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# A survey into the patterns of shifting clinical and academic activity of orthopedic residents during the COVID-19 epidemic

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## Abstract

**Background:** The orthopedic residency training programs have faced an extraordinary challenge in adapting to a web-based learning environment and simulation-based instruction as a result of the COVID-19 pandemic. The emphasis of this study is on the orthopedic residents' perspectives on the paradigm change in clinical treatment and academic activities.

**Materials and Methods:** One hundred and fourteen orthopedic residents at seven tertiary care facilities were sent an anonymous survey created in an online survey generator through email. The questionnaire was broken down into three sections: clinical activity, mental health, and academic activity. There were a total of 44 single-answer questions, and the answers were arranged in order of increasing difficulty from the former circumstance (before the COVID-19 epidemic) to the current situation.

**Results:** 54 junior residents (67.5%) and 26 senior residents (32.5%) completed a total of 79 surveys. A quarantine was imposed on 25 residents (31%) and two tested positive for COVID-19. Even though they were all aware of the need for safety precautions, getting access to personal protective equipment could be challenging at times. There was a noticeable increase in the difficulty of finding new patients for study (48.9%) and conducting prospective research (48.7%). Most locals said that learning through the internet was simpler (44.2%) than learning in person. According to the majority of the residents, routine clinical work in the operating room, outpatient department, and inpatient department was challenging in addition to their fear of getting sick.

**Conclusion:** The results of this study can assist institutions and program chairs in developing a strong program that can outlive this epidemic. There are special chances for residency program enhancement during these times of uncertainty. Long-term integration of the web-based learning process into the resident training program may show to be beneficial.

**Keywords:** COVID-19, Personal equipment, Residency

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## Introduction

The global COVID-19 (coronavirus disease 2019) pandemic has emerged as the biggest concern now facing the healthcare sector. Within days of the first case being reported, the disease spread across the entire nation (1). Since April 2020, all elective surgeries have been postponed in the majority of hospitals due to a shortage of healthcare staff. Orthopedic residents have been front-line fighters in this conflict against the coronavirus pandemic from the start, much like other specialties (2). Residents have been assigned to COVID-19 screening outpatient departments, intensive care departments, inpatient departments, and telemedicine facilities at various locations across the world in response to the sharp decline in the number of elective orthopedic procedures (3). They have been used by splitting them into teams, with one team assigned to care for COVID-19 patients and the other teams assigned to orthopedic duties or quarantine. Residents' learning processes have undergone a paradigm change from problem-based learning to virtual web-based learning (4). There has been an increase in instructional meetings and webinars held on various digital platforms. Teams of orthopedic residents have either been placed under standard quarantine or after coming into contact with some COVID-19-positive patients. During this time, a few orthopedic residents have also taken part in other types of exams, such as the junior residency end-of-term exam. There are currently a few specific studies that concentrate on the resident's comments on these significant modifications to the regular clinical and academic activities. According to the current pandemic condition, the resident's perspective can help to improve the curriculum of orthopedic residency programs worldwide. This study intends to emphasize the experiences orthopedic residents had while performing both orthopedic and non-orthopedic activities in the workplace today. It also hopes to shed light on the residents' mental health as they deal with this demanding work environment, a topic that has not yet been examined.

## Materials and Methods

One hundred and fourteen anonymous questionnaires were emailed to orthopedic patients at three tertiary care facilities as part of an online study. 79 completed surveys (78.4%) were obtained from this group. There were three sections in the questionnaire: one for academic activities, one for mental health, and one for clinical activity (see Tables 1 and 2). The subsections for online academic activities, research, and examinations made up the academic activity section. Between this time and that in various centers, the majority of the residents received final evaluations. Questions with multiple choices were used to evaluate the cognitive domain. Case studies using standardized patients and objective structured clinical/practical examinations (OSCE/OSPE) were used to test the affective and psychomotor domains. The corresponding sections were created to help readers understand the residents' perspectives on the revised curriculum and clinical assignments. All participants had to provide general information regarding their age, current affiliation, their experience treating COVID-19-positive patients, their knowledge of safety precautions while working in COVID-19 designated areas, including how to put on and take off personal protective equipment (PPE), their history of quarantine or taking COVID-19 tests, and whether or not anyone in their family had tested positive for the infection. All participants were instructed to give a single response to each question, if at all feasible, and to disregard any questions they felt were inappropriate to answer. According to the questions' current, growing complexity compared to a former time before the COVID-19 epidemic, the responses were the same. The study covered all junior or senior orthopedic residents who were employed in the current environments. Ten residents who met the inclusion requirements participated in a pilot study to evaluate the questionnaires' readability, acceptability, and comprehension. On a Likert scale of 1 to 5, each question was evaluated for suitability (1 being unsuitable to 5 being highly suited). Each question's missing answers were evaluated as well. The study's objective was to determine the highest proportion of responses for each question indicating the current level of difficulty of that work.

