

Radiology Education Amid COVID-19 Pandemic and Possible Solutions

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Abstract: Along with the rest of the world, the United States is inundated by the COVID-19 pandemic. The medical services in the country have been severely affected. The pandemic poses extraordinary challenges to academic institutions including radiology residency and fellowship programs. Herein, we delineate major difficulties faced by our radiology training program and mitigating countermeasures. The primary objective is to discuss the changes in our radiology training programs due to COVID-19 to allow for continued radiology education.

Key Words: COVID-19, pandemic, trainee, virtual, education

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The Coronavirus Disease 2019 (COVID-19) is officially a global pandemic that has affected the United States. This development has had serious implications for academic institutions and medical education. The pandemic has resulted in disruption of personal and professional life, including the training of radiology residents and fellows. The pandemic poses unprecedented challenges to radiology residency and fellowship programs.^{1–3} We will delineate the major difficulties faced by our institutional radiology programs and mitigating countermeasures being used. The primary objective is to discuss the problems faced in our radiology programs due to COVID-19, for continuing the education among the trainees and possible solutions.

Supervised Radiology Training

The scheduled training activities of the residency and fellowship programs have been severely impacted by the COVID-19 pandemic. To protect both patients and medical staff from COVID-19 exposure, our department has postponed elective imaging examinations and interventions and continues to provide urgent and inpatient care. These elective studies provide education and learning opportunities for trainees. The fellowships in our institution are of 1-year duration, and educational activities often require hands-on training to varying degrees. However, because of the epidemic and decreased patient influx, the training has been impacted. To manage patients who require hospitalization, other institutions in the country have deployed radiology trainees in direct patient care settings, such as internal medicine wards and intensive care units. However, our institution has allowed voluntary trainee involvement in

COVID-19 patient clinical management,⁴ and this has been generally well received.

In the initial weeks of the virus outbreak, the fellows and residents who opted in to work were asked to practice social distancing. During the implementation of social distancing, the fellows were asked to read imaging studies in separate rooms to segregate them and were provided with Sani-Cloth disinfectant wipes. The trainees were able to access the imaging studies, transcribe reports, and assign them to the respective radiologist on duty. Most faculty were asked to read from home workstations, unless they were required to be on-site performing fluoroscopy, biopsies, ultrasounds, and intraoperative ultrasounds. At the same time, social distancing and stay-at-home order issued by the state government had further reduced personal interaction with the supervising faculty.^{4,5} This severely hampered the routine education activities of the trainees.²

As a countermeasure for social distancing, the department allocated vacant radstations, currently not used by currently at-home faculty, to the fellows (Figs. 1, 2). This initiative was well received by the fellows and has enhanced their education amidst the COVID-19 disruption. This adaptation allowed the fellows to read imaging studies remotely for night call, protocol imaging studies, and answer clinical queries. However, it was not possible to distribute the radstations to the residents, because of the large number of rotating residents and funding restraints, and given that they are not directly employed by our institution. Importantly though, remote access to picture archiving and communication system has been provided to them (Fig. 3). The trainees now read and check out imaging studies with the faculty remotely, via virtual platforms such as Cisco WebEx with screen sharing (Figs. 4, 5). The faculty have adapted to the new conditions, as well, and are now increasingly teaching remotely.^{6,7} The teaching materials still fundamentally include the same details as in-person teaching, such as sharing cases, articles, and lectures.

