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The COVID Cohort: PEM Fellowship Training During a Pandemic

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Abstract

Background: The COVID-19 pandemic led to training programs abruptly stopping in-person learning and redesigning curricula. Trainees had decreased patient contact. Trainee well-being became even more vital with social isolation and fears of infecting loved ones increased. Our study evaluated impacts of COVID-19 on Pediatric Emergency Medicine (PEM) fellowship programs, including effects on fellows' clinical and didactic experiences, and effects on fellows' well-being.

Methods: In this cross-sectional study, two surveys inquiring about the impact of COVID-19 on PEM fellowship training were developed using an iterative process: one for Program Directors (PDs) and one for fellows. Survey questions, which consisted of multiple choice, five-point Likert scale, and free text responses, included assessment of fellows' clinical rotations, didactics, administrative changes, and health and well-being. Anonymous, electronic surveys were distributed a total of three times between March and April 2021. Descriptive statistics were employed and responses of PDs and fellow compared.

Results: PDs had a 56.8% (50/88) response rate, fellows 34.6% (144/416). All PDs reported a decrease in pediatric patient volumes during the initial height of the pandemic. Participants commonly reported changes in rotations and block schedules, didactics moving to a virtual platform, increased frequency of speakers from outside the

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institution, and additional mental health services for providers. PDs and trainees reported being required to provide service to COVID patients outside of a pediatric ED, commonly in the adult ED and medical intensive care unit.

Conclusion: The impact of COVID-19 on PEM fellowship training, particularly for fellows who started training at the start of the pandemic, remains unclear. Initial decreases in pediatric patient volumes, canceled electives, care of adults, and altered didactics/conferences in accordance to CDC guidelines may have adversely affected training. Future research might assess pandemic-related differences on certification exam scores or how prepared fellows, particularly those who trained throughout the pandemic, feel for unsupervised practice.

Introduction

Coronavirus Disease 2019 (COVID-19) was first detected in December 2019 and quickly became a worldwide pandemic. With its spread, hospitals across the country saw a rapid rise in COVID-19 cases in the adult population with some health care systems, including teaching hospitals, becoming quickly overwhelmed with patients. Faculty and trainees made significant changes in their clinical model of care and their educational schedules. Shifts to virtual and telehealth models became necessary to ensure patient care continued while protecting the health of medical staff in the face of much uncertainty [1-5]. In some cases, trainees were reassigned from their scheduled specialty rotations to units caring for patients with COVID-19 in order to meet the demand of increasingly affected and severely ill patients. Many programs had to manage staffing shortages due to quarantine and illness [6]. With limited time in training, these changes have the potential to adversely affect fellows' training experiences and their professional development for years to come.

Several studies have explored the effects of COVID-19 on medical education. In-person learning abruptly stopped and curricula were redesigned to ensure the safety of medical trainees. Residency training programs used virtual platforms to continue didactic learning with variable success [7-11]. Residents also had decreased patient contact time as operative cases were canceled, clinic visits rescheduled, and the use of telehealth visits became more prominent [9-11]. Studies of surgical subspecialty training programs in the United Kingdom, Taiwan, and India report fellows and educators having significant concerns about the acquisition of required hands-on skills given decreased volumes and canceled elective procedures [12-14]. Resident well-being became even more vital with increased social isolation and fears of infecting loved ones [8,15,16].

While the number of hospitalized patients resulted in inpatient and critical care units being at maximum capacity, there was a significant decline in Emergency Department (ED) visits in the early stages of the pandemic. Compared to the same 4-week period in 2019, ED visits from March 29-April 25, 2020 declined by 42% and were most notable in patients ≤ 14 years, females, and visits in the Northeast region of the United States (US) [17]. Pediatric ED visits remained below usual levels through June 2020 [18].

Studies have yet to be conducted on the effect of the pandemic on Pediatric Emergency Medicine (PEM) fellowship training in the US and Canada. The initial reduced ED volume and reorganization of educational opportunities due to the pandemic may affect fellows' clinical and educational experiences. The extent to which these changes have impacted training experiences is unknown. To address this knowledge gap, this study explored the impacts of COVID-19 on PEM fellowship programs, including effects on fellows' clinical and didactic experiences, and effects on fellows' well-being, from the perspectives of Program Directors (PDs) and PEM fellows. This study was previously presented as a meeting abstract at the 2021 AAP National Conference and Exhibition Meeting on October 8, 2021.

