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Planning for Virtual Interviews: Residency Recruitment During a Pandemic

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ABSTRACT

Recent directives from The Coalition for Physician Accountability, Association of Pediatric Program Directors, Council on Medical Student Education in Pediatrics, and Association of Medical School Pediatric Department Chairs recommend virtual recruitment for graduate medical education (GME) programs this year. Driven by concerns for safety, equity and financial pressures, virtual interviewing will require a thoughtful approach to achieve the desired goals of recruitment. Drawing on the fields of communication and human resources management, we examine the potential effects of web-based interviews on communication through the lens of several communication theories: media richness, media naturalness, and signaling. We then review the literature on virtual interviews in GME training

programs. Finally, we will provide best practices compiled from the literature

KEYWORDS: Graduate Medical Education; recruitment; virtual interview; workforce; web-based interview

ABBREVIATIONS: APPD, Association of Pediatric Program Directors; COMSEP, Council on Medical Student Education in Pediatrics; AMSPDC, Association of Medical School Pediatric Department Chairs; AAMC, Association of American Medical Colleges; AMA, American Medical Association; FTF, face-to-face; WBI, web-based interviews; GME, graduate medical education; HRM, human resources management

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WHAT'S NEW

This paper provides guidance regarding best practices for virtual interviews utilizing literature from medical education and the field of communication.

THE CURRENT GLOBAL pandemic has necessitated broad-reaching changes in society, medical training included. In consideration of the travel-associated health risks and financial hardships during this time, the Association of Pediatric Program Directors (APPD), Council on Medical Student Education in Pediatrics (COMSEP), and Association of Medical School Pediatric Department Chairs (AMSPDC) recently issued a joint recommendation to pediatric residency programs advising “only offering virtual interviews for this year’s Match cycle.”¹ The Coalition for Physician Accountability (COPA), a cross-organizational group including the Association of American Medical Colleges (AAMC), the Accreditation Council of Graduate Medical Education (ACGME) and the American Medical Association (AMA), called for programs to “commit to online interviews and virtual

visits for all applicants, including local students, for the entire cycle.”² This followed AAMC’s recommendation encouraging all interviews to be conducted by phone or through video conferencing.³ This transformation will require fundamental redesign of recruitment given the inherent differences between face-to-face (FTF) interviews and web-based interviews (WBI). In this article, we examine WBI through the lens of several communication theories, describe the literature on WBI in GME training programs and identify best practices for programs to consider.

TRADITIONAL FACE-TO-FACE INTERVIEW DAY

The traditional FTF interview day in GME serves multiple purposes.⁴ The interview day is an opportunity for a program to highlight its strengths while assessing applicants’ communication skills, professionalism, maturity, and interest in their program.⁴ From the candidates’ perspective, the interview day provides valuable interactions with program leadership and residents, allowing them to assess the overall culture, fit of the

program, and camaraderie.^{4–7} Additionally, informal gatherings that foster open dialog with residents (eg, pre-interview dinner) are a highly valued part of the interview process.^{5,6} Applicants report the interview day heavily influences their Match list rankings.⁸ With the benefits of the traditional interview come significant financial and education costs.^{9–11} The annual cost of recruitment for internal medicine programs averages \$148,000 while applicants spend between \$2,500 and over \$10,000 for primary and surgical subspecialties respectively.^{9–13} This process is also time-intensive resulting in lost productivity for faculty and educational time for trainees.^{14–16}

EFFECTS OF WBI ON COMMUNICATION

While transitioning to WBI may decrease some of the substantial costs of FTF interviews, the differences in communication between these modalities may make it challenging to achieve the same goals as a FTF interview day. The communication theories media richness, media naturalness, and signaling have been described in the human resources management (HRM) literature and can provide a framework to understand the potential effects of WBI on communication (Figure). Media richness theory posits that different modes of communication will vary in their level of richness based on the communication cues carried (verbal, visual, emotional, behavioral) and the immediacy of the feedback afforded.^{17–19} Communication modes that carry more cues and allow more immediate feedback are more complete (richer) and less likely to lead to miscommunication. In this framework, a phone interview has the most limited ability to convey communication cues, whereas the visual presence of WBI allows greater exchange and the physical presence of FTF conveys maximal communication cues and allows for more immediate feedback. For example, an applicant in a FTF interview can lean in to indicate they have a question; the interviewer can see this cue and stop talking to allow the applicant the opportunity to talk. In contrast to this, in a WBI the interviewer may miss this subtle body language forcing the student to choose between interrupting or not asking the question.

