Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Invited Review

Society of Gynecologic Oncology recommendations for fellowship education during the COVID-19 pandemic and beyond: Innovating programs to optimize trainee success

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HIGHLIGHTS

- The novel coronavirus pandemic has disrupted medical education at all levels.
- Fellowship programs must adapt to the realities of social distancing, workforce redeployments, and laboratory closures.
- The integration of teleconferencing into clinical practice and learning provides both challenges and growth opportunities.
- Program directors should be aware of new stressors our fellows, particularly underrepresented minorities, are facing.
- Programs should take advantage of the opportunity to rethink fellowship education and the needs of our recent graduates.

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ABSTRACT

In approximately ten months' time, the novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has infected over 34 million people and caused over one million deaths worldwide. The impact of this virus on our health, relationships, and careers is difficult to overstate. As the economic realities for academic medical centers come into focus, we must recommit to our core missions of patient care, education, and research. Fellowship education programs in gynecologic oncology have quickly adapted to the "new normal" of social distancing using video conferencing platforms to continue clinical and didactic teaching. United in a time of crisis, we have embraced systemic change by developing and delivering collaborative educational content, overcoming the limitations imposed by institutional silos. Additional innovations are needed in order to overcome the losses in program surgical volume and research opportunities. With the end of the viral pandemic nowhere in sight, program directors can rethink how education is best delivered and potentially overhaul aspects of fellowship curriculum and content. Similarly, restrictions on travel and the need for social distancing has transformed the 2020 fellowship interview season from an in-person to a virtual experience. During this time of unprecedented and rapid change, program directors should be particularly mindful of the needs and health of their trainees and consider tailoring their educational experiences accordingly.

Contents

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1. Overview and impact on medical education

Between January and October of 2020, there were an estimated 34 million cases of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and over one million deaths worldwide [1]. In the United States (US), there were over 7 million documented cases and over 206,000 deaths—21% of whom were Black Americans [2,3]. Among healthcare workers in the U.S., there were over 168,000 cases and 726 deaths [2]. Given the lack of immunity in the population or any effective therapy, health systems braced for an influx of extremely ill patients. Many facilities lacked sufficient supplies of personal protective equipment (PPE) needed in a pandemic. Local governments, particularly those with swiftly rising case numbers, instituted an array of social control measures: stay at home orders, social distancing rules limiting gatherings, and wearing masks in public places. These new rules fundamentally changed the daily practice of medicine in three ways: telemedicine was rapidly adopted, hospitals increased the threshold for what required admission, and non-urgent interventions and procedures were halted [4]. Many states limited or suspended most elective procedures, including surgery, in an effort to conserve PPE, ventilators, beds and the workforce. As a result of these measures, many facilities saw overall patient volumes fall 40–50% and a sharp increase in critically ill patients [5]. The American College of Surgeons and the Society of Gynecologic Oncology (SGO) each issued guidance for safely triaging elective procedures [6,7]. With increasing numbers of patients needing intensive, complex care for several weeks at a time, many centers redeployed physicians from procedural areas to support critical care. The economic impact on hospitals has been substantial with some systems reporting hundreds of millions of dollars in losses and analysts have predicted hundreds of hospitals may close [8,9].

Medical education has rapidly changed in the face of this pandemic and the new reality in which we live. This has impacted gynecologic oncology fellowship programs, as surgical cases and cancer care have been disrupted at every academic center. Limiting patient care to essential personnel has sidelined our learners and interrupted their education causing training programs to adapt quickly [10]. With the end of the viral pandemic nowhere in sight, program directors can rethink how education is best delivered and potentially overhaul aspects of the fellowship curriculum. Selecting the next generation of fellows while transitioning from in-person to virtual interview formats is also critical. Gynecologic oncology programs and fellowships have made great strides in adapting to a rapidly evolving health care environment. This paper summarizes the changes that have taken place in fellowship education at the beginning of the pandemic and provides resources and recommendations for fellows, faculty, and program directors moving forward.