Materials and Methods

This study was approved by the Yale School of Medicine Institutional Review Board. Two web-based surveys were developed using an iterative process by the PEM Collaborative Scholarship Committee, one for program leadership consisting of 29 questions and one for fellows consisting of 27 questions. Survey questions, which consisted of multiple choice, five-point Likert scale, and free text responses, included assessment of fellows' clinical and didactic experiences and effects on fellows' well-being. Surveys were reviewed, approved, and distributed by the PEM-PD Survey Committee to PDs via email containing a link to each survey a total of three times in two-week intervals. PDs were asked to complete the PD survey and forward the fellow survey to their fellows. PDs were also queried on the number of fellows in their program to capture the total number of possible fellow respondents. Responses to both surveys were anonymous. Surveys were completed online using Qualtrics software between March 17, 2021 and April 19, 2021.

All analyses were performed using SAS v9.4 (Cary, NC). Descriptive statistics were examined, including frequencies and proportions and means and standard deviations. Free text responses were examined by two investigators (TN, LY) and categorized by consensus. Differences between PD and fellow responses were assessed using Chi-squared or Fisher's exact tests, as appropriate. P-values < 0.05 were considered to indicate statistical significance. Additionally, we explored differences among fellows' responses by geographic location and year of training (for fellows only).

Results

PDs had a 56.8% (50/88) response rate, while fellows had a 34.6% (144/416) response rate. The majority of responding PDs represented programs in the Northeast US (n=18, 36%) followed by the Midwest (n=10, 20%) (Table 1). The distribution of PDs in our sample was representative of national program distribution in the West (10% vs. 13%), Midwest (20% vs. 20%), Southwest (10% vs. 8%), Mid-Atlantic (16% vs. 14%) and Southeast (6% vs. 9%); however, there was a slightly higher proportion of PDs participating from the Northeast (36% vs. 28%). For fellows, respondents mostly represented the Midwest (n=39, 27%) followed by the Northeast (n=38, 26%). Fifty-seven (40%) respondents self-identified as 1st years, 41 (28.5%) as 2nd years, 45 (31%) as 3rd years, and 1 as a 4th year fellow.

Clinical Rotations

Changes to rotations or block schedules due to the pandemic were reported by 92% of PDs for some fellows and 8% of PDs for all fellows. Compared to the PD response, a statistically smaller proportion of fellows (43%, $p<.001$) reported changes to their rotations. This was more often reported by 3rd year fellows (54%) and 2nd year fellows (56%) as compared to 1st year fellows (30%) ($p=.019$). Reasons reported for changes to the rotation sched-

ules included rotation cancellations, required additional time in the pediatric ED, modifications to rotations (change to virtual or telehealth), and pregnancy (Figure 1). Only seven fellows (5%) and 7 PDs (14%) reported that PEM fellows were required to provide service outside of the pediatric ED. Those who were deployed often worked in the adult ED (fellows, n=3, 2.1%; PDs, n=4, 4.5%) or the adult medical intensive care unit (MICU; fellows n=2, 1.4%; PDs n=1.1%). While the majority of first year fellows (60%) strongly or somewhat disagreed that available electives were impacted by COVID-19, fewer 2nd (29%) and 3rd year (29%) fellows responded similarly to this statement (p=.001).

All PDs reported a decrease in patient volumes during the early height of the pandemic, estimating volumes decreased by 25-50% (n=17, 36%), 51-75% (n=20, 43%), or >75% (n=10, 21%). The fellow's role was reported as altered in medical resuscitations by 34% of PDs and 31% of fellows, and in traumas by 28% of PDs and 19% of fellows, overall. However, PDs located in the Midwest were more likely to report an alteration of fellow roles for both medical (56%) and trauma (35%) management as compared to other geographic areas (p=.013). When there were changes, the most common response was that anesthesia (fellows n=21, 14.6%; PDs n=10, 11.4%) was now responsible for most, if not all, intubations. Most fellows and PDs felt the decrease in patient volumes negatively impacted their clinical training and exposure to procedures, with stronger agreement among PDs from the Northeast as compared to other geographic regions (p=.01). Fifty percent of fellows agreed or strongly agreed that COVID-19 negatively impacted their readiness for graduation. There were no statistically significant differences across training year with 62% of 2nd year fellows, 54% of 3rd year fellows and 42% of 1st year fellows strongly or somewhat agreed with this statement (p=.216). Also, the majority of first year fellows (57%) strongly or somewhat disagreed that opportunities to supervise junior trainees were impacted by COVID-19, fewer 2nd (46%) and 3rd year (38%) fellows responded similarly to this statement (p=.014). There were statistically significant differences in opinions on fellows receiving adequate training and updates in how to care for patients with suspected COVID-19. PDs strongly agreed with this statement (74%) as compared to 40% of fellows (p<0.0001).