The related theory of media naturalness describes elements that make communication feel natural and engaging.²⁰ This theory posits that the naturalness of communication depends on colocation, synchronicity of communication and the ability to express and perceive facial expressions, body language, and speech. When a communication mode feels less natural, participants will have to expend greater cognitive effort and there will be more ambiguity with decreased engagement. As compared with FTF interviews, WBI have less synchronicity (eg, slower exchanges of information due to audio lag, visual freezing) and decreased ability to transmit facial expressions (eg, low-quality images, poor eye contact, inadequate lighting) and body language (eg, only part of the body is visible on screen). As individuals gain experience with a mode of communication, they adapt their

communication styles to the mode and it becomes more natural. For example, individuals using WBI may rely less on facial expressions over time. Alternatively, they may develop ways to improve the transmission of facial expressions (eg, improved lighting). The suggestions covered later in the manuscript are adaptations described in the literature to increase the naturalness of this form of communication.

Signaling theory builds upon the previously described theories by stating that when an individual (or organization) communicates information (a signal) the recipient must choose how to interpret the information.^{21,22} The more incomplete or ambiguous the signal, the more the intended signal will become distorted as the recipient relies on their own mental models and external information to interpret the signal. Signal distortion can happen anytime there is asymmetry of information. Studies in the field of HRM demonstrate that applicants interpret a wide variety of recruitment experiences, such as diversity of interviewers, as symbolic of broader organizational characteristics.²³ For example, if an applicant interviews only with men they may conclude that the organization does not value women. Signal distortion may occur in both FTF and WBI, but is more likely in WBI than FTF.¹⁷ This is due to the incomplete communication cues relayed and difficulties interpreting facial expressions, body language, and speech in WBI.

Taken together, these theories suggest that when utilizing WBI, information may be lost and recipients on both sides will unconsciously fill in those gaps. Further, WBI may feel more natural to those that are more experienced with web-based video communication. A recent study by McColl and Michelotti assessed the interactions of these theories in a series of experiments utilizing both WBI and FTF interviews.¹⁷ They found that the less media-rich WBI format was less effective in communicating emotions, nonverbal cues and personality traits than the more media-rich FTF interviews. There were also many potential disruptions in communication that led to distortion of signals including technical problems, environmental factors, and verbal and nonverbal communication challenges. Interestingly, they demonstrated that although individuals who were more familiar with videoconferencing appeared more comfortable, their performance was perceived to be inferior to those with less experience with videoconferencing. The researchers postulated that because their experience was derived from social interactions utilizing this modality, their comfort may have been interpreted as being too casual.

GRADUATE MEDICAL EDUCATION EXPERIENCE WITH WEB-BASED INTERVIEWS

Over the past decade, several GME training programs have piloted WBI due to the significant financial and time costs associated with recruitment.^{16,24–29} Predictably, the WBI process was universally associated with decreased costs and time commitments.^{16,24–27,30,31} Despite the significant reduction in time and cost, applicants and faculty

