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As the US healthcare system restructured to deal with the COVID-19 pandemic, medical training was significantly disrupted. During the peak of the crisis, three surgical trainees in different stages of their residency shared their experiences and concerns on how this pandemic affected their training. The article is intended to generate discussion on the concerns of derailment and stagnation of surgical training and difficulties faced at all levels of surgical training to perform clinical duties and fulfill academic responsibilities during the early months of the COVID pandemic. (J Surg Educ 78:728–732. © 2020 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** surgical education, duty hours, case volume, pandemic, covid

**COMPETENCIES:** Patient Care, Professionalism, Interpersonal and Communication Skills, Practice-Based Learning and Improvement, Systems-Based Practice

As the US healthcare system restructures to deal with the COVID-19 pandemic, medical training was significantly disrupted. During the peak of the COVID crisis, three surgical trainees in different stages of their residency share their experiences and concerns on how this pandemic was affecting their training.

Howard University Hospital, home program of the training of the authors, is a mid-sized level 1 trauma center in Washington, D.C. area, has significantly busy surgical and medical services, and is a safety net hospital for many marginalized DC residents. The surgical residency program is comprised of 5 categorical residents in each of the 5 years of training, and 8 preliminary residents. The residents not only rotate at the home institution, but also complete rotations at affiliated community hospitals in Maryland. Furthermore, 2 residents with significant academic interests are selected each year at the end of their second year to complete 2 additional years of research. The research residents can choose to stay at their home institution to complete research or pursue research at other facilities.

**CONCERNS OF A JUNIOR SURGICAL RESIDENT**

As junior surgical residents working in these unique circumstances, unlike our medical colleagues who are bearing the brunt of managing the COVID outbreak, we seem to be looking at it from a distance. As resources re-route to emergency rooms and COVID units, the surgical arm of the medical system seems to be regressing. Understandably, all surgical associations have recommended taking all necessary precautions and cancelling or postponing elective cases during the worst phase of this pandemic.1,2 In light of the expected decline in case volumes for the residents, the American Board of Surgery (ABS) has responded by changing its graduation requirements for the current academic year; it has reduced required annual work weeks to 44 from 48 and slashed required surgical cases by 10%.3

Our program adapted by merging all surgical services into one, limiting resident exposure by having us rotate on to cover only during call days. We suddenly found ourselves having more free time than was ever expected during residency. Most residents have been utilizing this slowdown in clinical work to learn new skills, enhance their knowledge, and finish overdue research projects. Although cancellation of all elective cases means much less time in the operating room honing our surgical skills, it has given us an opportunity to focus on improving our perioperative clinical acumen.

With operating rooms expected to be at a standstill for the total duration of this outbreak, there is real fear of losing out on crucial training. In light of this, residents...
have adapted by spending more time in the simulation center to practice their skill; the simulation center has remained open during the outbreak and residents have been encouraged to book timeslots to use the equipment, which is decontaminated after each use. Our program has also implemented additional video conferences to specifically discuss intraoperative decision making to overcome the loss of operative exposure. Additionally, our weekly academic discourse, which include morbidity and mortality conferences as well as didactic sessions, have continued via virtual platforms. There is hope amongst the residents of a complete revival of elective procedures once the worst phase of the pandemic is over, and once hospitals have developed measures to screen elective patients in a safe manner.

On the other hand, unlike other subspecialized surgical residents, general surgery residents are adept at managing acute respiratory distress, and so we have had the pleasure of performing our part during this outbreak. We have been actively involved in the management of critically ill COVID patients both in the surgical ICU and the overflow post operative recovery unit, once the medical ICU reached capacity. Even though there is a looming fear of contracting the disease, junior residents share a feeling of achievement in being able to support our medical colleagues during these tough times, and we believe that this crucial experience will not only help improve our ventilator management skills but also enable us to better understand the critically ill patient.

Our home institution has restructured the surgical residency to limit our interaction with COVID positive patients who are not being actively taken care of by our surgical ICU residents. Only one resident team member visits the ICU to see strictly surgical consults, and we are utilizing chart checking and we are utilizing chart checking and telemedicine to augment surgical consults that will not require intervention. The Trauma bay has also been restructured, and all trauma evaluations are now being performed while donned in personal protective equipment (PPE). The call schedule has also been restructured to reduce resident exposure, while ensuring adequate staffing is present in the setting of some of the residents contracting SARS-CoV-2. Residents staff the hospital on a rotational basis, with nonessential residents staying home. One of our community affiliate hospitals has implemented a 2-team format, each one on for one week at a time. With new interns soon to be inducted into the program in July, at the peak of the COVID crisis, it is yet to be seen if these measures will be sustainable.

