

# In Response to COVID-19

## Current Trends in Orthopaedic Surgery Sports Medicine Fellowships

Jordan L. Liles,<sup>\*†</sup> MD, Richard Danilkowicz,<sup>†</sup> MD, Jeffrey R. Dugas,<sup>‡</sup> MD, Marc Safran,<sup>§</sup> MD, Dean Taylor,<sup>†</sup> MD, Annunziato “Ned” Amendola,<sup>†</sup> MD, Meredith Herzog,<sup>||</sup> BS, Matthew T. Provencher,<sup>¶</sup> MD, and Brian C. Lau,<sup>†</sup> MD

*Investigation performed at Duke University Medical Center, Durham, North Carolina, USA*

**Background:** The COVID-19 (SARS-COV-2) pandemic has brought unprecedented challenges to the health care system and education models. The reduction in case volume, transition to remote learning, lack of sports coverage opportunities, and decreased clinical interactions have had an immediate effect on orthopaedic sports medicine fellowship programs.

**Purpose/Hypothesis:** Our purpose was to gauge the response to the pandemic from a sports medicine fellowship education perspective. We hypothesized that (1) the COVID-19 pandemic has caused a significant change in training programs, (2) in-person surgical skills training and didactic learning would be substituted with virtual learning, and (3) hands-on surgical training and case numbers would decrease and the percentage of fellows graduating with skill levels commensurate with graduation would decrease.

**Study Design:** Cross-sectional study.

**Methods:** In May 2020, a survey was sent to the fellowship directors of all 90 orthopaedic sports medicine fellowships accredited by the Accreditation Council for Graduate Medical Education; it included questions on program characteristics, educational lectures, and surgical skills. A total of 37 completed surveys (41%) were returned, all of which were deidentified. Responses were compiled and saved on a closed, protected institutional server.

**Results:** In a majority of responding programs (89%), fellows continued to participate in the operating room. Fellows continued with in-person clinical visits in 65% of programs, while 51% had their fellows participate in telehealth visits. Fellows were “redeployed” to help triage and assist with off-service needs in 21% of programs compared with 65% of resident programs having residents rotate off service. Regarding virtual education, 78% of programs have used or are planning to use platforms offered by medical societies, and 49% have used or are planning to use third-party independent education platforms. Of the 37 programs, 30 reported no in-person lectures or meetings, and there was a sharp decline in the number of programs participating in cadaver laboratories (n = 10; 27%) and industry courses (n = 6; 16%).

**Conclusion:** Virtual didactic and surgical education and training as well as telehealth will play a larger role in the coming year than in the past. There are effects to fellows’ exposure to sports coverage and employment opportunities. The biggest challenge will be how to maintain the element of human interaction and connect with patients and trainees at a time when social distancing is needed to curb the spread of COVID-19.

**Keywords:** COVID-19; orthopaedic sports medicine fellowship; fellowship training; COVID training

As we approach the end of the 2019-2020 fellowship training cycle, the United States remains in the grip of the COVID-19 (SARS-COV-2) pandemic. On March 11, 2020, the World Health Organization announced the categorization of the disease as a pandemic, and with this announcement came dramatic changes to the working environments of surgeons and fellows in the United States. With initial estimates of the virus peaking in June 2020, many hospitals and

fellowship programs were hopeful that the drastic changes occurring within the American health system would be temporary and predominantly affect only a fraction of the training. At the time of publication, the number of patients testing positive for COVID-19 in the United States had passed 38 million, and we remain on a very steep incline on the total number of cases of COVID-19. There is optimism surrounding implementation of mass vaccination programs; however, the long-term consequences of these programs are unknown.

Bracing for the second major wave of cases in the United States, with heavy surges in the southern and western parts

The Orthopaedic Journal of Sports Medicine, 9(2), 2325967120987004

DOI: 10.1177/2325967120987004

© The Author(s) 2021

This open-access article is published and distributed under the Creative Commons Attribution - NonCommercial - No Derivatives License (<https://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits the noncommercial use, distribution, and reproduction of the article in any medium, provided the original author and source are credited. You may not alter, transform, or build upon this article without the permission of the Author(s). For article reuse guidelines, please visit SAGE’s website at <http://www.sagepub.com/journals-permissions>.

of the country, health systems and fellowship training programs are met with a new dilemma: how to appropriately react to the pandemic to prioritize the safety of our patients, faculty, and staff while simultaneously allowing the continuation of high-quality surgical sports medicine fellowship training. The pandemic poses an unprecedented challenge to surgical fellows and fellowship program directors.

The purpose of this study was to gauge the current response to the pandemic from a fellowship education perspective, gain insight into the continued response, and improve future educational properties. We hypothesized that the COVID-19 pandemic has caused a significant change in the training of orthopaedic sports medicine fellows. We hypothesized that in-person surgical skills training and in-person didactic learning would be substituted with virtual learning. Moreover, we hypothesized that hands-on surgical training and case numbers would be decreased and the percentage of fellows graduating with skill levels commensurate with graduation would decrease.

## METHODS

In May 2020, a survey was sent to the fellowship directors of all 90 orthopaedic sports medicine fellowships accredited by the Accreditation Council for Graduate Medical Education (ACGME). There were 2 follow-up emails requesting programs to participate, and there was a reminder given at the annual fellowship directors' meeting. The survey was anonymous, and all results were deidentified at the time of submission. Data collected were separated into 3 main categories: characteristics, educational lectures, and surgical skills (Table 1). Completed responses by 37 programs (41%) were returned. All information was saved to a private university server.

