When to Operate, Hesitate and Reintegrate: Society of Gynecologic Oncology Surgical Considerations during the COVID-19 Pandemic.

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When to Operate, Hesitate and Reintegrate: Society of Gynecologic Oncology Surgical Considerations during the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has challenged our ability to provide timely surgical care for our patients. In response, the U.S. Surgeon General, the American College of Srugeons, and other surgical professional societies recommended postponing elective surgical procedures and proceeding cautiously with cancer procedures that may require significant hospital resources and expose vulnerable patients to the virus. These challenges have particularly distressing for women with a gynecologic cancer diagnosis and their providers. Currently, circumstances vary greatly by region and by hospital, depending on COVID-19 prevalence, case mix, hospital type, and available resources. Therefore, COVID-19-related modifications to surgical practice guidelines must be individualized. Special consideration is necessary to evaluate the appropriateness of procedural interventions, recognizing the significant resources and personnel they require. Additionally, the pandemic may occur in waves, with patient demand for surgery ebbing and flowing accordingly. Hospitals, cancer centers and providers must prepare themselves to meet this demand. The purpose of this white paper is to highlight all phases of gynecologic cancer surgical care during the COVID-19 pandemic and to illustrate when it is best to operate, to hestitate, and reintegrate surgery. Triage and prioritization of surgical cases, preoperative COVID-19 testing, peri-operative safety principles, and preparations for the post-COVID-19 peak and surgical reintegration are reviewed.

1. The impact of SARS-CoV-2 and COVID-19

The coronavirus disease 2019 (COVID-19) pandemic is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a small RNA virus [1]. The World Health Organization (WHO) reports that the novel virus has become ubiquitous, is highly contagious, and is most commonly transmitted through close person-to-person contact and respiratory droplets/aerosolization [2]. Although COVID-19 related infection is most commonly asymptomatic or results in only mild disease, approximately 20% develop severe disease requiring hospitalization, with one quarter of the hospitalized cohort requiring prolonged intensive care unit admission and mechanical ventilation [[3], [4], [5], [6], [7]]. The true fatality rate of SARS-CoV-2 infection is not yet known, but is postulated to be 10 times higher than that of influenza.

2. Surgical triage and the impact on gynecologic cancer care

In mid-March 2020, recommendations were released by the American College of Surgeons (ACS), the U.S. Surgeon General, and several medical and surgical professional societies to postpone elective surgical interventions [[8], [9], [10], [11], [12], [13], [14]]. These recommendations were based on the desire to protect patients and providers from COVID-19-related complications and preserve hospital resources for the increasing demand of COVID-19 patients. Ultimately, the pandemic has challenged our ability to provide timely care for patients, including women with gynecologic cancer [3]. Those with gynecologic malignancies often require surgical interventions along their cancer care continuum, which has been particularly disrupted during this time [[4], [5], [6], [7]]. The triage of cancer cases has raised ethical dilemmas for gynecologic oncologists and their teams. In this manuscript, we highlight when it is best to operate, when to hesitate–or halt–select surgical procedures, and when it is safe to reintegrate surgery. Triaging and prioritizing surgical cases, preoperative COVID-19 testing, peri-operative safety principles, and strategies for the post-COVID-19 peak and surgical re-integration are reviewed.

3. Surgical prioritization

Equitable and accurate classification of surgical case urgency is critical during periods of resource constraint in order to preserve the availability of specialized staff, infrastructure and supplies. In addition, hospitals are an important vector for disease spread during a pandemic, and utilization must therefore be strategic to ensure patient and staff safety [6]. While definitions will vary by institution, a diagnosis of cancer may not represent an urgent/emergent surgical indication. The ACS and CMS have categorized most gynecologic cancer cases as semi-urgent [8,9]; however, the ACS further opines that if cancer cases are significantly delayed, this could result in significant patient harm. Clinicians with access to surgery should counsel patients about the risks of surgical delay versus in-hospital or community-acquired COVID-19 exposure in the perioperative setting. Furthermore, patients should be informed that surgical prioritization is determined based on 1) local/projected resources, 2) disease prevalence, 3) patient and tumor characteristics, and 4) expected outcomes from delays. Individual state mandates may actively prohibit elective and semi-urgent surgery during a pandemic, which can be contentious; consultation with institution legal representatives may be helpful in this setting.

