



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.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Checklist Framework for Surgical Education Disaster Plans

Jeffrey B Matthews, MD, FACS, MAMSE, Patrice Gabler Blair, MPH, E Christopher Ellison, MD, FACS, MAMSE, Eric Andrew Elster, MD, FACS, CAPT, Alisa Nagler, JD, MA, EdD, Steven D Schwartzberg, MD, FACS, Mohsen M Shabahang, MD, PhD, FACS, Anton N Sidawy, MD, MPH, FACS, MAMSE, Kathryn Spanknebel, MD, FACS, Steven C Stain, MD, FACS, LD Britt, MD, MPH, FACS, MAMSE, Ajit K Sachdeva, MD, FACS, FRCSC, FSACME, MAMSE

The COVID-19 pandemic disrupted—and, as of this writing, continues to disrupt—surgical training programs across the US and around the globe. Reductions in operative procedures, due first to the nationwide moratorium on nonessential operations and then to multiple subsequent “waves” of the pandemic that strained hospital capacity, jeopardized the ability of many trainees, especially those in their chief resident years, to achieve required case minimums. Social distancing policies interfered with the workflow of care teams, as well as the ability to gather for in-person didactic conferences. Trainee safety and wellness were compromised by factors ranging from redeployment to nonoperative assignments, such as ICUs, emergency departments, and wards overrun with COVID-19 patients to shortages of personal protective equipment (PPE) that risked viral transmission to self,

family, and loved ones. The response of surgical educators and their trainees has been nothing short of extraordinary. The organizations responsible for institutional and program accreditation and certification of freshly minted graduates have also demonstrated nimbleness and flexibility to address the crisis. Yet the pandemic also illustrated how much of the response to this educational disaster was improvisational and reactive. Overall, surgical educators and the institutions they represent were generally unprepared to address a disaster of this magnitude.

The ACGME requires institutions to maintain a policy that addresses support for each of their ACGME-accredited programs and for the residents and fellows in the event of a disaster occurrence that imparts substantial disruptions in patient care or education.¹ This policy must include information about assistance for continuation of salary, benefits, liability coverage, and educational assignments. Although such a rudimentary policy might protect residents in the case of program closure, there is no requirement that an institution consider a more comprehensive approach to educational program disruption. Disasters that can potentially disrupt patient care and education range from natural disasters (eg hurricane or earthquake) to manmade disasters (eg mass casualty events or ransomware) and can affect a single hospital, a region, or, as in the current pandemic, the world.

The Academy of Master Surgeon Educators of the American College of Surgeons (ACS), Division of Education appointed a Special Committee in March 2020 to address the impact of the COVID-19 pandemic on surgical training. Among the efforts of this Special Committee have been periodic surveys of program directors, surgical department chairs, clerkship directors, and learners to assess topics ranging from clinical experience to wellness over time.^{2,3} Based on the early and severe disruptions to surgical education reported by programs, particularly in the Northeast during the first wave, the Special Committee recognized that most institutions did not have sufficiently detailed disaster plans for surgical education to draw on to be able to meet the impending challenges they would

Disclosure Information: Nothing to disclose.

Disclosures outside the scope of this work: Dr Ellison receives royalty payments from Wolters Kluwer and McGraw Hill Education for original submissions and editorial work. Dr Schwartzberg is a paid board member of Academic Insurance and holds stock in Human Extension, Levita Magnetics, AcuityBio, NuView Surgical, Arch Therapeutics, Inc, and ActivSurgical.

Disclaimer: The opinions or assertions contained herein are the private ones of the author/speaker and are not to be construed as official or reflecting the views of the Department of Defense, the Uniformed Services University of the Health Sciences, or any other agency of the US Government.

Received May 17, 2021; Revised June 18, 2021; Accepted June 21, 2021.