2. Regulatory changes

2.1. ACGME program requirements

The Accreditation Council for Graduate Medical Education (ACGME) provides oversight regarding programmatic details and learner assessments for US gynecologic oncology fellowships. Early in the COVID-19 crisis, ACGME quickly established three stages of operation for each sponsoring institution dependent upon the degree to which normal operations had been interrupted [11]. With each stage, more program requirements were set aside. This allowed institutions the flexibility to redeploy fellows to areas of increased clinical need in the event Pandemic Emergency Status (Stage 3) was declared. As the pandemic progressed, ACGME also relaxed other trainee requirements given the time spent on COVID-19 planning and response. For the 2019–2020 academic year, Milestones reporting and Clinical Competency Committee meetings for non-graduating fellows were made optional, and the fellow and faculty surveys (while still available) were also deemed optional. ACGME suspended accreditation site visits and all program level self-study activities. However, summative evaluations for graduating fellows and Program Evaluation Committee meetings were still required and allowed to be conducted remotely. ACGME accelerated the inclusion of fellows in telemedicine visits and expanded the definition of supervision to allow for remote monitoring. Based upon responses about the impact of the pandemic from programs in the Annual Update "Major Changes and Other Updates" section of the Accreditation Data System, the Review Committees will may make further changes to accreditation requirements in the specialty. Updated ACGME requirements can be found at https://www.acgme.org/COVID-19.

2.2. ABOG subspecialty changes

The American Board of Obstetrics and Gynecology (ABOG) sets board certification (thus educational) standards in US gynecologic oncology programs. The pandemic has impacted timing of the 2020 subspecialty Qualifying and Certifying examinations. Given the travel restrictions and social distancing requirements, the subspecialty Certification Examinations were moved from April to November 2020 and later postponed again until 2021 [12]. The subspecialty Qualifying Examination was moved from June 26, 2020 to July 16, 2020 to allow for social distancing in the testing centers. Currently, ABOG allows

programs flexibility if fellows need to be redeployed. This includes allowing research fellows to be reassigned to clinical duties without requiring the research time to be made up. Time spent in quarantine or working from home due to COVID-19 is considered clinical experience. If a fellow needs time to care for a family member, partner, or dependent with COVID-19, this can be considered clinical experience as well. ABOG also allows fellows the opportunity to postpone their 2020 Qualifying Examination to 2021 without additional fees. As many labs were shut down during the pandemic, programs and fellows can request an extension to complete their research thesis and the eligibility period for fellows has been extended by one year due to the disruption. ABOG also allows for programs to extend training, if necessary, though makes clear that the fellowship program has final authority to decide if a fellow meets the graduation requirement. The latest information can be found at https://www.abog.org/covid-19-updates.

3. Adaptations in fellowship education

Every aspect of fellowship training has been affected by the COVID-19 pandemic. From decreased surgical case volumes and lab closures, to the disruption of daily rounds, didactics, and conference schedules, the fellowship learning environment looks very different today than ten months ago.

3.1. Surgical education

In a survey of 227 members of SGO, 83% of respondents reported a 50% or greater reduction in surgical volume due to the pandemic [13]. The efforts to minimize exposure to COVID-19 (for both patients and learners) and to conserve PPE will further reduce fellow participation in surgical cases. For example, in some centers fellows may have previously joined several overlapping cases each day during the portions critical to their learning. This model allows other portions of the same procedure to benefit resident education. Minimizing changeover of surgical teams does use less PPE, but also limits the number of learners able to benefit from each case. Despite these trends, several centers have been able to maintain surgical services for cancer patients [13]. When surgical cases can proceed, every effort should be made to maximize learning opportunities for fellows. This can be achieved by allowing the fellow to focus on the most critical portions of a procedure while balancing other priorities such as minimizing the use of PPE. For example, in a robotic case the fellow will use less PPE at the console while the faculty and surgical technician remain bedside for the duration of the procedure. Additionally, selected radical procedures can be used to maximize learning with two fellows (without other learners) with the faculty immediately available for guidance.

Fellows are also balancing their training priorities with that of obstetrics and gynecology residents, who require adequate surgical experience. Conversely, fellows may be asked to “step up” to the supervisory level as fully trained obstetrician gynecologists depending on attending availability and health. Each program will have to decide how best to manage the competing interests of fellow education and the directive to conserve resources as well as decrease workplace exposures.

In the months since the initial wave of the pandemic, many metropolitan centers have returned to near normal, while other areas are just now experiencing widespread community infection [2]. Thus, the implementation of these types of educational strategies to mitigate the impact on fellow surgical education will vary based on each program's local burden of disease.