Detailed surgical prioritization algorithms, such as the Medically-Necessary, Times-Sensitive (MeNTS) scoring system, consider patient co-morbidities and disease characteristics as well as additional factors based on available PPE, local COVID-19 prevalence, and the patient's need for

blood products, length of hospital stay, and intensive care unit support [15]. The Elective Surgery Acuity Scale (ESAS) categorizes procedures into tiers based on medical necessity and urgency, procedure location (e.g., ambulatory care center, hospital), and the regional burden of COVID-19 to formulate a course of action [10]. Whereas there is little controversy regarding the urgent/emergent and elective case categories, subtleties exist in the semi-urgent category. Most cancer-related procedures, including those for gynecologic cancers, are given a high priority, Tier 3 designation (second only to emergent cases and trauma). Gynecologic oncologists have special expertise in the multi-modality management of gynecologic malignancies and are uniquely qualified to identify cases that can be managed non-surgically, those for which a delay will not impact outcome, and those procedures that are truly urgent. Published literature regarding outcomes associated with gynecologic cancer surgical delays are retrospective, underpowered population-based or single institution analyses with inconsistent and inconclusive results [11,12]. However, available data demonstrate that a surgical delay of a few weeks is unlikely to impact overall outcomes for most women with newly-diagnosed gynecologic cancer. This, of course, will vary depending on the cancer stage, subtype, and interval between onset symptoms that and initial evaluation.

Recently, the Society of Gynecologic Oncology developed guidelines to assist surgeons in triaging cancer cases during the COVID-19 pandemic [13]. Detailed recommendations are shown in Table 1 . Surgical treatment of aggressive cancers with a propensity for early metastases and symptom progression, especially those that can be managed in a minimally invasive/short stay manner, should be given the highest priority, along with potentially curative procedures for apparent early-stage cancers [13]. Additionally, women with advanced-stage ovarian and uterine malignancies requiring interval cytoreductive surgery after neoadjuvant chemotherapy should be prioritized when possible; however, in heavily restricted surgical environments or regions with a high COVID-19 prevalence, primary and interval cytoreductive procedures should be postponed in lieu of chemotherapy to prevent viral exposure in immune-compromised patients and to conserve hospital resources and PPE. The ASCCP (American Society for Colposcopy and Cervical Pathology) has offered guidance on the management of preinvasive disease, stating that surgery for high grade dysplasia may be delayed up to three months and that cases performed for lower grade disease may be delayed for 6–12 months [14]. In contrast, individuals with suspected invasive disease should be evaluated within one month.

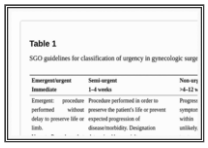

Table 1

SGO guidelines for classification of urgency in gynecologic surgery.

4. Mitigating factors: protecting the surgical patient with social distancing, hand hygiene and personal protective equipment

To mitigate community spread of the COVID-19 virus, the Centers for Disease Control (CDC) supports social distancing, stay-at-home orders, frequent hand hygiene, and restrictions on non-essential business [16]. While social distancing (both within and outside of healthcare settings) is critical to lessen the impact of COVID-19, this measure has created barriers for patients which span the full spectrum of medical care. This includes access to routine cancer screening, laboratory testing, imaging and ambulatory consultations. As many centers have developed policies to limit visitors accompanying patients to the hospital, this also impacts the patient experience in critical moments. For instance, a patient may undergo a major surgical procedure or receive difficult news from a masked provider without a loved one or care giver present for support and help with decision making. Utilization of virtual technologies may help mitigate these barriers.

In addition, a patient with gynecologic cancer who requires surgery should enhance social distancing measures to decrease the risk of asymptomatic infection at the time of surgery. Options include consistent use of a face mask outside the home, and limitation/elimination of visitors for at least two weeks prior to the procedure and two to four weeks postoperatively given the immunosuppressive nature of surgery. Face masks may provide source control (protecting others from the mask wearer's respiratory secretions) and protection (shielding the wearer from others' secretions), but not all masks fulfill both roles [[16], [17], [18], [19], [20]]. Table 2 describes the qualitative differences and applications of several mask types.