From the Department of Surgery, University of Chicago (Matthews), Division of Education, American College of Surgeons (Blair, Nagler, Sachdeva), Chicago, Illinois, Department of Surgery, The Ohio State University, Columbus, Ohio (Ellison), Department of Surgery, Uniformed Services University, Bethesda, Maryland (Elster), University at Buffalo School of Medicine and Biomedical Sciences, Buffalo, New York (Schwartzberg), Department of Surgery, New York Medical College, School of Medicine, Valhalla, New York (Spanknebel), The Geisinger Health System, Danville, Pennsylvania (Shabahang), Department of Surgery, George Washington University, Washington, DC (Sidawy), The Lahey Hospital and Medical Center, Boston, Massachusetts (Stain), and Department of Surgery, Eastern Virginia University, Norfolk, Virginia (Britt).

Correspondence address: Jeffrey B Matthews, MD, FACS, MAMSE, Department of Surgery, The University of Chicago Medicine and Biological Sciences, 5841 S Maryland Ave, MC5029, Chicago, IL 60637. email: jmatthews@uchicago.edu; jmatthews@surgery.bsd.uchicago.edu

face. The Special Committee appointed a subcommittee to specifically address the question of whether there might be common themes that run through potential institutional disaster policies (specifically with respect to surgical education) that could potentially improve preparedness for future, unspecified events. The subcommittee members reviewed and compared institutional disaster plans from their own institutions and found, as expected, that the responses to educational disasters lacked sufficient detail and scope to be of any practical value in the context of the pandemic. Based on discussions and detailed literature review of previous disasters and the impact on surgical education, the subcommittee identified the following 7 themes relevant to consider in the development of a plan to mitigate and/or manage disruption to surgical education: communication, safety and wellness, clinical experience, curriculum, telemedicine, resident redeployment, and leadership preparedness.

A surgical education disaster plan framework encompassing these 7 themes was developed in the form of a checklist (eDocument 1). This checklist is intentionally not prescriptive (“one size fits all”) in terms of the specifics of the disaster plan itself. Instead, the goal is to encourage department and program leaders to consider each of the 7 themes while in the process of developing an educational disaster plan that will be comprehensive yet sufficiently tailored to reflect the individual characteristics of their institution and surgical training programs, as well as the nature and extent of the disaster. For example, the details of an educational disaster plan for a rural, non-university-based training program would be expected to differ considerably from that of an urban, academic institution that also serves as a regional Level I trauma center. The rationale for the checklist within each of the themes is discussed in the following sections.

COMMUNICATION

Communication in a crisis is a primary responsibility of leadership.⁴⁻⁶ Strategic communication during a crisis stabilizes and advances an organization by inspiring confidence, earning trust, and engaging stakeholders. Clear consistent communication is vital to successfully maintain continuity during a crisis, which allows an organization to eventually recover. This is best accomplished using a plan designed to fit the individual situation and institution. Effective communication plans in a disaster share common elements. There is not a single communication plan that works for every organization. The checklist addresses a number of common elements.

First, the success of any initiative depends on a leader who has responsibility and ownership of that initiative.

It is essential for each unit (ie program, department, hospital, and college or medical school) to have a person designated as the communication lead for that unit. This person should be appointed before any disaster and can be a valuable part of the leadership team. Importantly, the communication lead should be integrated into the organization’s communication network and should be a liaison to an institutional incident command center. Finally, a backup person should be identified and briefed of ongoing communication plans.

Creation of a communication grid is a helpful planning step before a disaster and should be part of a disaster plan. The document outlines how a department or institution organizes the sharing of pertinent information in a timely fashion to the most appropriate people. The grid is defined by the following 6 elements: what the communication is about, who should lead the communication, the audience to receive the communication, when the communication should be made, how the communication should be made, and the need for security. The content (what) of the communication defines who should be responsible for leading the delivery of the information, as well as the audience for whom the information is intended. For example, if there is a communication concerning the institution’s GME programs, the communication lead responsibility would be that of the designated institutional official; and, if the communication is for a specific residency program, it would be the responsibility of the program director.

