


# The Early Impact of COVID-19 on Ophthalmology Resident Training and Wellness

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## Abstract

**Objective** The aim of this article is to assess the initial impact of the coronavirus disease 2019 (COVID-19) pandemic on ophthalmology resident training and wellness.

**Design** Online national survey of ophthalmology residents distributed by residency program directors and education coordinators of participating programs.

**Setting** US ophthalmology residency programs during the COVID-19 pandemic (May 20th, 2020 to June 10th, 2020).

**Participants** Ophthalmology residents enrolled in the US residency programs currently in postgraduate years two through four of training.

**Results** Two-hundred thirty-six of 785 (30.1%) residents responded to the survey. One-hundred eighteen of 234 (50.4%) residents reported exposure to known COVID-19 positive patients, and of those exposed, 44 of 118 (37.2%) felt that they did not have adequate personal protective equipment. One-hundred ninety-five of 233 (83.7%) residents reported a decrease in primary surgical cases during the pandemic, with 68 (29.2%) reporting a loss of more than 50 primary cases. One-hundred sixty-four of 234 (70.1%) residents were concerned that the pandemic would negatively impact their surgical skills beyond residency, and 15% reported that they were more likely to pursue fellowship due to the pandemic. 31.0% of residents met criteria of burnout, 9.1% were depressed, and 13.4% had generalized anxiety. Concerns about COVID-19 infection were correlated with increased anxiety and burnout during the pandemic.

**Conclusions** The COVID-19 pandemic has decreased resident surgical and clinical volumes and has negatively impacted ophthalmology residency training. Residents with increased concern for contracting COVID-19 and those actively engaged in a job search had significantly higher odds of increased anxiety.

## Keywords

- ▶ ophthalmology residency
- ▶ COVID-19
- ▶ coronavirus
- ▶ wellness
- ▶ physician burnout

The coronavirus disease 2019 (COVID-19) pandemic has made an unprecedented impact on the healthcare system in the United States and worldwide. On March 18, 2020, the American Academy of Ophthalmology (AAO) stated that “it is essential that all ophthalmologists cease providing any treatment other than urgent or emergent care immediately” to reduce virus transmissibility and allow resources to be

directed toward COVID-19 patients.<sup>1</sup> As a result, there were drastic changes to ophthalmology practice across the United States. According to an AAO Member Pulse survey conducted in April 2020, 95% of practices were seeing 25% or less of their pre-COVID-19 patient volumes, and 81% were seeing less than 10% of their pre-COVID-19 surgical volumes.<sup>2</sup>

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As hospitals and clinics across the nation faced drastic reductions in clinical volume, there were undoubtedly impacts on ophthalmology resident education and well-being.<sup>3</sup> We sought to estimate the impact of the nation's initial COVID-19 response on ophthalmology resident education and well-being to address the concerns of our current trainees and recent graduates as they prepare to enter practice in the context of the continued COVID-19 pandemic.

## Methods

This study was IRB-exempt from the University of Washington Institutional Review Board (IRB). All ophthalmology residents in postgraduate years (PGY)-two through four

years who were enrolled in a US ophthalmology residency program were eligible to participate. A 36-item electronic survey was distributed by email to all US ophthalmology residency program directors and coordinators in May 2020, and the email was forwarded to ophthalmology residents by participating programs. Participation in the survey was anonymous and voluntary. The survey was open from May 20th, 2020 to June 10th, 2020.

The survey included questions regarding sociodemographic and COVID-19 related changes to clinical responsibilities, wellness, and career plans (– **Table 1**). Respondents reported the state in which their residency was located, and these responses were coded into regions using US Census guidelines.<sup>4</sup> Accreditation Council for Graduate Medical

