



# The Evolving Impact of COVID-19 on Medical Student Orthopedic Education: Perspectives From Medical Students in Different Phases of the Curriculum

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## Abstract

**Introduction:** The world-wide lockdown caused by Coronavirus Disease 2019 (COVID-19) has upended the trajectories of lives everywhere. The medical profession has been on the front lines of this rapidly developing situation, which in turn has called for unprecedented changes in the medical school curriculum. These changes have severe implications for medical students interested in applying to competitive surgical specialties like orthopedics. **Methods:** As medical students in 3 different class years pursuing orthopedic surgery, we provide our perspectives on the impact that COVID-19 has had on medical student orthopedic education. **Results:** With the removal of away rotations and a shift to virtual interviews, rising fourth year medical students are arguably the most impacted as they prepare for the orthopedic residency application process. Third year students, who are in the exploratory phase of choosing a specialty, also face uncertainties in the shift to a “new” clerkship experience that may (1) be of shorter duration, (2) implement shifts to limit overcrowding of clinical space, and (3) increase the use of telehealth over direct patient contact. **Discussion:** The COVID-19 pandemic has altered the course of medical students’ orthopedic education in unprecedented ways. We believe the following suggestions may be helpful for students seeking alternative, supplemental ways of learning: (1) read up on major orthopedic journals, (2) reach out to orthopedic surgeons in areas of interest, (3) reach out to program directors/medical clerkship directors/program coordinators for opportunities to attend their educational curriculum virtually, (4) attend online lectures and hospital grand rounds, and (5) practice suturing technique with a practice kit. **Conclusions:** While the medical education landscape remains uncertain amid the evolving conditions of COVID-19, as medical students we strive to learn from this pandemic and respond to future unforeseen challenges with resilience, dedication, and compassion: all qualities we admire in orthopedic surgeons.

## Keywords

medical education, COVID-19, residency application, away rotation, clerkship

Submitted July 07, 2020. Revised July 29, 2020. Accepted July 29, 2020.

## Introduction

The world-wide lockdown caused by Coronavirus Disease 2019 (COVID-19) has upended the trajectories of lives everywhere. The medical profession has been on the front lines of this rapidly developing situation, which in turn has called for unprecedented changes in the medical school curriculum. In March, the Association of American Medical Colleges (AAMC) released an official statement recommending the suspension of all medical students’ clinical activities.<sup>1</sup> On May 11th, the Coalition for Physician Accountability (Coalition) instructed medical schools and residency programs to (1) discourage away rotations for medical students and (2) eliminate

in-person interviews and instead shift to online interviews and virtual visits.<sup>2</sup> These changes have severe implications for medical students interested in applying to competitive surgical specialties like orthopedics.

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Orthopedic surgery is an increasingly competitive specialty that requires demonstrated competency with some of the highest USMLE (United States Medical Licensing Examination) Step scores, number of research publications, and clinical clerkship grades of all specialties.<sup>3-5</sup> In an analysis of orthopedic surgery applications, the mean number of research abstracts or publications doubled over the course of 7 years from 2007 to 2014.<sup>5</sup> As a result of these high expectations, medical students are often motivated to dedicate their efforts in medical school (in the form of learning, research, and time in clinic) toward orthopedic surgery. There is no doubt that COVID-19 has negatively impacted medical student orthopedic education as well as the process of preparing for and ultimately applying to residency. As medical students pursuing orthopedics, we share the perspectives from students in different phases of the curriculum, and offer insight into opportunities for learning in the setting of COVID-19.

### Preparing for Orthopedic Residency Applications

While all class years have been affected by the pandemic, rising fourth year medical students are arguably the most impacted as they prepare for the orthopedic residency application process. Away rotations have been discouraged by the Coalition for the 2020-2021 academic year, with an exception for students who have an interest in a specific specialty but do not have access to an experience through the residency program at their home institution.<sup>2</sup> Following these recommendations, orthopedic residency programs across the country have canceled commitments to host visiting students. In lieu of away rotations, some programs are offering virtual opportunities for interested students, which can vary quite significantly. For example, Rush University Medical Center is offering virtual open house sessions with residents and a small group of fourth year students as an opportunity to learn more about their program.<sup>6</sup> In contrast, New York University Langone Medical Center is presenting students with a more structured virtual offering, which includes journal clubs, grand rounds, participation in resident academic conferences, and didactic sessions specifically designed for medical students.<sup>7</sup> Given the novelty of these virtual opportunities, the current literature on the perspectives of applicants and orthopedic faculty who have participated in these programs is limited.