These realities create new challenges in gynecologic oncology training, yet programs have an opportunity to design and implement competence-based assessment of surgical milestones. For instance, the University of Miami has incorporated a structured surgical case review into the educational curriculum. This is based on the hypothesis that systematic immediate and delayed feedback maximize the surgical learning environment [14]. Minimally invasive and open procedures performed by fellows are recorded, reviewed, and critiqued by an attending physician not involved in the case. For open procedures, recording can be done utilizing action cameras with image stabilization technology mounted on a head strap or with camera attachments fitted on operating room light handles. Specific procedures are selected to maintain feasibility due to the large time commitment required for editing and providing feedback on a lengthy surgical video. Expectations are set preoperatively based upon predetermined competencies listed on a surgical review worksheet. An example worksheet used for small bowel resection and anastomosis is shown in Table 1. It is imperative that this is available to trainees prior to the operation. Postoperatively, rough video editing to select for the procedure in question is performed, and the resultant clip is reviewed with the trainee for both self-assessment and educator feedback on areas for improvement. This provides an opportunity for secondary reinforcement and feedback for the trainee surgeon. Participation of co-fellows in this process results in group benefit, especially for less common surgical procedures. The current implementation of this assessment is as a surgical performance improvement tool, and not to directly establish competence for individual procedures. As worksheets for each procedure are developed further, this tool will be used to complement traditional assessments of surgical competence. Published surgical videos are also incorporated into the curriculum to supplement direct observation and provide a blended experience beyond the apprenticeship model.

Computer-based surgical simulators, which are available for standard and robotic-assisted laparoscopy and dry lab training are useful, especially if used as part of an integrated educational module [15]. Participation in surgical simulation has been shown to improve participants self-rated ability, and objective measures of skill [16]. Known barriers to trainee participation in surgical simulation (lack of time, access, and supervision) should be addressed when possible [17]. A multiplatform approach is essential as several studies demonstrate skills developed with traditional laparoscopic simulation are not transferrable to the robotic platform [18]. Virtual reality simulation is readily available on modern robotic systems and is shown to be as effective as dry lab simulation without the need for a complicated logistical setup [19]. While surgical simulation is a helpful adjunct, it does not replace the hands on learning essential to our field.

3.2. Inpatient and ambulatory care

Utilization of telemedicine has increased dramatically during the COVID-19 outbreak. A virtual approach can minimize disruption to

Table 1
Structured surgical case review worksheet.

Small bowel resection and side to side anastomosis
Instructions for reviewer: For each of the following procedural steps, please use the following scale: (1) The fellow is unable to identify the correct steps to the procedure (2) The fellow is unable to perform the procedure (3) The fellow is able to perform the procedure with significant guidance (4) The fellow is able to perform the procedure with minimal correction (5) The fellow has mastered the procedure
1. Identifies limits of bowel resection
2. Identifies distance from water shed areas
3. Identifies vasculature within the mesentery
4. Selects appropriate stapler length and staple height
5. Creates hole in mesentery in correct location and direction
6. Fires stapler with control
7. Resects the bowel off the mesentery
8. Identifies antimesenteric end for enterotomy and creates appropriately sized enterotomy
9. Orients the bowel correctly and fires intraluminal stapler checking for staple line bleeding as stapler is removed
10. Lines up the bowel in the TA stapler
11. Closes the mesenteric defect

inpatient, ambulatory, and chemotherapy education for fellows. The Johns Hopkins Hospital model of telemedicine implementation for inpatient rounds presents an innovative and safe opportunity to continue fellow participation in perioperative care [20]. In this model, a single health care provider conducts bedside rounds and, with patient consent, projects the clinical interaction using an approved synchronous audio-visual link to the remainder of the team at offsite locations. Each member of the team has a specified task (e.g. pre-rounding, documentation, order entry), which keeps everyone engaged. With practice, this model allows medical education on the inpatient service to continue. Fellows can also remain engaged in ambulatory telemedicine encounters using platforms that allow more than one provider to be in the virtual patient room. This is particularly useful in chemotherapy clearance encounters and recapitulates the familiar clinic workflow. Given the unproven nature of these clinical education formats, routine assessment of clinical milestones should be undertaken to ensure appropriate progression.

3.3. Research

The research enterprise at many academic institutions has been severely affected by the COVID-19 pandemic. Like clinical services, research efforts that are not deemed essential have been shifted to remote operations or shut down entirely. Most centers followed a similar set of guiding principles: noncritical research must be performed remotely, strict adherence to social distancing, and new projects that require in-person presence are not permitted, excluding all COVID-19–related basic and clinical research [21]. With most research stopped, lab supplies such as PPE, pipettes, and reagents have been redeployed to augment clinical areas. Additionally, clinical research efforts have been scaled back with many centers stopping enrollments to selected clinical trials [22].