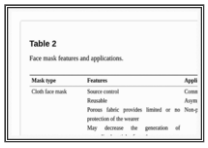

Table 2

Face mask features and applications.

The CDC additionally recommends that health care workers wear a face mask at all times in the workplace in addition to meticulous hand hygiene and interpersonal distancing of more than six feet [18]. Eye protection is also critical to providers caring for patients in the ambulatory and inpatient settings. N95 respirators/eye protection or Powered Air-Purifying Respirators (PAPRs) are also recommended in the care of suspected or known

COVID-19-positive patients. N95 respirators are designed to achieve a close facial fit and efficient filtration of at least 95% of airborne particles 0.3 μm and greater [[19], [20], [21], [22], [23], [24]]. For those who fail fit testing, the CDC has issued caution regarding the use of Powered Air-Purifying Respirators (PAPRs) in the operating room because the exhalation valve may contaminate the sterile surgical field with the wearer's exhaled, unfiltered air [24]. If N95 stock is limited, other options include respirator re-use, reprocessing or extended use. When extended use is necessary, providers should be aware of the potential for decreased efficacy over time and the risk of self-inoculation during respirator handling.

5. Preoperative COVID-19 screening, imaging and testing

Access to timely and reliable testing for the presence of active virus has been a major challenge during this pandemic due to limited testing capacity, reagents, and supplies. The CDC, commercial entities, and many medical institutions have rapidly developed PCR-based tests for nasopharyngeal or oropharyngeal secretions [[25], [26], [27], [28], [29], [30]]. Clinical screening for COVID-19 consists of queries regarding the presence of viral symptoms or potential contact with high risk individuals, including those in quarantine with active COVID-19 or a CDC-defined close contact (3)t. All patients should be clinically screened at multiple points (i.e., pre-visit phone screen, immediately prior to surgery, at entry into the institution, etc.) and any positive screen should be further evaluated.

Diagnostic testing involves identification of SARS-CoV-2 specific genes (nucleocapsid or envelope) using RT-PCR, with most results expected within 12–48 h. Real-time RT-PCR allows for results to be visualized while the PCR reaction is still cycling, reducing assay time to <3 h. Under the FDA's Emergency Use Authorization, commercial entities such as Cepheid (Sunnyvale, CA) and Abbott (Abbott Park, IL) developed rapid testing platforms that can provide a result in as little as 10–45 min [26]. However, poor availability of reagents has limited testing capacity.

Theoretically, RT-PCR assays for SARS-CoV-2 should be highly sensitive in detecting the presence of viral RNA. However, the limit of detection differs among the various respiratory tract sources [25]. A recent literature review and pooled analysis of previously published studies on RT-PCR performance from nasopharyngeal specimens by time since symptom onset or SARS-CoV-2 exposure demonstrated that the false negative rate ranged from 20 to 100% depending on test time point [31]. Care must be taken in interpreting RT-PCR tests for SARS-CoV-2 infection, particularly early in the course of infection, when using these results as a basis for removing precautions intended to prevent onward transmission. SARS-C0V-2 RT-PCR tests appear to be 100% specific [29,30].

Routine preoperative COVID testing is recommended due to the high prevalence of asymptomatic cases. Recognizing that morbidity and mortality from postoperative COVID-19 pneumonia is a concern [8,9,32], surgery should be delayed in patients with a positive test until asymptomatic for >14 days, with some centers also recommending subsequent documentation of negative RT-PCR testing before proceeding to the operating room. A single negative test cannot reliably exclude COVID-19 and N95 masks should be worn, when available, during aerosol generating procedures. Table 3 demonstrates preoperative testing strategies at six U.S. academic institutions. If a patient declines preoperative SARS-CoV-2 testing, she should be informed that this may result in delay of surgery unless truly emergent. In emergent or urgent surgical settings, surgery should be performed presuming the patient is positive if testing results are unavailable.

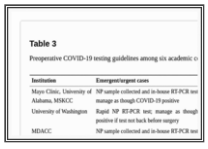

Table 3

Preoperative COVID-19 testing guidelines among six academic centers (as of May 30, 2020).