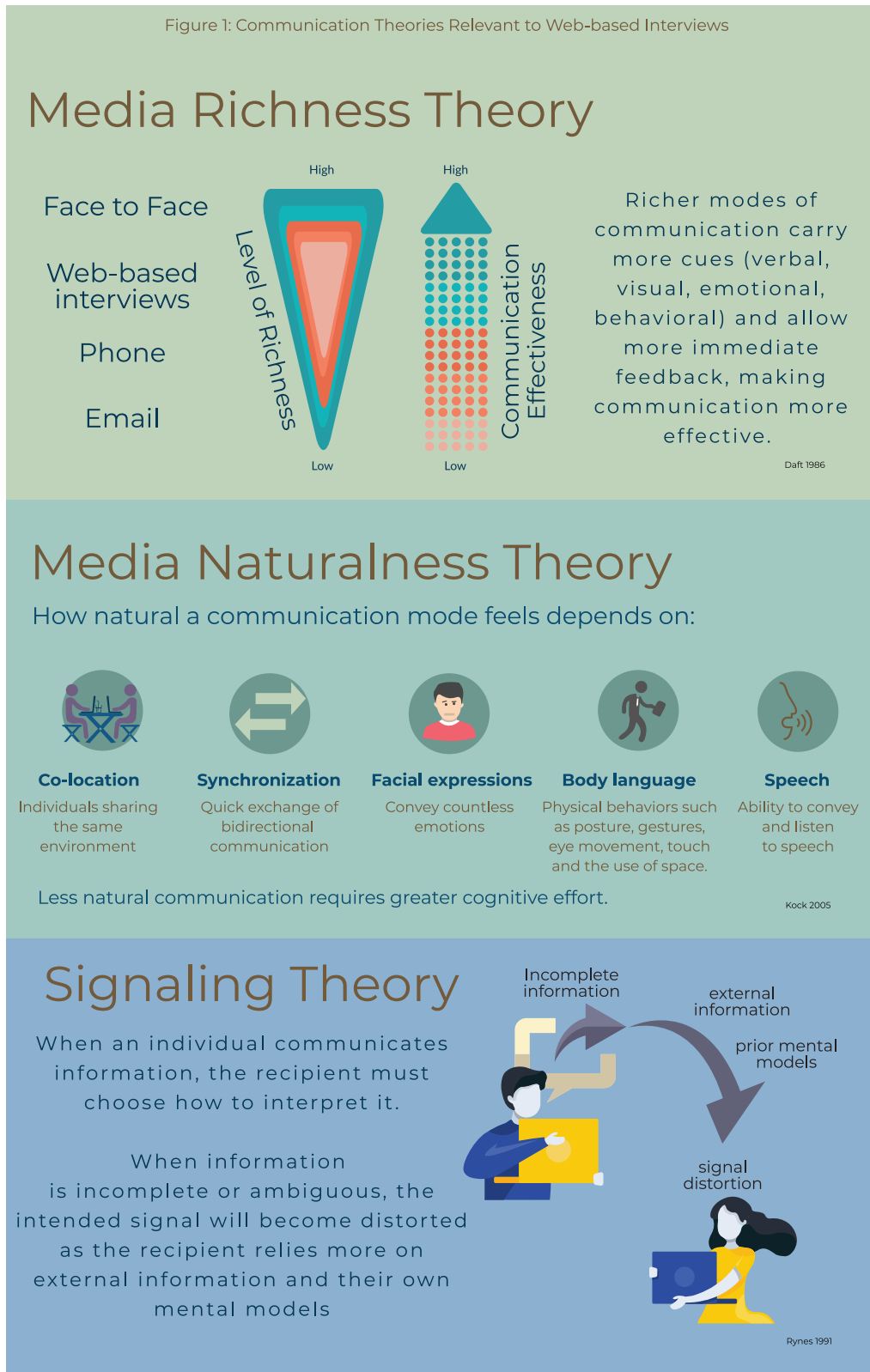


Figure 1. Communication theories relevant to web-based interviews.

in these pilots generally preferred FTF interviews due to perceived ability to represent themselves and develop rapport in FTF interviews.^{16,26,30} As a result, many authors concluded that WBI would be a reasonable adjunct to the FTF interview, not a replacement.^{16,26,30} Now that current

times necessitate WBI exclusively, these pilots can offer valuable insights (Table 1). In the next section, we describe best practices by interpreting the findings of these pilots through the communication theories described above.

Table 1. Web-based Interview Pilots in Graduate Medical Education

Study	Program Type	Interview Season	Study Design	N	Processes Utilized	Outcomes
Shah et al (2012)	Urology residency	2010	Cross over randomization	33 applicants	Applicants made test call 1 wk prior Back-up phone number provided Faculty were provided a tutorial	Applicants preferred FTF
Pasadhika et al (2010)	Ophthalmology residency	2010	Applicants selected FTF or WBI	27 FTF 21 WBI	Applicants who chose WBI had the option for an in-person visit	WBI applicants were able to participate in more interviews
Edje et al (2013)	Family medicine residency	2012	WBI offered to applicants who did not meet FTF criteria	32 FTF 10 WBI	Program used WBI as a screening tool and offered FTF interviews to 3/10	WBI represented a cost savings for the residency program and for applicants
Daram et al (2014)	Gastroenterology fellowship	2013	FTF interview day with a single embedded WBI interview	16 applicants	Immediate technical assistance was available	25% felt the WBI was equivalent or better than the FTF interview
Williams et al (2015)	Internal medicine residency	2014	WBI offered to applicants who met criteria for FTF interviews but had schedule constraints	12 WBI offered, 8 accepted	Panel of interviewers had agreed upon questions prior to interview Applicants were provided a virtual tour of campus and overview of the program prior to the interview day	5/6 who responded to a post-interview survey felt that they could make a decision based on a WBI
Vadi et al (2016)	Anesthesia residency	2014	Applicants selected FTF or WBI	141 FTF 53 WBI	Video tours provided Interview day Google Hangouts with residents Applicants choose their WBI platform (Skype, Facetime)	Few technologic difficulties Majority of WBI applicants preferred this modality Applicants in both categories had similar Match rates
Healy et al (2017)	Adult reconstructive orthopedic surgery fellowship	2016-2017	All interviews were WBI (Skype)	2016: 27 applicants 2017: 17 applicants	Immediate technical assistance was available Video tours provided	85% reported that they were able to make a decision after the WBI 15% felt that they could not present themselves to their satisfaction
Day et al (2020)	General Surgical Oncology Fellowship	2020	All interviews were WBI (WebEx) – faculty were on site together	24 applicants	6 × 20 min interviews. 2 h virtual activities the evening before (PD talk, tour, Q&A).	The majority of applicants felt interview length was “just right”

FTF indicates fact-to-face; WBI, web-based interviews.