Rotation/Didactic Learning

With the decrease in imaging and procedure volumes, the residents may find increased difficulty in meeting the training requirements of the Mammography Quality Standards Act or the Nuclear Regulatory Commission. In addition, the institution has canceled elective rotations in other institutions to avoid trainee exposure and to maintain social distancing. The noon conferences, journal clubs, institutional review courses, and core curriculum lectures, which involved participation of the trainees, have been rescheduled to later fall of 2020. However, most of these activities have been switched to a virtual platform. We can use other added features of the virtual platforms such as raising hand, live polling, and personal chatting that have made it more interactive and a good learning experience. A Google document with links to free online available educational resources has been circulating with high-yield lectures from all over the country.⁸

Computed tomography has been used to aid in the diagnosis of COVID-19 and its related complications. The trainees have been accessing virtual learning and webinars that are organized by the

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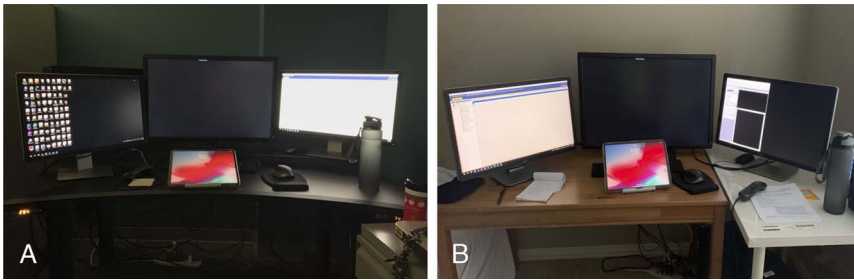


FIGURE 1. Radiology workstations. (A) Hospital reading room and (B) home. Figure 1 can be viewed online in color at www.jcat.org.

Radiological Society of North America and American College of Radiology, and the department has been encouraging participation of the trainees to familiarize with the imaging features of the COVID-19. Multinational consensus guidelines and statements have been published for reporting chest findings related to COVID-19, including the use of standardized report templates.^{9,10}

Research

Prospective research activities have been suspended at our institutions, including basic science and clinical trials. However, this time is being used academically such as to write grant proposals, write review manuscripts, and collect data for meta-analyses. In