Didactics

Although the majority of PDs (55%) and fellows (53%) reported no change to the didactic schedule, most respondents reported that conferences pivoted to virtual didactics or a hybrid of virtual and in-person didactics (PDs 88%, Fellows 99%). Only one PD and one fellow reported remaining in person, and 5% of PDs reported other changes. Despite these changes, approximately two-thirds of PDs and fellows did not feel their didactic education was negatively impacted (Table 2). Respondents reported that using the virtual platform improved conference attendance, and 51% of PDs reported having more invited speakers from outside their institutions than before the pandemic. Both fellows (41%) and PDs (45%) remained neutral regarding improvements in the overall quality of conferences. Fellows preferred attending conferences virtually with 50% of fellows strongly or somewhat agreeing as compared to only 25% of PDs (p=.02).

Health and Well-Being

Lastly, there were statistically significant differences in the proportion of PD and fellow survey respondents who agreed that there were accommodations for fellows who preferred not to be exposed to COVID-19 (66% v. 14%, p=<0.001), that there was adequate availability of personal protective equipment (94% v. 78%, p=0.0042), and that additional mental health resources were made available to providers (80% v. 56%, p=0.0048). The majority of fellow respondents strongly or somewhat agreed that they were concerned about becoming infected (74%) or infecting their loved ones (88%). While 65% of fellows agreed that they had an opportunity to talk about their feelings, only 56% of the fellows were aware of additional mental health services provided by the hospital during the pandemic.

Table 1: Respondent Demographics.

Question	PD	Fellows	Number of Programs
Year in fellowship training		n=139	
1st year fellow		57 (40%)	
2nd year fellow		41 (28.5%)	
3rd year fellow		45 (31%)	
4th year fellow		1 (0.5%)	
Location of fellowship program:	n=50	n=144	n=83
West (Alaska, California, Colorado, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming)	5 (10%)	16 (11%)	11 (13%)
Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin)	10 (20%)	39 (27%)	17 (20%)
Southwest (Arizona, New Mexico, Oklahoma, Texas)	5 (10%)	18 (13%)	7 (8%)
Mid-Atlantic (Delaware, District of Columbia, Kentucky, Maryland, North Carolina, Tennessee, Virginia, West Virginia)	8 (16%)	17 (12%)	12 (14%)
Southeast (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Puerto Rico, South Carolina)	3 (6%)	13 (9%)	8 (9%)
Northeast (Connecticut, Pennsylvania, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont)	18 (36%)	38 (26%)	24 (28%)
Other	1 (2%)	3 (2%)	6 (7%)

Table 2: Program Directors' and Fellows' Survey Responses.

