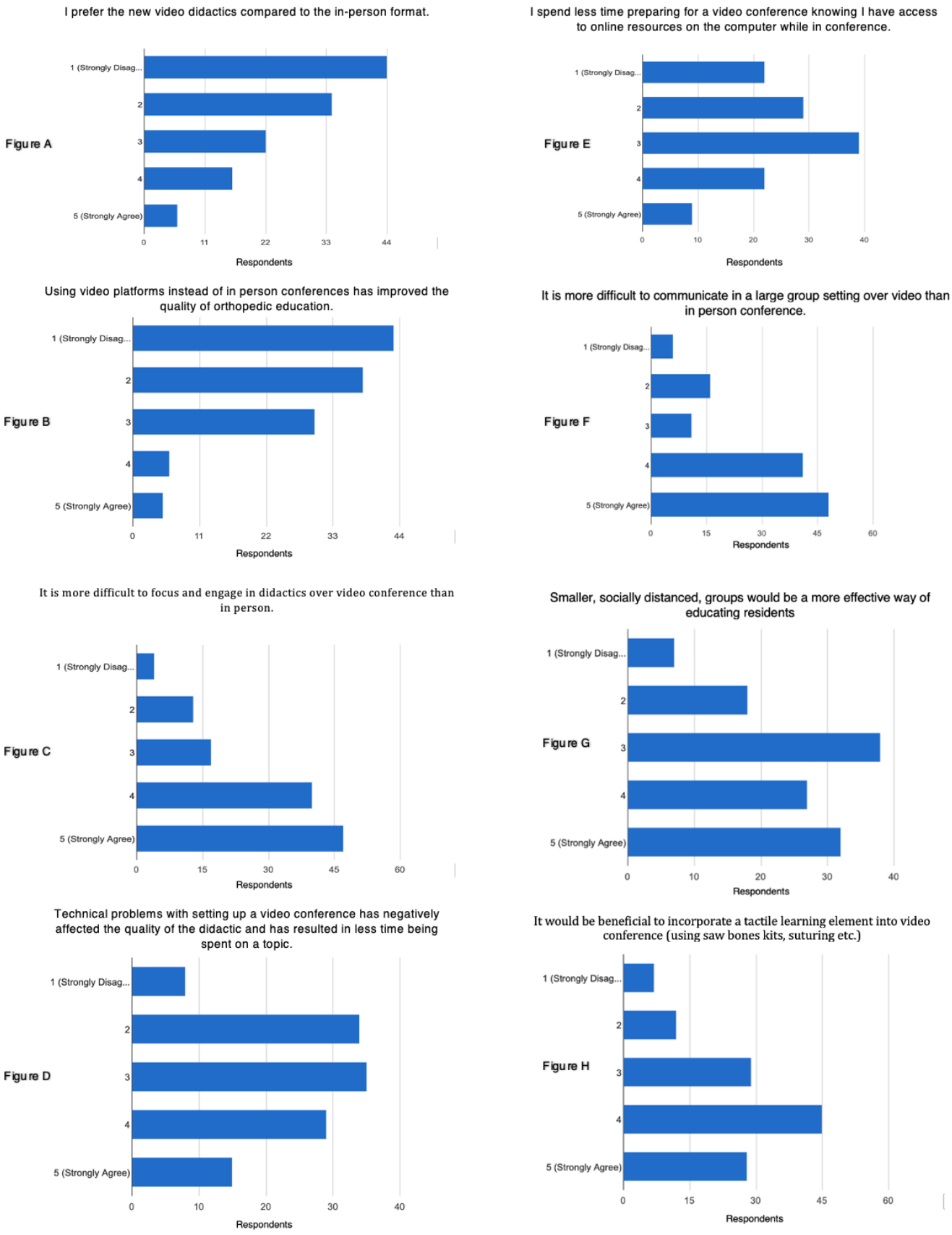


**Figure 2** a-f show the survey responses

**Table 1** Wilcoxon/Kruskal-Wallis Score Means for All Survey Respondents

| Question | Wilcoxon/Kruskal-Wallis Score Mean (Strong Disagreement) | Wilcoxon/Kruskal-Wallis Score Mean (Strong Agreement) | 2-Sample Test (Prob>Z) | One-Way Test (Prob>Chi Square) |
|---|---|---|---|---|
| I prefer the new didactics compared to in-person format | 62.9 | 43.1 | 0.014 | 0.014 |
| Using video platforms instead of in person conferences has improved the quality of orthopedic education. | 55.1 | 61 | 0.46 | 0.46 |
| It is more difficult to focus and engage in didactics over video conference than in person. | 52.6 | 60.9 | 0.3 | 0.3 |
| Technical problems with setting up a video conference has negatively affected the quality of the didactic, and has resulted in less time being spent on a topic. | 63.6 | 58.7 | 0.55 | 0.55 |
| I spend less time preparing for a video conference knowing I have access to online resources on the computer while in conference. | 60.5 | 59.3 | 0.89 | 0.89 |
| It is more difficult to communicate in a large group setting over video than in person conference. | 58.1 | 60.4 | 0.77 | 0.77 |
| Smaller, socially distanced, groups would be a more effective way of educating residents. | 63.3 | 59.3 | 0.63 | 0.63 |
| It would be beneficial to incorporate a tactile learning element into video conference (using saw bones kits, suturing etc). | 59.6 | 60.1 | 0.95 | 0.95 |

**Table 2** Junior versus Senior Resident Agreement for Survey Questions

| Question | Junior resident agreement (PGY 1-2) | Senior Resident Agreement (PGY 3-5) | Likeli-hood ratio (Chi Square) | Prob>ChiSq | Fisher's Exact Test (2-tail) |
|---|---|---|---|---|---|
| I prefer the new didactics compared to in-person format | 5 of 32 (15%) | 0 of 44 (0%) | 9.14 | 0.0025 | 0.011 |
| Using video platforms instead of in person conferences has improved the quality of orthopedic education. | 21 of 32 (66%) | 29 of 44 (66%) | 0.001 | 0.98 | 1 |
| It is more difficult to focus and engage in didactics over video conference than in person. | 15 of 32 (47%) | 15 of 44 (34%) | 1.26 | 0.26 | 0.34 |
| Technical problems with setting up a video conference has negatively affected the quality of the didactic, and has resulted in less time being spent on a topic. | 13 of 32 (41%) | 15 of 44 (34%) | 0.34 | 0.56 | 0.63 |