During this time of disruption, many gynecologic oncology fellows in their research year were prevented from completing lab projects related to their thesis. Moreover, some research fellows have been redeployed to clinical roles further limiting their ability to focus on scholarly work. While redeployments are meant to be temporary, the time away from research is unlikely to be recaptured. As a result, program directors and fellows will need to understand the limits of the changes allowed by ABOG regarding extensions and exceptions of the thesis requirement. The impact these interruptions will have on fellows beyond completion of the thesis is unknown. Further, programs lack a systematic way to track and assess research competency as the current ACGME milestones in gynecologic oncology are largely focused on the thesis project [23]. Assessment tools focused on research competency for clinical fellows are urgently needed.

3.4. Didactic program

The COVID-19 pandemic has significantly affected medical education, necessitating innovation. To minimize educational gaps created by social distancing and limitations on clinical encounters, novel approaches to remote instruction have become increasingly utilized.

3.4.1. Video lectures

Due to social distancing, video-based conferencing has emerged as the primary delivery method for didactics and clinical education and has been shown to be useful and highly acceptable among millennial learners [24,25]. Several applications exist, such as Google Hangouts or Meet, GoToMeeting, Microsoft Teams, Skype, WebEx, and Zoom. Each are adaptable for a variety of educational conferences [24]. This live video feed format allows the lecturer to view the attendee list, see trainee responses, and ask directed questions to individuals, simulating an in-person meeting from a safe distance. Video-based lectures should be focused, with clearly defined learning objectives, rather than covering vast amounts of material, as adult learner attention spans wane after 15–20 min [26]. Utilization of the live chat function for questions and comments minimizes participant talk-over and interruptions. Use of online audience response systems promotes active participation from remote learners, which is known to improve performance. This also provides the lecturer an opportunity to assess content understanding and knowledge deficits [27]. Keeping learners engaged remotely is important as it helps prevent distractions and multitasking with clinical work. These platforms are accessible from computers, tablets, and smartphones allowing learner engagement from any location.

3.4.2. Asynchronous learning

E-learning technologies allow for individualized learning plans in which trainees can tailor the content, sequence, and pace to meet their personal learning objectives [28]. Video-based conferences can be recorded and stored on a cloud account, accessible by fellows for later review outside of scheduled didactics. This flexibility also allows fellowship programs to overcome the educational barriers of traditional trainee schedules and off-site clinical rotations [27].

The flipped classroom strategy can be easily adapted to remote fellow education. In this online asynchronous instruction method, fellows are provided with a pre-recorded video lecture that is viewed prior to the scheduled didactic conference. The didactic session is then replaced with a live video conference that can be focused on synthesis, application, and case-based discussion [24]. This well-studied teaching method has been shown to improve knowledge acquisition with no increase in preparation time and is preferred by trainees [29,30].

In addition to pre-recorded video lectures, several other online resources exist for asynchronous learning assignments. Online e-learning courses and webinars are available through several national websites, encompassing a variety of topics. Podcasts, which are pre-recorded audio files, are another means to engage millennial learners as a supplemental resource [31]. Surgical video libraries are also beneficial, with self-review of videos encouraged. These resources can be utilized asynchronously in a flipped classroom format, for later high-yield content review and faculty commentary in a live video-based didactic session [29].

3.4.3. National educational resources

Prior to the COVID-19 pandemic, several modalities were already available for virtual education content, including society-curated content, video libraries, and podcasts. Since the pandemic, online resource content has grown dramatically. SGO has developed substantial content useful to both faculty and fellows, including a useful summary of educational resources. In addition to SGO, national societies including American Society of Clinical Oncology (ASCO), International Gynecologic Cancer Society (IGCS), and others have created online educational repositories that include resources related to our field as well as COVID-19 specific resources (Table 2).

The current crisis has also provided opportunity for multi-institutional collaborations for programs to share virtual educational content. GYOEDU (www.gyoedu.org) is a free, collaborative effort to pool fellowship program resources and has resulted in a robust and evolving educational repository, including live and pre-recorded video-based lectures, study summaries, and clinical trial timelines, as well as a planned question bank.

4. Fellows: learners, individuals, our future

4.1. Fellow wellness

The promotion of wellness is closely tied to reducing burnout, a condition in physicians associated with impaired coping and caregiving abilities, and shown to occur with high prevalence in gynecologic oncologists [32]. The SGO review on burnout frames wellness as a conscious, self-directed and evolving process of achieving full potential [33]. For our trainees, the COVID-19 pandemic has not only created barriers to the achievement of their full academic, clinical, and personal potentials,

Table 2
Resources for online educational content.