Survey Question	Respondents	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	P-value
Clinical Activities							
COVID has negatively impacted my readiness for graduation	Fellow (n=139)	18 (13%)	54 (39%)	33 (24%)	27 (19%)	7 (5%)	N/A
	PD/APD (n=50)	N/A					
Clinical education was negatively impacted due to patient volumes	Fellow (n=139)	43 (31%)	58 (42%)	14 (10%)	20 (14%)	4 (3%)	0.64
	PD/APD (n=47)	14 (30%)	25 (53%)	3 (6%)	5 (11%)	0	
Opportunities to supervise junior trainees in the emergency department were negatively affected	Fellow (n=139)	6 (4%)	39 (28%)	28 (20%)	46 (33%)	20 (14%)	0.1629
	PD/APD (n=47)	3 (6%)	20 (43%)	4 (9%)	16 (34%)	4 (9%)	
The number of procedures I/the fellows could perform was limited	Fellow (n=139)	29 (21%)	56 (40%)	21 (15%)	25 (18%)	8 (6%)	0.0457
	PD/APD (n=47)	10 (21%)	29 (62%)	4 (9%)	2 (4%)	2 (4%)	
I/The fellows had to rethink what electives/rotations could be done	Fellow (n=139)	17 (12%)	41 (30%)	24 (17%)	32 (23%)	25 (18%)	0.0008
	PD/APD (n=47)	9 (19%)	26 (55%)	7 (15%)	2 (4%)	3 (6%)	
I/The fellows received adequate training and frequent updates in how to take care of Patients Under Investigation (PUI)	Fellow (n=139)	56 (40%)	56 (40%)	21 (15%)	5 (4%)	1 (1%)	<0.0001
	PD/APD (n=47)	35 (74%)	9 (19%)	1 (2%)	0	2 (4%)	
Didactics							
My/The fellows' didactic education was negatively impacted	Fellow (n=138)	10 (7%)	36 (26%)	23 (17%)	45 (33%)	24 (17%)	0.4855
	PD/APD (n=47)	1 (2%)	13 (28%)	12 (26%)	12 (26%)	9 (19%)	
I prefer having fellows' conference using a virtual platform	Fellow (n=138)	31 (22%)	38 (28%)	31 (22%)	23 (17%)	15 (11%)	0.0209
	PD/APD (n=47)	3 (6%)	9 (19%)	15 (32%)	15 (32%)	5 (11%)	
Using a virtual platform improved attendance at conferences	Fellow (n=138)	49 (36%)	44 (32%)	30 (22%)	11 (8%)	4 (3%)	0.1051
	PD/APD (n=47)	17 (36%)	22 (47%)	3 (6%)	4 (9%)	1 (2%)	
Using a virtual platform improved the quality of conferences	Fellow (n=138)	14 (10%)	22 (16%)	57 (41%)	30 (22%)	15 (11%)	0.3462
	PD/APD (n=47)	1 (2%)	8 (17%)	21 (45%)	14 (30%)	3 (6%)	
Wellness							
I was worried about becoming infected with COVID-19	Fellow (n=138)	40 (29%)	62 (45%)	10 (7%)	21 (15%)	5 (4%)	N/A
I was worried about infecting my loved ones	Fellow (n=138)	75 (54%)	47 (34%)	3 (2%)	7 (5%)	6 (4%)	N/A
I have had opportunities to talk about my feelings.	Fellow (n=138)	30 (22%)	59 (43%)	37 (27%)	11 (8%)	1 (1%)	N/A
Since receiving the COVID-19 vaccination, I have had a more positive outlook on my well-being.	Fellow (n=138)	66 (48%)	55 (40%)	15 (11%)	0	2 (1%)	N/A

Note: Percentages may sum to more than 100% due to rounding.

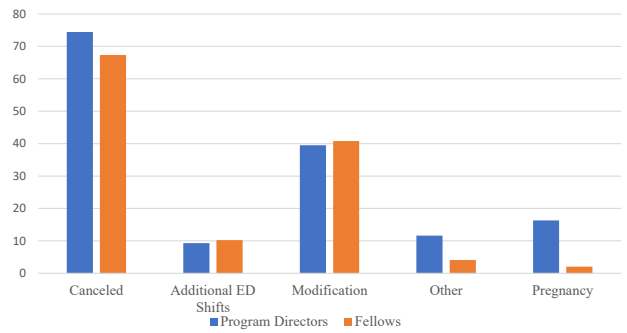

Figure 1: Reasons for Changes to Rotation Schedules During COVID-19 Pandemic.

Discussion

This study documents some of the effects on PEM fellows' learning experiences and well-being due to changes in PEM fellowship training resulting from the COVID-19 pandemic. The PEM fellowship class that graduated in 2023 would have been affected by the pandemic throughout their entire fellowship. Early in the pandemic, decreases in patient volumes led to altered clinical experiences with both fellows and PDs expressing concern regarding sufficient training for competency upon graduation. The vast majority of didactics became virtual or a hybrid of virtual and in-person didactics and fellows had additional opportunities in COVID-19 research. Lastly, fellows and PDs had different levels of concern around well-being and safety.

As COVID-19 spread across the world, the medical education community pivoted to ensure the ongoing development of fellows while advocating for their physical and mental safety and adhering to government shelter-in-place orders. Much of the world instituted changes to business and education models that mimicked those that were enacted during the global public health threat of SARS in parts of Asia in 2003. Though short-lived, the abrupt changes to virtual education and closure of schools during that time formed a foundation for many of the actions of governing bodies in 2020 [19]. In many respects, the pandemic was a shared experience and it is not surprising that PDs and fellows would have similar responses to survey questions. It is likely that some differences in PD and fellow responses are due to lack of institutional memory of trainees who

may not be able to recognize changes in training.

