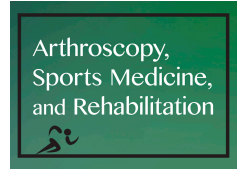


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The COVID-19 Pandemic Increased the Use of Virtual Fellowship Interviews, Reduced Case Volume, and Limited Sideline Coverage Opportunities During Sports Medicine Surgeon Training

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**The COVID-19 Pandemic Increased the Use of Virtual Fellowship Interviews, Reduced Case Volume, and Limited Sideline Coverage Opportunities During Sports Medicine Surgeon Training**

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1     **The COVID-19 Pandemic Increased the Use of Virtual Fellowship Interviews, Reduced**  
2     **Case Volume, and Limited Sideline Coverage Opportunities During Sports Medicine**  
3                     **Surgeon Training**

4  
5     **Abstract:** As one-year orthopaedic sports medicine fellowships heavily rely on elective cases and  
6 sports coverage, the COVID-19 pandemic necessitated fellowship programs to temporarily  
7 transition to virtual mediums for fellow education. Early in the pandemic there was uncertainty as  
8 to how programs would address concerns of trainee readiness, adequate education, and  
9 accompanying psychological impact. However, with a return to pre-pandemic elective procedure  
10 volumes and sideline sports coverage responsibilities, sports medicine fellowships have regained  
11 some of their traditional education opportunities. Moreover, the implementation of novel training  
12 resources including virtual didactics, augmented reality surgical skills labs, and telehealth  
13 medicine training are poised to outlast the current public health crisis and further supplement  
14 fellowship education. This article seeks to report on current evidence-based strategies and  
15 developments across several critical aspects of sports medicine training during the COVID-19  
16 pandemic.

17  
18     **I.     Introduction**

19             The COVID-19 pandemic has led to a dramatic reevaluation and adjustment to maintain  
20 the highest standards of physician training across medical specialties. As one-year orthopaedic  
21 sports medicine fellowships heavily rely on elective cases, programs were relegated to integrating  
22 virtual means of fellow education. While programs with necessary resources have been able to  
23 effectively incorporate alternative modes of education, a recent survey reported that a majority of

24 the sports medicine fellowship class of 2020 agreed that their education was negatively affected,  
25 had doubts of readiness, and experienced increased stress and anxiety related to future professional  
26 endeavors.<sup>1</sup>

27 However, as the COVID-19 pandemic continues to evolve along with the return of normal  
28 case volume, the implementation of previously underutilized resources including virtual didactics,  
29 augmented reality surgical skills labs, and greater utilization of telehealth medicine will serve to  
30 further supplement and improve fellow education (**Table 1**).<sup>2, 3</sup> Although it is unclear how the  
31 COVID-19 pandemic will affect sports medicine fellowship training within the next 3-5 years,  
32 these novel training approaches will likely continue to be incorporated into curriculums moving  
33 forward. This article seeks to report on current evidence-based strategies and developments across  
34 several critical aspects of orthopaedic sports medicine training.

## 36 **II. Changing landscape of the orthopaedic sports medicine fellowship interview**

37 During the 2020-21 and 2021-22 fellowship interview cycles, orthopaedic sports medicine  
38 fellowship interviews have been conducted virtually through various platforms. Although the  
39 future of fellowship interviews remains unclear, there has been considerable debate weighing the  
40 pros and cons of continuing to conduct interviews in this non-traditional manner during subsequent  
41 interview cycles.<sup>4</sup> Historically, fellowship interviews were held in-person at the respective  
42 program site and varied from half-day to full-day interview schedules.<sup>5</sup> However, along with an  
43 estimated 90-95% of orthopaedic surgery residents pursuing fellowship positions, increasing  
44 concerns have been raised regarding the financial and educational impact of attending in-person  
45 interviews.<sup>6-8</sup> On the financial side, the overall cost per applicant of in-person interview-related  
46 expenses is estimated to be \$5,875 per interview season.<sup>9, 10</sup> In addition to the time and cost it takes