BEST PRACTICES

The sum of these studies can assist GME training programs in developing WBI recruitment strategies that accurately represent their programs and minimize signal distortion. With appropriate planning, thoughtful implementation and deliberate engagement with applicants, limitations of WBI can be at least be partially mitigated (Table 2).

PLANNING

The first step is to identify the key messages that a program wishes to convey to applicants. In addition to highlighting program characteristics, programs should consider the values and culture they wish to depict. As the interview experience is planned, these messages should guide development of recruitment materials and decisions about the recruitment process. For example, a program wishing to portray flexibility may consider offering multiple scheduling options for interviews.

FORMAT

The traditional GME interview day is conducted in a half-day or day-long block of time that allows both applicants and faculty to immerse themselves in the experience. This can be replicated in a virtual format by scheduling each applicant's interviews in a consecutive fashion and by encouraging applicants to view

supplemental material during that block as well. This provides a more immersive experience and allows applicants to form a solidified program impression.³² Given the greater cognitive effort expended in WBI, length of interviews may need to be shortened and breaks should be interspersed.^{20,32} Each individual interview should include a buffer of time to troubleshoot any technical problems.²⁷ Another consideration is the time of day that interviews are offered. One advantage of the WBI format is that interviews can be offered at different times of day to accommodate time zone differences.^{28,29}

Additional considerations include format of interview (one-on-one, panel or asynchronous) and question type. The AAMC piloted asynchronous standardized video interviews (SVI) for applicants in emergency medicine to provide programs with objective, standardized information on applicants' interpersonal and communications skills and knowledge of professionalism.^{33,34} The SVI consisted of questions presented as text prompts followed by applicants recording a reply. The program was halted after 3 years in part due to lack of effectiveness and unfavorable student perceptions.³⁵ We do not recommend utilizing this as an alternative to live WBI given the limited communication cues transmitted in this one-directional communication. One-on-one interviews are the predominant format described in WBI.^{26,27,30,31} Successful panel interviews have been described in WBI as well.^{28,32} However, the panel interviewers were in the same room for the

Table 2. Best Practices for Web-Based Interviews Guided by The Communication Theories Media Naturalness and Signaling

Optimize synchronization
<ul style="list-style-type: none"> • Reliable, high-speed internet (Ethernet preferred over WiFi)
Increase visualization of facial expressions
<ul style="list-style-type: none"> • Adjust lighting - overhead lighting preferred to direct light or backlighting • Adjust camera angle - camera should be just above eye level, angled slightly down • Identify strategies for ensuring eye contact with the camera and not the screen – for a laptop, place on stack of books
Utilize body language effectively
<ul style="list-style-type: none"> • Position yourself in center of screen • Avoid rolling chairs • Minimize hand gestures
Enhance exchange of speech
<ul style="list-style-type: none"> • Use external microphone for improved quality and reduced background noise - can use phone earbuds • Minimize background noise (dogs, kids, sirens, wind)
Minimize signal distortion
<ul style="list-style-type: none"> • Minimize technical disruptions <ul style="list-style-type: none"> ◦ Reliable, high-speed internet ◦ Plug portable computers into a power source ◦ Create faculty tutorials to ensure comfort with platform ◦ Offer system test to applicants prior to interview ◦ Have administrative/information technology support readily available ◦ Have an alternate process prepared if there are connection errors – provide telephone number to use if disconnected • Prepare the setting <ul style="list-style-type: none"> ◦ Avoid distracting background ◦ Wear professional clothing – dress like you would for face-to-face interview ◦ Avoid interruptions - turn off phone, mute alerts on computer, log out of all other applications on computer

interview for improved synchronicity which may not be possible during this pandemic.^{28,32} In terms of question type, in 2016 the AAMC recommended utilizing standard interview questions and evaluation processes as best practices for conducting residency program interviews.³⁶ Programs could consider utilizing this overhaul of the interview process to examine their approach to interview questions.