## RESULTS

### Characteristics

Of the 37 programs that completed and submitted responses, 23 self-identified as an academic institution, 5 were "priva-demics" (ie, private orthopaedic groups

TABLE 1  
Orthopaedic Sports Fellowship Survey Categories<sup>a</sup>

Characteristics	Educational Lectures	Surgical Skills
<ul style="list-style-type: none"> <li>• Practice model</li> <li>• Region of practice</li> <li>• Number of faculty</li> <li>• Number of fellows</li> <li>• Number of residents</li> <li>• Estimated surgical case volume</li> <li>• Use of fellows during COVID-19</li> <li>• Plan to use telehealth after COVID-19</li> <li>• Estimated time until return to normal</li> </ul>	<ul style="list-style-type: none"> <li>• Source of virtual education before, during, and after COVID-19</li> <li>• Use of in-person didactics</li> <li>• Use of virtual didactics</li> </ul>	<ul style="list-style-type: none"> <li>• Source of surgical skills supplementation before, during, and after COVID-19</li> <li>• Percentage of fellows at level commensurate with graduation</li> </ul>

<sup>a</sup>COVID-19, SARS-COV-2.

associated with academic institutions/hospitals), 4 were hospital employed, 3 were private practice, 1 was military, and 1 identified as other (Table 2). Survey completions were uniformly distributed across the United States, with 9 from the West, 8 from the Northeast, 7 from each of the Midwest and Southeast, and 6 from the Southwest. The number of faculty members at each program ranged from 3 to 13, with an average of 6.92 faculty members per program. The number of fellows from each program also had a large range, from 1 fellow at the smallest program to 8 fellows at the largest program. The average number of fellows per program was 2.88. The average faculty-to-fellow ratio was 2.91 attending surgeons per fellow.

Of the 37 programs, 20 programs had both residents and fellows, while 17 programs had only fellows. Of those programs with residents and fellows, the average number of residents per program was 25.

Programs were asked to estimate the final number of surgical cases that the current fellows would complete

\*Address correspondence to Jordan L. Liles, MD, Department of Orthopaedic Surgery, Duke University Medical Center, 311 Trent Drive, Suite 2214, Box 104002, Durham, NC 27710, USA (email: jordan.liles@duke.edu) (Twitter: @dukeortho).

<sup>†</sup>Division of Sports Medicine, Department of Orthopaedic Surgery, Duke University Medical Center, Durham, North Carolina, USA.

<sup>‡</sup>American Sports Medicine Institute, Birmingham, Alabama, USA.

<sup>§</sup>Department of Orthopaedic Surgery, Stanford University Medical Center, Palo Alto, California, USA.

<sup>||</sup>American Orthopaedic Society for Sports Medicine, Rosemont, Illinois, USA.

<sup>¶</sup>The Steadman Clinic and Steadman Philippon Research Institute, Vail, Colorado, USA.

Final revision submitted November 8, 2020; accepted December 6, 2020.

One or more of the authors has declared the following potential conflict of interest or source of funding: J.R.D. has received consulting fees from Arthrex and DJO, nonconsulting fees from Arthrex and Smith & Nephew, and royalties from Arthrex. M.S. has received consulting fees from Anika Therapeutics, Medacta, and Linvatec; speaking fees from Linvatec and Smith & Nephew; honoraria from Medacta; and royalties from Smith & Nephew. D.T. has received consulting fees from DePuy/Medical Device Business Services, royalties from DePuy, and hospitality payments from Smith & Nephew. A.A. has received consulting fees from Arthrex and Bioventus, nonconsulting fees from Arthrex, and hospitality payments from Lima USA. M.T.P. has received nonconsulting fees from Arthrex and ArthroSurface, consulting fees from Arthrex, honoraria from Flexion and Joint Restoration Foundation, and royalties from Arthrex and ArthroSurface. B.C.L. has received education payments from Smith & Nephew, grant support from Zimmer Biomet and DJO, and hospitality payments from Wright Medical. AOSSM checks author disclosures against the Open Payments Database (OPD). AOSSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.

Ethical approval was not sought for the present study.

TABLE 2  
Characteristics of Survey Participants

Category	No. of Programs	Category	No. of Programs
Type of program		Sports medicine fellows	
Academic institution	23	1	5
Priva-demic Hospital employed	5	1.5	1
Private practice	4	2	12
Military	3	3	9
Other	1	4	5
Geographic region	1	5	3
West Coast		6	1
Northeast	9	8	1
Midwest	8	Average fellows per program	2.88
Southeast	7	Number of residents <sup>a</sup>	
Southwest	6	0	17
Total sports medicine faculty		2	2
3	2	3	1
4	5	15	1
5	6	20	5
6	7	25	4
7	2	30	2
8	2	32	1
9	7	36	2
10	4	40	1
11	0	42	1
12	1	Average residents per program	25.45
13	1	Estimated cases per fellow <sup>b</sup>	
Average faculty per program	6.92	200-299	2
		300-399	11
		400-499	14
		500-599	6
		600-699	2
		700-799	2
		Average cases per fellow	416.76

<sup>a</sup>For programs with residents.

<sup>b</sup>By July 31, 2020.

before July 31, 2020. Responses ranged from 250 to 799, with an average case completion estimate of 417 cases per fellow. The presence of residents did not significantly affect the number of estimated surgical cases for fellows (404 surgical cases per fellow in programs without residents, 427 surgical cases per fellow in programs with residents;  $P = .54$ ). Programs were not asked to submit pre-COVID surgical case volume.

Information regarding utilization of both residents and fellows was collected. During the COVID-19 pandemic, 89% (n = 33) of programs have had fellows continue to participate in the operating room, 65% (n = 24) have had fellows continue to participate in in-person clinical visits,

and 51% (n = 19) have had their fellows participate in telehealth visits. There was no separation between direct or indirect supervision as it related to fellows participating in telehealth visits. Of the responding programs, 22% have had fellows “redeployed” to help triage and assist with off-service needs. Three programs (8%) have removed their fellows from clinical duty, and 9 programs (24%) have transitioned to a “platoon” or divided schedule for their fellows.