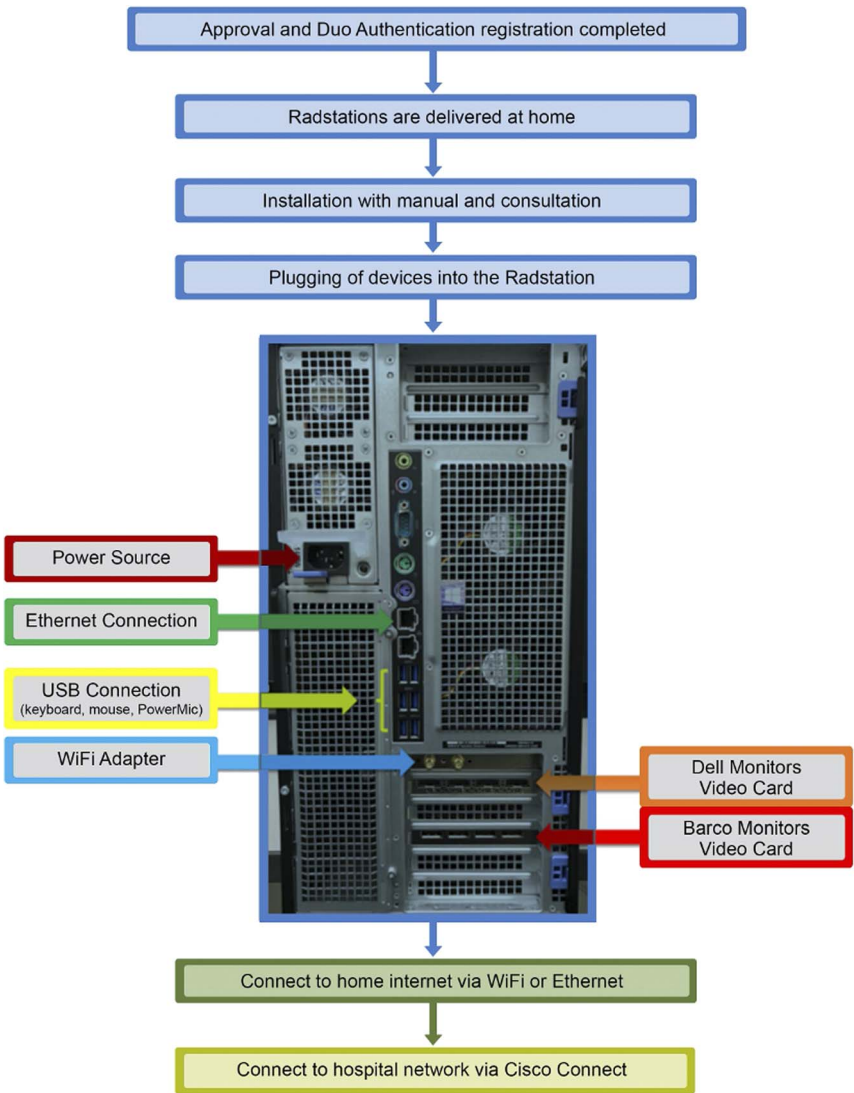


FIGURE 2. Steps for installation of home radstation. Duo 2-factor authentication is a specific type of multifactor authentication that strengthens access security by requiring 2 methods (also referred to as authentication factors) to verify your identity. Figure 2 can be viewed online in color at www.jcat.org.

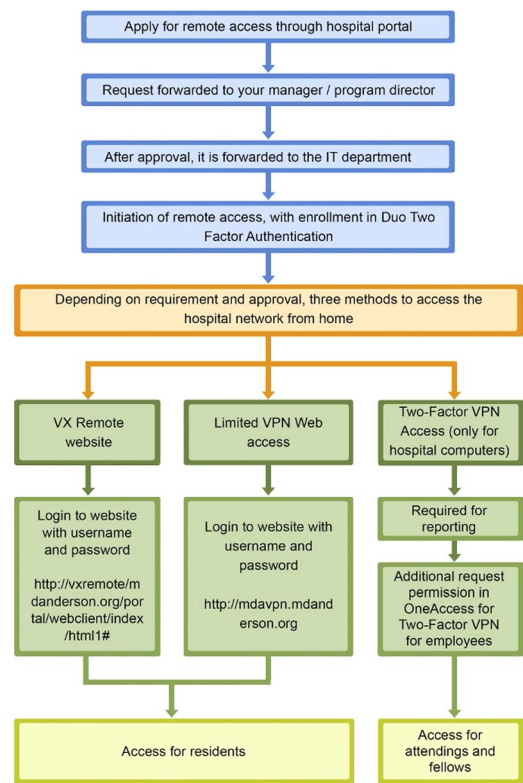


FIGURE 3. Steps for obtaining institutional remote access. Duo 2-factor authentication is a specific type of multifactor authentication that strengthens access security by requiring 2 methods (also referred to as authentication factors) to verify your identity. VX Remote provides a secure connection to all of the hospital folders from anywhere on an Internet connection. Figure 3 can be viewed online in color at www.jcat.org.

addition, the deadline for abstract submission for the annual Radiological Society of North America meeting has been postponed to April 29, 2020, providing extra time to work on meeting submissions.

Our research medical library has been closed since March because of COVID-19 precautions. The research workshops and retreats organized by the library were also canceled. However,