Sign outs are occurring over the phone or by utilizing virtual video based platforms, with individual teams maintaining controlled safe contact with each other. Although all these measures have helped reduce interpersonal contact and the risk of COVID transmission, it has led to individual isolation. The extended periods of free days, significantly reduced human interactions and extremely poor outcomes of the critical COVID patients has taken a collective toll on the morale of the residents. Our program leadership and senior residents have helped boost morale by doing virtual happy hours and weekly virtual check ins to discuss mental health concerns. We have also really appreciated the outpouring of love from the community during these testing times.

The current shortage of PPE has become a major barrier for delivering care to patients while remaining protected. In some hospitals PPE is being reused while in some instances PPE cannot always be provided. Understandably, most ER and medical residencies have reduced their resident exposure by only having attendings manage COVID positive patients, however this structure is not always possible for general surgery programs. PPE shortage means we are rationing N95 masks and eye shields. Our program has taken steps to mitigate this shortage by providing individual residents with 3 to 4 N95s which can be used on a rotational basis, recycled every 4 days. However not every hospital structure has the capacity to provide such PPEs, and our residents rotating at community centers have had to use the same PPE on multiple patients. At our community affiliate hospitals, the residents have stepped up to play their part and are involved in invasive bedside procedures such as chest tubes, arterial and central lines and emergency airway access for COVID positive patients. Although the risk and fear of exposure has increased apprehension amongst the surgical trainees, our collective sense of duty has helped us overcome these apprehensions.

**CONCERNS OF A SURGICAL RESIDENT OUT ON RESEARCH**

Similar to the disruption of COVID-19 on daily clinical activities, the world of academic surgery has also been immensely affected. Approximately a third of surgical trainees interested in academic careers punctuate their training with 1 to 3 years of dedicated research time. As the world continues to reconcile with the new realities mandated by a pandemic that currently shows no signs of slowing, academic centers and the researchers engaged in them have also adapted, embracing innovative solutions and novel processes to minimize the disruption to their scientific endeavors.

Unsurprisingly, the enforcement of full or partial lockdowns accompanied by aggressive social distancing measures resulted in a tangible effect on research activity. Temporarily, almost overnight, our research laboratories, devoted to studying lung cancer were
shuttered, and all planned activities were placed on hold for an unknown period as the safety of both research participants and investigators was evaluated. With the exception of experiments that needed to be performed in a time-sensitive manner, bench work was limited to the bare minimum necessary to sustain existing projects. Similarly, anticipating the unknown, we were tasked to swiftly develop contingency plans for our ongoing clinical trials and their participants to mitigate any unforeseen disruptions. As unsettling as this impact has been, the resulting unanticipated void provided a unique and fortuitous opportunity to restructure and engage in different ways.

While wet lab research was forced to halt, we shifted our research load to focus more on studying genomic databases, conducting chart reviews and analyzing the data we already had. This window of opportunity provided a somewhat welcome break to tackle the mountain of pending unwritten manuscripts that each researcher invariably grapples with. Literature reviews were restructured and synthesized to produce topic reviews and book chapters. Additionally, at the encouragement of our principal investigator, we have been able to explore a multitude of online educational resources. Utilizing these avenues has enabled the acquisition of alternative skill sets such as those relevant to machine learning, data management, and statistical analysis. Daily lab meetings and brainstorming sessions were transitioned to virtual platforms to ensure that critical thinking and academic discussion continue uninterrupted. Aside from academic discourse, remaining connected and engaged in this virtual manner provided us a necessary avenue for moral support, encouragement and reflection as we collectively embraced the new challenges we encountered.

On a similar note, with respect to academic conferences, we are faced with new challenges. These meetings afford budding investigators a platform to display their productivity and learn of other innovative works. As these events transition to online platforms, it is exciting to consider the broadened impact and potential scope that will exist for networking and engaging with a wider audience and like-minded colleagues to explore further research ideas and avenues. In certain regions hardest hit by the pandemic, research residents have also functioned as a unique ancillary force that hospital and institutions were able to call upon as they grappled with the need for additional healthcare workers. While our institute was not placed in such a situation, it was heartening to read stories through social media of how various residents rose to the challenge of embracing the surge faced by their coworkers and provide an additional source of manpower.