TECHNOLOGY

There are numerous WBI platforms available with several factors to consider including cost, security, privacy, and recording functionality.³⁷ Programs should select a platform that works on all operating systems and utilize the same platform for all interview activities.³⁸ With videoconferencing “soaring to record highs” during this pandemic, most users will have some familiarity with videoconferencing.³⁹ Programs could consider offering applicants a choice of platform to increase the naturalness of the WBI.²⁴ However, this will necessitate faculty and program staff become familiar with several platforms or risking increased technology disruptions and increased signal distortion. Irrespective of which platform is selected, applicants should have an opportunity to trial and troubleshoot the system in advance of their interview.¹⁶ Ideally this would occur several days prior to the WBI to allow time for adjustments if needed.¹⁶ This will minimize technology disruptions and all allow applicants to become familiar with the platform. Programs should encourage applicants to review the AAMC’s Applicant Preparation Guide for virtual interviews for tips on WBI.⁴⁰

Considerable effort should be made to facilitate clear and rich conversation between the applicant and the interviewer.¹⁷ Anything that causes disruption or confusion in communication will lead to signal distortion and potentially miscommunication. McColl identified issues with technology, the setting and nonverbal and verbal communication that contribute to signal distortion.¹⁷ The technical issues include disruptions in audio or video, synchronization of video and audio, frozen videos, and ease of establishing a connection. These can be minimized by trialing the system in advance.¹⁶ Another option would be to have immediate on-site technical assistance available.^{26,27} This would require faculty to be in a central location during the interviews. Phone numbers for both faculty and applicants should be provided in advance in case of technology failure.¹⁶ Challenges with the setting include poor lighting (halo or too dark), background noise, distracting visual background, misplaced camera angle, and overly casual dress.¹⁷ To minimize these challenges, both faculty and applicants should be provided with tips to optimize WBI including positioning of camera, use of lighting, and high-quality microphones.^{40–42} Recording a test session ahead of time and observing the quality of both sound and video can help users identify areas for improvement. Alternatively, programs may consider having all interviewers pair up to trial their set-up in advance including an assessment of their lighting, audio, and background.

In addition to training on the WBI platform, another essential preparatory component is faculty training on the expected differences in the modality from FTF interviews. For example, faculty should be encouraged to provide more opportunities for applicants to ask questions given that it is harder to break into a conversation on WBI. Faculty should be comfortable with the technology and expected process for beginning and ending the interviews (eg, is there a virtual waiting room? Does the applicant disconnect after the interview or return to waiting room?) In addition, all interviewers should be well-versed in the program so the applicants receive consistent messaging during a time when they will not be interacting with as many people. Faculty should have a clear idea of the goals of the interview process and utilize best practices that limit bias as delineated in the AAMC guidelines.³⁶ It will be important to utilize the time leading into the interview seasons to prepare faculty for this new process.

The potential challenges posed by technology may be alleviated if medical schools provide interview booths with high-quality equipment and onsite assistance. This is likely not possible for all medical schools, however, and may run the risk of introducing bias for students from less-resourced medical schools. During the asynchronous SVI pilot study, students reported variable support from their medical schools to assist with preparation.⁴³ Commercial services offered preparation assistance for fees ranging from \$400 to \$7,000.⁴⁴ The spirit of the COPA letter is to level the playing field for both programs and students given that some areas of the country have been disproportionately impacted by COVID-19.¹ Medical schools and residency programs will have to be cognizant of this to ensure that their approach does not negate this goal.

ENGAGEMENT WITH APPLICANTS

A common concern among applicants in the WBI pilots was the inability to sufficiently interact with faculty and residents.²⁹ This is a significant concern given the considerable emphasis placed on these interview day interactions by applicants in the traditional FTF interviews.^{4–7} Several strategies to promote engagement with faculty were described in the WBI pilots. The first is to provide a prerecorded program director video welcome that addresses the elements typically covered by the program director during the FTF recruitment.^{16,24,27} While a prerecorded session will present the facts and introduce the program director, a live-streamed session offers greater exchange of information and interaction with the program director.⁴⁵ Programs may consider a hybrid approach: Recorded video for essential details augmented with brief, live-virtual welcome or a question and answer session. In general, programs should consider live-virtual sessions when the goal of the session is to communicate personal connections and culture given the enhanced communication cues and the ability to observe interpersonal dynamics. Prerecorded sessions should be utilized when the goal is to deliver information or in situations where it is not feasible to have a live-virtual session. Additional videos

from residency leadership, faculty representing different missions (scholarship, advocacy, education), and residents could also be considered.

To provide both a sense of the interactions between residents and faculty as well as types of didactic instruction provided, programs could provide video clips of conference or live-stream conference on interview days.^{16,46} Live-stream would be preferable if technical disruptions do not interfere. Given that many residency didactics are currently being held over a web-based platform, applicants could be invited to a session. If utilizing Zoom, we suggest requiring a password for entry, change screen-sharing to “host only” and disable “join before host” to prevent zoom-bombing.⁴⁷