Only 26 of the 37 fellowship programs have an associated residency program. Of these 26 programs, 73% (n = 19) have had residents continue to participate in the operating room during the COVID-19 pandemic, 42% (n = 11) have had residents continue to participate in in-person clinical visits, 31% (n = 8) have had their residents participate in telehealth visits, and 65% (n = 17) have had residents redeployed to help assist with off-service needs. Four programs (15%) removed their residents from clinical duty, and 46% (n = 12) transitioned to a platoon or divided schedule for their residents.

A major difference between redeployment to off-service rotations is seen between fellows and residents, with 21% of programs having had fellows rotate off service and 65% of programs having had residents rotate off service.

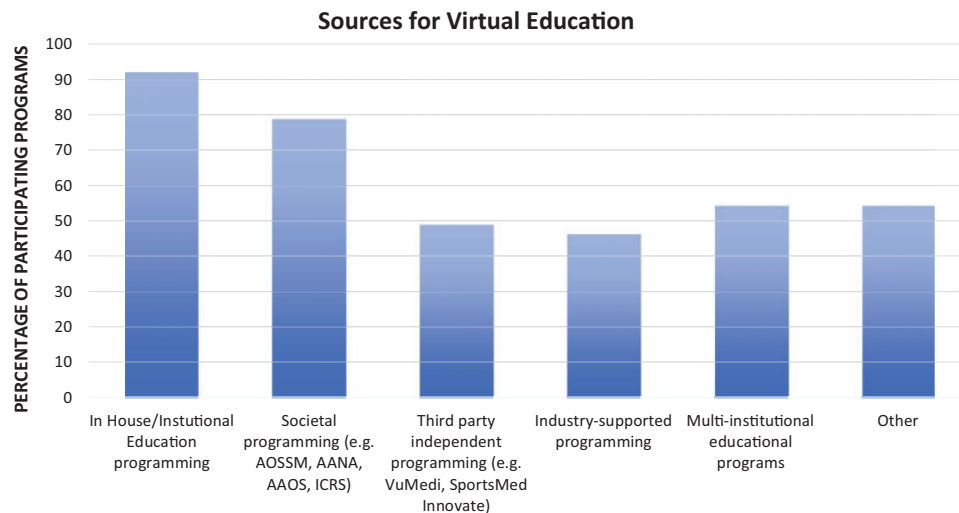
A majority (n = 28; 76%) of fellowship programs stated that they planned to incorporate telehealth into their training program in the future, while 22% (n = 8) did not plan to incorporate telehealth into fellowship training in the future.

A total of 31 of the programs believed that it would be a matter of months before their institution/program returned to normal practice or volume, while 5 programs responded that they believed it would be years before a return to normal.

### Educational Lectures

Programs were also surveyed about their past use or planned use of various sources for fellow education. Of the 37 programs, 34 (92%) have used or are planning on using in-house/institutional educational programming, and 29 (78%) have used or are planning to use platforms offered by medical societies (eg, AOSSM, Arthroscopy Association of North America, American Academy of Orthopaedic Surgeons, and International Cartilage Regeneration & Joint Preservation Society). A total of 49% (n = 18) are planning to use or have used third-party independent educational platforms (eg, VuMedi, Sports Med Innovative), while 54% (n = 20) are planning to use or have used multi-institutional educational programs (Figure 1).

The amount of time per week each program participated in in-person lectures and virtual lectures was then assessed for 3 separate time points: before COVID-19, during COVID-19, and after COVID-19 (Figure 2). Before COVID-19, a majority (n = 22) of the programs spent between 1 and 3 hours per week participating in in-person lectures or meetings. Four programs spent 1 hour per week, 7 spent 3-5 hours, and 2 spent 5-7 hours and 7-10 hours each. At the same time, 24 of the programs did not



**Figure 1.** Directors of orthopaedic sports medicine fellowship programs were asked about their previous or planned use of various sources for virtual education. Responses are given as a percentage of positive responses from the 37 participating programs. AANA, Arthroscopy Association of North America; AAOS, American Academy of Orthopaedic Surgeons; AOSSM, American Orthopaedic Society for Sports Medicine; ICRS, International Cartilage Regeneration & Joint Repair Society.

participate in any virtual lectures or meetings, while 8 spent 1 hour per week in virtual meetings.

During COVID-19, a significant change was reported for in-person and virtual lectures/meetings. Thirty of the programs reported no in-person lectures and meetings, while 6 programs reported 1 hour per week. Much more time is being spent in virtual meetings and lectures now, with 11 programs reporting between 1 and 3 hours per week and 12 programs reporting 3 to 5 hours per week being spent on virtual lectures and meetings.

Programs were also asked to report on the amount of time they would spend on both in-person and virtual learning after the COVID-19 pandemic. Similar responses were given regarding in-person lectures, with 24 of the programs anticipating spending between 1 and 3 hours per week for in-person lectures (compared with 22 programs before COVID-19). Six of the programs anticipated spending 1 hour per week, and 4 programs anticipated spending 3 to 5 hours per week.

When it came to incorporating virtual learning after the COVID-19 pandemic, programs anticipated increasing their use of virtual learning compared with before the pandemic. Twenty-two programs anticipated spending 1 to 3 hours per week on virtual learning, 6 programs anticipated spending 1 hour per week, and 3 programs anticipated spending 3 to 5 hours per week.

Survey responses regarding in-person and virtual learning trends before, during, and after COVID-19 are shown in Figure 2.

