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Epidemiology

# The impact of the COVID-19 pandemic on family medicine residency training

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## Abstract

**Background:** Family physicians have played a unique clinical role during the COVID-19 pandemic. We hypothesized that the pandemic would be associated with significant deleterious effects on clinical activity, educational training, personal safety and well-being.

**Objective:** We conducted a national survey to obtain preliminary data that would assist in future targeted data collection and subsequent evaluation of the impact of the pandemic on family medicine residents and teaching faculty.

**Methods:** An anonymous online survey of residents and faculty was distributed via the Association of Family Medicine Residency Directors list serve between 5/21/2020 and 6/18/2020. Survey questions focused on clinical and educational activities, safety and well-being.

**Results:** One hundred and fifty-three residents and 151 teaching faculty participated in the survey. Decreased clinical activity was noted by 81.5% of residents and 80.9% of faculty and the majority began conducting telehealth visits (97.9% of residents, 91.0% of faculty). Distance learning platforms were used by all residents (100%) and 39.6% noted an overall positive impact on their education. Higher levels of burnout did not significantly correlate with reassignment of clinical duties (residents  $P = 0.164$ ; faculty  $P = 0.064$ ). Residents who showed significantly higher burnout scores ( $P = 0.035$ ) and a decline in levels of well-being ( $P = 0.031$ ) were more likely to participate in institutional well-being support activities.

**Conclusions:** Our preliminary data indicate that family medicine residents and teaching faculty were profoundly affected by the COVID-19 pandemic. Future studies can be directed by current findings with focus on mitigation factors in addressing globally disruptive events such as COVID-19.

**Key words:** Academic medicine, graduate medical education, mental health, primary care, telemedicine, work-related stress

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**Key messages**

- Clinical activity decreased for 81% of respondents in the first pandemic surge.
- Telehealth services were implemented or expanded for 98% of respondents.
- Video conferencing rapidly became the primary resident education method.
- Burnout did not significantly correlate with reassignment of clinical duties.
- Institution-provided well-being support services helped those with high burnout.
- Education on personal protective equipment improved perceptions of safety.

**Introduction**

On 11 March 2020, the World Health Organization declared a global pandemic from COVID-19 (1). Since then, the USA has been severely impacted, with over 25 million confirmed cases and at least 430 000 deaths resulting in deleterious effects on our health care system (2). Family medicine faculty and resident physicians are uniquely poised to respond in a national pandemic given their broad training and expertise. However, this position also increases their vulnerability to stressors associated with frontline care and loss of educational opportunities.

Family medicine accounts for the second largest specialty training in the USA with 701 residency programs and over 13 000 residents, many of whom took a frontline role in managing this health care crisis (3). While there have been reports of the pandemic's impact on residency training, none have focused specifically on family medicine residents or faculty (4–20). Thus, we aimed to explore the impact of the COVID-19 pandemic on the clinical responsibilities, educational training and personal well-being of this potentially vulnerable population. These data could then be used to inform future studies on areas significantly impacted as we continue navigating the effects of the pandemic.

**Methods**

This study was deemed exempt by the Colorado Multiple Institutional Review Board. We performed a cross-sectional study of family medicine residents and faculty physicians between 5/21/2020 and 6/18/2020. An electronic survey was developed using the REDCap (Research Electronic Data Capture) electronic data capture tools hosted at the University of Colorado School of Medicine (21). The survey took an estimated 5–7 minutes to complete and contained up to 64 questions for residents and 49 for faculty, depending on branching logic. Survey items were developed using an iterative review process by a group of faculty medical educators and program directors. Basic demographic information collected is listed in Table 1. Location of practice/training was later converted to geographic location as defined by United States Census regions (22). The main domains of interest were (i) clinical activity including reassignment, (ii) changes in educational training and (iii) personal well-being and safety, including use of personal protective equipment (PPE). Measures of wellness were assessed with two tools: (i) the validated 7-item Physicians Well-Being Index (PWBI, MedEd Web Solutions, Mayo Clinic) and (ii) a non-proprietary single-item burnout question. A PWBI score of  $\geq 5$  for residents and  $\geq 4$  for faculty indicates greater distress and higher risk for adverse outcomes (23,24). The non-proprietary single-item burnout scale is scored using a five-category ordinal scale where burnout is defined as scoring  $\geq 3$  (25).