**Table 1:** The questionnaire (academic activity section and mental health section)

| | **Very difficult** | **Very easy** |
|---|---|---|
| **Academic activity section** | | |
| 1. Examination | | |
| interplay with the examiners | | |
| Working with patients | | |
| Online viva voce using an interface | | |
| Exam room environment | | |
| Multiple-choice questions on the theory test | | |
| A complete blueprint for OSCE/OSPE | | |
| 2. Research | | |
| Bringing in new participants for the study | | |
| Carrying out a prospective study | | |
| Carrying out retrospective analysis using the data at hand | | |
| Making time to conduct research | | |
| Obtaining publication of a study | | |
| 3. Online learning initiatives | | |
| Organizing the study time | | |
| Getting ready for a school assignment | | |
| Interaction with the public | | |
| Keep the audience's attention span intact | | |
| Any improvement in a presenter's knowledge | | |
| Technical difficulties with an online conference | | |
| The case scenario's quality | | |
| General education through online platforms | | |
| **The section on mental health** | | |
| Spending time when being alone | | |
| Pursuing hospital work that is not orthopaedic | | |
| Organizing your own time | | |
| Interaction with others | | |

**Table 2:** The questionnaire (clinical activity section)

| | Very difficult | | | | Very easy |
|---|---|---|---|---|---|
| **Clinical activity section** | | | | | |
| 1. Performing surgical procedures | | | | | |
| A patient's pre-operative preparation | | | | | |
| before surgery | | | | | |
| Setting up the appropriate implant | | | | | |
| Arranging a time for surgery | | | | | |
| Possibilities for education in operating rooms | | | | | |
| gaining practical experience in surgery | | | | | |
| Availability of PPE | | | | | |
| Managing concerns regarding COVID-19 infection | | | | | |
| 2. The outpatient department and emergency room | | | | | |
| Managing the patient load | | | | | |
| Patient examination | | | | | |
| Services for dressing and plaster rooms | | | | | |
| Radiological and laboratory tests are sent | | | | | |
| investigations | | | | | |
| Getting a professional opinion | | | | | |
| Availability of PPE | | | | | |
| Managing concerns regarding COVID-19 infection | | | | | |
| 3. A hospital ward | | | | | |
| Monitoring of the admitted patient | | | | | |
| Radiological and laboratory tests are sent for | | | | | |
| investigations | | | | | |
| Availability of suitable medication | | | | | |
| Getting testimonials from different sections | | | | | |
| Availability of PPE | | | | | |
| Co-operation from staff and fellow tenants | | | | | |
| Managing concerns regarding COVID-19 infection | | | | | |

The survey was made using an online survey maker, and the data was then exported to Microsoft Excel 2016 Excel sheets for additional analysis. For each of the 44 questions, the percentage of respondents to each answer was recorded. The mean and standard deviation were used to express all quantitative variables. The IBM SPSS version 26.0 was used to conduct the statistical analysis.

## Results

Participants' age was 27.8 ±4.3 on average. 26 senior residents (32.5%) and 54 junior residents (67.5%) were present. All of the residents had been assigned to COVID-19 patient care areas and were familiar with all safety precautions, including how to put on and take off PPE. However, quarantine was imposed on 25 residents (or 31%) as a result of contact with a COVID-19-positive patient. 29 residents all had their COVID-19 checked for a variety of reasons, and three of them obtained positive results. 67 residents (83.7%) completed the questionnaire in its entirety, while 9 residents (11.2%) skipped the exam-related questions in the academic activities area, and 4 residents (5%) left the research questions unanswered. Most participants (97.27%) in the pilot study responded to all of the questions. According to the Likert scale, the average score was 3.85 ±0.5.

Academic activity section

The majority of inhabitants (44.2%) thought that learning in general was simpler than before because of web-based platforms. However, the majority of locals believed that taking part in an online case presentation (55.3%) and keeping the audience's attention during any online presentation (63.8%) were more challenging than offline activities.

The majority of the residents found it challenging to conduct prospective research (48.7%) and recruit new patients (48.9%) in the current environment. Multiple-choice questions (MCQ) and the Objective Structured Clinical and Practical Examination (OSCE/OSPE) did not provide any issues for the majority of the residents (47.8% and 45.6%, respectively), despite there being challenges with a fully online interface-based viva voce (45.8%).

Mental health section

The majority of residents thought it was challenging (40.4%) to spend time in quarantine, (59.5%) to complete non-orthopedic hospital tasks, and (48.9%), to interact with others.

Clinical activity section

In the operating room (46.8%), outpatient department (OPD) (38.3%), and inpatient department (IPD) (38.3%), PPE was difficult to get. Working in the OR was found to be the most challenging clinical activity. Also noted as being more challenging than before was the clinical assessment of patients (68.1%), working in the dressing and plaster room (53.2%), and sending laboratory or radiological investigations to the OPD (55.3%). In IPD, OR, and OPD, respectively, 51.3%, 53.2%, and 56.3% of the residents were found to be dealing with anxiety related to COVID-19 infection.