In addition to providing a unique educational opportunity, away rotations allow medical students to demonstrate many qualities important to the applicant selection process including academic competency, ability to work in a team, professionalism, and general fit within the culture of the program. While virtual experiences may allow students a venue to express interest in a given program and to meet residents and faculty, there are potential downsides. Limited virtual engagement with resident and faculty will make it challenging for programs to assess important attributes of an applicant. As away rotations remain suspended for many students for this application cycle, recommendation letters previously obtained following strong

performances at away rotations will no longer be a factor for applications.<sup>8</sup> Traditionally, in-person rotations significantly influence where a student will match.<sup>9</sup> In many competitive surgical subspecialties, including orthopedic surgery, greater than 50% of students completing away rotations match at a program where they rotated.<sup>9</sup> Ultimately, these unprecedented changes will likely have effects that are universal for all applicants.

For the upcoming application cycle, without away rotations for many students, program directors may focus on other imperfect proxies for assessing applicants' personality and ability to fit into the culture of the program (e.g., letters of recommendation and personal advocacy from mentors on a student's behalf). This may preferentially benefit medical students applying from institutions that have orthopedic programs, as these students have greater access to orthopedic faculty mentors. In addition, applicants from more renowned academic centers with orthopedic surgeons whose names are widely recognized in the field and are willing to use their influence on their mentee's behalf may have a significant advantage over others. Similarly, now more than ever, personal connections such as applicants' family members or close acquaintances in the medical profession will matter more because they can also communicate information about the applicant to residency programs. Such influences, without the merit of students' performances on away rotations, may have more sway on the decisions of residency program directors than before.

The Coalition's recommendation to conduct virtual residency interviews is another unprecedented change for the upcoming application cycle. A review of virtual interviews for a surgical fellowship program during COVID-19 noted the possibility of miscommunication between applicants and programs and the inability for applicants to demonstrate unique personality traits and communication skills.<sup>10</sup> Additionally, applicants were concerned about being able to assess the culture of the program.<sup>10</sup> With the shift to virtual interviews, there will be no pre- and post-interview social time. In a study that surveyed urology applicants from the 2019-2020 application cycle, 64% of respondents said that social opportunities with residents were the most important part of the interview day and 81% agreed that this experience could not be duplicated virtually.<sup>11</sup> As a result, applicants will be forced to rank programs that feel far less familiar than in previous years and may opt, to a greater extent, to favor programs to which they have personal or geographic connections.

Understanding the downstream effects of the COVID-19-related changes to the application process will be critical in ensuring that the residency selection is equitable for all applicants, minimizing potential disadvantages based on geographic location, home institution, access to mentors, and personal connections.

### Disruptions of Medical Clerkships

During the initial emergence of COVID-19, at one medical school in the "epicenter" of the pandemic (New York City),

medical students on their clerkships were initially restricted from the care of suspected or confirmed COVID-19 patients. Due to concerns of personal protective equipment (PPE) shortages, students on their surgical clerkships were no longer allowed to scrub into surgical cases, impeding their ability to develop technical and clinical skills that are fundamental to the educational experience. In mid-March, consistent with the AAMC recommendation to suspend clinical rotations in an effort to conserve PPE and reduce the risk of asymptomatic spread, medical schools across the country removed students from the clinical learning environment.<sup>12</sup> Since then, many medical schools have designed and implemented innovative opportunities for virtual learning and engagement. These efforts have included telehealth opportunities, independent research time, and remote elective coursework.<sup>13-15</sup> In addition, many students have led community service efforts such as gathering PPE, creating patient education material, and advocating for vulnerable populations.<sup>16</sup>

Although medical schools have quickly and innovatively adapted to learning amid a pandemic, third year clerkship students, who were in the exploratory phase of choosing a specialty, were faced with new challenges. Clinical clerkships are intended to allow students the opportunity to gain exposure to a variety of specialties and subspecialties, while developing the clinical skills necessary to becoming a competent physician.<sup>17</sup> For some students, surgical clerkships are often their first experience stepping foot into an operating room (OR), scrubbing into cases, and providing surgical care. However, matching into orthopedic surgery has become increasingly more competitive each year, which has led some medical students to commit to orthopedic surgery from the onset of their medical school experiences, in order to position themselves as a more competitive applicant.<sup>4,18,19</sup> A previous study reported that 51% of fourth year medical students and interns who selected orthopedics, had already decided to pursue this field prior to their third-year rotation.<sup>20,21</sup> In a published commentary of the orthopedic residency applications “arms race,” Dr. Joseph Zuckerman notes, “students already are specializing too early.” Instead of going to medical school to become a physician first and an orthopedic surgeon second, many seem to bypass the physician part.<sup>22</sup> The disruption of the clinical learning environment may encourage even more students to commit to orthopedic surgery at earlier points in their medical education, without having been exposed to other specialties during the clerkship phase.