### Surgical Skills

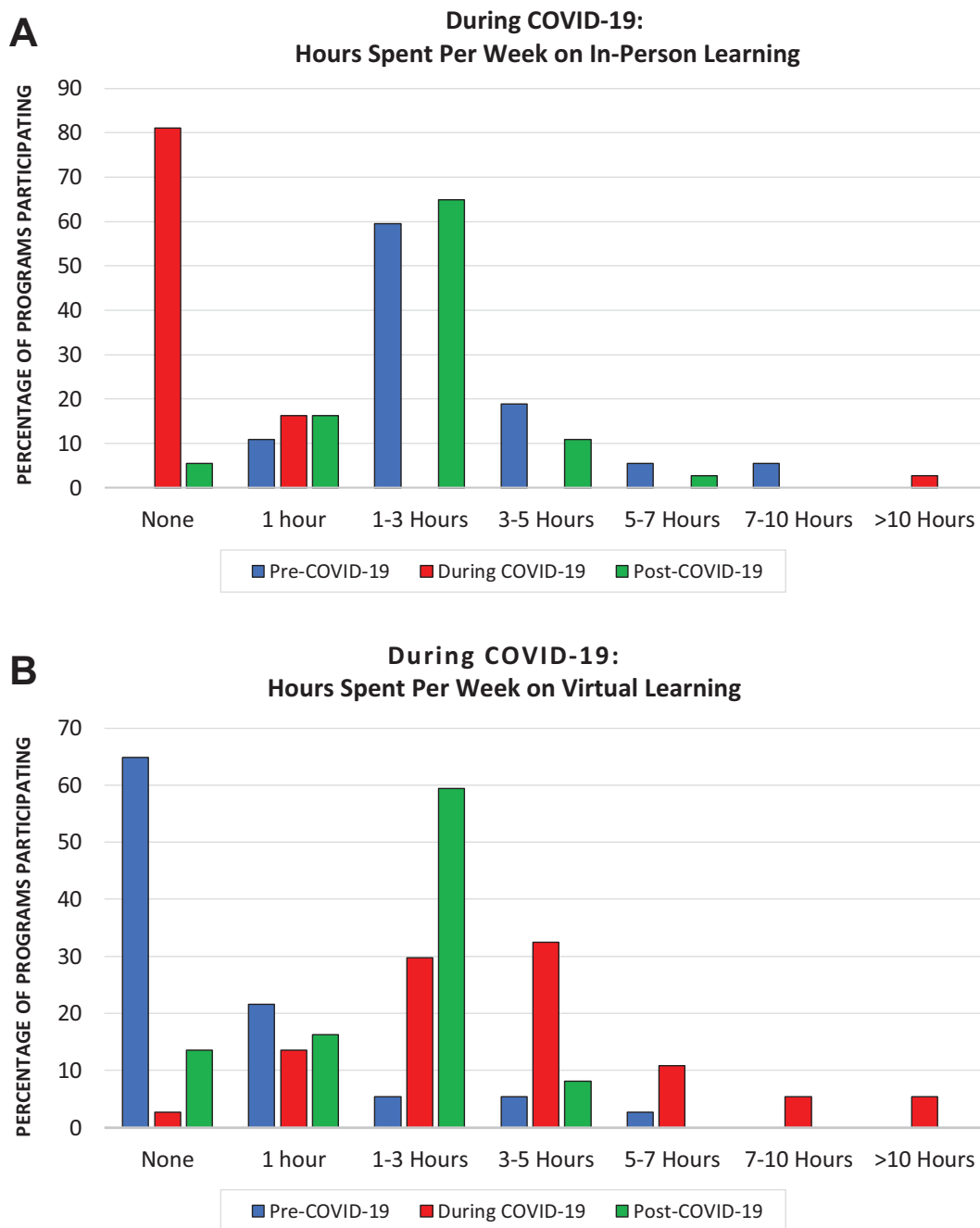
Survey respondents were asked how they were supplementing or anticipated supplementing surgical skills for

the fellowship training at 3 different time points: before COVID-19, during COVID-19, and after COVID-19.

Before COVID-19, 86% ( $n = 32$ ) were supplementing with cadaver laboratories, 35% ( $n = 13$ ) were supplementing with virtual laboratories (eg, simulators, training boxes, sawbones), 81% ( $n = 30$ ) were supplementing with industry courses, and 1 program was not supplementing the surgical training. Respondents were also asked how often they were supplementing surgical skills training. A majority stated they were supplementing either once per month ( $n = 11$ ; 30%) or twice per month ( $n = 9$ ; 24%).

During COVID-19, there was a sharp decline in the number of programs participating in cadaver laboratories ( $n = 10$ ; 27%) and industry courses ( $n = 6$ ; 16%). Supplementation with virtual laboratories increased slightly ( $n = 15$ ; 41%). Of the total, 38% of programs ( $n = 14$ ) indicated they were supplementing surgical training in a way not on the survey response list, and 43% ( $n = 16$ ) said they were not supplementing surgical skills training during COVID-19. Eight (22%) of the programs were participating in surgical learning once per week, and 22% were participating in surgical training 1 to 2 times per month. Interestingly, of the programs participating in training once per week, nearly all were participating in virtual training and not cadaver laboratories (virtual:  $n = 7$ , 87.5%; cadaver:  $n = 1$ , 12.5%), whereas almost all groups participating in training 1 to 2 times per month were participating in cadaver laboratories ( $n = 7$ ; 87.5%).

For after COVID-19, there was a similar rate of programs anticipating participation in cadaver laboratories to that for pre-COVID (89% [ $n = 33$ ] post-COVID, 86% [ $n = 32$ ] pre-COVID). This was also true for industry-sponsored events (76% [ $n = 28$ ] post-COVID, 81% [ $n = 30$ ] pre-COVID). A large number of programs anticipated



**Figure 2.** The amount of time spent or anticipated to be spent by orthopaedic surgery sports medicine fellowship programs on (A) in-person training and (B) virtual lectures/meetings was recorded at 3 time points: before COVID-19, during COVID-19, and after COVID-19. COVID-19, SARS-COV-2.

implementing virtual laboratories (21 programs post-COVID, 13 programs pre-COVID).