Published reports from China during the viral outbreak examined the role of screening computed tomography (CT). One study demonstrated that 19% of COVID-19 pneumonias occurred in asymptomatic patients [[33], [34], [35]], suggesting that preoperative chest CT may be valuable as an additional preoperative test, especially in those at highest risks. However, generalizability of these results is limited by methodologic flaws [36]. In settings where RT-PCR testing is not available, and in areas of high prevalence, chest CT may be the only option for preoperative testing. At this time, the CDC recommends using chest CT only if it will change management. The American College of Radiology recommends that it not be performed as a screening tests for COVID-19 and rather be reserved for diagnostic purposes among symptomatic patients [37]. As preoperative SARS-CoV-2 testing improves, CT imaging may become less relevant for COVID-19 screening purposes.

6. Intraoperative safety considerations for the gynecologic oncologist during the COVID-19 pandemic

6.1. Safety protocols during procedural intubation and extubation

From an infection transmission standpoint, the most hazardous aspect of surgery in a COVID-19 positive/unknown patient is endotracheal intubation and extubation [38]. Aerosol-generating procedures (AGPs) are described as "…procedures performed on patients [that] are more likely to generate

higher concentrations of infectious respiratory aerosols than coughing, sneezing, talking, or breathing" [38,39]. Enhanced safety measures appear to reduce the risk of exposure. The essential theme of AGP safety protocols is "Safe – Accurate – Swift" management in order to minimize potential aerosolization of respiratory droplet particles [40]. The following recommendations allow for timely and safe intubation/extubation process for all operating room personnel [41]:

1. Only necessary personnel (i.e., anesthesia providers) should be in the operating room (OR) during the intubation/extubation process. Other surgical team members may relocate outside of the OR, and timing of re-entry is based upon the type of PPE they are wearing and the air exchange rate of the room [42]. If an OR has a typical 15 air changes per hour, 99% of the airborne pathogens will be removed from the room within 18 min, at which point staff can safely re-enter wearing a surgical mask and eye protection. Alternatively, surgeon and OR staff may wear a N95 respirator with a face shield or goggles if they are unable to relocate outside of OR and will remain near an unmasked patient [[20], [21], [22], [23], [24]].
2. Rapid sequence intubation and video laryngoscopy reduce the risk of aerosolization and promote accuracy and increased distance between the person performing intubation and the patient.
3. All surgeons should wear the usual cap, gowns, footwear protection and double gloves. N95 masks (when available) and eye protection are recommended for AGPs; surgical mask with eye protection can be used for non-AGPs [43].

6.2. Operating room safety and laparoscopy

Surgical smoke produced by the thermal destruction of tissue with electrosurgical devices or lasers may harbor aerosolized toxic or carcinogenic chemicals, live or dead cellular material, and potential bacterial and viral particles [[43], [44], [45], [46], [47], [48]]. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) developed a statement cautioning the potential for aerosolization of SARS-CoV-2 during minimally invasive surgery (MIS) [46]. The concern was derived from prior research demonstrating that laparoscopy can lead to aerosolization of blood borne viral RNA particles. Preliminary research has identified very small quantities of COVID-19 viral RNA in the blood stream or stool of COVID-19 positive patients: however, to date, there has been no scientific evidence to suggest that 1) viral RNA particles are infectious, or 2) that viral respiratory pathogens spread to OR personnel via abdominal exposure [47,48]. In fact, a Joint Statement of six U.S. gynecologic professional societies lead by the AAGL (and with the Society of Gynecologic Oncology as a co-signatory), states that "there is no available evidence from the COVID-19 pandemic, or from prior global influenza epidemics, to suggest that respiratory viruses are transmitted through an abdominal route from patients to health care providers in the OR" [49].

Open surgery should not be considered safer than MIS [43]. In fact, filtration of aerosolized particles may be more effectively controlled in MIS procedures provided that the pneumoperitoneum is not released suddenly [47,48]. For these reasons, SAGES later issued an updated announcement, stating that "there is no evidence to indicate that there is aerosolization of COVID-19 during laparoscopy, nor that it would be isolated to minimally invasive procedures" [45].