Resource	Content	Website
Gynecologic Oncology		
GYOEDU	Live and Pre-recorded lectures Study summaries Clinical trial timelines Question bank	https://www.gyoedu.org
SGO ConnectED	Webinars Core Lecture Series Surgical videos Practice guidelines Podcasts	https://www.sgo.org/education/e-learning/
IGCS Education Portal	Surgical videos Literature library Online courses in pathology and palliative care Podcasts	https://igcs.org/online-education/
General Oncology		
ASCO eLearning Courses	Online courses (paid subscription) Podcasts (free)	https://elearning.asco.org/homepage
SITC ConnectED	Online immunotherapy and toxicity management courses (free)	https://www.sitcancer.org/connectedold/c/clinician
Surgery and Critical Care		
SurgeryU	Surgical video library (free for trainees)	https://surgeryu.com/landing
Atlas of Pelvic Surgery	Online surgical atlas (free)	http://www.atlasofpelvicsurgery.com/
Society of Critical Care Medicine	Critical Care for the Non-ICU Clinician (free due to COVID)	https://covid19.sccm.org/nonicu/

it also brings existing inequalities and their associated barriers into sharp focus.

Fellows have endured significant changes in their training and education in recent months. These changes are likely to persist for the foreseeable future. A perceived reduction in academic productivity may subsequently impact their candidacy for jobs or subspecialty certification. The need to promote social distancing has prompted many conferences to be held virtually. Although essential continuing medical education remains available, there is reduced opportunity for fellows to present to their colleagues and peers, an important skill in professional development. There is also an accompanying reduction in fellow participation in national committees as well as decreased networking opportunities, which are crucial for job searches. At the institutional level, the initiation of hiring freezes and reduced physician compensation may significantly impact job prospects for our graduating fellows and future junior attendings [34].

The status of fellows as senior trainees allow them to be eligible for redeployment to care for COVID-19 patients. As cancer patients have been disproportionately affected by COVID-19, our fellows may be caring for patients suffering from cancer-related complications as well as COVID-19 [35]. Although our fellows are taught the importance of communication skills, it is likely that few were prepared to have goals of care conversations while in full PPE, and with family available only through virtual means [36,37].

The COVID-19 pandemic has also exposed disturbing health care and societal disparities in both the incidence and mortality of Hispanic and Black patients [38]. Anti-Asian hostilities during the pandemic have also increased in the U.S. and elsewhere and may adversely affect our Asian and Asian American medical students, residents, and fellows [39]. The national outrage over police brutality against countless Black individuals, and its impact on our trainees of color should be acknowledged. These tragic and unfortunate events may perpetuate an atmosphere of anxiety and distress for our underrepresented minority trainees that must not be ignored. We should encourage open dialogue with our fellows and provide them with a supportive working and learning environment [40]. Gynecologic oncology program directors and faculty should educate themselves about systemic racism and social inequalities that have been underestimated and underrecognized in academics and medicine. Most academic medical centers have an office of Diversity and Inclusion with numerous resources available [41].

4.2. An individualized learning and recovery plan

What can we do to help our gynecologic oncology fellows complete their training and achieve their full potential? Each learner's progress in clinical, surgical, and research performance should be assessed, and subsequent rotations may require revision to tailor the learning experience. For example, this may involve reevaluation of research projects and consideration of alternative work in order to satisfy ABOG thesis requirements. Further, clinical rotations may need to be repeated and some electives may need to be set aside to focus on the acquisition of core skills. In rare cases, training may need to be extended until competency can be attained. This process entails careful review of regulatory and board requirements, as well as open and frank discussions with each fellow to meet them where they are in the learning process. Faculty must be prepared to have honest conversations with fellows about personal sources of stress and anxiety. Program directors should review the signs and symptoms of burnout and maintain heightened awareness. The COVID-19 pandemic has had widespread impact on the economy – fellows may have partners with job loss and new income limitations, may be facing loss of social support or childcare, have fears of infecting their family, and face reduced access to essential services such as grocery stores or pharmacies. While these impacts can be significant regardless of gender, the majority of our fellows are female and women physicians are known to be disproportionately affected by a lack of child care [42]. Faculty should be willing to share resources with fellows as they become available to other administrators and staff. Finally, conduct early and honest conversations about each fellow's career goals and be an advocate for them in creating professional networks and advancement opportunities.