Undoubtedly, we should anticipate the future occurrence of further impacts and derailments as a result of these truly unprecedented times. As unpleasant and disappointing as these events may be, we should strive to refashion these situations to our benefit, focusing not on the potential downsides but rather the positive opportunity costs that we can extract and repurpose to our advantage. Learning from our shared experiences will be vital in this regard as we collectively seek our common goals of advancing academic surgery and ultimately benefiting our patients.

**CONCERNS OF A SURGICAL CHIEF RESIDENT**

As the pandemic surges, senior residents across the country have found themselves thrust into leadership roles with the responsibility to provide patients the best possible care in the most austere environments, while maintaining academic integrity of the training program. With austerity comes the threat of risky working conditions, that have the potential to affect all trainees. Junior residents, often at the forefront of delivering patient care on hospital floors, have remained most susceptible to exposures during patient interactions. A large part of assuming leadership has been to protect all levels of trainees from exposure and to staunchly advocate for improved access to PPE. Another major aspect of our new role has been to maintain the morale of the surgical residency and provide emotional support to the junior residents during these difficult times.

Procedures, which were previously fertile ground for teaching, are now largely overseen by senior residents and attending surgeons to reduce Potential detriment of junior trainees’ training experience and case volumes. From the perspective of the senior residents at our program, we have seen a drastic decline in subspecialty elective procedures since the start of the COVID-19 pandemic. Our emergency general Surgery services have remained strong, however the total case numbers have been reduced to a quarter or less of the usual capacity. Although we believe that this momentary decline will not affect our ability to achieve the minimum index cases required to graduate, it is a welcome relief to see that the ABS has reduced their required cases for graduation. Hope remains that this momentary moratorium on elective cases will lead to a surge in case volumes for all levels of trainees once the pandemic lessens and the restrictions are eased.

One of the biggest impacts of the nationwide quarantine has been on the interviews for fellowships for residents, and potential job opportunities for graduating fellows. The academic community has, for the first time, been forced to seriously consider and conduct interviews using virtual platforms. Four of our 5 rising chiefs have seen their interview trail get effected due to COVID, with all chiefs having nearly a quarter of their interviews via virtual video platforms. Overall, the
experience of virtual interviews has been positive, however most of my fellow chiefs felt that it is more difficult to judge the culture of a program during these video interviews. Although this paradigm shift towards virtual interviews cannot replace an in-person interview, it is an avenue worth exploring. This pilot test of conducting video conference interviews will bear results after the conclusion of the match process, once programs have an opportunity to evaluate their chosen applicants in the clinical setting. Added fine-tuning and a move toward efficient standardization of the interview process will help alleviate the extraneous fiscal cost of the interview trail for applicants and reduce time away from training programs, as demonstrated by a recent ACGME survey showing more than a week of missed work for 58% of applicants and an average of $8000 in travel related expenditure. The recent difficulties faced by the ABS in conducting the virtual 2020 board examinations shows that the surgical community as a whole needs to adapt to the current times, and that this evolution will affect current trainees in more ways than expected. It is clear that safeguards need to be in place to prevent surgical residents from facing financial and educational hardship during this time.

Medical personnel and trainees cling to hope that once the dust settles, they will be witness to a new era in how medicine and surgery are conducted in the United States. Many beliefs held in dogma are now being challenged and the potential for disease spread has brought previously controversial aspects of treatment of surgical ailments to the forefront. The wealth of information and experiences that result from the pandemic should be geared towards evolving current surgical practices and molding our surgical education. The strong work of our junior colleagues who courageously rose up to the challenge of the pandemic should be commended, and the surgical leadership should make sure that their interests are safeguarded and their surgical education is not shortchanged. Selfish endeavors that place allied healthcare workers at risk of exposure may have long lasting repercussions. Our collective national experience should mold the ideology of inclusiveness and break down barriers for the coming generation of surgeons. There should be a higher percentage of trainee representatives in surgical board and committees to help establish this culture of inclusiveness. Additionally, with the tremendous increase in use of virtual platforms, we should aim to take advantage of this resource and broaden the horizon of our surgical meetings and conferences. Lastly, it is imperative that leadership across the country not lose sight of the fact that it will take a collective push to overcome this adversity. Let’s not lose sight of the fact that current trainees will be both leaders and colleagues in the near future. The steps we take now, will guide the essence of surgery as a field for decades to come.

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