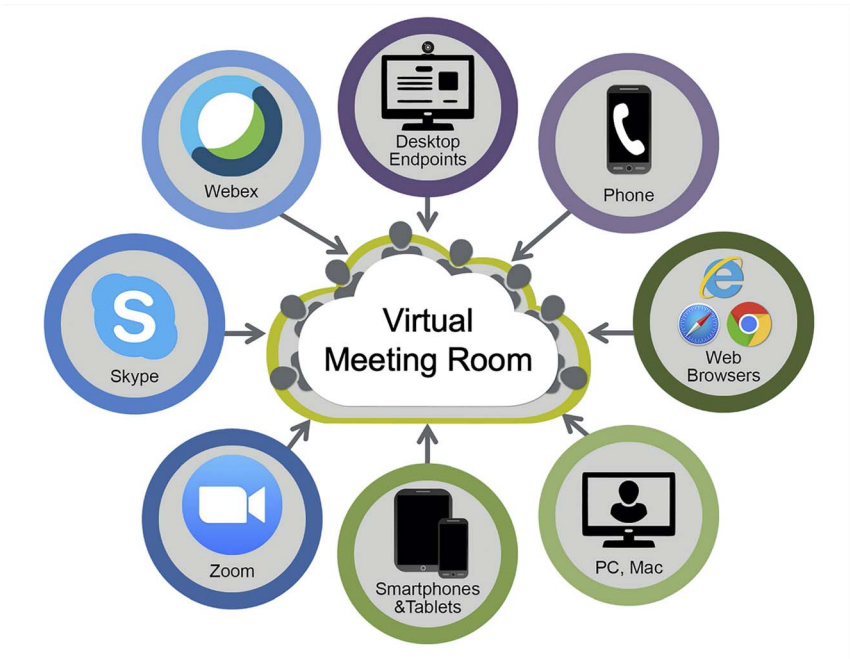


FIGURE 4. A schematic of virtual meeting. Figure 4 can be viewed online in color at www.jcat.org.

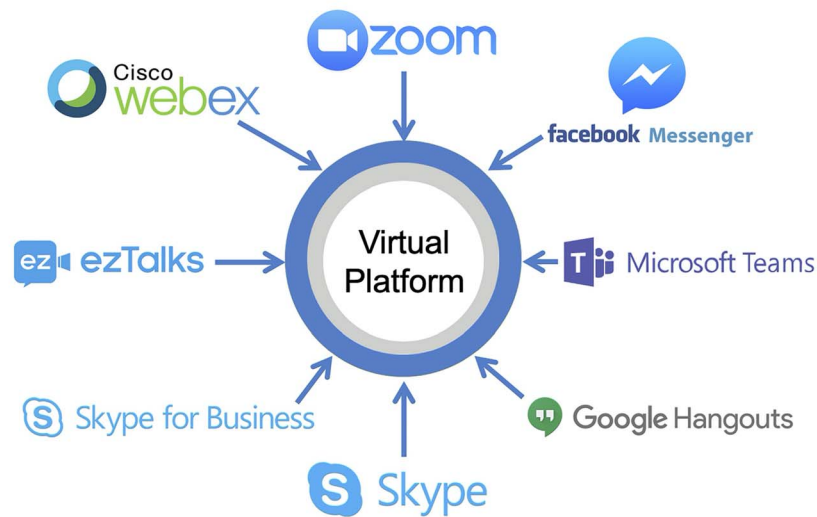


FIGURE 5. Various virtual platforms, for example, ezTalks, Skype, Microsoft Teams, Zoom, WebEx, Google Hangouts, and Facebook messenger, for research meetings and discussion. Figure 5 can be viewed online in color at www.jcat.org.

the library has committed to provide many online services via library portal and support InterLibrary Loan Internet-accessible database requests and publication services. Recently, the library has started a WebEx series called “Tool time Tuesday,” in which the librarians, editors, or special guests present useful tools, resources, or services available for faculty, staff, and students. These include technology tools and applications to help continue working from home.

In addition, institutional research assistants had to reallocate their work stations home, to decrease the volume of workforce

present in the institution at any point in time and to implement social distancing. Because the information technology employees were prioritized to ensure clinical studies were read remotely in a timely fashion without disturbances led to technologically issues, hence they could not assist the research assistants in installing the home work stations. In addition, the servers had an overflow of electronic signals initially, which led to remote access malfunction, slowing of the reading stations, and constant computer freezes. Moreover, multiple applications required an additional server. Because not many employees are familiar with remote accessing of