5. Candidate recruitment

During the 2019 Gynecologic Oncology interview season (beginning fellowship in 2020), 106 applicants vied for 73 positions, and applicants matched into their 1st or 2nd rank 43.4% percent of the time [43]. The data from the National Residency Match Program (NRMP) Program Director Survey found unanimous agreement among program directors citing these factors as critical in making their rank list: interaction with faculty during the interview and visit, interpersonal skills, and interactions with house staff during interview and visit. With varying degrees of state mandated limitations on gatherings and travel related to COVID-19, the 2020 gynecologic oncology fellowship interview season was converted to a virtual encounter. This was done to minimize exposure risk for both faculty and candidates as well as provide an equal opportunity to all candidates.

5.1. Virtual interviews

Assessment of interpersonal interactions is a critical part of candidate assessments. It is currently unclear if this can be done adequately using video interactions. Based on reports that half of the firms in the business world were already using some form of video interviewing prior to the COVID-19 crisis, it appears that other industries might have overcome the hesitancy of using virtual interviews [44]. The ability to communicate calmly, succinctly, clearly and articulate opinions, positions, and lessons learned from life experiences can be assessed through a video interaction. Although data are lacking evaluating the implementation of video interviews during residency or fellowship selections, a few studies from the pre-COVID era seem to suggest that both interviewers and applicants had a favorable view of this format. In one

study of Ophthalmology residency applicants interviewed either by video or in-person, an in-person interview did not increase the chance of being ranked in the top 25 of the rank list [45]. Data from the 2020 surgical oncology fellowship interview season showed that all faculty interviewers felt candidates were able to convey themselves "well" or "very well" through the video interview platform, and 81% of candidates felt the same [46].

Two studies exclusively explored the applicant's point of view regarding video interviews. First, a survey study of internal medicine applicants revealed a high level of satisfaction with a majority of candidates reporting that the video interview (and the virtual materials prepared by the program) were sufficient to make a ranking decision [47]. Second, a survey in 2017 following video interviews for orthopedic fellowships demonstrated that 85% of candidates felt they presented themselves satisfactorily to the program. The same percentage stated that the video interview gave them an adequate understanding of the program [48].

One notable weakness in the video interview is a decreased likelihood to give an accurate assessment of a candidate's ability to interact in a group. This skill is essential as team-based approaches are the norm for care provided in oncology service lines. These shortcomings can be overcome if letters of recommendation mention the leadership skills of a candidate or how the candidate functions in a team-setting. Moreover, interviewers could deliberately include questions about the candidate's group communication style, self-assessment of strengths and weaknesses in team settings, as well as lessons learned from successes and failures in those situations.

Another significant drawback to virtual interviews is that applicants do not get to visit the city, medical center, and campus where they would be working and living for the forthcoming 3–4 years. In a study of Urology residency interviews, candidates expressed that while they had a similarly good understanding of the program with video interviews and in-person interviews, they were significantly less satisfied with the medical facilities and city after video interviews. Candidates overwhelmingly stated that in-person interviews were better to develop rapport [49]. A virtual reception could allow applicants a forum to discuss these issues. There are some strategies that could be used to overcome the challenges of hosting a virtual reception with 12–15 applicants and 3–5 current fellows on a single video-based group. Many popular video conferencing software allow the creation of virtual rooms. Virtual rooms can then host a smaller subset of applicants [4,5] with each room hosted by one fellow for 30–40 min. Alternatively, in a question and answer format, all participants and fellows remain in one single meeting. Applicants ask questions by unmuting themselves or using the chat function. Fellows then take turns answering questions and expressing their views on the subject.

There are concerns that fellowship programs may be tempted to default to keeping candidates from their own program during the 2020 recruitment season. There is certainly no harm in keeping a resident at the same institution for fellowship; however, a diversity of training experiences is beneficial to propagate ideas and techniques and to enlarge networks among candidates and institutions. COVID-19 has likely opened doors for video interviewing in medicine that may not close again.

In an informal survey conducted prior to the 2020 fellowship interview season through the SGO Program Directors Network, fellowship directors reported that they planned to increase the number of interviews to a median of 26.6 (range 1–40), up from 21.6 (range 1–36) in the 2019 interview season. Fellowship directors anticipated that it would be more challenging to assess interpersonal skills of the candidates with virtual interviews. Programs planned to address these concerns with an increased use of structured interview questions, more interviewers, and augmented information regarding the location and culture of the program. The SGO Program Directors Network has initiated a follow up survey regarding the programmatic experiences of the 2020 interview season now that it has come to a close. Results are forthcoming.