The electronic survey link was then distributed via the Association of Family Medicine Residency Directors (AFMRD) list serve, requesting participation. The program directors were also asked to further distribute the survey to their residents and faculty.

No additional reminders were sent. Survey participation was voluntary and anonymous. While there are currently 559 program directors on the AFMRD list serve, given our anonymous approach we do not have access to a total number of potential respondents, nor demographic information about non-respondents. Incomplete surveys were included in the analyses, but only for completed portions.

**Statistical analysis**

Descriptive analyses of survey results were completed using SAS statistical software, version 9.4 (SAS Institute Inc., Cary, NC). *T*-tests were used to assess the difference in burnout between those with and without reassigned duties, as well as the difference in well-being and burnout between those participating and not participating in support activities. A Spearman correlation coefficient was used to assess the degree of association between well-being and burnout.

**Results**

Of the 304 respondents, 153 were residents and 151 were faculty members. Table 1 lists demographics of the respondents. The vast majority of respondents ( $n = 253$ , 83%) reported their main setting of clinical practice to be both inpatient and outpatient.

**Clinical experiences****Clinical activity**

The clinical activity portion of this survey was completed by 146 residents and 147 faculty. The vast majority of respondents (81.5%,  $n = 119$  residents and 80.9%,  $n = 119$  faculty), reported significantly or slightly decreased clinical activity during the pandemic response, with the remainder reporting no change or increased clinical activity. It was extremely rare for all clinical activity to stop completely (0.7%,  $n = 1$  in each group). Most institutions implemented or significantly expanded telehealth services during this time for the safety of patients and health care staff (98.6%,  $n = 144$  residents and 98.0%,  $n = 144$  faculty). None of the residents and only two of the 147 faculty (1.4%) had been conducting telehealth visits routinely before the pandemic. Among those whose institutions implemented the telehealth changes, 97.9% ( $n = 141$ ) of residents and 91.0% ( $n = 131$ ) of faculty participated in conducting telehealth visits. However, only about half of residents (48.9%,  $n = 69$ ) and faculty (50.4%,  $n = 66$ ) received formal telehealth training. Most residents and faculty felt telehealth visits were a positive contribution to their clinical experience (82.3%,  $n = 116$  residents and 92.4%,  $n = 121$  faculty). Additionally, 88.5% ( $n = 116$ ) of faculty thought telehealth provided a positive contribution to their residents' clinical experience.

**Reassignment**

Of the 146 resident responses, approximately half of residents (52.7%,  $n = 77$ ) reported being reassigned to perform medical duties outside of their previously assigned duties due to the pandemic with

**Table 1.** Demographics of the 304 family medicine residents and faculty surveyed on the impact of the COVID-19 pandemic (2020)

