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ORIGINAL RESEARCH

Pulmonary and Critical Care Medicine Trainees' Educational Experiences and Well-Being During the COVID-19 Pandemic

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Purpose: We conducted a quality improvement study to gain insight into how the COVID-19 pandemic affected the education of trainees in pulmonary and critical care medicine (PCCM). We also sought to understand the experiences of fellows to better prepare for future pandemics.

Methods: We sent an electronic survey to fellows of an academic PCCM program and used data from the electronic survey to design semi-structured interviews for a qualitative study.

Results: Three themes were generated, centred on the emotional burden and physical demand, friendship, and education. Favourable aspects included the organizational response to the pandemic, particularly in terms of communication, personal protective equipment, and an emphasis on teamwork. Fellows became proficient in critical care procedures. The need for a trainees' respite area was emphasized. Other areas of concern included the lack of leadership to facilitate assistance from various services in the ICU and ensuring adequate education in pulmonary medicine, despite the extended demands of critical care.

Conclusion: Participants were dismayed at the lack of support from other services. The shift to virtual lectures resulted in a loss of personal contact and connections, as fellows much preferred in-person sessions. Our results highlight opportunities for learning, fulfillment, and challenges encountered while navigating a pandemic.

Keywords: medical education, physician, fellows, burnout, mental health, qualitative methodology

Introduction

The challenges posed by the COVID-19 pandemic reshaped the landscape of pulmonary and critical care (PCCM) fellowship training. PCCM trainees were unique because, as a group, they experienced higher rates of depression, distress, and burnout before the pandemic.[1] During the pandemic, they were at the forefront of the response. They cared for sicker hospitalized patients for extended periods, facing a greater risk of exposure, a more significant workload, and moral dilemmas while dealing with a continuously changing clinical practice environment. These changes had a substantial impact on the roles, learning experiences, and well-being of PCCM fellows. Prior studies[2–10] investigated the effects of COVID-19 on medical education and well-being; however, few studies have examined the impact on PCCM fellows. For example, Xia et al[11] surveyed interventional radiology (IR) programs and concluded that the COVID-19 pandemic had a significant adverse effect on IR training and employment. However, these conclusions may not apply to PCCM. Additionally, most studies consisted of surveys,[1,4,12,13] while these provided significant findings, questionnaires cannot delve deeply into perspectives and experiences. Moreover, few studies examined the effects of the pandemic from the perspective of the fellowship director (FD), information that could convey fundamental implications for training and education.

We conducted a quality improvement study to investigate the impact of the pandemic on various aspects of training for PCCM fellows from 2020 to 2021. We sought to understand trainees' perceptions of both educational and operational

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factors, as well as their well-being, during the pandemic. We aimed to gain insight into how to support the learning and resilience of trainees in the event of a future pandemic.

Methods

As a quality improvement initiative whose intent was to collect aggregate anonymous data, the Syracuse VA Institutional Review Board exempted this study from full review. Nonetheless, all participants were informed about the purpose of the study and verbal informed consent was acceptable and approved by the IRB. The consent included publication of anonymized responses and direct quotes.

Setting

This research was conducted within an academic university-based PCCM fellowship program, where trainees undergo rotations at three hospitals: a university hospital, a Veterans Affairs (VA) facility, and a private community hospital. Rotations include pulmonary consultative services, outpatient clinics, procedures, and medical intensive care units (ICUs). The university and VA hospitals have a closed medical ICU model, whereas the community hospital maintains an open model. One fellow covers the university and private MICUs at night, while another covers the VA hospital. Notably, all three hospitals are situated within walking distance of one another.

Fourteen PCCM fellows from 2020–2021 participated in the study. Data collection started in January 2022. The analysis began in January 2023 and completed in December 2023.

Online Survey

We developed a handwritten pilot questionnaire and sent it to four fellows not involved in the study to assess the questionnaire before its full deployment. This pretesting identified issues with the questionnaire's clarity, flow, and length, ensuring more accurate and reliable data. Through an iterative process, questions were refined. We then sent an electronic survey to PCCM fellows from 2020 to 2021 (supplementary material). Data were collected and managed using the REDCap electronic data capture tool hosted at SUNY Upstate Medical University. We collected demographics and included questions about program preparedness, satisfaction, communication, rotational changes, and education, which were assessed using yes-and-no questions, a Likert scale, multiple-choice questions, and semi-open-ended questions. No participant was identified in person, and the data are presented as aggregates. We used data from the electronic survey to inform our planning of questions for the interviews.

Qualitative Interviews

We used results from the electronic survey to formulate interview questions. We used pretested questions on four fellows, who provided feedback on the questions, process, and overall flow of the interview. We used these suggestions to modify the interview. We interviewed the fourteen participants whose training coincided with the 2020–2021 COVID-19 pandemic. To gain insight into the program's perspective, we also interviewed the fellowship director.

