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# How We Do It: Modified Residency Programming and Adoption of Remote Didactic Curriculum During the COVID-19 Pandemic

Samir Sabharwal, MD, MPH, James R. Ficke, MD, and Dawn M. LaPorte, MD

Department of Orthopaedic Surgery, The Johns Hopkins University School of Medicine, Baltimore, Maryland

**OBJECTIVE:** To describe the modified operational plan we implemented for residents and faculty in our orthopedic surgery department to allow continuation of resident education and other core activities during the novel coronavirus (COVID-19) pandemic.

**DESIGN:** Description of educational augmentation and programming modifications.

**SETTING:** The Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center, Baltimore, MD.

**PARTICIPANTS:** Residents and faculty, Department of Orthopaedic Surgery.

**METHODS:** In response to the COVID-19 pandemic, we developed and implemented a modified operational schedule and remote curriculum in the orthopedic surgery department of our health system. Our plan was guided by the following principles: protecting the workforce while providing essential clinical care; maintaining continuity of education and research; and promoting social distancing while minimizing the impact on team psychosocial well-being.

**RESULTS:** The operational schedule and remote curriculum have been implemented successfully and allow resident education and other core departmental functions to continue as our health care system responds to the pandemic.

**CONCLUSIONS:** We have been proactive and deliberate in implementing these operational changes, without compromise of our workforce. This experience provides residents exposure to real-life systems-based practice. We hope that our early experience will provide a framework for other surgical residency programs facing this

crisis. (J Surg Ed 77:1033–1036. © 2020 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** COVID-19, novel coronavirus, pandemic, social distancing, remote curriculum

**COMPETENCIES:** Systems-Based Practice, Interpersonal and Communication Skills

## INTRODUCTION

In December 2019, clusters of patients with pneumonia of unknown cause were linked epidemiologically to a seafood and wet animal market in Wuhan, China; scientists isolated a novel coronavirus from the epithelial airway cells of these patients, naming the virus 2019-nCoV.<sup>1</sup> The first case of 2019-nCoV in the United States was detected in January 2020, in a 35-year-old man who had returned to Washington after visiting family in Wuhan.<sup>2</sup> Our institution has been tracking cases of coronavirus disease, or COVID-19, in real time; as of March 25, 2020, more than 450,000 cases have been confirmed globally, with more than 60,000 in the United States.<sup>3</sup>

The highly contagious and virulent nature of 2019-nCoV make the COVID-19 pandemic a critical threat to the global health care system. To date, the only successful mitigation strategy has been radical reduction of social interaction.<sup>4,5</sup> Much of the literature regarding this pandemic and prior pandemics, such as severe acute respiratory syndrome and Middle East respiratory syndrome pertains to the “front lines” and critical care of patients. Studies describe disease management and appropriate triage for managing surge capacity, but nothing, to our knowledge, has been published regarding adaptations that surgical subspecialty personnel must make in this new paradigm.<sup>6-8</sup>

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Correspondence: Inquiries to Dawn M. LaPorte, MD, Department of Orthopaedic Surgery, The Johns Hopkins University, 601 North Caroline Street, Suite 5252, Baltimore, MD 21287;; e-mail: [dlaport1@jhmi.edu](mailto:dlaport1@jhmi.edu)

In our academic orthopedic surgery department, we have adopted a modified operational schedule and remote curriculum for resident education in response to the COVID-19 pandemic. Our plan was guided by the principles of protecting the workforce while providing essential clinical care; maintaining continuity of education and research; and promoting social distancing while minimizing the impact on team psychosocial well-being.<sup>9-11</sup> By sharing our early experience with this plan, we hope to provide an operational and educational framework for other departments now and in the future.

## OPERATIONAL MODIFICATIONS

We have developed and implemented a comprehensive set of modifications to our department's operations to protect our workforce and support patient care, maintain continuity of resident education and research, and ensure social distancing while minimizing the impact on team psychosocial well-being.

Faculty, residents, and advanced practice providers have been divided into 2 teams: Team A and Team B. Residents on elective rotations have been moved from our ancillary clinical sites and consolidated into these teams to serve our 2 hospitals that handle the largest volume of trauma cases. Our 30 interns, junior residents (PGY2-3), and senior residents (PGY4-5) have been evenly distributed into 4 teams, creating Teams A and B at each of our 2 main hospitals. All orthopedic subspecialty services have been consolidated into the team system. At each of our main hospitals, there is only 1 orthopedic resident team at any time.

