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Spine Surgery Education

COVID-19 pandemic and the implications for orthopaedic and neurosurgery residents and fellows on spine rotations

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ABSTRACT

Background: The COVID-19 global pandemic has caused unprecedented levels of strain on the United States healthcare and its workforce. Orthopaedic and neurosurgery residents and fellows, as part of this workforce have also experienced some of the uncertainty and stress caused by this pandemic. Concerns exist regarding the effects of the pandemic on spine surgery education due to the cancellation of all elective surgeries.

Current Context: We explore how this pandemic is affecting orthopaedic and neurosurgery residents and fellows and their spine surgery education and experience. We also examined measures taken by the residency and fellowship programs to protect their residents and fellows, and measures taken by regulatory agencies like the ACGME and the ABOS to give programs some flexibility during these difficult times.

Conclusion: Orthopaedic and neurosurgery residents and fellows are often on the front lines of patient care. Programs have to ensure adequate resources and training, supervision, and work hour requirements are met. Residents and fellows need to be ready to assist with management of COVID-19 patients if necessary. Residency programs and spine surgery fellowships need to use objective metrics to assess the impact of the pandemic on the spine surgery education of their residents and fellows in order to address any potential area of weakness caused by the decreased exposure to spine surgery.

Introduction

In December 2019, an aggressive pneumonia was identified in Wuhan, China.¹ The cause was later identified as a novel virus (SARS-CoV-2). Infection with this virus causes a highly contagious respiratory disease known as (Coronavirus Disease 2019 or COVID-19).² The virus has rapidly spread worldwide and created an enormous strain to involved countries and their healthcare systems.^{3,4} On March 11, 2020, it was declared a global pandemic by the World Health Organization (WHO),⁵ and 1,046,022 cases with 61,547 deaths have been reported in the United States as of April 30th, 2020.⁶

With the rapid spread of the virus and the strain on healthcare systems, there is significant concern about medical needs exceeding health care resources and the inability to continue providing appropriate medical care during this pandemic. Orthopaedic and neurosurgery residents and fellows have been significantly impacted by this global catastrophe, as have all healthcare providers. Our goal is to discuss how this pandemic is affecting spine surgery education and surgical experience, and

what measures have been taken by regulatory agencies like the ACGME and the ABOS to give programs some flexibility during these difficult times. We also discuss measures taken by residency and fellowship programs to protect the physical health and mental wellbeing of their residents and fellows.

Residents and fellow's education and expectations amidst COVID-19

The Accreditation Council for Graduate Medical Education (ACGME) has created a new framework from which graduate medical education (GME) programs across the United States can operate during the pandemic.⁷ Three different stages will guide participating institutions as the volume of patients continues to increase due to COVID-19. During the first stage, "Business as Usual", there is no disruption of patient care and educational activities and programs are expected to continue the normal common and specialty-specific requirements. During stage two, Increased Clinical Demands, residents and fellows may need

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to shift to patient care duties while some educational activities are cancelled.⁸ The ACGME still expects programs to maintain strict compliance to the work hour, supervision, and safety requirements during this stage. The last stage, Pandemic Emergency Status (PES),⁹ is declared by the GME designated institutional official (DIO) in circumstances where patient needs create a crisis in patient care delivery configuration. The declaration of PES involves all residents and fellows at that institution and is governed by four overriding requirements: work hour limit, adequate resources and training (trained in, and be provided with, appropriate infection protection for the clinical setting and situation), adequate supervision, and the ability to function in their core specialty (other work must be limited to 20 percent of their annual education time).