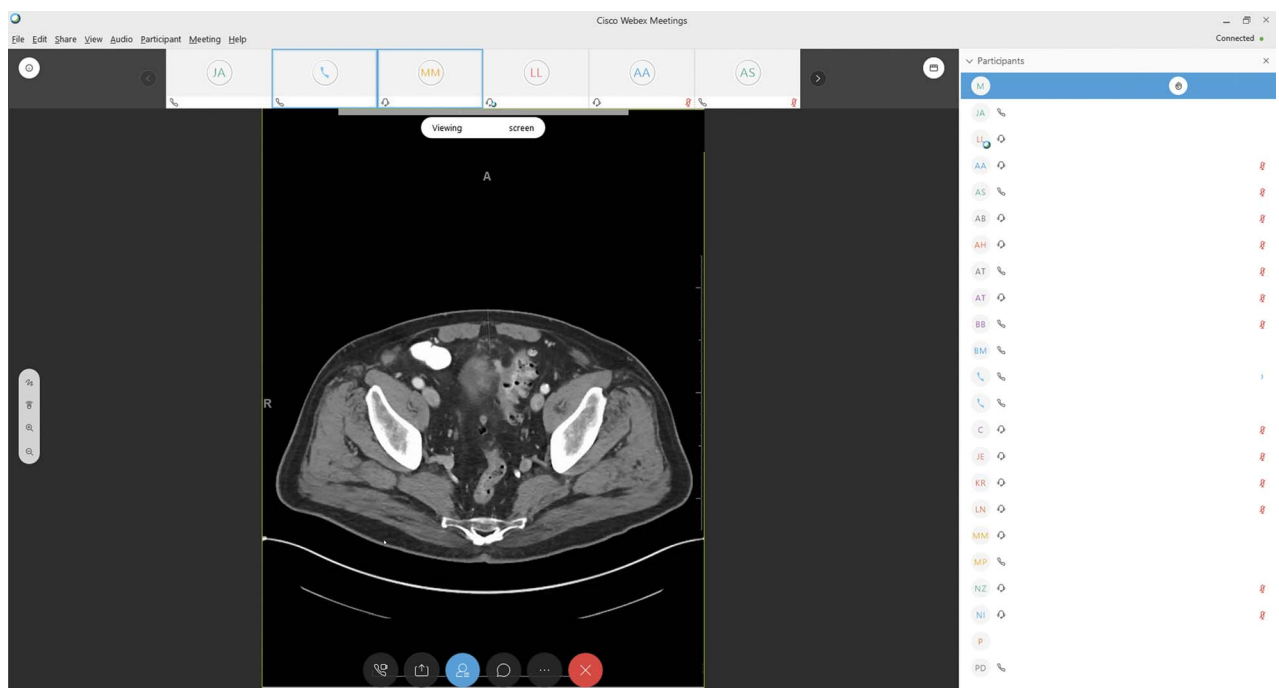


FIGURE 6. A virtual multidisciplinary tumor board conference on secure WebEx. Figure 6 can be viewed online in color at www.jcat.org.

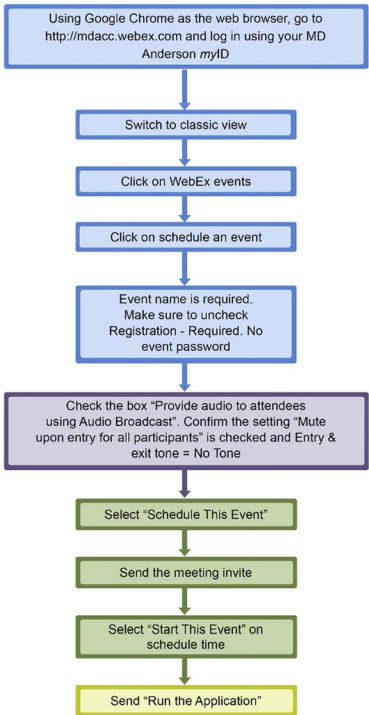


FIGURE 7. Steps for setting up a virtual meeting/tumor board conference. Figure 7 can be viewed online in color at www.jcat.org.

servers and servers' functions, multiple projects had to be halted for a short period, until the employees were trained.