Characteristic	Residents	Faculty
	<i>n</i> = 153 <i>n</i> (%)	<i>n</i> = 151 <i>n</i> (%)
<b>Age</b>		
25–34 years old	136 (88.9%)	19 (12.6%)
35–44 years old	16 (10.5%)	36 (23.8%)
45–54 years old	1 (0.7%)	47 (31.1%)
55–64 years old		35 (23.2%)
65–74 years old		13 (8.6%)
Prefer not to answer		1 (0.7%)
<b>Gender identity pronouns</b>		
She/her/hers	101 (66.0%)	86 (57.0%)
He/him/his	49 (32.0%)	58 (38.4%)
They/them/theirs	0 (0%)	0 (0%)
Other	0 (0%)	0 (0%)
Prefer not to answer	3 (2.0%)	7 (4.6%)
<b>PGY level</b>		
PGY1	48 (31.4%)	
PGY2	47 (30.7%)	
PGY3	58 (37.9%)	
<b>Geographic distribution</b>		
Northeast	31 (20.3%)	30 (19.9%)
Midwest	19 (12.4%)	30 (19.9%)
South	32 (20.9%)	31 (20.5%)
West	71 (46.4%)	60 (39.7%)
<b>High-risk group for COVID-19<sup>a</sup> (either themselves or someone living with them)</b>		
Yes	32 (20.9%)	48 (31.8%)
No	121 (79.1%)	103 (68.2%)
<b>Shelter-at-home regulations by local government</b>		
Yes	147 (96.1%)	142 (94.0%)
No	3 (2.0%)	9 (6.0%)
Don't know	3 (2.0%)	0 (0%)
<b>Main clinical practice environment<sup>b</sup></b>		
University hospital setting	44 (28.8%)	34 (22.5%)
Private or community hospital setting	103 (67.3%)	87 (57.6%)
Public/county hospital setting	45 (29.4%)	13 (8.6%)
Children's hospital setting	12 (7.8%)	1 (0.7%)
Veteran Affairs	0 (0%)	1 (0.7%)
Teaching health centre	41 (26.8%)	43 (28.5%)
Other	5 (3.3%)	17 (11.3%)

<sup>a</sup>High-risk group for COVID-19 was defined in this question as age  $\geq 65$ , immunocompromised, pregnant, chronic respiratory disease or other.

<sup>b</sup>Non-mutually exclusive categories with numbers adding to more than 100%.

another quarter (24.7%,  $n = 36$ ) being asked to prepare for reassignment. In contrast, while 70 of the 147 faculty respondents (47.6%) were asked to prepare for reassignment, only 19.7% ( $n = 29$ ) reported actually being reassigned. Of residents who were reassigned or asked to prepare for reassignment ( $n = 113$ ), most were somewhat or very comfortable with their program director or institution making decisions about reassignment (76.1%,  $n = 86$ ), with the remainder neutral, somewhat or very uncomfortable. Of the 77 residents who were reassigned, 67.5% ( $n = 52$ ) reported reassignment was not voluntary and 10.4% ( $n = 8$ ) were asked to perform work in a different specialty outside of their primary family medicine team or previously assigned rotation. Although a minority (7.8%,

$n = 6$ ) noted that they were somewhat or very uncomfortable with the level of work that they were reassigned, the vast majority of all residents felt they were appropriately supervised to provide clinical care during the pandemic and complied with Accreditation Council for Graduate Medical Education (ACGME) requirements for work hours (95.9%,  $n = 140$  and 98.6%,  $n = 144$ , respectively).

### Education during the pandemic

Three-quarters of resident respondents ( $n = 111/144$ , 77.1%) stated their educational activities had significantly or slightly decreased due to the pandemic, with a minority noting no change (13.2%,  $n = 19$ ). However, there were 14 (9.7%) residents who experienced an increase in educational activities. Use of distance learning platforms was reported by all respondents, with 39.6% ( $n = 57$ ) noting a positive impact on their education and 38.9% ( $n = 56$ ) noting no change. However, 21.5% ( $n = 31$ ) believed distance learning had a negative impact on their education. Nearly two-thirds of residents (64.6%,  $n = 93$ ) would like to see distance learning options continue long term after the pandemic. About half believed there would still be lost training experiences and continued attempt to catch up on clinical or academic training requirements 1 year later (55% and 47%, respectively).