## Discussion

The primary finding of the current study was that during the COVID-19 pandemic, orthopedic residents encountered challenges when completing standard OR, OPD, and IPD tasks. Due to heightened fear of catching the illness and difficulty passing time alone without associating with people, the current scenario has put residents' mental health at risk. It has been suggested that orthopedic surgeons stand up as role models in these times, both in clinical and medical education activities, even though orthopedic residency training has been significantly impacted by the current circumstances (5). The managers of residency programs had to come up with ways to continue providing high-quality, doable clinical care and medical education in these circumstances with little to no supervision. However, there isn't enough information in the literature about orthopedic residents' opinions of these adjustments and their long-term viability. One of the earliest studies to be published in the literature, this one focuses on the opinions and responses of orthopedic residents to the paradigm shift in clinical treatment and academic activities.

Crises like this offer educators the chance to change the way residents are trained. With the use of video conferencing and e-learning platforms, more seminars and didactic lectures are being delivered online these days, signaling the shift of medical education into a more digital structure (6). In the future, online platforms may be more effective than offline activities because most study participants believed that learning in general on the web was simple. Similar to this, faculty-intervened procedural learning instructional videos are a revolutionary step forward in responding to resident inquiries. It has been up to the program director to come up with creative ways to carry out medical education in cooperation with the academic wing of the hospitals in the lack of general rules from universities. Residents had found it challenging to carry out a prospective research study during these times due to a dramatic decline in patients visiting hospitals with orthopedic issues. Additionally, enrolling new patients or keeping track of them could endanger the patients and put them at risk of getting sick when visiting the hospital. The future may lie in telephonic consultation and follow-up.

A lot of nations now employ standardized patients for exams and OSCE/OSPE as a method of resident assessment in their curricula (7). There is no conceptual framework in the literature for formulating common OSCE/OSPE queries (8). Furthermore, it is unclear if passing the OSCE or OSPE qualifies as exhibiting competent clinical judgment. The final-year residents were able to finish their junior residency within the allotted period, although the majority of residents found it more difficult to adjust to the online-based exam and its resulting difficulty in interaction with examiners and standardized patients.

The residents were expected to manage urgent orthopedic cases during the pandemic and fill the gap in COVID-19 healthcare. This study found that the majority of routine clinical activity-related tasks have been harder throughout the epidemic. This conclusion may be explained by the fact that many healthcare professionals have had their attention diverted from providing basic care to managing COVID-19 (9). The capacity to manage the patient volume, which was regarded as easy because of the decrease in orthopedic patients during this time, stands out as an exception to this conclusion. The occupants were divided into three teams, which is another element that contributes to the same. A third team was put on standby in case one of the aforementioned teams needed to be isolated due to exposure. There was one team each for COVID-19 care and emergency orthopedic cases. Despite the infection's well-known highly contagious nature, a sizable portion of respondents reported difficulty locating PPE near their workstations. This resulted in more worry, as seen in this study, of collecting COVID-19 while going about their daily business. The ongoing revision of policies for the treatment and prevention of COVID-19 has also heightened this fear.

The focus is on the residents' mental health because it is still unclear how long this epidemic will endure and how long the orthopedic residents will be required to care for non-orthopedic patients (4). The majority of the study's participants understood the risks of infection at work and the need for separation and quarantine. Virtual social hours with the faculty and residents can be organized using online platforms to engage in themes other than medical education during these unusual times of social distance and less frequent face-to-face connection. The occupants' anxiety and tension are reduced by initiatives to improve interpersonal communication (lower interpersonal isolation) (10).

The fact that this study's conclusions are based solely on the opinions of orthopedic residents from one nation means that they cannot necessarily be generalized to other nations around the world. Other nations might have various infrastructures for their healthcare systems and resident training programs. This study has attempted to give a glimpse of the feedback from the orthopedic residents regarding early strategies used after the cancellation of routine clinical and medical education services, but it is also constrained by the rapidly evolving strategies in public health and medical education. The effectiveness of current tactics compared to earlier standard protocols is difficult to measure.

The global residency training programs need to be drastically altered because the pandemic's outcome is yet unknown. The results of this study may clarify the decision-making process. While ensuring the residents' optimum safety and psychological support, a focus must be placed on web-based learning, simulation-based surgical procedures, and telemedicine patient consultations. Better patient care will result from accepting these adjustments as well.

## Conclusions

To sum up, this pandemic poses a challenge for program chairs to come up with workable and efficient clinical care and medical education solutions. The results of this study can assist institutions and program chairs in developing a strong program that can outlive this epidemic. There are special chances for residency program enhancement during these times of uncertainty. Long-term integration of the web-based learning process into the resident training program may show to be beneficial. The residents must sense their safety and care for any of these tactics to be effective. The orthopedic education community will be better able to meet the problems posed by this pandemic by accepting feedback from the residents.

**Declaration of interest:**

The authors report no conflicts of interest.

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**Ethical approval:**

This study was conducted in accordance with the latest version of the Declaration of Helsinki.

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**Data availability**

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

**Contributions**

Research concept and design: **HH**
Data analysis and interpretation: **HH**
Collection and/or assembly of data: **HH**
Writing the article: **HH**
Critical revision of the article: **HH**
Final approval of the article: **HH**

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