Participants were informed that their responses would be anonymous, and trainees were allowed to withhold their PGY level or graduation date if they chose to do so. To minimize researcher bias, permission was obtained from the interviewees to record verbatim, anonymized written notes. Interviews were conducted over the phone.

Following published methods in qualitative research, we used a thematic analysis approach to analyze the data.[14]

Results

Online Survey

The mean age of the fellows was 35.5 ± 3.7 years, and 54% of the fellows had at least one child. The vast majority (92%) of the fellows expressed concern about spreading COVID-19 to their families, and 46% said that their personal lives were somewhat affected, while 38% reported that it was significantly affected. Due to the pandemic, 23% of fellows reported increased work hours. Additionally, 70% of fellows noted significant changes in their rotations, primarily in critical care rotations (77%), and over half (54%) believed these changes were voluntary. Over three-quarters (76%) of fellows felt

that their education was impacted by the cancellation of conferences (77%) and remote learning (61%). All the fellows perceived a reduction in non-COVID procedures such as endobronchial ultrasound (EBUS). Although 100% of fellows felt they had adequate support from their program, 61% thought that support from other in-house residency/fellowship programs required improvement.

Thirty-one percent of fellows believed that the hospital was overwhelmed, 23% thought it was unprepared for the pandemic, while only 15% felt it was adequately prepared. Interestingly, 92% of the fellows did not believe that the program placed them at unnecessary risk for COVID-19 exposure, and 31% stated that one or more of their et.al tested positive for COVID-19. The overall fellowship experience was rated as "Very Good" by 31%, "Good" by 31%, and "Poor" by 8%. 58% of fellows were satisfied, 33% were very satisfied, and remarkably, none were dissatisfied with the program.

Semi-Structured Interviews

All trainees were comfortable providing their grade or graduation year despite being allowed to withhold this information.

We analyzed the interviews thematically following the approach initially described by Braun and Clarke[14] and used by others[15,16] Each interview was read and re-read closely by the authors independently so they would become familiar with the material and identify key patterns of meaning within and across transcripts. Similar findings were then grouped to form the initial codes. Using coded excerpts from each of the interviews, broader codes were interpretively analyzed and merged to form early themes. The merged codes and early themes were then re-examined in the context of the previously coded excerpts. Further refining led to the development of the following themes: emotional burden and physical demand, Loneliness and camaraderie, and Education. During this process, the authors met regularly to discuss progress and agree on the final themes. We describe the key themes and findings (Table 1).

Emotional Burden and Physical Demand

The need for a dedicated space became paramount for PCCM fellows during the pandemic, especially at the University Hospital. The fellow room emerged as the only area where fellows could be without personal protective equipment (PPE) and were able to take much-needed breaks, including lunch. Wearing PPE for extended periods in the ICU produced physical discomfort with skin tears and challenges navigating the hospital floors. Due to the critical condition of patients, fellows often had to be in the ICU for prolonged periods. The only permissible space to remove PPE was the fellows' room since fellows hesitated to do so in shared break areas with nursing staff and other ICU staff, fearing potential COVID-19 transmission.

The small size of the break room had not been a concern previously. The size was amplified during the pandemic due to greater demand for space during the crisis. With many shifts spent in the ICU, fellows required more space for breaks and respite. Personal space became indispensable for the trainees working nights, as they needed access to their call rooms. Acknowledging these concerns, the hospital's leadership responded by providing fellows with a larger break room. This adjustment demonstrated a commitment to addressing the unique challenges faced by the PCCM fellows during the pandemic, offering them a safer and more accommodating environment amidst the demanding circumstances they encountered daily.

The interviews revealed that a sense of instability and uncertainty prevailed, making it crucial for PCCM trainees to find safety and support. Initially, all fellows were concerned about the risk of infection. Uncertainty prevailed regarding the availability of PPE and the contagious nature of COVID-19. The anxiety extended beyond the workplace, with fears about spouses and children contracting the virus, amplifying the emotional burden on trainees. One fellow, grappling with the added concern for his pregnant wife, implemented strict precautions. He would change clothes before heading home, leave spare garments in the car, refrain from bringing work shoes indoors, and immediately shower upon arrival at his house. His wife gave birth three months later without complications. As protocols and understanding of the virus evolved, the anxiety about contracting COVID-19 decreased. It became clear that wearing a gown, gloves, and a mask provided adequate protection, gradually easing concerns among the trainees.