Meetings and Conferences

Because of the Centers for Disease Control and Prevention and institutional travel restrictions, the faculty and trainees had to

cancel their travel plans. Some annual societies' meetings such as the American Society of Neuroradiology and American College of Radiology have already switched to a 100% virtual platform. The presenting authors are advised to record their lectures with presentations and upload on the conference portal. The lectures are then played on the conference web portal and can be accessed by the conference registrants. The American Institute for Radiologic Pathology, commonly attended by the residents, also canceled its last session. The Duke Radiology board review course has also been postponed to August 2020.

Interdisciplinary Conferences/Tumor Boards

Historically, interdisciplinary tumor boards are held regularly in a conference room. However, since the outbreak of COVID-19, balancing the clinical need of discussion while maintaining social distancing has been important. All tumor boards are currently conducted via videoconferencing (Figs. 6–8). A WebEx link is emailed to registered attendees with specific instructions for logging in. The faculty or fellow presenting at the conference shares his or her workstation screen for the images and remotely discusses the patients' imaging findings. Although it is a virtual environment, the team contributions are valuable in making appropriate recommendations for patient care. The tumor board Continuing Medical Education credits are earned via badging in and attending the conference. However, in the virtual tumor board era, an attendance log is generated from the virtual platform portal for the Continuing Medical Education credits (Fig. 9).

Interviews

The pandemic has also impacted the interview season for fellowships and jobs. The institutional and Centers for Disease Control and Prevention travel restrictions have resulted in cancellation of the interviews. Whereas some health care centers, including our institution, have paused new hire offers, others have scheduled virtual interviews. These interviews are being carried out on WebEx, Microsoft Teams or Zoom. On a brighter side, this has saved time

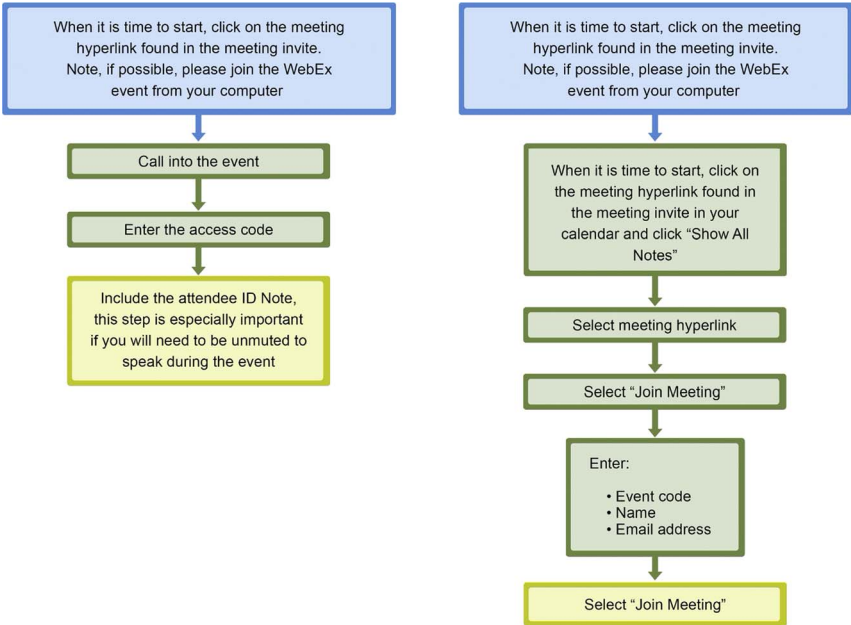


FIGURE 8. Steps for accessing in virtual meeting through computer and phone for attendees. Figure 8 can be viewed online in color at www.jcat.org.