During the pandemic, orthopaedic and neurosurgery residents and fellows could miss a significant amount of time away from required rotations, which could affect their board eligibility and ACGME requirements for graduation. In response, the American Board of Orthopaedic Surgery (ABOS) and the ACGME have taken a very active approach to support faculty and residents involved in educational programs as they focus on this global crisis. The ACGME, recognizing that institutions have reduced the number of elective visits and procedures and residents may not be able to achieve the minimum number of cases as specified in the specialty-specific requirements, have placed the responsibility on the program director, with consideration of the recommendation of the program's Clinical Competence Committee, to assess the readiness of the residents/fellows for graduation.¹⁰ These measures give programs some flexibility if extended absences are needed. It is unknown how the decreased surgical exposure caused by the COVID-19 pandemic will affect young orthopaedic residents. In addition, a July 2018 ABOS rule change allowed for six weeks of time away from education per year of residency, and that time can be averaged over the five years of orthopaedic surgery residency training.¹¹ This rule would protect residents should they contract COVID-19, and consequently, spend significant time away from residency education.

Of particular concern is the training of spine surgery fellows who will be graduating this fall. With close to three months of lost elective surgery experience, their overall training could be compromised unless measures are taken to address any potential areas of weakness. Spine surgery fellows are expected to have good exposure to the treatment of degenerative spine disorders, spinal trauma, spine deformity, spinal tumors, and some programs also expose their fellows to pediatric spine. In some programs, fellows could be missing an entire rotation and therefore lack exposure to one of these areas. How can we quantify to what degree COVID-19 has compromised their education and surgical experience and how will this impact the start of their practice? These are very difficult questions to answer. The ACGME has placed most of the responsibility of making this assessment on each program. As mentioned earlier, the ACGME expects them to assess the readiness of the residents/fellows for graduation. Orthopaedic and neurosurgery residents are also impacted by the suspension of elective spine surgery procedures. Because their training is spanned over 5 years, however, in comparison with orthopaedic and neurosurgery fellows, it is a lot easier to identify and address any lack of exposure or deficiencies in their spine surgery training. Residency programs and spine surgery fellowship programs need to use objective metrics to assess the impact of the pandemic on the spine surgery education of their residents and fellows in order to address any potential area of weakness caused by the decreased exposure to spine surgery.

Residency and fellowship programs need to consider novel ways of learning. May programs have already transitioned all of their weekly conferences to online virtual meeting spaces. During times of decreased clinical duties, the value of self-directed independent study and research cannot be overstated. With orthopaedic faculty also having increased time available, they can provide invaluable mentorship to residents regarding their research, career path, fellowship applications, amongst other professional goals.

A common concern amongst orthopaedic residents is what will happen if their institution is overwhelmed with patients affected by COVID-19. Are we expected to take care of these patients? Most of us have not taken care of respiratory illnesses since medical school, and even then, with a great deal of supervision. The ACGME expects that residents and fellows be both aware of and able to appropriately respond to this viral disease.¹² Residents and fellows taking care of patients with COVID-19 will need clear care pathways and supervision if needed to extend the supply of providers. Orthopaedic surgery residents are already being assigned to help in intensive care units and emergency rooms where coverage is stretched thin. This situation highlights the importance of orthopaedic surgery providers keeping up with their medical knowledge. We are first and foremost *medical* doctors.

Protecting residents and fellows during the COVID-19 pandemic

Orthopaedic and neurosurgery residents and fellows are an important source of front-line providers in Academic Medical Centers. Keeping them healthy during the COVID-19 pandemic should be a universal goal for their programs. The SARS-CoV-2 virus is transmitted through respiratory droplets, being in close contact with an affected individual, and contact with contaminated objects or surfaces.¹³ One of the main challenges is the high transmission rate of the virus and the transmission potential of asymptomatic or mildly symptomatic patients.¹⁴⁻¹⁷ Every interaction with a new patient is a potential exposure as the patient may be unaware of their infection.