The virtual interview experience should also include informal portions to allow applicants to engage with residents and experience the program’s culture and camaraderie.^{32,38} While some programs may elect to combine all interview day activities into one block of time, others may decide to hold a virtual preinterview social event.³² For any informal event, applicants should be told in advance the purpose, the dress code, who will be in attendance and if the session is required. If the event is held during a mealtime, communicate in advance if eating and drinking are welcomed. Virtual social events should start with a welcome and overview of the session. Given that many applicants may not feel comfortable engaging in a large virtual group session, social sessions should incorporate small group break-out sessions. Themed break-out sessions may encourage dialog.³⁸ If programs do not wish to hold a large virtual gathering, other formats include offering Google Hangout chat sessions with chiefs, Zoom meetings with small groups of residents, or one on one WBI with residents.^{24,48} Another option recently described as a recruitment tool is the business communication platform, Slack.⁴⁹ This internet-based platform offers a broad range of features including private chat rooms, direct messaging, and persistent chat rooms (channels). The University of Minnesota utilized this platform for graduate student recruitment during the pandemic with positive feedback from both faculty and applicants.⁵⁰

Prior to the interview, programs should provide digital resources that replicate the information traditionally provided in the interview day packet such as curriculum overview, schedules, and postresidency career data.^{27,32,46} This allows the applicants to familiarize themselves with the program in advance and ask meaningful questions.³² Other helpful resources prior to the interview include an up-to-date website and narrated virtual tours of the hospital and local area.^{16,24,27,28} Utilizing local tourism materials or providing links to local recreational activities and resources can also help applicants familiarize themselves with the area without requiring significant resources.^{16,24}

LOOKING FORWARD

As we continue to face unprecedented challenges during this pandemic, the leadership and vision demonstrated by the COPA letter highlights the power of community

and the strength in approaching GME recruitment from the national perspective. This pandemic has caused disruption at every level, making it unlikely that GME recruitment will completely return to the prepandemic state. For the first time, we have the opportunity to proactively assess WBI without concern of disadvantaging applicants or programs because all programs will be utilizing WBI. Lessons learned from prospectively studying this recruitment cycle as a community will inform future recruitment cycles for years to come.

REFERENCES

1. Improving Pediatric Residency Application Process Recommendations. APPD, COMSEP, AMSPDC. 2020. Available at: https://aamc-orange.global.ssl.fastly.net/production/media/filer_public/bc/55/bc556412-2daf-439b-9d04-921047edb721/improving_pediatric_residency_application_process_recommendations_april_28_2020.pdf. Accessed October 23, 2020.
2. *Final Report and Recommendations for Medical Education Institutions of LCME-Accredited, U.S. Osteopathic, and Non-U.S. Medical School Applicants The Coalition for Physician Accountability’s Work Group on Medical Students in the Class of 2021 Moving Across Institutions for Post Graduate Training*. 2020. Available at: https://www.aamc.org/system/files/2020-05/covid19_Final_Recommendations_Executive%20Summary_Final_05112020.pdf. Accessed October 23, 2020.
3. Conducting Interviews During the Coronavirus Pandemic AAMC. Available at: <https://www.aamc.org/what-we-do/mission-areas/medical-education/conducting-interviews-during-coronavirus-pandemic>. Published 2020. Accessed May 10, 2020.
4. Stephenson-Famy A, Houmard BS, Oberoi S, et al. Use of the interview in resident candidate selection: a review of the literature. *J Grad Med Educ*. 2015;7:539–548. <https://doi.org/10.4300/JGME-D-14-00236.1>.
5. Schlitzkus LL, Schenarts PJ, Schenarts KD. It was the night before the interview: perceptions of resident applicants about the preinterview reception. *J Surg Educ*. 2013;70:750–757. <https://doi.org/10.1016/j.jsurg.2013.05.008>.
6. Skalski JH, Dulohery MM, Kelm DJ, et al. Impact of a preinterview dinner on candidate perception of a fellowship training program. *J Grad Med Educ*. 2016;8:763–766. <https://doi.org/10.4300/JGME-D-16-00162.1>.
7. Marasa LH, Pittman TA. Factors neurosurgery candidates use when choosing a residency program. Clinical article. *J Neurosurg*. 2014;120:167–172. <https://doi.org/10.3171/2013.7.JNS13290>.
8. Zuo KJ, Retrouvey H, Wanzel KR. Factors that affect medical students’ perception and impression of a plastic surgery program. *Ann Plast Surg*. 2019;82:224–228. <https://doi.org/10.1097/SAP.0000000000001525>.
9. Brummond A, Sefcik S, Halvorsen AJ, et al. AAIM Perspectives Resident Recruitment Costs: A National Survey of Internal Medicine Program Directors. doi:10.1016/j.amjmed.2013.03.018.
10. Blackshaw AM, Watson SC, Bush JS. The cost and burden of the residency match in emergency medicine. *West J Emerg Med*. 2017;18:169–173. <https://doi.org/10.5811/westjem.2016.10.31277>.
11. Agarwal N, Choi PA, Okonkwo DO, et al. Financial burden associated with the residency match in neurological surgery. *J Neurosurg*. 2017;126:184–190. <https://doi.org/10.3171/2015.12.JNS15488>.
12. Walling A, Nilsen K, Callaway P, et al. Student expenses in residency interviewing. *Kansas J Med*. 2017;10:50–54.
13. Fogel HA, Liskutin TE, Wu K, et al. The economic burden of residency interviews on applicants. *Iowa Orthop J*. 2018;38:9–15.
14. Walling A, Merando A. The fourth year of medical education : a literature review. *Acad Med*. 2010;85:1698–1704. <https://doi.org/10.1097/ACM.0b013e3181f52dc6>.