Table 1 Themes, Subthemes, Codes, and Related Quotations from Trainees

Theme	Sub-Themes	Codes	Quotations
Emotional Burden and Physical Demand	Safety	Contracting COVID	• I fell ill with an upper respiratory infection for 1 week. COVID-19 testing was slow. It eventually came back negative. • A lot of us were fearful about getting infected initially. No one knew how much protection we needed or how contagious the COVID-19 virus was. • As time went on, there was less anxiety about contracting the disease. Wearing PPE was sufficient.
		Personal Protective Equipment (PPE)	• Do the masks really protect me? Do we have to double mask or double glove? • There was shortage of PPE with gowns, but we always had N95 masks. • At the beginning of the pandemic, we were told to reuse N95 masks and replace them weekly. Near the end of the pandemic, we were able to have a mask daily. • We had paper bags to store our N95 masks so we could reuse them. • If we could not find our type of mask, the nursing staff was usually able to find one for me. • Charge nurses would ask trainees for their N95 mask type and make sure we had enough of a supply. • I had to use a pauper and it made it difficult to hear patients. I did not enjoy wearing it. • I do not recall there being a time where I could not find a mask, gloves, or a gown • Obtaining PPE at the VA was more frustrating. It took a long time to obtain a mask. I had to ask many people. • I did not want to go to the VA because PPE was harder to come by. • There was not much difference in obtaining PPE from the academic university or the private hospital.
	Fear of transmission	Family	• We all have a relative with COVID, some relatives are not in the USA. Thankfully, no one in my immediate family. • Many of us are fearful of giving the disease to our spouse or children. • My wife is currently pregnant and I would change before going home and shower. I had spare clothes in the car, left a pair of shoes in the hospital and car. I did not bring my work shoes into the house. She had the baby three months later without any issues but during that moment I was scared of giving her COVID. • It was difficult to deal with the stress of the pandemic when my family was across the border and I could not visit them. Even when the border opened up, I feared transmission of the disease.
	Burden of caring for critical patients	Death toll	• We were caring for the sickest patients. • People were super sick. • We talked to each other, attendings, family members about how the deaths of patients. • The deaths had become unbearable. • Dealing with all these deaths was stressful; every shift there was so much death. • I am from Nepal, where I have witnessed an earthquake, and still, I have not seen so many people die. • I started to focus on those that survived • I counted wins instead of losses. Those that survived gave staff more encouragement.
		Lack of non-invasive ventilation	• A source of frustration was majority of patients who were hypoxic were intubated due to the concern of aerosolizing the virus • It was exhausting because there were so many patients on vents which means more lines, more sedation, and great number of vent weaning. • I could not help but wonder if using BIPAP or high-flow oxygen would have been less harmful. • If we were intubating a patient and were all gowned up, we would put in a central line and A-line while in the room, whether the patient needed it or not. It was easier than going in out of the COVID patients' rooms.
		Overwhelming Workload	• There were such long days in the ICU. There were days that I could not recall if I sat down. • I would get skin tears on the bridge of my nose from wearing N95 mask for so long. • I think the second year fellows did most of the work and the burden fell on them. The first-year fellows worked very hard in their rotations but they had the least experience. • Third year fellows were three months from graduating and were checked out. • The ICU was bursting out of it's seams
	Work Environment	Cleanliness	• I would wipe down my workstation with a purple top every hour and then became less obsessive as time went on. • It was important to wipe down my computer keyboard
		Physical space	• The fellows' room at the academic hospital was tiny. This was not an issue prior to the pandemic because we did not spend much time there. • During the entire ICU shift, the fellows'room was the only room I felt safe to take off my PPE • Break room was connected to the ICU and all the nurses and respiratory staff would have lunch there and it did not feel safe. • The fellow room was the only place I felt safe to have my lunch. • Thankfully, administration had assigned a larger room after hearing our pleas.
	Emotional Burden	Mental Fortitude	• I was not affected by the stress of the pandemic. My enjoyed hiking and outdoor activities which were thankfully the only thing we could do in the pandemic. • It was hard dealing with stress of work, I could visit my friends or family. We could not do normal things like go out to eat, get a drink together. • It was difficult to deal with the stress of the pandemic when my family was across the border and I could not visit them. Even when the border opened up, I feared transmission of the disease.