While viral aerosolization and transmission of COVID-19 during abdominal surgery remains theoretical, several techniques may mitigate risk [48,49]. In open surgery, the National Institute for Occupational Safety and Health (NIOSH) recommends using a smoke evacuator with an inline high efficiency particulate air (HEPA) or Ultra-low Particulate Air (ULPA) filter for trapping particulates as well as additional filters remove and inactivate the gases and vapors. HEPA filters have a minimum 99.97% efficiency for removing particles 0.3 μm in diameter and larger. ULPA filters can remove a minimum of 99.99% of airborne particles with a minimum particle size of 0.05 μm [47]. The smoke evacuator nozzle should be kept within 2 in. of the surgical site to capture airborne contaminants. Tubing filters and absorbers are considered a possible biohazard and should be disposed properly.

Additional approaches include lowering the power setting on electrocautery and ultrasonic devices and minimizing desiccation times to reduce smoke plume. During MIS, CO2 insufflation pressures should also be minimized and smoke evacuation with ultrafiltration employed, with avoidance of passive smoke evacuators [44]. Once placed, laparoscopic and robotic ports should fit tightly and should not be "vented" to avoid sudden release of the pneumoperitoneum. The pneumoperitoneum may be evacuated using the ultrafiltration system before tissue extraction, trocar removal and closure of operative sites. If a desufflation feature is not available, the insufflation port should be closed and the pneumoperitoneum should be evacuated using a separate ultrafiltration system. Port closure devices should be avoided and the fascia closed after desufflation.

6.3. Operating on the COVID-19 positive patient

Patient and staff safety must remain the priority when emergent surgery is required for COVID-19 positive patients. Hospital leadership at each institution should consider assigning a small cohort of specialty-specific expert surgeons to participate in COVD-19 surgery care. This allows for development of surgeon experience and familiarity with executing COVID-19 positive surgical protocols. While all healthcare workers face increased risks of COVID-19 infection, there are practitioners for whom the risk for severe disease and death is highest and who should avoid participating in

the surgical care of COVID-19 positive patients, if possible. The CDC has identified these individuals as >65 years of age or those with chronic lung disease or moderate/severe asthma, serious cardiac conditions, immunosuppressive disease or therapy, cancer, diabetes mellitus, chronic kidney or liver disease, and severely obese individuals (BMI > 40 kg/m^2) [3]. Thus far, pregnancy has not been associated with an increased risk for severe illness or death from COVID-19, although some practices have chosen to limit pregnant provider's exposure to COVID-19 patients. However, neither the CDC nor ACOG recommend that pregnant or breastfeeding providers be excluded from the clinical workforce [3,10].

As part of a preparedness plan, centers may conduct COVID-19 positive patient surgical simulations and operating room “walk throughs” for all relevant health care providers and personnel. Given social distancing guidelines, virtual simulations should be considered. The American College of Surgeons provides guidelines regarding logistics and PPE considerations when operating on a COVID-19 positive patient [44]. Additional logistical considerations developed at The Johns Hopkins Hospital are shown in Table 4 .

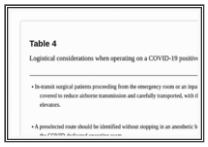

Table 4

Logistical considerations when operating on a COVID-19 positive surgical patient.[a]

6.4. Perioperative care and inpatient virtual rounding/telemedicine

In the perioperative setting, optimization of best practices and targeted modification of care processes are options to minimize exposure risks and resource utilization [50]. For example, video visits (pre- and post-operative) and limiting unnecessary preoperative testing decrease potential patient exposure to COVID-19. Utilization of absorbable skin sutures rather than staples will reduce early post-operative visits, and vaginal cuff checks may be delayed in asymptomatic patients. Additionally, implementation of enhanced recovery and same day discharge pathways can minimize length of hospital stay, as can preoperative assessment of social determinants of health to avoid discharge delays due factors such as inadequate habitation or transportation. Measures should also be taken to reduce the risk of delirium, which may be exacerbated given restrictions on inpatient visitors and companions. Strategies to reduce post-operative complications and readmissions should be enhanced, not abandoned during this time, and include surgical site infection bundles [50], venous thromboembolic prevention protocols, and restrictive blood transfusion protocols.