The communication plan should include consideration of multiple ways to communicate bidirectionally with stakeholders. Communication channels can include smart phone (or mobile phone), social media, electronic health record and telemedicine, pagers, and overhead announcements when systems are down. The plan must be secure and Health Insurance Portability and Accountability Act-compliant if it involves patients and secure if it involves confidential information. Finally, it is important to consider how to efficiently schedule meetings in a disaster situation. Best practices convert regularly scheduled meetings into disaster response meetings. Attendance can be optimized if the audience is already accustomed to the timing of such meetings. Converting regularly scheduled educational meetings into same-day, same-time educational disaster response meetings might be ideal.

SAFETY AND WELLNESS

The safety and well-being of residents and faculty members are essential to the provision of high-quality healthcare, as well as to the development of resilient physicians and surgeons.⁷ The ACGME mandates that programs include

resident education in self-care and assessment of trainee well-being.⁸ As surgeons are known to be at increased risk for depression, burnout, and suicide,⁹ it is critical that general surgery trainees be nurtured and supported to achieve competency in foundational self-care and wellness skills with the same rigor and prioritization as other aspects of training. Such baseline resident competencies, program assessments, and infrastructure must be in place before a disaster strikes. For many general surgery residents surveyed during the COVID-19 pandemic, wellness resources were either unknown, underused, or not provided. Lack of wellness resources (and female gender) was associated with new depression and burnout symptoms among residents surveyed, and the provision of wellness resources and PPE were protective of burnout symptoms.³ Another survey of general and specialty surgery program directors and department chairs showed a considerable negative impact on physical, emotional, and mental health of respondents as institutional operations progressed from usual operations to an emergency ACGME-declared stage under the burden of increasing numbers of patients with COVID-19.² This underscores the importance of not only matching the individual and organization wellness needs and resources to the specific crisis at hand, but also ensuring resource utilization.

Safety of learners in the context of a disaster is also paramount. An institutional disaster response plan must consider safety of all employees, caregivers, and learners. There might be some specific additional considerations for learner safety in the context of a disaster plan for education, but this is more likely to depend on the specific nature of the disaster. Although it is clear that safety is fundamental to wellness, attention to wellness requires a great deal more than addressing safety. Nevertheless, in the context of a disaster, physical safety and psychological safety are quite deeply intertwined. For example, during the COVID-19 pandemic, the lack of PPE was found to be a major disruptor of trainee wellness.^{2,3}

Institutional disaster plans for education should ideally anticipate the need to scope and scale wellness resources and support, to address safety concerns specific to the threat at hand, and to adapt to individual resident and program needs in real time. In the setting of disease outbreaks, epidemics and pandemics such as COVID-19, the evidence to support the selection of various interventions beneficial to mental health and resilience of healthcare providers, remains unproven. However, interventions successfully used by the military during times of combat have been adapted for use in civilian populations and emergency response teams/workers with favorable outcomes.^{10,11} Recently, the ACGME has also provided a comprehensive COVID-19 wellness resource guidebook

that details specific recommendations for wellness and resiliency knowledge, skills, and abilities, including links to national organizations and resource banks. The guidebook also details organizational strategies and tactics by which programs can inventory, plan, communicate, and educate during “usual” operations, as well as ways to implement expanded and proactive well-being support services during times of increased clinical demand and during emergency declaration periods when patient care concerns are paramount.¹²

Safety and wellness considerations for an educational disaster plan should include both institutional and programmatic resources. Institutional resources can include a crisis hotline; bereavement response; occupational health resources, including post-exposure policy and procedures; a plan to acquire and provide PPE and to mitigate needs identified; a range of virtual and in-person counseling and mental health services; grief counseling; and a central repository of wellness and mental health resources to address basic and community needs specific to the area and program.⁷ Program resources can include a resident wellness committee with peer support and faculty mentoring, defined contingency plans for extended leave due to injury or illness, comprehensive wellness and resiliency skills training, and self-care including self- and peer-assessments at baseline with means to monitor during the course of disaster emergencies.