**Clinical Skills and Strategies**

Programs were asked to estimate the percentage of their current fellows that they anticipated would be at a surgical level commensurate with their fellowship graduation on July 31, 2020. A total of 24 of the 37 programs responded

that all of their fellows (100%) would be at this level by July 31, 11 responded that most of their fellows (75%) would be at this level, and 2 responded that only 25% of their fellows would be at this level. Programs were not asked to comment on surgical skills of fellows from previous years.

Fellowship programs had the ability to freely respond to the following question: “What other strategies have you employed during the COVID-19 pandemic or plan to incorporate after COVID-19 to continue the education of

TABLE 3  
Responses From Programs Regarding Continuing  
Education of Fellows During and After COVID-19<sup>a</sup>

What other strategies have you employed during the COVID-19 pandemic or plan to incorporate after COVID-19 to continue the education of trainees?

“We have taken this ‘down’ time to do the less clinical parts of the educational program. Topics like coding, contracts, malpractice, office management, etc, have been moved so that we can still teach without concern for losing clinical acumen related to in-person education on clinical topics.”

“We increased our conferences to include combined conferences with other fellows in our department (we have 13 fellows in 5 fellowships . . . sports, tumor, F&A, trauma, and joints). We did transition to practice topics . . . Coding and billing, Leadership development, Preparing for Part II ABOS oral exam. Earlier in the year, we also did combined fellowship conferences on Choosing a Practice and Contract Negotiations.”

“Fellows involved in urgent cases. Although many of them are not sports cases, it still helps to maintain their surgical skills.”

“Weekly personal meetings on Zoom along with conferences.”

“Remote/virtual Ultrasound Class combined both nonoperative and operative sports fellow. Supported by clinics with loaner US units so fellows could have them at home.”

“Increased invasion of after-hours time frame for conference calls, webinars, and other educational opportunities.”

“More virtual meetings. More interactions with our fellowship directors to get shared ideas on best practices and new strategies for fellowship preparation for starting independent practice. How is everyone doing fellow graduations?”

“Multi-institutional lectures as outlined above. Supplemental ICL-level lectures given by staff.”

“Review and discuss surgical pearls and challenges for a variety of conditions—using online resources, Zoom, and faculty-fellow-resident discussions. Will continue to use Zoom to get greater participation in meetings and conferences and to expand educational offerings.”

<sup>a</sup>ABOS, American Board of Orthopaedic Surgery; COVID-19, SARS-COV-2; exam, examination; F&A, foot and ankle; ICL, instructional course lecture; US, ultrasound; Zoom, Zoom Video Communications, Inc.

trainees?” Responses were variable, but comments centered around focusing on nonsurgical topics that previously were not part of the surgical curriculum. One program has focused on the “less clinical” parts of education including coding, contracts, malpractice, and office management. Another program has added coding and billing, leadership development, and preparing for Part II of the American Board of Orthopaedic Surgery oral examination. Full responses for this question are listed in Table 3.

## DISCUSSION

There has never been a challenge encountered by the orthopaedic community or the sports fellowship quite like what we are currently experiencing. The future is uncertain, and the changes we make now can and will have a substantial and lasting effect on the way health care, specifically sports medicine, is shaped in the future. The principal findings of this

study demonstrated that COVID-19 has caused a number of issues regarding fellow training and education including a decline in surgical case volume and exposure to a variety of pathologies, a decrease in in-person training opportunities (including athletic event coverage), and concerns about fellows’ technical ability, and it has caused fellowships and trainees to get creative in how to alter the education of orthopaedic sports medicine fellows. More time is being spent on supplemental practice skills including coding, contracts, malpractice, office management, and leadership development. It is important that we as a community continue to strive to remain up-to-date on the changes and recommendations of the ACGME, Centers for Disease Control and Prevention (CDC), and American College of Surgeons (see Table 4). We must strive to teach our trainees how the practice of sports medicine will be and not how it was.

## Effect on Sports Medicine Training

The previously “normal” day-to-day, week-to-week, and month-to-month working schedule for fellowships has seen a dramatic change over the past 4 months. This disruption in standard care initially predominantly affected training programs in cities heaviest hit by the pandemic including New York City, Seattle, and Chicago. Now, with an ever-increasing number of cases and the continued spread of the pandemic to surrounding rural areas, particularly in the South, Midwest, and West Coast, it is clear that no geographic area will continue to remain unaffected.

Surgeries that would previously have offered valuable training experiences for residents and fellows have been postponed or canceled on the recommendation of the American College of Surgeons.<sup>3,4</sup> Clinics have been either completely shut down or drastically cut to allow for social distancing and appropriate cleaning between patients. There was a slight return to normal in the summer months, but now as cases again surge with another wave of COVID-19, the future remains uncertain. Surgeons are wearing personal protective equipment for patient encounters. In hospital systems with an increased systemic burden of COVID-19, residents and fellows have been asked to cover services and units not typical for their level of training and specialty. Often, this coverage is done on a rotating platform, or a platoon system, that attempts to minimize infection and transmission of COVID-19 among health care providers. Clinics that continue to see patients are being asked to increase their utilization of telehealth visits, on recommendation of the CDC.<sup>7</sup>

The current study demonstrates that education of fellows is changing as well. A greater emphasis for skills training will be placed on virtual simulators and models versus fresh-tissue training. This is concerning for orthopaedic sports medicine fellowships because of the sheer number of arthroscopic and open techniques and implant systems, ranging from pediatric knee to adult shoulder. Live surgery was never able to be replaced by cadaveric or virtual training skills, but as a society we may need to develop virtual strategies to allow trainees to develop basic skills to maximize their live surgery experiences. While there is some debate in the literature on the degree of transferability of