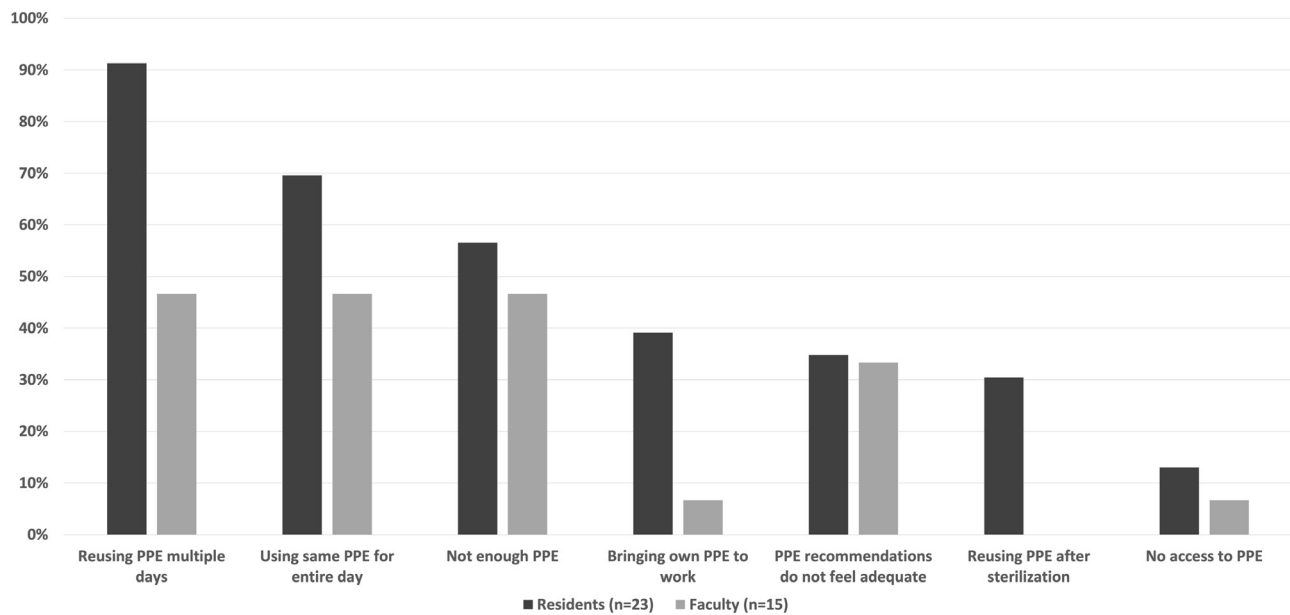
### Safety and wellness

#### Personal protective equipment

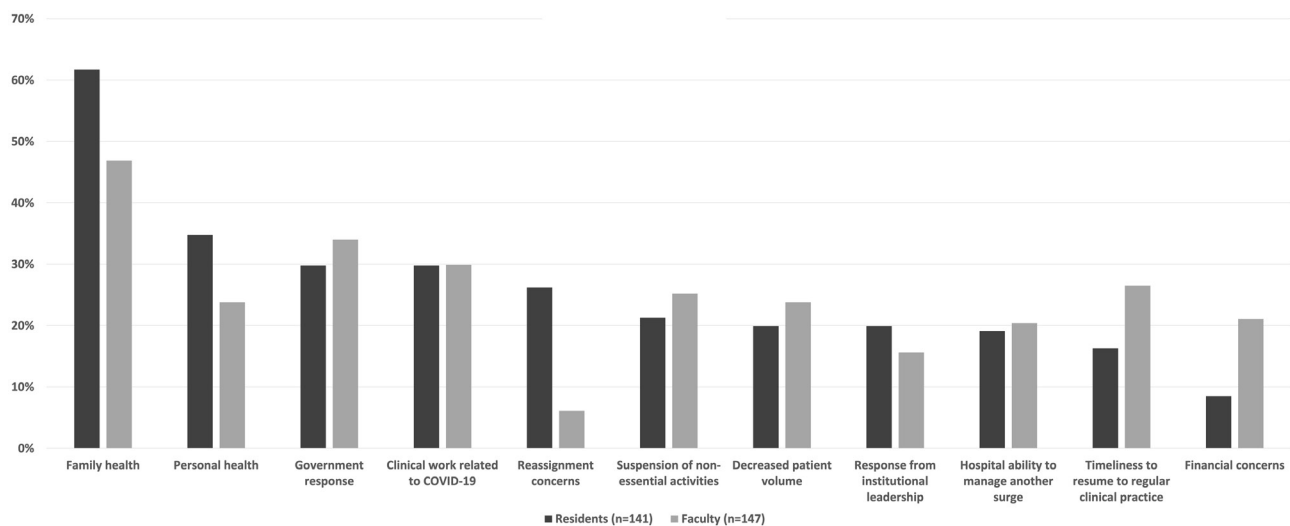
Most respondents felt safe with the level of PPE provided by their institution (82.8%,  $n = 125/151$  residents and 86.1%,  $n = 130/151$  faculty). However, there were residents and faculty who did not feel safe (15.2%,  $n = 23$  and 9.9%,  $n = 15$ , respectively). The top three reasons for feeling unsafe included lack of adequate PPE, need to use the same PPE for the whole day and need to reuse the same PPE for multiple days (Fig. 1). Although most residents and faculty noted they had been fit tested for a N95/respirator at some point (94.7%,  $n = 143$  residents and 74.8%,  $n = 113$  faculty) only about half of residents and faculty had been fit tested prior to the pandemic (58.9%,  $n = 89$  and 49%,  $n = 74$ , respectively). Most residents (88.7%,  $n = 134$ ) and faculty (86.8%,  $n = 131$ ) were offered training on how to properly don and doff PPE, but some did not participate in the training even when offered (7.5%,  $n = 10$  residents and 13.7%,  $n = 18$  faculty). Three-quarters of residents and faculty reported feeling safer caring for high-risk patients with this training (75.4%,  $n = 101$  and 77.1%,  $n = 101$ , respectively).