| I spend less time preparing for a video conference knowing I have access to online resources on the computer while in conference. | 23 of 32 (72%) | 34 of 44 (77%) | 0.29 | 0.59 | 0.6 |
| It is more difficult to communicate in a large group setting over video than in person conference. | 31 of 32 (97%) | 41 of 44 (93%) | 0.54 | 0.46 | 0.63 |
| Smaller, socially distanced, groups would be a more effective way of educating residents. | 25 of 32 (78%) | 35 of 44 (80%) | 0.022 | 0.88 | 1 |
| It would be beneficial to incorporate a tactile learning element into video conference (using saw bones kits, suturing etc). | 23 of 32 (72%) | 41 of 44 (93%) | 6.4 | 0.012 | 0.023 |

**Table 3** Resident versus Faculty Agreement for Survey Questions

| Question | Resident Agreement | Faculty Agreement | Likelihood ratio (Chi square) | Prob>ChiSquare | Fiisher Exact Test (2-tail) |
|---|---|---|---|---|---|
| I prefer the new didactics compared to in-person format | 5 of 76 (6%) | 2 of 43 (5%) | 0.19 | 0.66 | 1 |
| Using video platforms instead of in person conferences has improved the quality of orthopedic education. | 50 of 76 (66%) | 27 of 43 (63%) | 0.11 | 0.74 | 0.84 |
| It is more difficult to focus and engage in didactics over video conference than in person. | 17 of 43 (40%) | 30 of 76 (39%) | 0 | 0.99 | 1 |
| Technical problems with setting up a video conference has negatively affected the quality of the didactic, and has resulted in less time being spent on a topic. | 28 of 76 (37%) | 31 of 43 (72%) | 14 | 0.0002 | 0.0003 |
| I spend less time preparing for a video conference knowing I have access to online resources on the computer while in conference. | 57 of 76 (75%) | 35 of 43 (81%) | 0.65 | 0.42 | 0.5 |
| It is more difficult to communicate in a large group setting over video than in person conference. | 72 of 76 (95%) | 40 of 43 (93%) | 0.14 | 0.7 | 0.7 |
| Smaller, socially distanced, groups would be a more effective way of educating residents. | 45 of 76 (59%) | 27 of 43 (63%) | 0.15 | 0.7 | 0.85 |
| It would be beneficial to incorporate a tactile learning element into video conference (using saw bones kits, suturing etc). | 35 of 76 (46%) | 18 of 43 (42%) | 0.2 | 0.66 | 0.7 |