TABLE 4

The Most Up-to-Date Recommendations From the ACS, ACGME, and CDC as They Relate to Orthopaedic Surgical Practices<sup>a</sup>

Publication (Governing Body)	Key Items
<p>COVID-19: Recommendations for Management of Elective Surgical Procedures (ACS)<sup>4</sup></p>	<ul style="list-style-type: none"> <li>• Each hospital, health system, and surgeon should thoughtfully review all scheduled elective procedures with a plan to minimize, postpone, or cancel electively scheduled operations, endoscopies, or other invasive procedures until we have passed the predicted inflection point in the exposure graph and can be confident that our health care infrastructure can support a potentially rapid and overwhelming uptick in critical patient care needs.</li> <li>• Immediately minimize use of essential items needed to care for patients including but not limited to ICU beds, personal protective equipment, terminal cleaning supplies, and ventilators. There are many asymptomatic patients who are, nevertheless, shedding virus and are unwittingly exposing other inpatients, outpatients, and health care providers to the risk of contracting COVID-19.</li> <li>• Inpatient facilities: shift elective urgent inpatient diagnostic and surgical procedures to outpatient settings, when feasible.</li> </ul>
<p>COVID-19: Guidance for Triage of Non-Emergent Surgical Procedures (ACS)<sup>3</sup></p>	<ul style="list-style-type: none"> <li>• Hospitals and surgery centers should consider their patients' medical needs as well as their logistical capability to meet those needs in real time.</li> <li>• The medical need for a given procedure should be established by a surgeon with direct expertise in the relevant surgical specialty to determine what medical risks will be incurred by case delay.</li> <li>• Logistical feasibility for a given procedure should be determined by administrative personnel with an understanding of hospital and community limitations, taking into consideration facility resources (eg, beds, staff, equipment, supplies) and provider and community safety and well-being.</li> <li>• Case conduct should be determined based on a merger of these assessments using contemporary knowledge of the evolving national, local, and regional conditions, recognizing that marked regional variation may lead to significant differences in regional decision making.</li> <li>• The risk to the patient should include an aggregate assessment of the real risk of proceeding and the real risk of delay including the expectation that a delay of 6-8 wk or more may be required to emerge from an environment in which COVID-19 is less prevalent.</li> </ul>
<p>ACGME Response to COVID-19: Clarification Regarding Telemedicine and ACGME Surveys (ACGME)<sup>2</sup></p>	<p>ACGME has suspended the following activities:</p> <ul style="list-style-type: none"> <li>• Self-study activities including the submission of self-study summaries</li> <li>• All accreditation site visits</li> <li>• All Clinical Learning Environment Review (CLER) program site visits</li> <li>• Resident/fellow and faculty surveys</li> </ul> <p>The visits/case logs of a program's graduates who were on duty during this pandemic (particularly those in their ultimate or penultimate years) will be judiciously evaluated in light of the effect of the pandemic on that program. The program can delineate for the review committee how it was affected by the pandemic in the Major Changes and Other Updates section of the annual update.</p> <p>Update:</p> <ul style="list-style-type: none"> <li>• ACGME will permit residents/fellows to participate in the use of telemedicine to care for patients affected by the pandemic. In no situation will a program be penalized retroactively for appropriate engagement of residents and fellows with appropriate supervision in the use of telemedicine during this crisis.</li> <li>• We want to be clear that those residents and fellows who are capable of providing this service (telemedicine) with indirect supervision available or immediately available are covered under the indirect supervision requirements.</li> </ul>
<p>Healthcare Facilities: Managing Operations During the COVID-19 Pandemic (CDC)<sup>7</sup></p>	<p>Telehealth services should be optimized, when available and appropriate. The federal government has made telehealth services easier to implement and access. CDC considers that telehealth could be used to deliver the following:</p> <ul style="list-style-type: none"> <li>• Provide urgent care for non-COVID conditions, identify higher acuity care needs, and refer patients as appropriate</li> <li>• Participate in physical therapy, occupational therapy, and other modalities as a hybrid approach to in-person care for optimal health</li> </ul> <p>Outpatient facilities and ambulatory care practices:</p> <ul style="list-style-type: none"> <li>• Contact patients who may have an increased risk of severe illness from COVID-19-related complications to ensure they are adhering to current medications and therapeutic regimens, confirm they have access to sufficient medication refills, and instruct them to notify their provider by telephone if they become ill.</li> <li>• Ask patients with symptoms who require an in-person visit to call before they leave home so staff are ready to receive them using appropriate infection control practices and personal protective equipment.</li> <li>• Do not penalize patients for canceling or missing appointments because they are ill.</li> </ul>

(continued)



Table 4 (continued)

Publication (Governing Body)	Key Items
	<ul style="list-style-type: none"> <li>• Place visual alerts, such as signs and posters in appropriate languages, at entrances and in strategic places providing instructions on hand hygiene, respiratory hygiene (including the use of cloth face coverings), and cough etiquette (Stop the Spread of Germs).</li> <li>• Set up waiting rooms to allow patients to be at least 6 ft apart. If your facility does not have a waiting area, then use partitions or signs to create designated areas or waiting lines.</li> <li>• Reduce crowding in waiting rooms by asking patients to remain outside (eg, stay in their vehicles or in a designated outdoor waiting area), if feasible, until they are called into the facility for their appointment. Another option is to set up triage booths to screen patients safely.</li> </ul>

<sup>a</sup>ACGME, Accreditation Council for Graduate Medical Education; ACS, American College of Surgeons; CDC, Centers for Disease Control and Prevention; COVID-19, SARS-COV-2; ICU, intensive care unit.