The COVID-19 pandemic provides an opportunity to explore novel care models within institutional, state and regulatory billing and licensing guidelines, such as inpatient virtual rounds [51]. Previous experience is limited in scope, but virtual platforms have been used to conduct multidisciplinary radiology rounds, and in patient care settings, to include family members in treatment planning, with no change in patient satisfaction compared to face-to-face rounding [[51], [52], [53]]. In addition, with the onset of the COVID-19 pandemic, CMS has modified billing restrictions and permitted synchronous audio-video connection for consults and inpatient rounding [53]. Virtual technologies facilitate conservation of PPE, reduce the potential for patient and provider exposure, and allow ongoing clinical education for house staff and midlevel providers.

In one example of virtual rounding developed at The Johns Hopkins Hospital, a single health care provider dressed in appropriate PPE conducts bedside rounds with the patient, and projects this clinical interaction to the remainder of the team at offsite locations using a Health Insurance Portability and Accountability Act compliant, institution-approved audio-visual platform (i.e., an iPad) mounted on a stand. During each inpatient interaction, the in-person provider introduces the patient to all team members present on the audio-visual platform, confirms patient consent and conducts the bedside visit. In order to maintain remote team member engagement and education, each member is assigned different tasks, such as writing the progress note, entering orders, updating the service sign out list, providing constructive feedback to the in-person provider regarding the clinical interaction and identifying case-based learning points for team discussion. The process requires accurate documentation of the attending attestation regarding the visit method and her/his role in the patient interaction (with billing determined ideally based on clinical decision making and time spent with the patient). Notably, it is acceptable for the attending to bill for the encounter even if present virtually as long as CMS guidelines are followed and an institution-approved, synchronous two-way video platform is utilized. The use of virtual visits for inpatient consults may be performed with a similar platform/approach.

7. The future: a crisis state and how to reintegrate gynecologic cancer surgery in a post-COVID-19 world

Now that much of the U.S. and several countries worldwide have reached the peak or plateau of COVID-19 infections, it is time to begin the challenge of more fully reintegrating surgery and cancer care. Several future scenarios are predicted by epidemiologists, which differ according to how often and how severely SARS-CoV-2 afflicts the population [54]. It is postulated that the current pandemic may only represent the first of several waves of SARS-CoV-2 infection, and that resurgent outbreaks may occur in late 2020 or early 2021.

7.1. COVID-19: modeling and the long game

Many hospitals have used COVID-19 prediction models in order to estimate the future burden of disease in their catchment area. This information is critical to determine if clinical volume (i.e., surgery, outpatient visits) should be scaled back or allowed to recover to pre-pandemic levels. Predictions from these models are heavily influenced by a variety of assumptions and have the greatest accuracy over a 2–3-week period. Most models utilize a SEIR epidemiology approach based on individuals in a population who are susceptible, exposed, infected, and recovered [55,56]. The population analyzed differs between models, with some focusing on rates at the state level, others at the county level, and many institutions have created their own models focusing on their referral region. Companies such as Google and Apple are using cell phone location data to track compliance with social distancing over time, and provide near real-time predictive value in these models. Other important considerations for assessing the status of disease include the availability of testing, the proportion of the population with a positive test, and the associated mortality rate. Modeling is also increasingly used to estimate PPE burn rates, the availability of critical pharmaceutical supplies, total available beds, ICU beds, and ventilators.

Despite the current uncertainties, we know that 1) health care systems cannot remain in a crisis state in perpetuity, either infrastructurally or financially, 2) we need to be prepared to endure COVID-19 over a longer time frame, even though it is challenging to think about long-term health care system strategies at this time, and 3) a sound path forward will most likely involve developing a series of shorter term contingency plans that hospital administrators/physicians develop in conjunction with epidemiologists, public health and government officials, payors, and industry partners. Recognizing that novel therapies and vaccines for COVID-19 are unlikely to be developed in 2020, we must come to terms with the fact that gynecologic oncology surgical practice may be forever changed and that safely navigating COVID-19 will be a reality for some time to come.