5.2. Preparing for virtual interviews

In preparing for the video interview season in gynecologic oncology, there are several vital elements to maximize success and enjoyment of the process (Table 3). Months before the interview, if possible, consider updates to the fellowship program website and available electronic materials. Consider virtual tours of the campus, medical center, and the city. If available, engage an institution audio-visual department for high-resolution photographs and professional video segments. Many institutions are now investing in creating shared resources for programs to use during the recruitment season. Fellows or faculty may want to share photos/videos from their personal archives to give applicants a flavor of their lives in the city and around the medical centers. Select a video-conference platform early with input from information technology (IT) specialists at your institution. It is best to use what is familiar to the institution in case troubleshooting is required. Most video-conferencing platforms offer similar functionality. The interview day should be laid out well in advance. It will likely require greater detail and planning of time, as it will not be possible to guide candidates throughout the interview day physically. Also, a back-up method of contact is critical - usually in the form of a cell phone. Set a limit on the number of times you will try to contact the candidate if the video stream is lost or unusable. You do not want to use five of your twenty interview minutes just trying to connect.

During the interview day, turn off as many alerts as possible. Close other browser tabs and applications as this can affect the video streaming quality. Dress for an in-person interview and frame yourself from the chest up. Ideally make eye contact with the camera - not the screen. This is challenging and requires practice. Active listening is a useful skill during in-person interactions but is even more critical during video interviews. Finally, practice, practice, practice. That goes for both

Table 3
Tips for Successful Video Interviewing.

Logistics

- Use the platform supported by your institution.
- Test the webcam and audio on the device.
- Have earbuds with microphone available in the event of microphone trouble.
- Ensure that your computer is charged or plugged in.
- Ensure you have a stable internet connection.
- Pay attention to time zones.

Location

- Take note of the backdrop and lighting at the time of day for the interviews. We recommend no beds, bathrooms, or kitchens.
- Choose a quiet, private location without clutter or distractions.
- Ensure others will not be walking around in the background.
- Ensure childcare and pet care as needed.

On the day of the interview

- Have paper copies of the interview materials and a pen.
- Minimize computer applications and browser tabs.
- Turn off email and phone alerts (it's loud through the microphone).
- Dress for a regular interview.
- Frame yourself from the chest up.
- Look at the camera - not the screen.
- Use active listening.
- Avoid interrupting.
- Place sticky notes on your computer with questions to avoid having to look down often.
- Maintain good posture and consider using a stationary chair or locking your swivel chair.
- Do not eat or drink during the interview. Have a bottle of water nearby during short breaks.

Practice

- Practice interviews with your faculty members.
- Record yourself and watch the play-back.

candidates and programs. Anxiety and unfamiliarity with the format will prevent you from presenting the best version of yourself and your program. Programs should do mock interview sessions and give feedback to each other about their sound level, distracting noises, privacy of each location, body language, background, presentation on screen, and framing.

While video interviewing has been on the fringes, it is primetime now, and the candidates are most likely to benefit from the process for two reasons. First, virtual interviews significantly reduce the cost involved in the application process. A survey study estimated that obstetrics and gynecology applicants spent nearly 900 dollars per interview, with an average of 10 interviews per candidate. Thus, the average applicant spent close to $10,000 [50]. Second, virtual interviews might reduce the number of days away from training due to elimination of travel time. However, if candidates start to accept more interview offers, due to reduced cost, the time saved might be offset.

6. Medical education beyond the pandemic

In the aftermath of the SARS-Co-V2 pandemic, healthcare as we know it will not be the same, and academic institutions will continue to grapple with delivering high quality graduate medical education in the "new normal." [51,52] Which of these acute adaptations that have been made during the pandemic should be kept? There is no doubt that virtual learning offers new and exciting opportunities that are deserving of further development. A physical presence is not essential for conducting most academic activities including lectures, grand rounds, multidisciplinary cancer conferences, tumor boards, and journal clubs [52,53]. Even after the pandemic, these activities can and should continue to be conducted on these platforms, allowing the inclusion of learners who may not be able to attend in person. In the future, such platforms could allow multi-institutional events to take place. For example, a multi-institutional tumor board could be held with screen sharing technology allowing radiology images and pathology slides to be shown as part of case discussion. Other possibilities include multi-institutional grand rounds presentations given by experts in the field who might not otherwise be available to a smaller institution. Even weekly fellowship didactics could be coordinated among several institutions realizing new efficiencies.