skills acquired in haptics trainers and dry simulators to cadaveric and live arthroscopy, the continued advances in simulation may become more valuable as the technology advances.<sup>5,6,13</sup> Additionally, because of the need for social distancing, regular didactic sessions are now being held remotely via a virtual platform or not at all. In-person meetings have been the staple of medical education. They offer the opportunity to discuss topics and difficult cases and to engage with and learn from each other. The challenge with in-person meetings is getting everyone on the same schedule in the same place. This limits participation to those in close proximity. However, with the rapid increase in the use and familiarity of virtual platforms during COVID-19, such as Zoom (Zoom Video Communications, Inc), WebEx (Cisco Systems, Inc), and Microsoft Teams (Microsoft Corp), within the general population, this presents a unique opportunity. Individuals can be in separate locations but continue to engage with one another and learn from each other. In the current study, 83.7% (n = 31) of programs plan to incorporate virtual didactics and meetings into their regular programming. During COVID-19, several training programs utilized a multi-institutional conference to garner outside expertise and expand the learning opportunities for their trainees. Additionally, many societies including the AOSSM are expanding their live virtual course offerings. Virtual meetings may not fully replace the live, in-person interaction, but they can expand the educational network.

### Telehealth and Sports

On March 18, 2020, the ACGME revised the Common Program Requirements to allow for earlier implementation of both resident and fellow telehealth visits, with either direct supervision or the availability of immediate supervision.<sup>2</sup> This revision was initially set to begin on July 1, 2020, but was pushed up in an attempt to decrease risk to clinical staff from in-person visits. In June 2020, the CDC updated its recommendations for the utilization of telehealth for clinical practice.<sup>7</sup> The utilization of telehealth visits has now been recommended to include outpatient physical therapy and occupational therapy. As sports surgeons, much of our clinical decision making for patients after

surgical intervention is based on objective information including strength, range of motion, and muscular recruitment, all of which are difficult to ascertain without an in-person examination. Finer points of the sports physical examination, such as performing the Lachman technique properly, picking out a positive Lachman test in the face of a bucket-handle meniscal tear, and noting subtle laxity on a thorough shoulder or ankle examination, cannot be adequately taught over web conferences or through telemedicine visits and require repetitions on human patients. Studies have found that in the postoperative setting, telehealth visits may be comparable with in-person visits for range of motion, wound checks, and nerve-related symptoms and, in some cases, such as the diagnosis of femoroacetabular impingement syndrome, self-examinations provide some clinical value but cannot replace the standard in-person clinical examinations.<sup>1,8-10,12</sup> However, the literature on validated self-examinations and larger clinical outcome studies utilizing these examinations are lacking at this time. Telehealth clinical visits and outpatient therapy represent a unique problem for sports surgeons that is not encountered by many other specialties. Despite its challenges, telehealth is likely here to stay. In the current study, 75% of programs plan to incorporate telehealth into the training of their fellows.

### Sports Coverage

One of the very unique privileges we have as sports medicine providers is the ability to interact and care for athletes, ranging in skill from high school to professional athletes. Learning how to care for these athletes is an incredibly important skill for fellows to develop and hone during fellowship and includes navigating the relationships with trainers, coaches, families, and agents of the athletes. This skill set, in particular, cannot be obtained through observation and virtual learning. In March 2020, all Power Five conferences canceled the remainder of their spring sporting events and tournaments including the National Collegiate Athletic Association basketball championship. Since that time, we have seen dramatic changes in the sporting world including the cancellation and subsequent reinstatement of the college football season, travel restrictions, and daily



COVID-19 testing for the majority of college and professional football programs and medical staff. Professional golf, mixed martial arts, and NASCAR have been competing with no or limited spectator attendance and with significant safety protocols in place. The National Basketball Association returned to play on July 30, with 22 of its 30 teams returning to competition. It is unclear if fellows will be allowed to participate in coverage of these teams or how coverage of these conferences and leagues will unfold in the next year. The inability to participate in live sports coverage during fellowship will have a negative effect on the education of sports medicine fellows—not just on the aspects of sideline management of injuries and sideline emergencies, but also on learning how to interact with the players, athletic trainers, coaches, family, and agents. This will remain a challenge, as teams want to protect their “bubbles” and limit all nonessential personnel, and how best to address change in training remains to be determined.

### Effect on Employment

For fellows about to begin their yearlong training program, job outlook is unknown. Private practices are struggling to remain open, surgical centers are facing more difficult restrictions, and clinical visits are intentionally reduced. As fewer people are participating in athletics (eg, high school sports, adult recreational leagues, skiing, college sports), people are sustaining fewer athletic injuries. Thus, volumes of practices that are able to survive the economic effect of the virus may not have the patient volume to hire a new surgeon. All of these have the potential to negatively affect the ability of future fellows to secure gainful employment after completion of their surgical fellowship. For those fellows completing their training this July, it is unknown how the continued rise in COVID-19 will affect their current contracts and future financial stability; however, a recent report has found that 9% of respondents had job offers withdrawn as a result of the COVID-19 pandemic.<sup>11</sup>

### Current Fellows Perspective

The recent publication by Perrone et al<sup>11</sup> on the perspective of sports medicine fellows to the COVID-19 response showed concordance with this fellowship director survey and provided additional insight. In their survey, over 90% of fellows reported performing fewer than 20 surgical cases since the start of the COVID-19 restrictions on elective surgery until the time of the fellow survey, down from 15 to 11 per week, which may provide some context for programs that believed their fellows may leave without performing at a surgical level commensurate with their fellowship graduation. The responses were similar in regard to redeployment and clinical learning, with 100% of fellows reporting increased utilization of web-based learning and 72% reporting using web-based journal clubs. A concerning outcome found in the study is that the fellows who reported an alteration to their postfellowship career plans expressed significantly increased doubts

concerning readiness for practice, anxiety about their future, increased personal stress, and signs of depression, all of which are significant ramifications of the COVID-19 pandemic that may be underappreciated and inadequately addressed if not identified.<sup>11</sup>