One of the biggest challenges during the pandemic for any training program that relies on clinical experiences was the dramatic drop in patient volumes. Similar to our findings, Lo, et al found a dramatic decrease in the number of pediatric patients at their hospital in Taiwan, measured in Patients seen Per Hour (PPH) [20]. Contrary to adults, the average PPH managed by residents in the pediatric ED decreased from 1.56 pre-pandemic to 0.51 [20]. This was reported across disciplines [2,11,21]. While our PEM PDs and fellows feel that these changes in volume affected their clinical training and graduation readiness, they are not alone. Multiple surgical training programs reported trainees and educators having significant concerns about the acquisition of required hands-on skills given decreased volumes and canceled elective procedures [12-14]. In PEM, being a front-line provider necessitates fast-paced triaging patients, alleviating bottlenecks, ensuring safe disposition of patients, and adapting to an ever-changing environment is a learned skill. Reduced patient volumes will affect the acquisition of these skills.

Given the decrease in patient encounters during the early part of the pandemic, it is not surprising that PDs changed rotations and block schedules to maximize learning opportunities for fellows. In addition, with several areas of the country seeing pediatric patients relatively unaffected by the disease while illness across adult populations surged, several programs reported PEM fellows spending additional time in the adult ED and MICU. This could potentially have mitigated the decreased procedural opportunities that some fellows experienced. While ACGME core requirements [22] for pediatric-trained PEM fellows do require at least 4 months of reciprocal time in an adult emergency setting, additional time spent on adult rotations is likely institution dependent. The effects of increased adult patient care with a reciprocal decrease in pediatric care are currently unknown, but likely to be small given the short duration of these changes for most programs.

Outside of the clinical arena, virtual learning became a mainstay during the COVID-19 pandemic, one of the silver linings noted by most respondents. The move to virtual conferences was not perceived as impacting fellows' didactic education or the quality of conferences, and attendance to conferences reportedly improved. Many fellows or faculty may have been juggling additional non-academic responsibilities like overseeing education at home or caring for their children with the closure of schools and daycare facilities [20,23-25]. Being able to attend conferences virtually likely allowed them to continue learning while still addressing important needs at home. Additionally, without the need to commute to the hospital for educational sessions, attendance may have increased with broader faculty participation leading to increased engagement and discussion, further augmenting fellow learning.

In an effort to support virtual learning, the national PEM-Program Directors' Committee created a database for PEM fellowship programs to share information on their faculty and respective lecture topics. This provided a convenient means for programs to find and invite quality faculty lecturers who covered topics that may have been needed in a program's education curriculum and increased the ease in accessing PEM lecturers and experts from across the nation. Videoconferencing is not new in medical education and shown to be effective internationally in post-graduate education [26]. Leveraging technology has allowed educational opportunities to expand and create new partnerships without imposing additional time, cost, or health risk related to travel. That said, assessing whether knowledge was acquired is unclear [27-29].

The social isolation that comes from virtual learning can lead to increased depression.[30] There were differences between PDs' and fellows' responses to survey items related to the availability of mental health resources and additional support for healthcare providers' mental health given the stressful nature of this global pandemic. Though 85% of PDs reported having additional services for fellows, 59% of fellows reported the same. PDs often have a detailed understanding of hospital and university level programs available to fellows involving counseling, academic, and social support after years of program administration. Fellows who are new or have not needed services in the past may not be as familiar. There was often a vast amount of information and frequent communication during the pandemic, and certain information may have been lost. Though the survey may also reflect regional differences between survey respondents, this finding could indicate a need for programs to consider how they can disseminate information around mental health services. Many of our fellow respondents were concerned about becoming infected or infecting their loved ones. While many fellows felt they had an opportunity to talk about their feelings, mental health services should have a broader reach in the future.

Limitations

This study has several limitations. While the number of surveys distributed to PEM fellows and PDs is regulated and several attempts were made to collect responses from PDs and fellows, our response rate was less than ideal and does not represent all programs and trainees. Since this study was conducted about one year into the pandemic, these data represent effects that were notable to PDs and fellows over the earlier months of the pandemic. It is unclear if any of these findings were long-lasting or only took place over a short period of time. It is also unclear from these data what impacts any programmatic or didactic changes will have on fellow readiness for independent practice. The timing of the study did not allow for more objective measurements of the impacts such as board pass rates. Further studies may help clarify any effects, if any.

Conclusions

COVID-19 has impacted PEM fellowship training including decreases in pediatric patient volumes, canceled rotations, increased care of adults, and altered didactics/conferences in accordance with CDC guidelines. Most PDs and fellows felt the hospital provided adequate mental health resources during the pandemic. As the impact remains unclear, future research might assess pandemic-related differences on board exam pass rates or how prepared fellows who trained during this period feel for unsupervised practice, particularly for those fellows who just graduated, having had their entire fellowship affected in some way by the pandemic.

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