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Loneliness and Comradery	Comradery	Colleagues	• We tried to help each other out whenever we could. • The number of procedures in the ICU was overwhelming, it was nice to have helping hands with senior fellows. • If someone needed a schedule change, we would try and accommodate since we are all in the same boat. • We were soldiers in the trenches together. • One fellow was pregnant during the pandemic, and we had to switch our rotations around. Of course, no body wanted to do more ICU, but we did it for our colleague.
		PCCM Faculty	• Attendings came in on nights when needed but, they mainly did call from home. • We had no trouble or issues speaking with our attendings, assistant fellowship directors, or fellowship director. • In that way, the program was very receptive to our feedback or at least give us an opportunity to be heard
	Loneliness	Critical Care Rotations	• 1 fellow per ICU in charge of 25+ patients felt really overwhelming at times. • At night, we were responsible for 50 patients at the academic hospital and another 50 at the private. It was impossible to be in two places at one time. • Attendings came in on nights when needed, but they mainly did call from home. • I felt alone when it came to ICU care
		Too much autonomy	• We had more autonomy because our attendings could not possibly supervise It all. This was especially the case with procedures. • At times, this new autonomy was frustrating when they needed advice or were concerned about making errors
		Trainees from other divisions and departments	• Consulting trainees such as ID and nephrology were busy services but, they were consultants in the ICU. They saw the patient and moved on. They were not consistently in ICU like we were. • Cardiology fellows did not help with any central or A-line placements. In fact, cardiology fellow took home call. They were not in the hospital off-hours. • I understood why cardiology trainees were allowed this. They were not proficient in critical care medicine and putting in lines. Still, it was frustrating, and we could have used the help. • There was a medical ICU patient who was COVID positive and there was concerns that his pacemaker was not capturing. I was told by the cardiology fellow that he will not see a COVID patient. Why was it just us risking our lives? • Surgery's availability to put in central lines was a hit or miss • ENT residents did assist us with tracheostomies

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Table 1 (Continued).

Theme	Sub-Themes	Codes	Quotations
Education	Pulmonary Education	Too much critical care	• All the education was critical care because it was an "all hands on deck situation." • Pulmonary rotations were basically switched to ICU rotations. • Even our pulmonary consults were about COVID, it's like we could not escape it. • For floor COVID patients, I did not understand why they were pulmonary consults. I know the same amount of information about COVID as the hospitalist attending. Even when there was a drug regimen with remdesivir and steroids, we were still getting consults for COVID patients. • These consults were extra work and did not provide any educational value. • I refused to see some of these consults. It's the same thing repeatedly. • A lot of our lectures were about COVID because we were all trying to just have a game plan to take care of these patients • We were dealing with a lot of hypoxic, ventilated COVID patients. So many of the lectures were ARDS, pruning, and reverse ventilation (APRV). • Our pulmonary education suffered. • Third year fellows were comfortable with the pulmonary material but first and second year fellows' pulmonary education was affected. They may have been able to make up for it after the pandemic. • All outpatient pulmonary rotations were cancelled. • There was no bronchoscopies unless they were occurring in the ICU. • We were really worried about our EBUS numbers because they were all canceled. Eventually the endoscopy suite opened up but we were only doing EBUS procedures on cancer patients.
	Critical Care	Procedures & Management	• Good experience with ARDS, ventilator management, and sedation. We became so good at putting in central lines and A lines because everyone needed one. • I was able to put in so many chest tubes. All the ARDS patients that were intubated eventually required chest tubes and become proficient. • We were going into the ICU every day and doing stuff
		Having well-rounded critical care education	• All electives were cancelled. • We do outside electives at an outside hospital for cardiac critical unit and neurology ICU which were cancelled. • I noticed as new attending during the pandemic that some trainees were struggling with basic critical care cases such as diabetic ketoacidosis
	Virtual Learning	Virtual Learning	• Zoom was convenient because we could multitask. • I missed the social aspect of in-person lectures; it was our time to catch up with our attendings and colleagues. • Although we had protected lecture times, it became too difficult to attend while on ICU rotations. I had 25–30 charts to review and vents to manage. It was not feasible to sit and attend lecture in order to be adequately prepared for rounds. • I feel like the participation of the lectures declined with Zoom. I am not sure if it's because I am so easily distracted when it's virtual.

The emotional burden of coping with the substantial number of ICU deaths and the challenging and often distressing nature of dealing with the high mortality rate weighed heavily on the well-being of the trainees. Discussions about these distressing events became commonplace among the trainees—these involved conversations with peers, attendings, and family members. Witnessing numerous patients succumb to COVID-19 added a profound and challenging aspect to their professional experiences, contributing to the overall emotional toll. One trainee who grew up in Nepal likened the death toll in the ICU to the aftermath of an earthquake in Nepal, describing a scene of widespread loss: "There were people dying everywhere, and I have not seen so many people die before."

Although palliative care services were available, they had little impact on alleviating the emotional strain. The fellows informed family members and discussed patients' status, a responsibility shouldered neither by residents nor attendings. Family meetings often took place over the phone rather than in person, further complicating the challenge. Face-to-face visits were prohibited, and families were denied the opportunity to see their loved ones, making it challenging to understand the gravity of their family member's condition. Establishing a personal connection with families was necessary but gruelling for the fellows. The lack of eye contact and facial expressions hindered meaningful interactions. Family meetings had become routine, with one trainee expressing, "It had become so routine that it felt like a cold call, and I had to get it done because I had 5–10 more families to call that day." The impersonal nature of the communication exacerbated the emotional toll.