**Table 1** Demographics and COVID-19 related changes in residency training

Survey response ( <i>n</i> = total number of responses per question)	Number of residents (%) or mean ± SD
<b>Demographics</b>	
Age ( <i>n</i> = 232)	30.4 ± 2.43
Gender: male ( <i>n</i> = 232)	131 (56.4%)
Marital status: married ( <i>n</i> = 232)	125 (53.9%)
Parent: yes ( <i>n</i> = 234)	60 (25.6%)
Year of training ( <i>n</i> = 232)	
PGY-2	75 (32.3%)
PGY-3	67 (28.9%)
PGY-4	90 (38.8%)
Region of residency ( <i>n</i> = 229)	
South	64 (27.9%)
Midwest	59 (25.8%)
Northeast	57 (24.9%)
West	47 (20.5%)
<b>COVID-19 related changes to clinical duties</b>	
Deployed to provide clinical care outside of ophthalmology due to COVID-19 ( <i>n</i> = 233)	34 (14.6%)
In a risk pool to be deployed	75 (32.2%)
Duration of non-ophthalmology clinical duties ( <i>n</i> = 34)	
< 1 wk	1 (2.9%)
> 4 wk	6 (17.6%)
Reduced clinical duties ( <i>n</i> = 233)	219 (94.0%)
Seeing urgent patients only ( <i>n</i> = 233)	206 (88.4%)
Initiating or increasing telehealth ( <i>n</i> = 233)	143 (61.4%)
Elimination of OR time ( <i>n</i> = 233)	167 (71.7%)
>50 primary surgical cases canceled ( <i>n</i> = 233)	68 (29.2%)
<b>Concerns regarding COVID-19 exposure</b>	
Concern regarding contracting COVID 19 on a scale of 1–5 ( <i>n</i> = 232)	3.18 ± 1.00
Known COVID-19 exposure in the clinical setting ( <i>n</i> = 234)	118 (50.4%)
Inadequate PPE at times ( <i>n</i> = 118)	44 (37.2%)
Have contracted COVID-19 ( <i>n</i> = 234)	2 (0.009%)
<b>Impact of COVID-19 on career plans and skills</b>	
Concerned about impact of COVID-19 on: ( <i>n</i> = 234)	

(Continued)

**Table 1** (Continued)

Survey response ( <i>n</i> = total number of responses per question)	Number of residents (%) or mean $\pm$ SD		
Surgical skills	164 (70.1%)		
Clinical skills	108 (46.2%)		
Job prospects	135 (57.7%)		
More likely to pursue fellowship ( <i>n</i> = 233)	35 (15.0%)		
Positive impact of COVID-19 ( <i>n</i> = 229)			
More time to sleep	165 (72.1%)		
More time to study	161 (70.3%)		
More time with family	152 (66.4%)		
More time for research	151 (65.9%)		
Negative impact of COVID ( <i>n</i> = 234)			
Isolation from colleagues, peers, friends/family	208 (88.9%)		
Inability to travel during vacation	194 (82.9%)		
Stress or anxiety regarding family and personal health	161 (68.8%)		
Stress regarding re-deployment	119 (50.9%)		
<b>Burnout, depression, anxiety, and satisfaction</b>			
Positive burnout screen ( <i>n</i> = 232)	72 (31.0%)		
Positive anxiety screen ( <i>n</i> = 231)	31 (13.4%)		
Positive depression screen ( <i>n</i> = 221)	21 (9.1%)		
Satisfaction with specialty choice on 1–5 scale ( <i>n</i> = 233)	4.54 $\pm$ 0.69		
Changes related on sleep and wellness during COVID-19 hospital response			
	Decreased	Unchanged	Increased
Sleep while ON call ( <i>n</i> = 216)	22 (9.8%)	74 (34.3%)	124 (57.4%)
Number of encounters on call ( <i>n</i> = 216)	174 (80.6%)	37 (17.1%)	5 (2.3%)
Physical activity ( <i>n</i> = 227)	78 (34.4%)	47 (20.7%)	102 (44.9%)
Burnout ( <i>n</i> = 223)	107 (48.0%)	66 (29.6%)	50 (22.4%)
Anxiety ( <i>n</i> = 227)	44 (19.4%)	66 (29.1%)	117 (51.5%)

Abbreviations: COVID-19, coronavirus disease 2019; PGY, postgraduate year; PPE, personal protective equipment.

Education data was used to calculate the total number of residents meeting inclusion criteria and resident response rate from programs confirming participation.<sup>5</sup>

To quantify resident wellness, items from validated questionnaires were used verbatim within the survey. Burnout was assessed using the Maslach Burnout Inventory 2-item survey,<sup>6</sup> depression was assessed using the Patient Health Care Questionnaire 2,<sup>7</sup> and anxiety was assessed using the Generalized Anxiety Disorder 2-item screen.<sup>8</sup>

Statistical analysis was conducted using Stata 13.1. Responses were analyzed using descriptive statistics, and free-response answers were categorized. Logistic regression was used to calculate odds ratios. A *p*-value < 0.05 was considered statistically significant.

## Results

Fifty-seven of 123 (46.3%) ophthalmology residencies confirmed participation and forwarding of the survey to a total

of 785 residents, and 236 (30.1%) responded to the survey. Two responses from PGY-1 residents were excluded as they did not meet our inclusion criteria.