As medical schools prepare to reintroduce students back into the clinical space, there are many uncertainties about the “new” clerkship experience. There has been some speculation about shortening clerkship durations, implementing shifts for students to limit overcrowding of the clinical space, and increasing the use of telehealth and clinical case modules over direct patient contact. There are also looming concerns of a possible second wave in cases of COVID-19,<sup>23</sup> which may further disrupt the clinical learning environment. Given this uncertainty, some students may choose to focus on aspects of their academic portfolio that they perceive to have more control over.

For example, OrthoMentor, an online orthopedic mentorship platform led by Dr. William Levine (Chairman of Orthopedic Surgery at Columbia University) and Dr. Amiethab Aiyer, advised medical students to seek out research opportunities amid the COVID-19 crisis.<sup>24</sup> The mean number of research products is significantly greater for matched orthopedic surgery applicants than those who did not match, and research productivity has been reported as a predictor for the number of applications students must submit in order to secure interviews for a successful match.<sup>4,18</sup> While research has been affected by the COVID-19 restrictions placed on human contact as well as cadaveric research, finding feasible research collaborations that align with the latest COVID-19-related guidelines can facilitate meaningful mentorship experiences with orthopedic attendings, fellows, and residents. In the upcoming classes of orthopedic residency applicants, it will be interesting to examine whether research productivity (i.e., the number of publications and presentations) will represent an increasingly important dimension of the residency application “arms race,” alongside factors such as USMLE Step 1 scores.<sup>22</sup>

## **An Introduction to Orthopedics in Pre-Clinical Years**

The first 2 years of medical school are pivotal moments for gaining exposure to various medical fields and developing relationships with mentors. In fact, previous studies have suggested that many medical students will commit to a specialty prior to entering clerkships.<sup>25,26</sup> At one medical school in upstate New York, the orthopedic physical exam series was one of the first components of the first-year curriculum to shift online as a pre-recorded video. This opportunity to meet and learn from orthopedic surgeons was a highly anticipated course among students interested in orthopedic surgery. Further, as the orthopedic physical exam is largely based on maneuvering large joints, the lack of an interactive, hands-on component was especially detrimental to the learning experience. In a survey of medical students at Michigan State University, those interested in orthopedics found such curriculums to be of high importance in further developing their initial interest.<sup>27</sup> In other words, these curriculum-based, pre-clinical exposures to orthopedics and the musculoskeletal system have an influential role on medical students’ interest in the field.<sup>28,29</sup>

In addition to learning in the classroom, first and second year students commonly gain exposure to orthopedics through specialty interest groups. Orthopedic surgery interest group activities often include suturing skills-labs, introductions to surgical technology, shadowing in the OR, scrubbing workshops, and student-mentor mixers. These events are helpful for increasing comfort in the OR, generating confidence in technical skills, and fostering relationships with mentors.<sup>25</sup> In particular, mentors have a well-documented role in shaping the career interests of medical students.<sup>30,31</sup> With the cancellation of many of these activities amid COVID-19 and likely through the first half of the upcoming school year, rising second year students have also pursued research in orthopedics.

Interestingly, this new emphasis on research may allow students to build stronger relationships with mentors. In a time of high anxiety for all, these relationships will be an important source of guidance and support.

## Summary & Conclusion

The clinical exposures and experiences ranging from the first year of medical school to the fourth year provide medical students with a foundation essential to becoming competent physicians and future orthopedic surgery trainees. The COVID-19 pandemic has altered the course of medical students' orthopedic education in unprecedented ways. Although we include only the perspectives of 3 medical students at 2 institutions, we believe these thoughts are shared among many of our classmates and peers in medical schools across the country. Further, the following suggestions may be helpful when seeking alternative, supplemental ways of learning: (1) read up on major orthopedic journals, (2) reach out to orthopedic surgeons in areas of interest, (3) reach out to program directors/medical clerkship directors/program coordinators for opportunities to attend their educational curriculum virtually, (4) attend online lectures and hospital grand rounds, and (5) practice suturing technique with a practice kit. We hope that this paper will provide insight into the limitations of orthopedic education in the context of COVID-19 as well as encourage others in our shoes to seek alternative ways to maximize learning in preparation for residency. While the medical education landscape remains uncertain amid the evolving conditions of COVID-19, as medical students we strive to learn from this pandemic and respond to future unforeseen challenges with resilience, dedication, and compassion: all qualities we admire in orthopedic surgeons.

## Authors' Note

Michelle A. Richardson and Wasif Islam contributed equally to this work. Investigation performed at University of Rochester School of Medicine and Dentistry, Rochester, New York.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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