Another source of frustration for the PCCM fellows stemmed from the need to intubate numerous patients. The initial apprehension surrounding the aerosolization of the COVID-19 virus led to sparse use of non-invasive ventilation and high-flow nasal oxygen. This precautionary measure, while understandable, placed an additional burden on the trainees. There were many patients on ventilators, demanding heightened care, additional central lines, the use of sedatives, and numerous ventilator weaning trials. The physical exhaustion of the trainees was compounded by the lingering question of whether non-invasive ventilation might have sufficed in some. This uncertainty fueled the frustration as the fellows grappled with concerns about potentially harming their patients. This dilemma of whether they were doing more harm than good weighed heavily on their minds, highlighting the challenging ethical and medical decisions.

Loneliness and Camaraderie

The trainees experienced a paradoxical sense of loneliness and camaraderie in the ICU. They felt a profound loneliness while managing many critically ill patients, particularly during night shifts. One fellow highlighted the challenge of overseeing 50 patients at the academic hospital and an additional 50 at the private hospital, creating the impossible situation of being in two places at once. The trainees faced an added challenge during the pandemic as attendings took calls from home. The fellows were left with a profound sense of isolation, particularly when managing many patients during the night shift, as fellows navigated the complexities of patient care in an overwhelming environment.

Furthermore, PCCM trainees felt isolated and requested added support from the other subspecialties. While the cardiac ICU and surgical ICUs were filled with COVID patients, assistance from these specialties was erratic. Surgical residents occasionally assisted in central line placements, but cardiology fellows, not trained in critical care medicine, were less inclined to help. In one instance, a cardiology fellow declined to address an issue with a pacemaker for a COVID-19 patient, accentuating the PCCM trainees' belief of insufficient collaboration. Despite these challenges, the PCCM fellows found support from anesthesia services for intubations and ENT for tracheostomies, highlighting a mixed experience of cooperation and isolation.

On the other hand, the loneliness experienced by the PCCM fellows during the pandemic fostered a deep sense of camaraderie. One fellow described it as "brothers and sisters in the trenches", emphasizing that only other PCCM fellows understood their challenges. This shared experience forged a strong bond among the trainees. In a spirit of mutual support, the trainees extended helping hands to one another. Whether using the elective time to assist in the critical care unit or rearranging schedules to accommodate individual needs, they recognized the value of solidarity, acknowledging that they were in the "same boat." Sensitivity to a fellow who was pregnant led to prioritizing outpatient telemedicine appointments and rearranging her ICU rotations to suit her circumstances better. However, there were also mixed feelings about this arrangement due to the added workload.

Despite the demanding circumstances, the trainees found solace in their faculty and fellowship director. They perceived their PCCM program as supportive, further contributing to a sense of unity and shared purpose.

Education

Given the overwhelming patient load in the ICU, it became an "all hands-on deck" situation, leading to a shift in most pulmonary rotations towards critical care. In response to the escalating demand at the university hospital, a third ICU was established as a step-down unit. Interestingly, the fellow in charge of this unit was also the pulmonary fellow responsible for inpatient pulmonary consults. Pulmonary medicine advice was sought in the medicine wards for COVID-19 patients. Fellows became frustrated as they dealt with the increased workload and were often consulted on ward patients with COVID-19. Even the emergence of treatment regimens such as remdesivir and steroids did not decrease the number of consults. Fellows considered these pulmonary consults unnecessary, as they added to their workload without providing educational benefits. One trainee even declined such consults, expressing to the attending physician in medicine, "I possess the same knowledge as you about COVID; why are these consults being requested?"

The first- and second-year fellows perceived a decline in the quality of their pulmonary education, as all pulmonary outpatient experiences and procedures were initially cancelled. On the other hand, the third-year fellows were adept at handling pulmonary issues and even engaged in board reviews.

The fellows were especially concerned about endobronchial ultrasound (EBUS) procedures, as these needed an additional set of skills for proficiency. EBUS appointments gradually resumed, but only for patients with cancer. By the end of the pandemic, fellows believed they could make up for lost ground in terms of pulmonary procedures.