In a population where everyone is susceptible, the average number of secondary infections produced by an infectious case is termed R_0 .¹⁸ Liu *et al.*¹⁹ compared 12 studies published since the COVID-19 outbreak and found the reported mean and median value for R_0 to be 3.28 and 2.79 respectively, with values ranging from 1.5 to 6.68. Regardless of the low level of concordance between these studies, they highlight the high transmissibility of the COVID-19 infection if no measures are taken. Decreasing the contact rate of individuals affected with the virus reduces the fundamental coefficient of R_0 .^{20,21}

The Center for Disease Control and Prevention (CDC) has issued multiple guidelines to direct the appropriate actions when a healthcare provider is exposed to a patient with COVID-19 in an attempt to decrease further transmission by that provider.²² However, because of the unknown role that asymptomatic and pre-symptomatic individuals with COVID-19 play in its transmission, their latest recommendation is to practice universal source control and screening of healthcare personnel for fever and symptoms of COVID-19 before every shift.

The CDC has proposed strategies to mitigate healthcare provider shortages when there are no longer staff to provide safe patient care.²³ Schwartz *et al.*²⁴ recently presented the strategy used by their orthopaedic program to navigate this evolving situation. Residents were divided into two teams, "active-duty inpatient" and "remotely-working". These two teams remained completely isolated from each other to decrease the possibility of the entire program being exposed to the virus. The teams have two-week working cycles, which allows the team not on active duty to self-isolate and watch for the onset of symptoms during the potential incubation period. This method reduces the chance of transmitting the infection to other team members or patients.

The Centers for Medicare and Medicaid Services (CMS) and the American College of Surgeons (ACS) have all issued recommendations to limit all non-essential planned or elective surgeries until such time as local resources and policies allow for resumption of elective surgery.^{25, 26} The American Academy of Orthopaedic Surgeons (AAOS) supports these recommendations.²⁷ Limiting elective procedures has reduced the volume of orthopaedic surgeries being performed and in consequence, more providers are available to participate in rotating schedules, taking care of higher acuity cases.

It is important to recognize the constant change of this pandemic. Orthopaedic and neurosurgery programs and their residents and fellows

need to be flexible and ready to adapt to constantly changing guidelines and events.

Resident Wellness

Orthopaedic surgery residents are accustomed to a busy and stressful lifestyle. However, the many unknowns and variables introduced by a pandemic like COVID-19 can cause even higher levels of stress. For residents with families, especially with small children, there is always concern about their wellbeing. As healthcare workers, residents do not only risk themselves but also their families and measures to decrease their exposure must be followed. Changing clothes and showering before coming in contact with their family is an important measure to decrease the risk of transmission.

During these trying times, orthopaedic residents need to make a dedicated effort to maintain their mental well-being. Sleep is one important aspect of mental well-being that is many times overlooked by orthopaedic residents. With decreased duties residents should make it a goal to obtain adequate amounts of sleep.

Another important factor for mental well-being that is being challenged by the COVID-19 pandemic is social contact. This is especially true for single residents that live alone. With many states encouraging their residents to stay at home except for essential activities, residents are likely to remain at home when not working. Social videoconferences where orthopaedic residents interact and discuss topics not related to their education can provide some sense of normalcy.

Programs need to closely monitor the well-being of their residents as stigmatization can prevent them from asking for help when needed. Programs can consider having a trained provider to have periodical, brief online or phone-based wellness checks for their residents and fellows. Measures like this can avoid some of the stigmatization commonly seen in orthopaedic and neurosurgery residents and fellows that may think asking for help is a sign of weakness.

Conclusion

Orthopaedic and neurosurgery residents and fellows are often on the front lines of patient care. Residency and fellowship programs should create strategies to minimize resident exposure, illness and potential simultaneous multiple trainees in quarantine. The ACGME has issued guidelines that give programs flexibility during this pandemic. Adequate resources and training, supervision, and work hour requirements are still expected from programs. Orthopaedic and neurosurgery residents and fellows need to be ready to assist with management of COVID-19 patients if necessary.

It is imperative to remain constantly updated with the latest guidelines from the many governmental and regulatory agencies (CDC, AAOS, ABOS, ACGME, etc) that issue guidelines directing actions and expectations for orthopaedic surgery residents. Programs should find objective ways to evaluate how the spine surgery experience has been affected by the pandemic in order to effectively address any issues that have resulted from the decreased exposure to spine surgery.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.xnsj.2020.100006.

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