#### Well-being

Among respondents completing the PWBI, 16.8% of residents ( $n = 24/143$ ) and 24.5% of faculty ( $n = 36/147$ ) screened positive for higher distress. For those completing the single-item burnout measure, 39.7% of residents ( $n = 56/141$ ) and 35.4% of faculty ( $n = 52/147$ ) scored positive for burnout. Although higher level of burnout was highly correlated with lower well-being for residents and faculty (Spearman's Rho = 0.737,  $P < 0.0001$ ), burnout was not significantly different among those who were reassigned versus not reassigned (residents  $P = 0.164$ ; faculty  $P = 0.064$ ). Using a scale of 1–10 (1 = not worried to 10 = extremely worried), there remained moderate concern about the pandemic among both residents and faculty at the time of survey (mean  $4.7 \pm 2.14$  for residents,  $4.46 \pm 2.22$  for faculty). The most commonly identified stressor by both residents and faculty was concern for their families' health, with residents slightly more likely to also report personal health as a stressor



**Figure 1.** Perceptions around institution-provided PPE in 38 surveyed family medicine physicians and residents who felt unsafe during the initial pandemic surge (2020).



**Figure 2.** Top stressors related to the COVID-19 pandemic in 288 surveyed family medicine physicians and residents during the initial pandemic surge (2020).