Conversely, PCCM fellows became adept at treating acute respiratory distress syndrome, managing ventilators, and administering sedative and paralytic agents. They became experts in critical care procedures, including the placement of central lines, arterial lines, dialysis catheters, chest tubes, and intubation. One fellow even remarked, "There was an abundance of critical care procedures; we are doing so many." Yet, another third-year fellow, now an attending, observed that certain aspects of critical care training had suffered. He noted: "Some fellows struggled with managing diabetic ketoacidosis, a condition that was once considered a straightforward critical care case." Cancelling all trainees' electives in areas such as transplant, radiology, and rotations in neurology and cardiac ICUs intensified the challenges of obtaining a comprehensive critical care education.

Lectures eventually resumed virtually, departing from the previous in-person sessions. Trainees were allocated a protected time between 7 and 8 am to attend such seminars. However, even virtual lectures were challenging for fellows assigned to the ICU. Despite the designated protected time, the high ICU patient load during the pandemic demanded extensive chart review and round preparation. This workload made it difficult for the ICU fellow to participate fully in the virtual lectures. While the trainees appreciated the convenience of the virtual format during the pandemic, allowing them to multitask and manage their time efficiently, it came at the expense of their ability to remain fully engaged in the lecture. The shift to virtual lectures resulted in the loss of more than just educational content; it meant the absence of personal contact and connections. Beyond the formal learning environment, the trainees missed the opportunity to interact with one another. The sense of camaraderie and shared experiences that typically accompany in-person interactions was perceived as a loss during this period of virtual learning.

Fellowship Director (FD) Perspective

We interviewed the FD for her perspective on the fellows' concerns and how she managed the program during the COVID-19 pandemic. This was a single interview without thematic analysis; the results are presented in Table 2.

The three main issues discussed that fellows discussed with the FD were: 1] The fear of contracting COVID-19 at the onset of the pandemic and the adequacy of PPE, 2] Concerns regarding their mental well-being and exhaustion due to the increasing demands in the ICU, and 3] Frustration with the overbearing workload since they shouldered most of the responsibility for managing critically ill patients without assistance from other services.

The FD made earnest efforts to address their concerns. The department convened ZOOM meetings three times a week to disseminate information about COVID-19, share treatment protocols, and, crucially, provide a platform for the fellows to voice their frustrations. The fellowship schedule was adjusted to alleviate the burden on the medical ICU fellow. Since

Table 2 Themes, Subthemes, Codes, and Related Quotations from Fellowship Director

Theme	Subthemes	Codes	Quotations
Physical Demand and Emotional Burden	Safety	Contracting COVID	• One of the concerns the fellows had whether they were going to get COVID and whether we had enough PPE
		Concern for Family	• Everybody was afraid. People had kids at home and they were spending most of their time in the ICU. It was stressful and emotional time. • There was a pregnant fellow and nobody was vaccinated yet. We had taken her off her ICU rotations and instead asked her to cover the clinic. When the pandemic started in March to June, she was not asked to come in.
	ICU Burden	Fatigue	• Another concern that the trainees had was the exhaustion due to multiple ICU rotations and workload
		Stress	• Fellows were venting to me. The first years did not talk much; the third years were more vocal • It was a very emotionally stressful time. The townhall zoom meetings got intense on some occasions. I had some fellows check in on me to make sure I was okay. • Nobody buckled under the stress, the trainees carried themselves with such grace. • I did not feel there was anger towards me. The fellows felt like I was on their side. • We would hear their stress and would just talk to them (trainees), it helped to alleviate their concerns. • The fellows were very stressed out and unhappy. I was afraid we would bomb the ECFMG survey but, thankfully we did not.
		Tension between colleagues	• There was animosity towards the trainee who was pregnant. She was asked to do the ICU and pulmonary fellows clinic duties while they did her ICU rotations. They did not think it was fair because she was allowed to stay home. She was annoyed to be doing extra clinic. • Third years were pulled off their electives and asked to assist in the ICU. They were not pleased and felt as though they had paid their dues.
Loneliness & Comradery	Loneliness	Helplessness	• I felt for them [trainees] and felt helpless; I tried my best to address their concerns
		Lack of support from other specialties	• I spoke to hospital leadership to obtain more support. • Chair of the department was part of the Command Center for the hospital and passed along the information to the rest of us. Fellows felt that the chair was not assertive with the other services. • Cardiology and surgery could have done more. We had a surgical resident assisting in the ICU. They were assigned to help and was asked to be made available but was only sporadically in the ICU. • We tried to speak to hospital leadership to obtain more support for the trainees. We were met with resistance because they needed to cover their own services. For example, the cardiology fellow needed to cover the cardiac ICU. • Trainees were wondering why is not everyone else forced to be in the ICU • I did feel that PCCM trainees were asked to do too much. In fact, I argued with the chair about it one day. Why should we be the only one burden with all this work? • The trainees felt as though we needed to twist other people's arms from other divisions to get their support, • Other services such as anesthesia and surgery kept saying they have their own busy services. We felt like we had no support from other divisions.
	Comradery	With attendings	• There was so much comradery between the fellows and the attendings. • At first only the attendings would see COVID-19 patients. We felt that the trainees should be protected. Especially what we were hearing was happening to New York City physicians. • There was one attending who stated "During a war, the general is usually in the back with the soldiers in front." I disagreed with this attending and felt that are learners had to be protected. • After some time when things had settled down, the COVID-19 patients were split between the fellows and the attendings.
		As a program	• The fellows worked really hard. • Looking back we did well as a fellowship and I am proud of the fellows and all their hard work. • I think the Zoom meetings with everyone really kept morale up. • Talking and discussing things made us feel like we were on the same page. • My co-fellowship director was my support. He and I used to talk through things. • Everyone was present for these Zoom meetings, and all the faculty and fellows would join. • Fellows showed a real maturity and overcame so many obstacles. The hospital could not function without them.
		With colleagues	• Some third-year fellows felt as if they had paid their dues, but we needed their expertise in the ICU. The first-year fellows needed the help, and the third-year fellows stepped up. • I got the third years more involved and to pick up a third ICU. Usually, first-year students have more ICU rotations than third-year students, but we needed their help. The rotations were moved around to pick up the slack.