While many medical specialty societies have issued guidance in how to triage cases for delay during this pandemic, there is scant guidance on how to start resuming surgical practice [57]. For health care systems, this decision will be dictated in large part by state governors, health departments and/or institutional policies, based on regional COVID-19 prevalence/burden on health care systems. Declining COVID-19 infection rates and lower rates of COVID-19 hospitalization over a 14-day period of time are important criterion to begin non-urgent cases. The availability of abundant PPE supplies, blood products, operating rooms, intensive care unit beds, and adequate staff will also impact when and how delayed cases will resume. Physician and institutional readiness to resume elective and semi-urgent surgeries will also vary by geographic location. The virus will continue to have a disproportionate adverse impact on U.S. gynecologic oncology survivors of Black race, Hispanic ethnicity, and those of low socioeconomic backgrounds [62]. Hospital systems and cancer centers are encouraged to consider novel strategies to study and optimize surgical and cancer care in these vulnerable populations. Finally, access to adequate SARS-CoV-2 RT-PCR and antibody testing for patients and health care workers and operationalizing testing and contact tracing on a national scale are also critical [54,55].

7.2. Gynecologic cancer surgery reintegration

On April 17, 2020, the American College of Surgeons, in conjunction with other societies, developed a joint statement outlining a roadmap for surgery reintegration after the COVID-19 pandemic [57]. In the same manner that patients with non-urgent conditions were triaged for surgical delay, the development of processes to systematically and objectively prioritize these delayed cases are needed. Departmental leadership and/or institutional, multi-specialty surgical review committees should make recommendations to proceed with surgery as resources become available [57]. The review committees will help to fairly allocate resources among the different surgical services and quickly resolve any disputed cases. It is also recommended that institutions consider a phased approach to surgical reintegration to allow for a gradual ramp up period, so that the health care system is not stressed and to prevent worsening COVID-19 infection rates. Logistics and (possibly permanent) infrastructural changes are important to consider, such as how surgical and amblatory units and waitings rooms will be designed to optimize social distancing, and if visitor policies will be forever modified.

Procedures performed for gynecologic cancer, precancerous or risk reducing indications are likely to be prioritized, especially those performed minimally invasively and for curative or preventative intent. For the foreseeable future, most, if not all, patients having an AGP will require preoperative COVID-19 testing and every surgical procedure will require appropriate safety measures. Additionally, as we continue to recognize the impact of viral infection on postoperative recovery [58,59] we must broaden our differential diagnosis of postoperative fever, continue to study and optimize outcomes, and contribute to COVID-19 clinical trials. It may also be necessary to extend surgical block time into evenings and weekends to facilitate access to surgery.

7.3. Reducing gynecologic oncologist stress and burn out

Finally, it cannot be emphasized enough that this phase of increased clinical demand and intense financial pressure on health care providers will have a tremendous toll on physical and psychological well-being. Even at baseline, gynecologic oncologists face considerable professional trauma, stress and burnout [60]. During the COVID-19 pandemic, they have had to grapple with almost impossible ethical situations associated with delays in surgery and cancer care. Additionally, it is well established that health care workers serving in prior infectious outbreaks have experienced long-term

psychological and occupational effects including burnout, psychological distress, and posttraumatic stress [61]. Our hospital systems must take heed and consider including generous wellness allowances for their staff to mitigate this potential stress.

8. Conclusions

The challenges to gynecologic cancer surgical care brought on by the COVID-19 pandemic–and specifically related to the questions of when to operate, hesitate and when and how to reintegrate–are difficult, but far from insurmountable. Gynecologic oncology surgeons have been an extremely valuable resource during the COVID-19 pandemic, and should be supported strongly by their health care systems as they focus on the needs of their oncology patients and continue to rapidly adapt their surgical and cancer care paradigms to address a fast moving public health problem. Procedures performed for cancer indications will be prioritized in the coming months, but surgical restrictions are likely to continue to some degree as institutions adapt their infrastructures and health care missions to optimize care for populations in a post-COVID world. As surgeries gradually ramp up again in the post-pandemic period, optimizing surgical manpower, supporting operative personnel, and using hospital resources equitably and responsibly, will be paramount.

Author contributions

Drs. Amanda Fader and Sean Dowdy conceived of the manuscript and developed its sections. They wrote large parts of the manuscript, edited and approved the final submission.

All other co-authors contributed significantly by writing at least 2–3 sections of the manuscript, edited and approved the final submission.

Declaration of competing interest

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