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 Commentary

COVID-19 Pandemic and the Need for Disaster Planning in Surgical Education

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The COVID-19 pandemic disrupted nearly every aspect of life in the US and beyond. The findings of the article by Coleman and colleagues[1] provide important and timely insights on the impact of the COVID-19 pandemic on clinical experience and the well-being of surgical trainees and young surgeons in practice. The results were similar for residents and young surgeons, showing substantial decreased clinical experience affecting resident education and practicing surgeon compensation, variable access to personal protective equipment (PPE), and the resulting emotional problems and burnout.

We will focus our comments on the resident survey findings. Predictably, the impact was particularly severe for trainees in procedure-based residencies and fellowships as community hospitals and academic health centers cancelled nonemergency operations to make room for patients infected with COVID-19 and preserve PPE. As with all surveys, a major weakness might be the introduction of bias, as those who were most severely impacted would be more likely to participate. Was this simply a few disgruntled residents responding to their plight? Absolutely not. Of those surveyed, there were 465 respondents for a response rate of 9%. They were relatively equally distributed throughout the US. In addition, the results are validated by being nearly identical to the findings of a survey of surgical educators by A Special

Committee of the Academy of Master Surgical Educators of the American College of Surgeons.[2] We believe that the findings of these complementary studies will help us better characterize the impact of this pandemic on surgical education and trainee well-being and motivate us to proactively develop steps to both preserve surgical trainee development of ACGME competencies and protect their emotional health and physical safety should there be a similar crisis in the future.

The authors found that 96% of respondents reported that the pandemic had negatively impacted their clinical experience. The greatest impact was on operative experience, with 84% of surgical residents reporting a $>$ 50% reduction in nonemergency operative volume and 24% reporting a negative impact on achieving the required ACGME minimum case numbers, affecting their progression to autonomy severely in 17% or moderately in 42%. Although 61% reported a negative impact on didactic education, 21% reported a positive impact and that most programs were able to provide virtual adaptations to didactic conferences.

The impact on resident well-being was striking. The majority of residents (82%) reported caring for known COVID-19-positive patients, with two-thirds reporting that they performed invasive procedures on these patients. Thirty-four percent of residents reported not having adequate access to PPE. Of the residents responding, 53% reported a negative impact on physical safety and 70% on mental health. Screening for new or increased symptoms of depression identified that at least one-third of residents experienced depressed mood and half experienced anxiety and burnout.

Importantly, residents who reported a high number of depressive symptoms and high burnout scores were more likely to be women (53%), and less likely to have adequate access to PPE (62% and 46%, respectively) and wellness resources (46%) at their own institution. Those with high burnout scores were more likely to report an extreme impact of nonemergency case volume (52%) and caring for COVID-19-infected patients (62%). In multivariate analysis, female sex, lack of wellness resources, and lack of adequate PPE were predictive of both depression and burnout.

Other studies point out similar challenges, including resource restraints, need for prioritization, and response to COVID-19 infection among healthcare providers. This has affected the training and education of medical students, residents, and fellows across all medical disciplines, including the surgical specialties.[3,4] Published plans have emphasized resident safety, maximizing learning opportunities (both didactic and clinical), using virtual and in-person platforms, and the well-being of learners in the form of protective gear and psychological health.[5,6] These require flexibility, connectivity, and team spirit.

These studies underscore the need for an institutional disaster preparedness plan that includes educational plans and provisions for learner well-being. An important finding of the surgical educator survey was the variability of including education planning in an institutional disaster plan.[2] In this study, nearly 80% of respondents across all surgical specialties thought that institutional disaster plans should have provisions for education programs. Who should be involved in making these plans? In addition to institutional leadership, it is imperative to include a diverse group of learners, as they can be impacted differently based on sex, race, ethnicity, and sexual preference, and front-line educators. Components of an educational disaster plan should ideally include a plan to maintain development of ACGME competencies and, in surgical specialties, should include innovations to support the continued development of technical competence. In addition, it is clear that such plans must include an emphasis on learner well-being. Residents are particularly susceptible to depression and burnout. They need access to adequate PPE and wellness programs.

Such plans are required by the ACGME.[7] These stipulations are included in the ACGME Institutional Requirements:

> *IV.M. Disasters: The Sponsoring Institution must maintain a policy consistent with ACGME Policies and Procedures that addresses administrative support for each of its ACGME-accredited programs and residents/fellows in the event of a disaster or interruption in patient care. (Core) IV.M.1. This policy should include information about assistance for continuation of salary, benefits, and resident/fellow assignments. (Core)*

In addition, the Common Program Requirements (VI.C.1c) specify the responsibility of the sponsoring institution and its programs to monitor physical safety and emotional well-being after adverse events.[8] Articles such as the one we have commented on are a call to action that we need to be better prepared for future disasters to mitigate their impact on surgical education, staff, and learners. Organizations of surgical educators, such as the Academy of Master Surgical Educators of the American College of Surgeons, associations of program directors, and the ACGME have an opportunity to work together to specify the components of these educational disaster plans.

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