(*Continued*)

Table 2 (Continued).

Theme	Subthemes	Codes	Quotations
Education	Virtual Learning	Virtual Learning	• All educational activities were suspended for the first two months of the pandemic and then gradually teaching started up again with Zoom • It is not the same on Zoom, but we did the best that we could and modified the curriculum accordingly. No one at the time had the time to "talk or present". Looking back though, we did well despite the odds. Everyone worked so hard.
	Critical Care Education	Emphasis on critical care	• There were talks on COVID and the latest treatment. • A lot of our afternoon Zoom meetings were discussions about what the CDC was saying. • We made PowerPoint presentations about what the Mayo Clinic and Harvard were doing for COVID to make sure everyone was on the same page. The trainees were able to pull this up on their phones. The algorithms and guidelines were readily available online. • There was a stress on proning everybody. We also have had lectures on APRV ventilation. • At first anesthesia was doing all the intubations on COVID-19 patients but, it was important to the PCCM fellows to intubate their own patients. We need to learn how to intubate difficult airways, they would say.

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electives were cancelled, fellows helped in the ICU or served as backup for the medical ICU. While the ICU schedule remained from 7 am to 7 pm, a third medical ICU opened to accommodate more stable, critically ill patients with the goal of reducing the census of the other two ICUs from 25–30 patients each, to fewer than 20 patients.

Managing the private hospital ICU and two medical ICUs in the academic hospital became overwhelming for the night fellow whose duties were changed to focus on the university ICU. An attending was required to manage the private hospital's patients at night. Further efforts were made to enlist the assistance of surgical residents and fellows for procedures at night, but their participation was inconsistent. The FD became the fellows' liaison with hospital leadership to secure additional support from other specialties, but encountered resistance. The FD noted that leadership "expressed concerns about diverting resources to the medical ICU as they were already stretched thin covering their services."

All educational activities were suspended in the first two months of the pandemic, and conferences gradually resumed via Zoom. Much of the focus was on COVID-related topics, with presentations dedicated to sharing insights from other institutions to ensure alignment of practices. Lectures explored emerging data on proning and the use of airway pressure release ventilation.

When discussing the challenges of managing a fellowship program during the pandemic, the FD admitted feeling "very stressed out" due to the fellows' discontent, which was vocalized to the FD in private and occasionally during the Zoom meetings. Disgruntlement arose following the decision to have third-year fellows assist in the ICU. Several fellows expressed frustration, feeling "they had paid their dues." Nevertheless, their expertise was needed to support the MICU and mentor junior fellows. Resentment ensued when a pregnant fellow was reassigned from all MICU rotations to clinics. The PD noted that third-year fellows were more likely to express discontent than first- and second-year fellows.

Despite the tensions, the FD believed that the trainees displayed remarkable unity and resilience in navigating the pandemic and showed maturity in overcoming obstacles. Their collective efforts were essential for the hospital's functioning, with the FD emphasizing that "the housestaff and fellows played indispensable roles."

Discussion

This qualitative study delved into the multifaceted challenges faced by PCCM trainees during the COVID-19 pandemic. Through interviews, we provided a platform for reflection, enabling trainees to navigate and understand their experiences in depth. Three themes emerged: the pandemic's emotional and physical toll, feelings of isolation fostering camaraderie among PCCM fellows, and how the pandemic influenced their education.