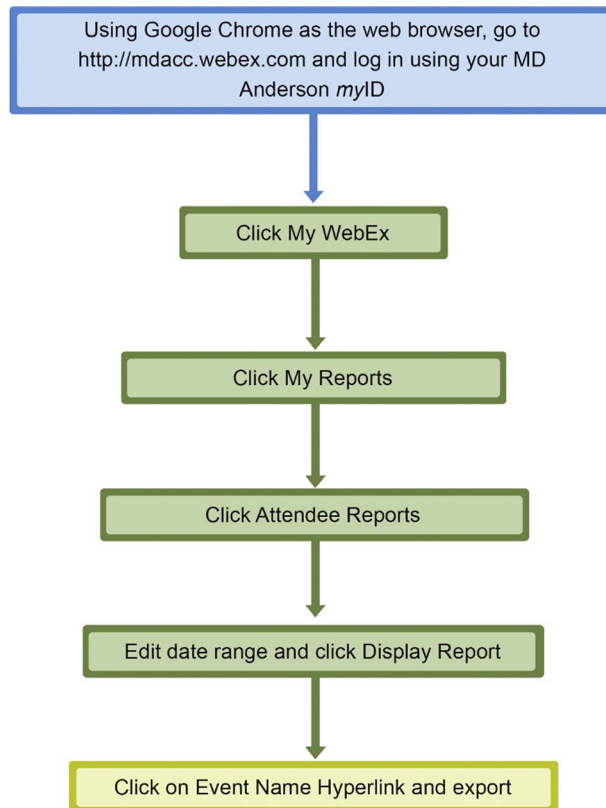


FIGURE 9. Steps for attendance log in virtual meeting for Continuing Medical Education credits. Figure 9 can be viewed online in color at www.jcat.org.

for traveling, and avoided the cost of traveling, while adhering to the prevention guidelines.

Psychological Impact on Trainees

The social distancing requirement, working remotely, changes in residency rotations, postponement of American Board of Radiology (ABR) examinations, job/fellowship interview rescheduling, and possible deployment in clinical service are some of the stressors that can lead to negative psychological impact on the trainee. At the same time, it is also important to take care of personal and family members' health.¹¹ The program directors and institutional leadership should be aware of these issues and should have regular discussions or virtual meetings with the trainees. A virtual town hall meeting can help trainee connect, share updates, express concerns, and find a potential solution. The conversations can break the feeling of remoteness and create a friendly reminder that we are all in this together.¹²

ABR/Accreditation Council for Graduate Medical Education/American Board of Medical Specialties

The ABR has rescheduled the diagnostic radiology (DR) and interventional radiology/DR Core Exam for November 5–6 and 9–10, 2020, and DR and interventional radiology/DR Certifying Exam for October 4–6 and 18–20, 2020. These changes have resulted in alteration in trainee clinical scheduling, including call shifts and vacation time. This rescheduling may affect graduation, credentialing, and job interviewing for residents and fellows. The Accreditation Council for Graduate Medical Education (ACGME) case requirements have been established for program accreditation

and resident initial certification such as the Mammography Quality Standards Act or the Nuclear Regulatory Commission. The trainee may find it difficult to complete the stipulated cases because of reduced workload or changes in the clinical rotations. These may also impact future ACGME accreditation of the program. To provide clarity for trainees and programs, on the 10th of April 2020, the American Board of Medical Specialties and ACGME issued a joint principle statement to address ongoing developments and have levied the authority and judgment of Clinical Competency Committees and training program directors to determine readiness for unsupervised practice of a trainee and to inform specialty board decisions regarding eligibility for initial board certification. The ACGME also clearly states that furloughs of residents or fellows are unacceptable and the sponsoring institutions must adhere to ACGME policies.¹³

CONCLUSION

In these difficult times, it is very important to maintain education of radiology trainees and, at the same time, protect their safety. This article presents some challenges and their countermeasures adopted by our institution. We hope that our approach will allow us to practice social distancing and follow institutional advice with minimal disruption of clinical services and educational activities. However, every institution may be facing unique difficulties, and optimal customization according to the workload, available facilities, and updated training program guidelines is recommended.

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