The separation of staff into teams reduces the risk of disabling the entire team if quarantine is required. Teams A and B alternate clinical in-hospital duty every 14 days. While Team A works on-site, performing essential clinical activities (i.e., urgent and emergency cases and consultations, as well as continuing care of hospitalized patients), Team B works remotely. The remote team has no face-to-face interaction with the clinical team. Although there is built-in redundancy within each team to accommodate for house staff falling ill while on clinical duty, the remote team serves as additional reserve personnel to support the clinical team on an as-needed basis.

As both a department and an institution, with consensus across all surgical specialties, we have cancelled all elective cases and decreased clinical volume, limiting in-person visits to those deemed to be urgent or emergencies. Whenever possible and appropriate, telemedicine consultations supplant in-person visits. Although we have eliminated resident clinic coverage to reduce in-person exposure, residents have completed the requisite training to participate in telemedicine consultations.

Participation in these consultations provides continuity of clinical education without additional risk. Operative cases are staffed by no more than 1 faculty and 1 resident to limit exposure.

A comprehensive hand-off between Teams A and B is completed by teleconference just before switching of on-site and remote duties, and closed-loop communication is emphasized throughout this process. While the remote team may not attend to the hospital or other clinical sites in-person, they are available to assist with supportive tasks, such as answering patient calls or performing discharge summaries. In addition to performing research and completing an augmented remote curriculum, discussed in further detail below, residents working remotely maintain their availability as backup, in case of illness or quarantine of on-site staff.

Social distancing is an expectation during the 2-week remote rotation, which mirrors the time recommended for a home quarantine if indicated.<sup>5</sup> Daily teleconferences minimize the impact of social isolation while promoting social distancing and preventing disease spread. It is expected that the remote team will avoid contact closer than 6 feet with anyone outside their households. In addition to maintaining educational continuity, daily teleconferences provide a sense of community and promote team well-being. We will distribute surveys at regular intervals to monitor resident and faculty mental health, using short-form measures of burnout, social isolation, and well-being.<sup>12-14</sup>

## REMOTE DIDACTIC CURRICULUM

As stated above, residents working remotely complete an augmented didactic curriculum (Table 1). The remote curriculum begins with a live, 1-hour teleconference presented by a faculty member on the remote team, covering clinical cases.<sup>15</sup> This presentation is followed by a break of several hours, using the principle of spaced repetition.<sup>16</sup> A chief resident on the remote team then leads a question review, also by teleconference. Residents also independently complete a structured "flipped-classroom" curriculum, comprising prerecorded webinars and assigned reading, as well as additional review questions, in preparation for the next day's faculty-led teleconference.<sup>17</sup> In addition to this didactic curriculum, residents (and faculty) participate in teleconferences engaging multiple departments across the institution on pandemic-specific topics, including appropriate personal protective equipment use, care of the critically ill COVID-19 patient, and ethical stewardship. From the perspective of experiential learning, these adaptations expose residents to a real-life example of systems-based practice.<sup>18</sup> Residents working remotely continue to pursue research

**TABLE 1.** Template for Daily Remote Didactic Curriculum Structure

Time	Content
8:00 am–9:00 am	Faculty-led teleconference: case presentation format
Completed independently	Prerecorded webinar viewing (1-2 h): covering next day's teleconference topic (flipped classroom)
Completed independently	Assigned reading: covering next day's teleconference topic (flipped classroom)
12:00 pm–1:00 pm	Chief resident-led teleconference: question review format, on earlier faculty-led topic
Completed independently	In-training exam question completion and review (50 questions)

and to check in with their research mentors each week by email and teleconference, to discuss the progress of ongoing projects. Our department's editorial services team also continues remote operations to support the research volume produced during this period.

## CONCLUSIONS

The COVID-19 pandemic presents many uncertainties. By proactively developing and implementing a modified operational schedule and remote curriculum, our department is striving to minimize risk to our workforce while we continue core functions. This experience exposes residents to a real-life example of systems-based practice.<sup>18</sup> Although the particular staffing constraints of individual programs may warrant modifications to the approach we describe, we hope that our early experience will provide a framework for other surgical subspecialty residency programs facing this crisis or similar events in the future.

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