CLINICAL EXPERIENCE

Clinical experience and surgical knowledge are the most important components of residency training. Although it might be possible to replicate components of didactic education, the suspension of clinical activity in the operating room or outpatient clinic during residency can be difficult to remediate because of the finite time for training. A disaster plan should anticipate the potential effects of decreased operative experience for several reasons, most importantly that the goal of trainees is being ready for practice at the completion of training. Several recent publications have highlighted the impact of the COVID-19 on operative volume. Most of these, based on surveys of faculty and residents from many specialties, have reported the majority of residents, up to 96%, believe that the COVID pandemic has had a negative impact on their clinical experience.^{2,3,13-15} Disasters such as the COVID-19 pandemic that will affect the clinical experience of surgical residents will occur in the future. What is unclear is the duration of the disaster, and how that loss of clinical experience will affect the ability of surgery residents to meet minimal operative requirements and trajectory toward autonomy. Unfortunately, there

have not been broad recommendations to prepare for the reduction of clinical experiences due to natural disasters. The group at Louisiana State University and Charity Hospital chronicled their experience after Hurricane Katrina, which provided lessons about organizational preparedness for a mass disaster.¹⁶

ACGME residency training is time based and requires specific operative experience in defined categories specified by residency review committees. Any reduction of clinical experience can have an impact, but it is worth considering the length of the disaster and the reduction in operative volume for the trainee. The minimal case requirements are objective criteria supported by milestones and faculty evaluation by the Program Clinical Competency Committee, and it is important to assess the effects of reduced operative volume. For 2021, as a result of the pandemic, The American Board of Surgery allowed a 10% reduction in operative experience to retain eligibility for the American Board of Surgery Qualifying Examination.¹⁷ It is unclear what a short-term loss of operative experience due to a natural disaster will have on trainees' clinical competency at the end of their training, but it might make sense to have guidelines, based on length of the natural disaster or extent of reduction of operative experience. Of course, all trainees must be carefully evaluated by the Program Clinical Competency Committee and program director as they approach the anticipated date of graduation, regardless of whether they have fallen victim to a disaster during their training or not. To this end, a program might consider, for example, establishing a minimum amount of clinical time and operative cases (particularly complex cases) below which a resident or fellow could not graduate. In addition, programs might consider whether assignment of complex cases to residents before their final year might mitigate the impact on operative experience should some disaster befall those residents during their final year.

Given this context, programs and institutions should consider in their disaster plans the extent of reduction in clinical experience or operative volume that will require additional evaluation. The plan should include a method of evaluation of clinical competency and a plan for remediation if deficits are identified. An increased use of simulation centers might serve as a means to maintain and develop technical skills during the disaster itself. Simulation might also be a tool for assessment of individuals approaching the anticipated date of graduation whose clinical time and operative experience has been impacted by a disaster. Additional considerations include ways to accommodate and to fund overlapping residents if remediation requires additional months or years of training.

CURRICULUM

A disaster might not only disrupt traditional onsite education, but might present the need and opportunity to adapt the curriculum to emphasize and prioritize topics relevant to the unfolding circumstances. A disaster plan for surgical education should include contingency plans for learners to acquire new skills and information through a just-in-time approach. Efforts in this area within the Military Health System can be leveraged so that programs can rapidly pivot within the context of the specific disaster.

The Military Health System is unique in that it must provide expertise in both stateside hospitals as well across the globe in support of military operations. There is tremendous overlap between the knowledge and skills assessments (KSA) needed to support expeditionary operations and the potential scenarios in which civilian surgeons might find themselves as a result of a wide variety of manmade or natural disasters. The opportunities to capitalize in a just-in-time basis on the investments made in the development and distribution of these programs through the Military Health System Strategic Partnership with the ACS are potentially lifesaving and will be made readily accessible to civilian hospitals.