The development and rapid uptake of telemedicine will forever change clinical practice. While post treatment surveillance for cancer patients has been practiced for decades, it requires a significant investment of time and effort for both the clinician and the patient. Patients have embraced telemedicine visits during the pandemic, but it is not clear that this enthusiasm will continue, nor that this uptake has been universal across the socio-economic spectrum [4]. Additionally, there are no data regarding how this change in the provider and patient interaction will affect the patient provider relationship, or if remote only cancer surveillance is safe in the long term. Nevertheless, there is no doubt that telemedicine is likely here to stay, as some patients who are at low risk of recurrence can have telemedicine integrated into (but not replace) their follow up. We will need to work to include trainees at all levels in this process, so that they can continue to learn how to care for patients, manage problems, and recognize the symptoms of recurrence, even when those women are not physically present.

There is no doubt that training has suffered in two areas where adaptation has been less successful: research and surgery. Research laboratories in some parts of the country have begun to open slowly with limited personnel allowed in the laboratory. During the early peaks of the pandemic, many cancer centers significantly limited or temporarily halted their clinical trials programs. Even some quality improvement research projects were put on hold due to the all-encompassing focus on the pandemic. Fellowship programs must mitigate and manage the fellowship research requirement during this time and beyond. Flexibility from accreditation and certification bodies will be essential.

Surgical training is a hands-on experience. Advanced surgical technique needs to be repetitively practiced for fellows to become efficient and confident attendings. The potential reduction in cases experienced by select senior fellows during the last 3–4 months of their fellowship in 2020 may have adversely impacted surgical volume and self-confidence as they move into their first attending positions. As part of our adaptation, we should establish formal mentorship programs for new faculty and make senior clinicians available to mentor and assist new faculty with complex procedures [52]. Additionally, in the coming months surgeons are likely to be asked to work extended operating room hours during the week and weekend to clear the backlog of cases. Efficiency in the operating room means less time for teaching trainees at all levels, and it is not clear how this extended educational hiatus will affect surgical training moving forward. Data from the 2019–2020 ACGME fellow case logs may be a valuable resource to measure the impact the pandemic has had on surgical training.

The focus on wellness is another aspect of the pandemic that should be further developed and sustained. Attention to physical wellness should be coupled with the acknowledgement that stress impacts work performance and the work-life continuum. Underrepresented minorities in medicine experience additional stressors that deserve our attention as well. Recognizing the stress of the pandemic at all levels, most health systems have increased their messaging and resources for work life balance, mental health, and self-directed learning [41,52,53]. This increased attention should also apply to our fellows. As faculty, we must continue to de-stigmatize the need to ask for help with stress management, learn to recognize the manifestations of stress in ourselves and our trainees, and be aware of the available resources for management.

Converting the fellowship interview process to a virtual format will have a far-reaching impact that cannot be measured at this time. There is no doubt that there are multiple positives to this process, many of which are listed above. Additionally, many candidates will choose to investigate programs that they might not have otherwise considered due to cost constraints. This opportunity may result in a more diverse pool of applicants for programs that traditionally interview limited cohorts due to geography. How these apparent benefits affect the success of the match for an individual program, for good or bad, may not be evident for years.

Though much remains unknown, the lessons learned during the COVID-19 pandemic have resulted in rapid and creative adaptation of new techniques to contemporize existing educational paradigms. Moving forward, we can develop many of the positive aspects of these adaptations, including virtual learning and multi-disciplinary conferences. These opportunities can and should remain part of our training programs. The focus on wellness and attention to stress should also carry forward, as we have learned the importance of preventing burnout to both the health of our trainees as well as our patients. Finally, the loss of the last few months of surgical training for our graduates may be the impetus we need to create a mentorship program for young attendings that was sorely needed even before the pandemic began. The COVID-19 pandemic has challenged us to become more creative and to think of new, and potentially more efficient and better, ways to train gynecologic oncologists that can only benefit us in the future.

Author contributions

Drs. Ferriss, Walsh, and Rose participated in the conceptualization of the manuscript. All authors participated in writing the original draft, as well as review and editing of the final manuscript.

Declaration of Competing Interest

RU reports royalties from UpToDate, CW reports research funding from Merck and advisory board participation with AstraZeneca and Genentech. All other authors report no relevant competing interests.

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