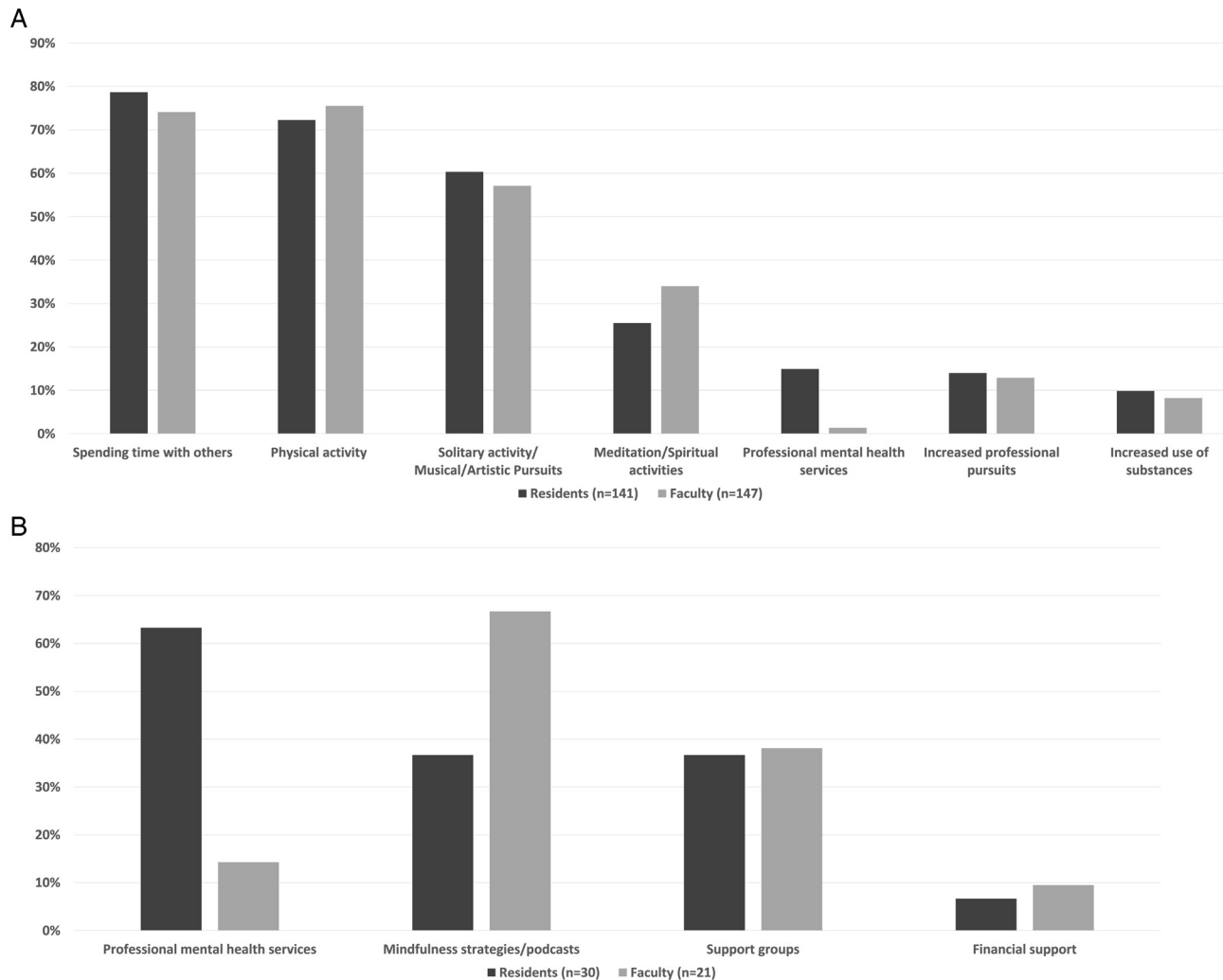
(Fig. 2). The most common coping mechanisms were spending time with family and friends, physical activity or solitary activities/musical or artistic pursuits (Fig. 3a). A minority reported unhealthy mechanisms such as tobacco, alcohol or other substance use (9.9%,  $n = 14$  residents and 8.2%,  $n = 12$  faculty).