The results of the survey are shown in **Table 1**. We found that approximately half (50.4%) of all respondents reported exposure to known COVID-19 positive patients, and among these, 37.2% felt that they did not have adequate personal protective equipment (PPE). Nearly all residents (94.0%) reported a decrease in clinical duties due to COVID-19, and 84% of residents reported a decrease in primary surgical cases with 29.2% reporting a loss of more than 50 primary surgical cases. Most (70.1%) residents were concerned that the pandemic would negatively impact their surgical skills beyond residency and 50.7% were concerned that COVID-19 would negatively impact their ability to find employment. Fifteen percent of residents reported that they were more likely to pursue fellowship due to the pandemic.

From the validated survey questions, 31% residents screened positive for burnout, 9.1% residents screened

positive for depression, and 13.4% residents screened positive for generalized anxiety. Specialty satisfaction continued to be high when measured on a Likert scale from 1 to 5, with 5 being “most satisfied” ( $4.54 \pm 0.69$ ). Those who expressed higher concern for contracting COVID-19 were more likely to experience burnout and anxiety, and those who were redeployed for nonophthalmology clinical duties were more likely to experience anxiety (► **Table 2**). PGY-2 residents had higher odds of burnout and depression, and residents who reported being parents had lower odds of burnout (► **Table 2**).

Fifty-two percent of the respondents reported increased anxiety during the pandemic; these residents had higher odds of reporting increased concern of contracting COVID-19 and being currently engaged in a job search (► **Table 3**). Forty-eight percent of the respondents reported a decrease in burnout during their hospital’s COVID-19 response. These residents had higher odds of reporting increased sleep, physical activity, time for research, and time to study due to the pandemic (► **Table 3**).

## Discussion

Our survey administration period of May to June 2020 was timed to capture the initial impact from the pandemic, during which surgical and clinical visits were significantly reduced. Our findings describe the short-term effects on the training and perspectives of ophthalmology residents, and it remains to be seen what lasting effects the pandemic will have on clinical competence, fellowship decisions, and future employment.

The pandemic also presents a unique situation for assessing resident well-being. We previously found a high prevalence of

burnout among ophthalmology residents due to factors such as inadequate sleep on call, long work hours, and high clinical volumes.<sup>9</sup> As most residents reported a drastic decrease in clinical and call volumes during the pandemic response, it was not surprising to find the 31% prevalence of burnout in our study was lower than previous national surveys (55.8<sup>9</sup>–63.3%<sup>10</sup>).

Despite the decrease in resident workload and burnout, many pandemic-related factors negatively affected resident well-being. More than half the residents in our study reported increased anxiety during the pandemic. Although only 14.6% of residents were deployed to clinical duties outside ophthalmology, 50.4% were exposed to known COVID-19 positive patients, suggesting that most exposures had occurred in an ophthalmology setting. While having exposure to known COVID-19 patients did not affect the odds of any measure of well-being, greater concern regarding contracting COVID-19 resulted in increased odds of anxiety and burnout. Because 37% of those with COVID-19 exposures felt they did not always have adequate PPE, this may reflect delays or inconsistency in institutional implementation of appropriate PPE.<sup>11</sup> Similarly, 38% of residents reported a high (at least 4 out of 5) level of concern regarding contracting COVID-19, possibly due to ophthalmologists being at higher risk for contracting COVID-19.<sup>12</sup> Trainees in other specialties have similarly expressed personal concern of acquiring and transmitting COVID-19 to family members.<sup>13–16</sup>

Part of the COVID-19-related anxiety is likely associated with the uncertainty of the pandemic’s future course. While many practices have now resumed average clinical volumes,<sup>17</sup> there is continued fear of the pandemic’s effect on future surgical caseloads, job prospects, and continued

**Table 2** Factors affecting burnout, anxiety, and depression

	Positive GAD Screen OR (95% CI) <i>p</i> -Value	Positive MBI Screen OR (95% CI) <i>p</i> -Value	Positive PHQ Screen OR (95% CI) <i>p</i> -Value
Year in training			
PGY-2	1.62 (0.75–3.52) 0.22	2.10 (1.17–3.76) 0.01	2.53 (1.02–6.26) 0.04
PGY-3	0.43 (0.16–1.18) 0.10	0.78 (0.42–1.48) 0.45	0.55 (0.18–1.71) 0.31
PGY-4	1.16 (0.54–2.50) 0.71	0.59 (0.33–1.08) 0.09	0.60 (0.22–1.62) 0.31
Parent	0.52 (0.19–1.42) 0.20	0.35 (0.17–0.75) 0.007	0.28 (0.06–1.25) 0.10
Region			
South	0.71 (0.29–1.74) 0.45	0.89 (0.47–1.12) 0.70	0.46 (0.13–1.65) 0.23
Midwest	1.09 (0.46–2.61) 0.85	0.56 (0.28–3.16) 0.10	2.01 (0.74–5.46) 0.17
Northeast	2.30 (1.03–5.15) 0.04	1.69 (0.90–2.28) 0.10	1.18 (0.40–3.48) 0.76
West	0.38 (0.11–1.33) 0.13	1.15 (0.58–4.08) 0.68	0.75 (0.21–2.69) 0.65
Redeployed to nonophthalmology clinical duties	3.64 (1.53–8.69) 0.004	1.94 (0.92–1.51) 0.08	2.02 (0.69–5.95) 0.20
Concern for contracting COVID-19 (1–5 scale)	1.70 (1.12–2.56) 0.01	1.39 (1.05–3.30) 0.02	1.12 (0.71–1.76) 0.64
Exposure to COVID-19 positive patients	1.47 (0.68–3.16) 0.32	1.54 (0.90–2.62) 0.11	0.74 (0.30–1.82) 0.51