15. Fried J. Cost of applying to residency questionnaire report. *AAMC*. May 2015. Available at: <https://www.aamc.org/system/files/c/2/430902-costofapplyingtoresidency.pdf>. Accessed October 28, 2020.
16. Shah SK, Arora S, Skipper B, et al. Randomized evaluation of a web based interview process for urology resident selection. *J Urol*. 2012;187:1380–1384. <https://doi.org/10.1016/j.juro.2011.11.108>.
17. McColl R, Michelotti M. Sorry, could you repeat the question? Exploring video-interview recruitment practice in HRM. *Hum Resour Manag J*. 2019;29:637–656. <https://doi.org/10.1111/1748-8583.12249>.
18. Daft RL, Lengel RH. *Organizational Information Requirements, Media Richness and Structural Design*. 32. 1986. Available at: <http://www.jstor.org/journals/informs.html>. Accessed May 8, 2020.
19. Daft RL, Lengel RH. Information richness: a new approach to manager information processing and organization design. In: Staw BM, Cummings LL, eds. *Research in Organizational Behavior*. 6, CT: JAI Press; 1984:193–233. Information new approach to manager information processing and organization design. In *Research in organizational behavior Greenwich*.
20. Kock N. Media richness or media naturalness? The evolution of our biological communication apparatus and its influence on our behavior toward e-communication tools. *IEEE Trans Prof Commun*. 2005;48:117–130. Available at: https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=1435624&casa_token=AV8IyedVdN0AAAAA:TOOmzLy3F3-DhbM6c7cu_u0oCYEp3NCd5k5_KPbtLMfgIIS-ryg5peMJuKa8ZOqDmpqi-HTGLYx0. Accessed May 8, 2020.
21. Connelly BL, Certo ST, Ireland RD, et al. Signaling theory: a review and assessment. *J Manage*. 2011;37:39–67. <https://doi.org/10.1177/0149206310388419>.
22. Suazo MM, Martínez PG, Sandoval R. Creating psychological and legal contracts through human resource practices: a signaling theory perspective. *Hum Resour Manag Rev*. 2009;19:154–166. <https://doi.org/10.1016/j.hrmr.2008.11.002>.
23. Rynes SL, Bretz RD, Gerhart B. The importance of recruitment in job choice: a different way of looking. *Pers Psychol*. 2006;44:487–521. <https://doi.org/10.1111/j.1744-6570.1991.tb02402.x>.
24. Vadi MG, Malkin MR, Lenart J, et al. Comparison of web-based and face-to-face interviews for application to an anesthesiology training program: a pilot study. *Int J Med Educ*. 2016;7:102–108. <https://doi.org/10.5116/ijme.56e5.491a>.
25. Melendez MM, Dobryansky M, Alizadeh K. Live online video interviews dramatically improve the plastic surgery residency application process. *Plast Reconstr Surg*. 2012;130. <https://doi.org/10.1097/PRS.0b013e3182550411>.
26. Daram SR, Wu R, Tang SJ. Interview from anywhere: Feasibility and utility of web-based videoconference interviews in the gastroenterology fellowship selection process. *Am J Gastroenterol*. 2014;109:155–159. <https://doi.org/10.1038/ajg.2013.278>.
27. Healy WL, Bedair H. Videoconference interviews for an adult reconstruction fellowship: lessons learned. *J Bone Joint Surg Am*. 2017;99:e114. <https://doi.org/10.2106/JBJS.17.00322>.
28. Williams K, Kling JM, Labonte HR, et al. Videoconference interviewing: tips for success. *J Grad Med Educ*. 2015;7:331–333. <https://doi.org/10.4300/JGME-D-14-00507.1>.
29. Pourmand A, Lee H, Fair M, et al. Feasibility and usability of tele-interview for medical residency interview. *West J Emerg Med*. 2018;19:80–86. <https://doi.org/10.5811/westjem.2017.11.35167>.
30. Pasadhika S, Altenbernd T, Ober RR, et al. *Residency Interview Video Conferencing*. 2012. Available at: <http://aaajournal>. Accessed May 1, 2020.
31. Edje L, Miller C, Kiefer J, et al. Using Skype as an alternative for residency selection interviews. *J Grad Med Educ*. 2013;5:503–505. <https://doi.org/10.4300/jgme-d-12-00152.1>.