The key to the military mission is identifying which aspects of care are relevant to "readiness" and ensuring that military providers are proficient in those areas. Although there are many components that comprise "readiness," the basis of the Department of Defense expeditionary medical systems rests on individual clinical proficiency. To meet this need, the Department of Defense in partnership with the ACS has developed the Clinical Readiness Program, which provides an innovative approach to measuring, evaluating, and sustaining individual clinical proficiency, with a focus on the expeditionary environment.¹⁸ Many of the elements developed within such a program have relevance outside of the military mission, especially in the response and management of disasters and mass casualty events within the country, as these emerging environments are essentially equivalent to "expeditionary" scenarios. KSAs form the basis of the Clinical Readiness Program used by expeditionary (military) clinicians to monitor and maintain both clinical competency and currency. The KSA developmental process is driven by the specialty community and starts with defining the Expeditionary Scope of Practice, which is followed by formulation of a KSA blueprint developed from Clinical Practice Guidelines, case registries from trauma, and relevant literature. From this blueprint, both knowledge and skills assessments are developed, as well as supporting curricula.

Periodic knowledge assessment assures the sustainment of clinical proficiencies by identifying gap areas that can challenge expeditionary or civilian surgeons and informing the requirements for targeted training resources to assure ongoing readiness. Knowledge assessments are specialty specific, and implementation is in partnership with the ACS.¹⁹ To reduce identified knowledge gaps, on-demand, multimedia-supported training resources are under final development. Knowledge assessments are implemented every 3 years to identify areas of knowledge decay and to inform ongoing training refreshment intervals.

Current training and practice do not fully prepare expeditionary surgeons or their civilian counterparts and teams to perform vital life, limb, and eyesight-saving procedures in the event of unplanned catastrophic circumstances. The KSA program has developed and validated a standardized skills course (Advanced Surgical Skills Exposure for Trauma) that uses best-in-class educational principles to teach and robustly assess more than 25 life-, limb-, and eyesight-saving procedures using a partially perfused fresh cadaver model and procedure-specific simulators, in a time-pressured fashion. During a 2-day course, participants receive hands-on training in a 1-to-1 fashion by 4 experienced trauma surgeons and selected subspecialists who provide real-time assessment and individualized feedback. Courses such as this are essential to building institutional expertise in treating less common injury patterns associated with disasters.

TELEMEDICINE

The COVID-19 pandemic has rapidly accelerated the adoption of telemedicine in routine surgical practice and has illustrated its ongoing relevance to surgical education in the response to future unanticipated disasters.²⁰ To be able to use telemedicine in a crisis, it is important to have trained the faculty, staff, and learners on the use of the technology and to have been familiarized in normal circumstances. That makes it essential for every surgical learner to have experience in assessing patients using telemedicine. Telemedicine needs to become part of the curriculum starting at the junior level of residency and continue through the more senior years. Only then will a learner be able to use telemedicine with ease at the time of crisis. There are 2 important reasons for the use of telemedicine in times of crisis.

First relates to the utility of virtual patient visits for clinical throughput. Telemedicine offers tremendous efficiencies.²¹ In a time of a crisis, it is important to be able to keep patient flow as close to normal as possible. Telemedicine can be of high utility both in the inpatient and

outpatient settings. In the inpatient setting, the ability to communicate with other facilities about transfers and remote management of patients is of high utility. In the outpatient setting, the ability to maintain a normal throughput of patients who are not involved in the disaster is crucial. Learners can be of great utility in both settings.

Second relates to the utility of virtual patient visits for the clinical education of learners. The clinical education of surgical learners is complete only when done in the outpatient and inpatient settings. A disaster of any sort can affect the outpatient clinic experience of the learner. The ability to see patients via telemedicine can sustain the clinic activity of the learner as mandated by accreditation bodies.