Abbreviations CI, confidence interval; COVID-19, coronavirus disease 2019; GAD, Generalized Anxiety Disorder 2-item; MBI, Maslach Burnout Inventory 2-item survey; OR, odds ratio; PGY, postgraduate year; PHQ, Patient Health Care Questionnaire 2.

**Table 3** Factors contributing to increased anxiety or decreased burnout

	Increased anxiety OR (95% CI) <i>p</i> -Value	Decreased burnout OR (95% CI) <i>p</i> -Value
Concern for contracting COVID-19 (1–5 scale)	2.01 (1.51–2.69) <0.001	0.84 (0.65–1.08) 0.17
Exposure to COVID-19 positive patients	1.14 (0.67–1.91) 0.6	0.93 (0.55–1.56) 0.8
Currently applying for a job	2.01 (1.51–2.69) 0.02	0.34 (0.12–0.96) 0.04
Reported that pandemic has caused:		
Increased sleep on call	0.56 (0.33–0.93) 0.03	3.39 (1.98–5.81) <0.001
Increased time to sleep overall	0.37 (0.21–0.68) <0.001	8.42 (4.02–17.6) <0.001
Increased physical activity	0.81 (0.48–1.36) 0.43	2.58 (1.52–4.40) <0.001
Increased time for research	0.57 (0.33–0.98) 0.04	1.99 (1.14–3.46) 0.02
Increased time with family	0.47 (0.27–0.81) 0.007	1.41 (0.82–2.42) 0.22
Increased time to study	0.46 (0.26–0.82) 0.008	3.77 (2.04–7.00) <0.001

Abbreviations: CI, confidence interval; COVID-19, coronavirus disease 2019; OR, odds ratio.

exposure risks. This survey provides insight into resident concerns as we move forward in upcoming phases of the pandemic; institutions will need to continue to develop PPE protocols that make trainees feel protected and programs will need to work individually with residents to ensure surgical and clinical competency despite interruptions to anticipated caseloads.

Unfortunately, ophthalmology trainees will continue to observe the economic disruptions caused by the virus and its effect on the job market. Whether the initial short-term reduction in clinical and surgical volume found in this survey will have a true impact on resident preparedness for clinical practice is unknown. At this time, there is high anxiety and concern surrounding the effects of COVID-19 on clinical skills and the ability to secure employment. According to our survey, this concern may manifest with an increase in fellowship applications for this and following years. Armed with this knowledge, ophthalmology residency programs around the country should be ready to counsel each resident individually about future career plans to determine the best course of action, whether that include an extension of residency training or additional fellowship training.

Our study has several limitations. Only 43% of ophthalmology residencies confirmed survey distribution, limiting our reach to just over half (785/1473, 53%) of residents meeting our inclusion criteria.<sup>5</sup> Of those residents who received the survey, the number that answered was only 30%. Overall, 236 responses represent a small fraction of ophthalmology residents in the United States, though this is similar to previous national ophthalmology resident surveys.<sup>10,18</sup> Residents with concerns about COVID-19 or those impacted more strongly by COVID-19 may be more likely to participate, which may have biased the results by overestimating the impact of the pandemic.

## Conclusions

While this survey assesses the impact to ophthalmology residents in particular, other surgical specialties have experi-

enced similar changes to training volumes and resident well-being.<sup>14,19,20</sup> There will continue to be future unavoidable decreases to clinical and surgical volumes due to COVID-19, and it is important for residency training programs to understand the potential impact to this future generation of surgeons and to prepare accordingly. Most importantly, we must prioritize trainee safety by enforcing PPE guidelines and minimizing known COVID-19 exposure as much as possible.

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### Conflict of Interest

None declared.

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