Most respondents (91% of both residents and faculty) reported emotional well-being or other supportive services were offered by their institution during the pandemic. More residents than faculty report accessing these services (28.1%,  $n = 36$  and 18%,  $n = 24$ , respectively). Among these respondents, most believed the accessed services were helpful (83.3%,  $n = 30$  residents and 87.5%  $n = 21$  faculty) with residents much more commonly using professional mental health services while faculty used mindfulness strategies or podcasts (Fig. 3b). Furthermore, residents who accessed these services were more likely to have higher burnout scores ( $P = 0.035$ ) and poorer levels of well-being ( $P = 0.031$ ) than faculty.

Most residents and faculty were able to identify positive changes during the pandemic (73%,  $n = 103/141$  and 81%,  $n = 119/147$ , respectively). Both groups identified more time with loved ones (41.8%,  $n = 59$  residents and 57.1%,  $n = 84$  faculty) and self-care activities (37.6%,  $n = 53$  residents and 35.4%,  $n = 52$  faculty), and an increased sense of shared purpose/camaraderie with colleagues (34.8%,  $n = 49$  residents and 43.5%,  $n = 64$  faculty). Residents also identified more time for self-directed learning (43.3%,  $n = 61$ ), and faculty identified greater pride in their work (31.9%,  $n = 47$ ).

## Discussion

The impact of the pandemic on medical professionals and trainees has been profound and will likely have long-lasting effects. Our study is one of the first to report the clinical, educational and



**Figure 3.** (a) Top coping strategies during the initial COVID-19 pandemic surge in 288 surveyed family medicine physicians and residents (2020). (b) Top institutional provided well-being support services in 51 family physicians and residents who perceived the services as helpful (2020).

well-being experiences and perceptions of family medicine residents and teaching faculty during the initial phase of this pandemic. The majority of the respondents indicate changes to all aspects assessed in this study.

We found that similar to previously published US ambulatory care data, the majority of residents and faculty report a reduction in clinical activity and a significant rise in telehealth (26). Since telehealth has emerged as a potentially valuable patient care and educational component for family physicians, we must consider innovative ways to continue to expand access when appropriate such as group telehealth visits (27). Educational implementation may result in less exposure to certain clinical cases and may result in gaps in resident education that require curricular changes.

Resident reassignment was a unique aspect of the COVID-19 response during the initial phase of the pandemic. While the majority of resident respondents noted a high level of comfort in their institutions or program directors making decisions about reassignment, we need to explore reasons for those identifying lower levels of comfort and ensure there are oversight mechanisms for adherence to ACGME requirements for appropriate levels of supervision and work hours. In addition, those reassigned should have proper experience with navigating hospital settings and be equipped to adapt to these changes (9).

In-person didactics and other educational activities have been largely replaced by virtual learning platforms. For maximum effect, we must consider utilizing distance learning techniques that are learner-centred and less cognitively taxing to include small group and interactive discussions (28,29). As the pandemic continues, exploring how to leverage the positives of distance learning while identifying problems and solutions is essential.

Residents and faculty experienced significant stress as a result of changes to clinical duties and perceptions around safety, reminding us that we must offer proper training and planning in anticipation of such events. In addition, residents reported worrying more than faculty about personal and family health impacts from the pandemic, which is interesting considering their overall younger age and therefore lower risk profile. We suspect that the constant change and lack of personal control that is unique to residency training contributes to this discrepancy. Nevertheless, access to and training for proper use of PPE is crucial to the safety and education of learners (30). One recent study found that primary care physicians form the largest subset of physician deaths from the COVID-19 pandemic (31). The authors hypothesize that this may be due to more frequent interactions with asymptomatic patients and lack of adequate PPE compared with other frontline physicians (31). Our study found that those who did not

feel safe with the PPE provided by their institution cited reuse as their major concern followed by inadequate availability of PPE. A recent study found that reuse or inadequate PPE were each associated with subsequent increased risk of COVID-19 infection in frontline health care workers (32). We found that education on proper PPE use improves perceptions of safety. PPE education may also reduce the risk of subsequent infection due to self-contamination during repeated application and removal (32).