47 to travel to on-site interviews, previous studies demonstrated concern among 62% of program  
48 directors regarding the time away from medical training and its impact on hospital workflow.<sup>7,9</sup>

49         The past two fellowship interview cycles have further magnified these concerns, as virtual  
50 interviews demonstrated greater than \$5,000 in savings for applicants and over \$2,500 in savings  
51 for programs.<sup>11</sup> Further advantages for fellowship programs were highlighted by a survey  
52 following the 2020-2021 application cycle, including a greater number of interview days offered  
53 (18% of programs), more interviewees per interview (53%), and a greater ability for applicants to  
54 attend more interviews (80%).<sup>11</sup> Conversely, 58% of program directors (PDs) agreed/strongly  
55 agreed that virtual interviews negatively impacted a personal connection with applicants,  
56 compared to 43% of applicants who agreed/strongly agreed that virtual interviews negatively  
57 affected their personal connection to the program.<sup>11</sup> Ultimately, the 2020-2021 application cycle  
58 led to a 92% match rate and 93% of orthopaedic sports medicine fellowship positions filled, with  
59 only 29% of respondents reporting that virtual interviews negatively affected their ability to match  
60 at their desired program. Overall, concurrent with other orthopaedic subspecialty surveys, PDs and  
61 applicants favored virtual interviews, which suggests that virtual interviews may continue to play  
62 a role in future application cycles.<sup>12</sup> However, it has been suggested that virtual interviews should  
63 improve on providing a better overview of the program facilities, educational opportunities, more  
64 interaction with faculty and current fellows, and strategies to improve avenues for personal  
65 connections between the applicants and programs.<sup>13</sup> To address these issues, it has been proposed  
66 that PDs may consider hybrid interviews where applicants are offered the option of either a virtual  
67 or in-person interview, or alternatively for PDs to perform interviews at a neutral site (such as the  
68 American Academy of Orthopaedic Surgeons [AAOS] Annual Meeting) that allows applicants to  
69 hold in-person interviews with all prospective programs.<sup>13</sup>

70 Orthopaedic sports medicine fellowships remain highly competitive. Prior to the COVID-  
71 19 pandemic, a survey of 57 fellowship PDs found that the most important criteria for a successful  
72 match for both programs and applicants included quality of the interview, letter of  
73 recommendations, the strength of the applicant's residency program, research experience, and  
74 personal connections.<sup>14, 15</sup> In the current state of virtual interviews, it has been suggested that the  
75 greatest detriment to virtual interviews is the reciprocal lack of a quality holistic assessment,  
76 potentially leading to decreased confidence in assessing one's 'fit' for a particular program.<sup>4</sup> As a  
77 result, relationships, research productivity, strength of letters of recommendation, and residency  
78 program reputation may carry more weight than the quality of the interview for PDs for future  
79 application cycles.<sup>13</sup> The practice of "pipelining" at top fellowship programs may further worsen  
80 the chances for certain qualified applicants from residency programs without an established  
81 reputation, as these applicants are unable to "prove themselves" during an in-person interview.<sup>16</sup>  
82 Ultimately, future surveys and longitudinal investigations are needed to determine if the current  
83 perceptions of virtual interviews withstand over time, and whether return to traditional or  
84 alternative interview processes are necessary.

85

### 86 **III. Impact of COVID-19 on sports medicine fellow operating experience and case volume**

87 In the wake of the COVID-19 pandemic, greater attention has been given to its potential  
88 short- and long-term effects on post-graduate medical and surgical training. In March 2020, the  
89 US Surgeon General recommended a delay of all elective and nonessential medical and surgical  
90 procedures to reduce disease transmission and conserve medical supplies and personal protective  
91 equipment to treat the critically ill. Shortly after that, the American College of Surgeons and AAOS  
92 published recommendations for optimal management and triage of elective, non-emergent surgical

93 procedures.<sup>17, 18</sup> In orthopaedic sports medicine, a specialty in which most surgical procedures are  
94 considered elective, these new guidelines had considerable effects on the case volume of fellows  
95 who rely on repetitive surgical exposure in their final year of preparation for independent  
96 practice.<sup>18, 19</sup>