32. Day RW, Taylor BM, Bednarski BK, et al. Virtual interviews for surgical training program applicants during COVID-19: lessons learned and recommendations. *Ann Surg*. 2020;272:e144–e147. <https://doi.org/10.1097/SLA.0000000000004064>.
33. *The AAMC Standardized Video Interview: Essentials for the ERAS® 2020 Season.*; 2020.
34. Bird SB, Hern HG, Blomkalns A, et al. Innovation in residency selection: the AAMC standardized video interview. *Acad Med*. 2019;94:1489–1497. <https://doi.org/10.1097/ACM.0000000000002705>.
35. Joint Letter to the AAMC on the Standardized Video Interview (SVI) AAEM - American Academy of Emergency Medicine. Available at: <https://www.aem.org/current-news/joint-letter-to-the-aamc-on-the-svi>. Accessed April 30, 2020.
36. AAMC. *Best Practices for Conducting Residency Program Interviews Learn Serve Lead*. 2016. Available at: www.aamc.org/91514/reproductions.html. Accessed May 10, 2020.
37. Keough B Best Video Conferencing 2020 | Reviews by Wirecutter. New York Times - Wire Cutter. Available at: <https://thewirecutter.com/reviews/best-video-conferencing-service/>. Published April 20, 2020. Accessed May 6, 2020.
38. McKinley SK, Fong ZV, Udelsman B, et al. Successful virtual interviews. *Ann Surg*. 2020. <https://doi.org/10.1097/sla.0000000000004172>. Publish Ah(Xx).
39. Neate R. Zoom booms as demand for video-conferencing tech grows | Technology | The Guardian. *The Guardian*. 2020. Available at: <https://www.theguardian.com/technology/2020/mar/31/zoom-booms-as-demand-for-video-conferencing-tech-grows-in-coronavirus-outbreak>. Published March 31. Accessed May 6, 2020.
40. AAMC. *Virtual Interviews: Applicant Preparation Guide*. 2020. Available at: https://www.aamc.org/system/files/2020-05/Virtual-Interview-Tips_for_Applicants_03192020.pdf. Accessed May 10, 2020.
41. Purdy K How to Pull Off a Professional Video Call From Home | Wirecutter. New York Times - Wirecutter. Available at: <https://thewirecutter.com/blog/professional-video-call-from-home/>. Published April 21, 2020. Accessed May 6, 2020.
42. Pinola M 7 Things You Need for Better Video Calls | Wirecutter. The New York Times, Wirecutter. Available at: <https://thewirecutter.com/blog/7-things-you-need-for-better-video-calls/>. Published April 20, 2020. Accessed May 6, 2020.
43. Deiorio NM, Jarou ZJ, Alker A, et al. Applicant reactions to the AAMC standardized video interview during the 2018 application cycle. *Acad Med*. 2019;94:1498–1505. <https://doi.org/10.1097/ACM.0000000000002842>.
44. Standardized Video Interview Preparation (SVI Prep™) BeMo®. Available at: <https://bemoacademicconsulting.com/sviprep>. Accessed April 30, 2020.
45. Day RW, Taylor BM, Bednarski BK, et al. Virtual interviews for surgical training program applicants during COVID-19: lessons learned and recommendations. *Ann Surg*. 2020;272:e144–e147. <https://doi.org/10.1097/SLA.0000000000004064>.
46. Hariton E, Bortoletto P, Ayogu N. Residency interviews in the 21st century. *J Grad Med Educ*. 2016;8:322–324. <https://doi.org/10.4300/JGME-D-15-00501.1>.
47. O'Flaherty K. Beware zoom users: here's how people can 'zoom-bomb' your chat. *Forbes*. 2020. Available at: <https://www.forbes.com/sites/kateoflahertyuk/2020/03/27/beware-zoom-users-heres-how-people-can-zoom-bomb-your-chat/#3093e7dd618e>. Accessed August 18, 2020.
48. Video Conferencing, Web Conferencing, Webinars, Screen Sharing - Zoom. Available at: <https://zoom.us/>. Accessed May 6, 2020.
49. Where Work Happens | Slack. Available at: <https://slack.com/>. Accessed August 18, 2020.
50. Gavin J, Nguyen A, Plasek E, et al. Rethinking graduate recruitment weekends: using slack to make virtual recruitment as effective as in-person visits. *ChemRxiv*. 2020. <https://doi.org/10.26434/chemrxiv.12501818.v1>.