To have a relatively smooth increase in the utilization of telemedicine in times of crisis, it is important to have all the necessary equipment and software in place.²¹ A private room with stations for telemedicine is essential. As new platforms arise for telemedicine, the leadership needs to keep the learners, staff, and faculty apprised of those developments. In addition, guidelines should be written for the use of telemedicine in times of crisis: what types of patients should be seen using this technology in the outpatient and inpatient settings.²²

REDEPLOYMENT

As a national event, the COVID-19 pandemic disrupted surgical education throughout the world in general and in the US in particular. Such major disruption necessitated resident redeployment that was in large part institutional in nature to account for various factors, such as the PPE stock at the institution, patient care, resident safety, and resident education.²³⁻²⁵ National disruptions are rather rare; several factors determine the type of disruption and the extent of resident redeployment necessary to maintain continuity of resident education. Such factors include the magnitude of the disruption and whether it is institutional, regional, or national; the length of the disruption and whether the event is time-limited or protracted; and the nature of the event and whether it is a natural disaster, cyberattack, physical attack on population or infrastructure, or infectious in nature, to state a few.

Based on such factors, the type and magnitude of redeployment can vary. Institutional redeployment occurs within the same institution, either from one residency rotation structure to another within the surgery department, or from one service line to another, as example, surgical residents providing emergency department/ICU coverage or changes in team structure for redundancy or consolidation

to allow for on-and-off rotations and periods of rest while working in high-intensity environments. Regional redeployment occurs within the same region redeploying residents from one institution to another. National redeployment takes place when residents are redeployed from one state or one region of the US to another. An event, such as Hurricane Katrina, which hit New Orleans in August 2005, can disrupt the health system in a region for a protracted period of time that necessitates residency program closure either for a few years or permanently.²⁶ In such a situation, the program needs to be prepared to arrange for the residents to complete their training in other programs, regionally or even nationally.²⁷

Preparation for any kind of disruption and redeployment is of paramount importance and requires a predetermined plan. Consideration should be given to specific program policies, a predetermined group that can be assembled instantly in case of a disruption, including the department's educational leadership (as represented by the program director and chair), and a plan that can be put into action in case of a disaster event. Such a plan should consider factors that include the expected duration of the disruption, need for redeployment, the expected type and extent of redeployment, and specific consideration for action in case of program closure. Tools to assist in resident redeployment in the face of a disaster have been proposed by various groups.²⁸

LEADERSHIP AND PREPAREDNESS

At the time of a crisis, the need for effective leadership is even more crucial than in ordinary times. Many aspects of crisis leadership are similar to those principles that leaders use in their daily work.²⁹ In the time of crisis, those tenets are sharpened and even exaggerated.

Adaptability is an important trait. The ability to mold and adapt is crucial to the overall educational objectives, as well as to overcoming specific adversities created by the crisis. Agility and a keen sense of timing go along with adaptability. Another important characteristic of the crisis leader is empathy, the humble ability to view the world through the eyes of colleagues and employees as the leader mobilizes and inspires the learners and faculty. Transparent communication is the third trait that a leader needs to consider. The purpose of steady communication is to inform and inspire. Crisis leadership also requires trustworthiness and authenticity. Learners and faculty look to the leader to be confident but authentic. Words matter greatly in times of crisis. In addition, the leader needs to show decisiveness in the time of crisis. Effective crisis leaders analyze the information, define the priorities, decide on the trade-offs, and make decisions

with conviction. These leaders realize that the act of making a decision might be more important than achieving perfection. In the time of crisis, one cannot dwell on the losses, shortcomings, or failures. The leader has to decisively move things forward. The sixth trait of the crisis leader is the ability to engage their followers. It is essential that the leader engages the employees (and learners), motivates them, and communicates the goals. At time of crisis, leaders need to be seen and they need to be present. Finally, alignment of goals, accountability, and empowerment are essential. It is important to empower the frontline workers but establish and communicate the overall objective. The goalposts are determined by the leader, communicated effectively, autonomy is given at the local level, and everyone is held accountable.³⁰

The purpose of providing instruction on these concepts is that they become more natural in times of crisis. Part of the preparedness of educational programs for crisis situations is the ability of the entire educational leadership team to incorporate the principles above into their practices at times of disaster. These principles should be part of the drills that are run for dealing with sudden events that can affect the educational mission.