97         Due to the recent and ongoing nature of the COVID-19 pandemic, few studies have been  
98 able to provide quantitative data regarding the true impact of the pandemic on the case volume of  
99 orthopaedic sports medicine fellows. In a survey of 101 orthopaedic sports medicine fellows  
100 conducted in April 2020, nearly all (98/101, 97.0%) reported that their fellowship programs  
101 enacted policies to limit case or clinic volumes, with 72.3% reporting implementation between  
102 March 11 and March 20, 2020.<sup>1</sup> Although only 19.8% of fellows experienced a complete  
103 suspension of surgical procedures, 76.2% reported they were still assisting in urgent or emergent  
104 cases. Most (47.5%) sports medicine fellows had a typical weekly caseload of 11 to 15 cases prior  
105 to the COVID-19 pandemic; however, over 90% reported having performed fewer than 20 cases  
106 since implementing restrictions on performing elective procedures to the time of the survey in  
107 April 2020. Considering these drastic decreases in case volumes, programs have widely embraced  
108 web-based educational experiences in the form of fellowship- or industry-sponsored didactics and  
109 remote journal clubs, and some even offered fellowship extensions to the 2019-2020 class.<sup>1</sup>  
110 Remote journal clubs allow fellows to engage in discussions with faculty across the world on the  
111 most recent advancements in the field of orthopaedic surgery, increase their exposure to novel  
112 surgical techniques, and instill career-long habits of staying up-to-date on orthopaedic literature.<sup>20</sup>  
113 Although it is impossible to recreate operative experiences in a remote setting, industry-sponsored  
114 didactics may allow fellows to engage with expert speakers and learn more about medical devices  
115 available to them in their operating rooms when starting practice.

116 In a 2022 study conducted by Heaps et al,<sup>21</sup> 190 PDs of accredited orthopaedic surgery  
117 fellowships across the United States were surveyed in October 2020 regarding their perceptions of  
118 how the COVID-19 pandemic impacted the education of the 2019-2020 fellowship class and its  
119 potential effects on programs in the future. Although this decrease in surgical case volume and in-  
120 person educational experiences appeared daunting at first, it was reported that most fellowship  
121 PDs believed that there would be no negative impact on the level of patient care provided by  
122 fellows once they entered practice over the next three to five years.<sup>21</sup> Another encouraging finding  
123 identified in this study was that 86% of PDs reported learning new ways to educate fellows, and  
124 68.3% felt that their fellows were better trained in virtual medicine and telehealth consultations  
125 because of these pandemic-related educational changes. As the volume of elective procedures  
126 begins to return to pre-pandemic levels, future studies should aim to report on which supplemental  
127 educational opportunities continue as a mainstay in orthopaedic sports medicine fellowship  
128 training and the rate of return to pre-pandemic fellow case volumes.

129

#### 130 **IV. Sideline coverage during the COVID-19 pandemic**

131 It is also important to consider how lost opportunities outside of the operating room due to  
132 COVID-19 may negatively impact sports medicine fellowship training. One of the unique  
133 experiences of sports medicine coverage is the opportunity to interact and care for athletes at all  
134 skill levels. Learning how to effectively care for these athletes and develop relationships with their  
135 coaches, athletic trainers, and families is a crucial skillset that is further developed during this  
136 period of a fellow's training.<sup>22</sup> However, after the widespread cancellation of organized sporting  
137 events in Spring 2020 across the high school to professional level, fellows lost the opportunity to  
138 hone such skills that are impossible to obtain through observation and remote learning.<sup>23</sup> In a 2021



139 survey of 90 sports medicine fellows in the United States and Canada, nearly half identified these  
140 missed sports coverage opportunities as the greatest loss to their fellowship education.<sup>24</sup> In the  
141 same survey, 100% of respondents indicated that they had abundant or adequate exposure to sports  
142 coverage prior to the pandemic, but only 7.7% responded similarly following the implementation  
143 of COVID-19 restrictions. With athletes returning to full participation for their respective seasons  
144 with limited nonessential personnel, it is critical that sports medicine fellowship program directors  
145 definitively address these changes in training to limit their impact on the future careers of their  
146 fellows.