### Limitations

The main limitation of this survey study is the participation among ACGME-accredited orthopaedic sports medicine fellowships: 37 of 90 programs (41%) participated. Although a 41% survey response rate was believed to be acceptable, we were hoping for a higher participation rate from the thought leaders in the world of sports medicine training. We believe this participation rate was driven by both the timing of the survey and the uncertainty of program modifications. The survey was sent to fellowship directors in May, a time when these directors were likely primarily focused on internal administrative duties and an ever-changing landscape of clinical and surgical restrictions. Additionally, as nationally and state-imposed restrictions on health care were changing rapidly during the time of the survey, we believe that many institutions may not have had reliable responses to the questions asked.

Additionally, our survey outlines changes to “traditional” education normally provided to fellows. Conclusions may be inferred that the changes documented in the survey have the potential to result in decreased quality of patient care. This inference is unable to be drawn; we are unable to comment on how these changes in training have affected graduating fellow overall clinical care. Caution should be taken when associating decreased “traditional” training with decreased clinical care. Further studies evaluating milestones or other summative objective evaluations may be helpful in the future.

### Future Innovations

At our institution, we have used this survey to help modify our current fellowship training experience. We currently participate in a virtual weekly indication conference, along with monthly virtual technique presentations given by fellows and residents. Journal clubs have been moved to a virtual platform as well. Skills laboratories have been restricted to a smaller number of trainees. There has been an expanded curriculum and training in telehealth and telehealth coding. Our medical personnel participating in the care of student-athletes receive COVID-19 testing 3 times per week in compliance with the Atlantic Coast Conference guidelines. We continue to have all of our sports fellows participate in a yearlong, formal leadership development program, the Feagin Leadership Program, but this has also been transitioned to virtually based education and meetings for a short period.

### CONCLUSION

It is said that “tough times make strong men [or women],” and we are experiencing those tough times. It is crucial that

we continue to work together to positively influence the educational experience of our fellows and provide them the necessary tools to become successful and compassionate persons while also remaining cognizant of the physical and mental well-being of the trainees. Virtual education and training will play a larger role in the coming year than in the past, and trainees will be expected to utilize telehealth and learn strategies to incorporate it into their future practice. And finally, the biggest challenge will be how to maintain the element of human interaction and connect with our patients and our trainees at a time when social distancing is needed to curb the spread of COVID-19.

## REFERENCES

1. Abel KC, Baldwin K, Chuo J, et al. Can telemedicine be used for adolescent postoperative knee arthroscopy follow-up? *JBJS J Orthop Physician Assist*. 2017;5(4):e26.
2. ACGME response to COVID-19: clarification regarding telemedicine and ACGME surveys. Press release. ACGME; March 20, 2020. Accessed January 10, 2021. <https://acgme.org/Newsroom/Blog/Details/ArticleID/10125/ACGME-Response-to-COVID-19-Clarification-regarding-Telemedicine-and-ACGME-Surveys>
3. COVID-19: guidance for triage of non-emergent surgical procedures. American College of Surgeons. March 17, 2020. Accessed July 18, 2020. <https://www.facs.org/covid-19/clinical-guidance/triage>
4. COVID-19: recommendations for management of elective surgical procedures. American College of Surgeons. March 13, 2020. 2020. Accessed July 18, 2020. <https://www.facs.org/covid-19/clinical-guidance/elective-surgery>
5. Angelo RL, Ryu RK, Pedowitz RA, et al. A proficiency-based progression training curriculum coupled with a model simulator results in the acquisition of a superior arthroscopic Bankart skill set. *Arthroscopy*. 2015;31(10):1854-1871.
6. Butler A, Olson T, Koehler R, Nicandri G. Do the skills acquired by novice surgeons using anatomic dry models transfer effectively to the task of diagnostic knee arthroscopy performed on cadaveric specimens? *J Bone Joint Surg Am*. 2013;95(3):e15(11-18).
7. Healthcare facilities: managing operations during the COVID-19 pandemic. Centers for Disease Control and Prevention. June 9, 2020. Accessed July 18, 2020. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-hcf.html?>
8. Eble SK, Hansen OB, Ellis SJ, Drakos MC. The virtual foot and ankle physical examination. *Foot Ankle Int*. 2020;41(8):1017-1026.
9. Grandizio LC, Foster BK, Klena JC. Telemedicine in hand and upper-extremity surgery. *J Hand Surg Am*. 2020;45(3):239-242.
10. Owusu-Akyaw KA, Hutyra CA, Evanson RJ, Cook CE, Reiman M, Mather RC. Concurrent validity of a patient self-administered examination and a clinical examination for femoroacetabular impingement syndrome. *BMJ Open Sport Exerc Med*. 2019;5(1):e000574.
11. Perrone M, Youssefzadeh K, Serrano B, Limpisvasti O, Banffy M. The impact of COVID-19 on the sports medicine fellowship class of 2020. *Orthop J Sports Med*. 2020;8:232596712093990.
12. Sharareh B, Schwarzkopf R. Effectiveness of telemedical applications in postoperative follow-up after total joint arthroplasty. *J Arthroplasty*. 2014;29(5):918-922.e911.
13. Wang KC, Bernardoni ED, Cotter EJ, et al. Impact of simulation training on diagnostic arthroscopy performance: a randomized controlled trial. *Arthrosc Sports Med Rehabil*. 2019;1(1):e47-e57.