PCCM trainees prioritized fulfilling their physiological and safety needs before all others. Establishing a suitable rest area was crucial. At the onset of the pandemic, it became apparent that the existing break room was insufficient. In response, the facility expanded the workroom, providing additional workstations, food storage, and a dedicated call room for PCCM fellows.

Amidst the physical strain of the pandemic, the emotional toll was a recurrent topic. Given the frequency of encounters with death and critically ill patients, fellows sought outlets to manage their stress. Regular Zoom meetings provided a platform for trainees to express their frustration and afforded opportunities for reflection and debriefing. The presence of palliative care services did not alleviate the stress of dealing with very ill patients and their families. PCCM initiated and oversaw the vast majority of end of life discussions.

While fellows found solace in the support of their peers and the FD, there was a consistent call for additional support beyond their immediate circle. Many expressed a desire to recruit trainees from other specialties to share the burden of ICU responsibilities. This might have distributed the workload and alleviated the emotional strain experienced by PCCM fellows.

Other studies reported high levels of stress, increased workload, anxiety and fear of transmitting COVID-19 to family members, especially in the early phases of the pandemic.[2,12,17–20] Our data contribute to the existing literature and offer additional insight. For example, the emotional toll of initiating and clarifying goals of care, the anger over scant support from other services, and importance to the rest area. A qualitative study[21] using the appreciative inquiry technique in a UK tertiary medical center identified four themes: feeling safe, physical needs, emotional burden, and self-fulfillment. While these results were similar to ours, that study did not delve into the educational experience in detail.

The issues raised by PCCM fellows, whether positive or negative, align with Maslow's hierarchy of needs.[8,11,12,18,20–22] This motivational theory is consistent with a five-tier model of human needs, including physiological, safety, love and belonging, esteem, and self-actualization. Maslow's theory suggests that fundamental needs, including physical well-being and safety, must be fulfilled before individuals can progress to higher-level needs, such as love and camaraderie, ultimately leading to self-confidence and self-actualization, including job satisfaction.

The enduring challenges stemming from the COVID-19 pandemic profoundly disrupted graduate medical education.[6,7,12,18,20,22] A prior study concluded that the COVID-19 pandemic affected training, but its consequences were unevenly distributed across program types and regions of the country.[12] In this study, we concentrate only on one program and one specialty. Our trainees overwhelmingly favored in-person lectures over virtual platforms, raising concerns about the efficacy of this mode of instruction. While fellows developed proficiency in critical care, there was a genuine apprehension regarding the adequacy of pulmonary education. Similarly, other studies found that certain limitations in training were temporary and improved in the latter stages of the pandemic.[23] Research indicates that the pandemic has significantly influenced trainees' perceptions of their education and sense of purpose in their work, directly affecting their overall well-being.[2,8,10–13,17,19,20,22,24–27] Our study corroborates these findings and emphasizes the importance of addressing the broader implications of the pandemic on trainee education and professional fulfillment.

Even though there were conflicts and discontent amongst the PCCM fellows, the FD corroborated the subjective experience of the fellows, including the lack of support from other services. Meetings with the FD were frank and open with the fellows regarding the FD as fixer, advisor, arbitrator and point of contact.

Limitations and Strengths

This study was conducted at a single center, and the results may not be generalizable to other institutions. Our study included 14 participants, admittedly a sample of convenience. Yet, it was an exploratory study focusing on the lived experience of a homogenous group -fellows in the same speciality and program-. This type of study requires a small number of participants.[14,28–30] We iteratively reviewed and refined data ensuring that no new patterns emerged. Thus, interviewing more fellows is unlikely to yield additional information.[29,30] With its limitations, a notable strength of the study lies in our methodology. We provided a platform for trainees to engage in reflective practices, offering them a safe space to explore and gain deeper insights into the challenges they faced during a difficult period. Our findings contribute to previous research by acknowledging the importance of deliberative, reflective practice in fostering new perspectives and catalyzing change. The lessons derived from reflection are significant for organizational improvement.

Conclusions

While there was discontent amongst PCCM fellows in our program, our study found that the fellows valued the program's communication efforts in keeping them informed and confided in the FD. In these stressful times, the fellows did not consult mental health services and relied on each other, some attendings and the FD. Most fellows were concerned about the lack of support from other services. Conflict amongst fellows arose when ICU rotations were added to the third year fellows' schedule and when a pregnant fellow could not work in the ICU. While it was not possible to resolve these issues, the situation was improved by focusing on de-escalation and providing empathy. Our study implies that a place for rest is of utmost importance to a fellowship program and virtual lectures caused a loss of personal contact and connections with fellows much favoring in-person sessions. Overall, fellows became quite proficient in critical care, and while they were initially concerned about the pulmonary aspect, most felt they could compensate for the content.

Disclosure

The authors report no conflicts of interest in this work.

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