147

#### 148 **V. Traveling fellowship opportunities**

149 Orthopaedic surgery traveling fellowships are designed to foster leadership development  
150 among early-career surgeons by providing opportunities for academic, clinical, and cultural  
151 exchange. Over the course of these fellowships, surgeons visit multiple domestic and international  
152 sites to network with regional orthopaedic experts, observe in the operating room, interact with  
153 patients, and engage in scientific endeavors and case discussions. Traveling fellowships have been  
154 shown to substantially impact future career trajectory, with graduating fellows frequently receiving  
155 research grant funding, prestigious academic appointments, and high-ranking society leadership  
156 positions.<sup>25</sup> The importance of such programs becomes even more apparent when considering the  
157 limited scope of leadership development opportunities available for young surgeons in the early  
158 phases of their careers.<sup>26, 27</sup> In the wake of the COVID-19 pandemic, some of the most prestigious  
159 traveling fellowships were either cancelled or delayed for the 2020-2021 cycle, including those  
160 organized by the American Orthopaedic Society for Sports Medicine (AOSSM), the American  
161 Orthopaedic Association (AOA), and the Arthroscopy Association of North America (AANA).

162 Although many of the accepted traveling fellows were able to participate in these programs the  
163 following year, and these changes are largely limited to the 2020-2021 fellowship class, this  
164 resulted in a delay of training at a particularly tumultuous time in the careers of these young  
165 orthopaedic surgeons. Future reports may consider discussing the implications of these delays in  
166 surgeon training and their effects on the availability of positions for subsequent years. It is  
167 important to acknowledge the limitations of this article in that the impacts of COVID-19 have  
168 begun to normalize, as fellow case volumes and traveling fellowship opportunities return to their  
169 pre-pandemic levels. Although sideline sports medicine coverage has been reinstated at the high  
170 school and collegiate levels, on field professional team coverage opportunities remain severely  
171 limited for current fellows when compared to those available prior to COVID-19.

172

## 173 **VI. Conclusion**

174 Although the COVID-19 pandemic presented novel challenges in the training of  
175 orthopaedic sports medicine surgeons, fellows and program directors have adapted and established  
176 new standards of medical education that are positioned to outlast the current public health crisis.  
177 Sports medicine fellowship interviews were conducted exclusively remotely for two cycles  
178 following the beginning of the pandemic and programs have widely embraced web-based didactics  
179 to supplement fellow education. Sports medicine fellows experienced a drastic decrease in total  
180 case volume as well as opportunities for sideline team sports coverage. The cancellation of  
181 traveling fellowships also severely limited the number of available opportunities for professional  
182 leadership development that are crucial for newly practicing orthopaedic sports medicine surgeons.

183

184

185 **Tables**

Aspects of training affected by COVID-19 pandemic	Strategies to minimize training disruption
Loss of in-person fellowship interviews and visits; Missed opportunities to assess “fit” for applicants and program	Virtual interviews conducted via web-based conferencing platforms; Online social events and facility video tours
Cancellation of elective orthopaedic surgical procedures; Considerably decreased fellow case volume and operating time	Web-based fellowship and industry-sponsored didactics; Online journal clubs; Virtual reality surgical skills lab training
Sideline sports coverage opportunities from the high school to professional level; Interactions with players, coaches, and agents	Team physician-led case discussions; Fellow sideline telemedicine training for injury evaluations and potential consults with athletes and trainers
Postponed traveling fellowships and leadership development initiatives for practicing orthopaedic sports medicine physicians	Accepted fellows allowed to participate in traveling fellowships the following year; Online leadership lectures and forums

186  
187 **Table 1.** Orthopaedic sports medicine fellowship training opportunities affected by the COVID-  
188 19 pandemic and strategies implemented by program directors to minimize the disruptions.  
189

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