High burnout and declining well-being were found to be significantly correlated for both residents and faculty but were not correlated with reassignment of clinical duties. Use of professional mental health services was low for residents, though interestingly, much lower for faculty. The vast majority of those who used institution-provided emotional well-being or support services found them helpful. Residents who participated in support activities had significantly higher burnout scores and poorer levels of well-being, on average, than those not participating in support activities. We hypothesize that higher levels of burnout or stress are motivating factors for residents to seek out support. This highlights the need for particular support of trainees during this unprecedented time and the importance of increased awareness to monitor for more long term effects.

Finally, we noted some positive impacts from the pandemic on the various outcome measurements targeted in our survey. A significant number of residents and faculty reported an increased sense of purpose, camaraderie and pride. The silver lining of the tremendous need for frontline clinicians has likely helped foster camaraderie, courage, empathy and teamwork among residents (33). To fully benefit, medical educators should incorporate reflective practice into their curricula which can encourage metacognition and deep introspection (34). Unsurprisingly, the majority of residents and faculty reported finding stress relief from common activities like exercise, solitary time and time with loved ones. We suggest greater access to these self-care activities during work hours may be helpful not only during the pandemic, but long term. We uncovered a small but significant amount of reported tobacco, alcohol and other dangerous coping mechanisms. While our numbers are similar to the estimated 10–15% of physicians who will abuse drugs or alcohol at some point in their careers, we suspect that the pandemic represents a potential precipitant of these behaviours (35,36). Because physicians tend to present with more advanced addictive disease compared with non-physicians, we must remember to proactively address substance abuse issues that may precipitate from this pandemic (36).

There were multiple limitations to our study. We anticipated it would be difficult to reach all potential respondents given the large number of family medicine trainees and faculty and the lack of a central accessible list serve. It is important to note, however, that our survey distribution method was intended to reach a wide and diverse population across the country with a goal to collect foundational data to direct future studies with higher response rates. To our knowledge and despite this challenge, our study is the largest on the impact of the pandemic on family medicine training. This approach, however, prohibited our ability to measure a true response rate or perform any responder versus non-responder comparisons (e.g. assess for response biases). Therefore, inference from our results across the entire family medicine population is uncertain. Furthermore, the cross-sectional nature of our study limits our ability to confirm the directionality of observed associations. In addition, while we received responses from a variety of geographical regions, it would be difficult to measure local geographic conditions as it could vary considerably even within the same state

and may depend on patient demographics and comorbidities and available resources. However, these data can serve as hypothesis generating for future studies. Additionally, there was some bias in our survey distribution. Out of necessity, we relied on program directors to distribute the survey to their residents and faculty, and thus subjects may have felt pressure to participate. Some respondents may have been hesitant to report concerns about PPE or violations in work hours and/or supervision. We hoped to decrease these instances by making the survey completely anonymous and voluntary. Furthermore, we recognize the selection bias for residents or faculty who had strong feelings being more likely to respond. In addition, those who were especially adversely affected from burnout or unhealthy coping mechanisms may have been less likely to complete the survey. These two biases could lead to either an over or underestimate of these adverse impacts. Finally, as a potentially unique population, our data may not be generalizable to other health care practitioners outside of family medicine physicians.

## Conclusions

This national survey of family medicine residents and teaching faculty demonstrates the profound effect the COVID-19 pandemic has had on clinical care, education, safety and well-being. Medical professionals are continuing to adapt their practices to respond to the pandemic and it is imperative that institutions continue to prioritize the safety and well-being of frontline health care workers and the training of the next generation of physicians. Future studies should focus on confirming these findings and explore potential mitigation factors in addressing consequences of globally disruptive events such as COVID-19 on clinical activity, educational training and personal safety and well-being.

## Declaration

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Ethical approval: this study was deemed exempt by the Colorado Multiple Institutional Review Board.

Conflict of interest: none.

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