CONCLUSIONS

This checklist is intended to provide program directors, department chairs, and their educational teams a framework within which to consider the elements that might comprise an optimal disaster plan for surgical education. Given the nationwide and global experience with the COVID-19 pandemic and its disruption of surgical training, it is recommended that surgical departments review the performance of their training programs during the COVID-19 pandemic, consider "lessons learned" from their institutional experiences, and develop a more comprehensive disaster plan for surgical education to enhance preparedness. Surgery departments and institutions can find value in sharing their approaches to the categories defined within the checklist to continually learn from each other and be better prepared for future crises.

Author Contributions

Study conception and design: Matthews, Blair, Sidawy, Britt, Sachdeva
Acquisition of data: Matthews, Ellison, Elster, Nagler, Schwaitzberg, Shabahang, Sidawy, Spanknebel, Stain
Analysis and interpretation of data: Matthews, Britt, Sachdeva
Drafting of manuscript: Matthews, Ellison, Elster, Schwaitzberg, Shabahang, Sidawy, Spanknebel, Stain

Critical analysis: Matthews, Ellison, Nagler, Sidawy, Sachdeva

Acknowledgment: The authors thank Susan Newman, MPH, and Diamond Lanier of the American College of Surgeons, Division of Education for their organization, communication, and support managing this project.

REFERENCES

- Disasters IVM. ACGME institutional requirements. Effective July 1, 2018. ACGME. Available at: <https://www.acgme.org/Portals/0/PFAssets/InstitutionalRequirements/000InstitutionalRequirements2018.pdf?ver=2018-02-19-132236-600>. Accessed June 9, 2021.
- Ellison EC, Spanknebel K, Stain SC, et al. Impact of the COVID-19 pandemic on surgical training and learner well-being: report of a survey of general surgery and other surgical specialty educators. *J Am Coll Surg* 2020;231:613–626.
- Coleman JR, Abdelsattar JM, Glocker RJ, et al. COVID-19 pandemic and the lived experience of surgical residents, fellows, and early-career surgeons in the American College of Surgeons. *J Am Coll Surg* 2021;232:119–135.
- Kaul V, Shah VH, El-Serag H. Leadership during crisis: lessons and applications from the COVID-19 pandemic. *Gastroenterology* 2020;159:809–812.
- Brethauer SA, Poulouse BK, Needleman BJ, et al. Redesigning a department of surgery during the COVID-19 pandemic. *J Gastrointest Surg* 2020;24:1852–1859.
- Simpkin AL, Armstrong KA. Communicating uncertainty: a narrative review and framework for future research. *J Gen Intern Med* 2019;34:2586–2591.
- Shanafelt TD, Ripp J, Brown M, Sinsky CA. Caring for healthcare workers during crisis—creating a resilient organization. American Medical Association. <https://www.ama-assn.org/system/files/2020-05/caring-for-health-care-workers-covid-19.pdf>. Accessed April 3, 2021.
- VI.C.1-2. well-being. ACGME common program requirements. Effective July 1, 2020. ACGME. Available at: <https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/CPRResidency2020.pdf>. Accessed June 9, 2021.
- Patti MG, Schlottmann F, Sarr MG. The problem of burnout among surgeons. *JAMA Surg* 2018;153:403–404.
- Pollock A, Campbell P, Cheyne J, et al. Interventions to support the resilience and mental health of frontline health and social care professionals during and after a disease outbreak, epidemic or pandemic: a mixed methods systematic review. *Cochrane Database Syst Rev* 2020;11[11]:CD013779.
- Albott CS, Wozniak JR, McGlinch BP, et al. Battle buddies: rapid deployment of a psychological resilience intervention for health care workers during the COVID-19 pandemic. *Anesth Analg* 2020;131:43–54.
- Well-Being in the Time of COVID-19. Guidebook for Promoting Well-Being During the COVID-19 Pandemic. ACGME. <https://dl.acgme.org/pages/well-being-in-the-time-of-covid-19>. Accessed April 3, 2021.
- Fero KE, Weinberger JM, Lerman S, Bergman J. Perceived impact of urologic surgery training program modifications due to COVID-19 in the United States. *Urology* 2020;143:62–67.
- Ilonzo N, Koleilat I, Prakash V, et al. The effect of COVID-19 on training and case volume of vascular surgery trainees. *Vasc Endovascular Surg* 2021;11. 1538574420985775.
- Rothrock RJ, Maragos GA, Schupper AJ, et al. By the numbers analysis of effect of COVID-19 on a neurosurgical residency at the epicenter. *World Neurosurg* 2020;142:e434–e439.
- Dicarlo RP, Hilton CW, Chauvin SW, et al. Survival and recovery: maintaining the educational mission of the Louisiana state university school of medicine in the aftermath of hurricane Katrina. *Acad Med* 2007;82:745–756.
- 2021 hardship modifications to general surgery training requirements. American Board of Surgery. Available at: https://www.absurgery.org/default.jsp?hardship21_gs. Accessed June 9, 2021.
- Holt DB, Hueman MT, Jaffin J, et al. Clinical readiness program: refocusing the Military Health System. *Mil Med* 2021;25[Suppl 1]:32–39. 186.
- Knudson MM, Elster EA, Bailey JA, Woodson J. Military Health System strategic partnership with the American College of Surgeons. *J Am Coll Surg* 2018;227:296–297.
- Jumreornvong O, Yang E, Race J, Appel J. Telemedicine and medical education in the age of COVID-19. *Acad Med* 2020;95:1838–1843.
- Evans H, Yeo HL, Zhao J, et al. Adopting telemedicine in surgical care: what you need to know. *Bulletin of the American College of Surgeons*. American College of Surgeons. <https://bulletin.facs.org/2021/04/adopting-telemedicine-in-surgical-care-what-you-need-to-know/>. Published April 1, 2021. Accessed April 21, 2021.
- Smith WR, Atala AJ, Terlecki RP, Kelly EE, Matthews CA. Implementation guide for rapid integration of an outpatient telemedicine program during the COVID-19 pandemic. *J Am Coll Surg* 2020;231:216–222.
- Nobel TB, Marin M, Divino CM. Lessons in flexibility from a general surgery program at the epicenter of the pandemic in New York City. *Surgery* 2020;168:11–13.
- Wise CE, Merrell SB, Sasnal M, et al. COVID-19 impact on surgical resident education and coping. *J Surg Res* 2021;264:534–543.
- Coons BE, Tam SF, Okochi S. Rapid development of resident-led procedural response teams to support patient care during the coronavirus disease 2019 epidemic: a surgical workforce activation team. *JAMA Surg* 2020;155:683–684.
- Krane NK, Kahn MJ, Markert RJ, et al. Surviving hurricane Katrina: reconstructing the educational enterprise of Tulane University School of Medicine. *Acad Med* 2007;82:757–762.
- Chikwe J, Gaudino M, Hameed I, et al. Committee recommendations for resuming cardiac surgery activity in the SARS-COV-2 era: guidance from an international cardiac surgery consortium. *Ann Thorac Surg* 2020;110:725–732.
- Bradley D, Highet A, Kendrick D, et al. Knowing your team: rapid assessment of residents and fellows for effective horizontal care delivery in emergency events. *J Grad Med Educ* 2020;12:272–279.
- Nichols C, Hayden SC, Trendler C. 4 Behaviors that help leaders manage a crisis. *Harvard Business Review*. Available at: <https://hbr.org/2020/04/4-behaviors-that-help-leaders-manage-a-crisis>. Published April 2, 2020. Accessed June 23, 2021.
- Petriglieri G. The psychology behind effective crisis leadership. *Harvard Business Review*. <https://hbr.org/2020/04/the-psychology-behind-effective-crisis-leadership>. Published April 22, 2020. Accessed June 23, 2021.