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Effects of the COVID-19 lockdown on Canadian ophthalmologists: a survey

Many health care fields, including ophthalmology, were not equipped to manage the logistical, emotional, and mental stresses of the SARS-CoV-2 (COVID-19) pandemic. Ophthalmologists were required to rapidly adapt to virtual health care delivery, a less efficient way of practice for such a procedure-based specialty. Moreover, a decrease in patient encounters caused financial setbacks for many ophthalmologists. The true impact of the pandemic at both professional and personal levels on Canadian ophthalmologists is unknown. Consequently, this study investigates the experiences of Canadian ophthalmologists during the pandemic. Understanding these challenges will provide guidance for physicians when traditional services are limited.

A web-based survey was emailed to all members of the Canadian Ophthalmological Society on November 3 and 17, 2020. Survey questions targeted the months March through July 2020 to capture a specific period when ophthalmologists were first adjusting to new COVID-19 health guidelines and restrictions. Responses were collected until December 31, 2020. This study was approved by the Ottawa Health Science Network Research Ethics Board.

A total of 164 responses were collected (14.5% response rate). Demographic and professional characteristics of respondents are displayed in Table 1. Of note, we also performed a subgroup analysis and found no significant differences between subspecialists (Appendix A, available online). Our study results revealed that many ophthalmologists (83.5%) experienced a reduction in workload that negatively impacted patient health outcomes. This unfortunate reality of delayed care highlights the need for well-established telehealth and infection protocols to allow continued health care delivery. Ophthalmologists’ decreased workload also was reflected in changes in income across all subspecialties, with 77.4% reporting a 50%–100% decrease, whereas only 7.3% saw no decrease. These financial cuts were an additional stressor to practitioners during these unprecedented times.

Owing to the pandemic, many ophthalmologists (59.7%) shifted to practicing telemedicine at least a quarter of the time, but only 4.8% reported their experience using telemedicine as “excellent,” and 18.5% reported it as “good.” With varied experiences, it is unclear whether ophthalmologists will continue to use telemedicine after the pandemic. Participants were split, with 33.4% reporting that they would, 42.4% reporting that they would not, and 18.6% unsure. Regardless of ophthalmologist preference, it is likely that this technology will play a role in some practices and will require well-developed infrastructure to do so.

Table 1 — Descriptive statistics for all survey questions

| Demographic questions                                      | n (%)  | Missing (%) |
|-----------------------------------------------------------|--------|-------------|
| What is your age?                                         |        |             |
| <30 years                                                 | 6 (3.7) |             |
| 30–39 years                                               | 29 (17.7)|             |
| 40–49 years                                               | 24 (14.6)|             |
| 50–59 years                                               | 43 (26.2)|             |
| ≥60 years                                                 | 58 (35.4)|             |
| What is your sex?                                         |        |             |
| Female                                                    | 62 (37.8)|             |
| Male                                                      | 95 (57.9)|             |
| In what province(s) or territory do you work?             |        |             |
| Ontario                                                   | 65 (39.6)|             |
| British Columbia                                         | 30 (18.3)|             |
| Quebec                                                    | 20 (12.2)|             |
| Alberta                                                   | 17 (10.4)|             |
| Nova Scotia                                               | 12 (7.3)|             |
| Manotoba                                                  | 6 (3.7)|             |
| New Brunswick                                             | 5 (3)  |             |
| Prince Edward Island                                     | 3 (1.8)|             |
| Saskatchewan                                              | 2 (1.2)|             |
| Yukon                                                     | 2 (1.2)|             |
| Newfoundland and Labrador                                 | 1 (0.6)|             |
| Northwest Territory                                       | 1 (0.6)|             |
| Where do you practice?                                    |        |             |
| Urban–suburban                                            | 135 (82.3)|             |
| Rural–town                                                | 23 (14) |             |
| Prefer not to say                                         | 6 (3.7)|             |
| Which level of practice are you currently in?             |        |             |
| Attending physician                                       | 150 (91.5)|             |
| Residency                                                 | 10 (6.1)|             |
| Fellowship                                                | 4 (2.4)|             |
| What type of clinical setting do you practice/work in?    |        |             |
| Private practice                                           | 108 (65.9)|             |
| Academic hospital                                         | 45 (27.4)|             |
| Hospital clinic                                            | 6 (3.7)|             |
| Community health centre                                   | 2 (1.2)|             |
| Other                                                     | 3 (1.8)|             |
| Which subspecialty are you practicing or currently training in? |        |             |
| General                                                   | 93 (56.7)|             |
| Anterior segment                                          | 28 (17.1)|             |
| Cornea                                                    | 18 (11) |             |
| Glaucoma                                                  | 37 (22.6)|             |
| Medical retina                                            | 21 (12.8)|             |
| Vitreoretinal surgery                                     | 11 (6.7)|             |
| Neuro-ophthalmology                                       | 15 (9.1)|             |
| Ocular oncology                                           | 1 (0.6)|             |
| Oculoplastic surgery                                      | 21 (12.8)|             |
| Pediatric ophthalmology                                   | 10 (6.1)|             |
| Refractive surgery                                         | 9 (5.5)|             |
| Strabismus                                                | 7 (4.3)|             |
| Uveitis                                                   | 15 (9.1)|             |

Professional impacts of COVID-19 questions

Which of the following options best reflects your current situation with COVID-19?

- Asymptomatic and no COVID-19 testing done: 102 (62.2)
- Asymptomatic and tested negative for COVID-19: 37 (22.6)
- Asymptomatic but was in contact with patient with COVID-19: 5 (3)
- Asymptomatic but in contact with patient with COVID-19: 7 (4.3)
- Asymptomatic but was in contact with patient with COVID-19: 0 (0)
- Nonspecific cold or gastrointestinal symptoms but did not get tested: 1 (0.6)
- Symptomatic and tested positive for COVID-19: 2 (1.2)
- Symptomatic and tested positive for COVID-19: 2 (1.2)

(continued)
During the COVID-19 restrictions from March to July 2020, including yourself, how many individuals lived in your residence from March to July 2020 owing to COVID-19 restrictions?

Table 1—Continued

| Demographic questions | n (%) | Missing (%) |
|-----------------------|-------|-------------|
| How did you practice ophthalmology during the March–July 2020 period of the COVID-19 pandemic? | | |
| Not currently practicing/unemployed | 6 (3.7) |  |
| Practicing from home (e.g., telemedicine, video conferencing patients) | 38 (23.2) |  |
| Working in clinic setting part time (e.g., emergency cases only) | 115 (70.1) |  |
| Working in clinic setting full time | 48 (29.3) |  |
| How did your workload change during the March–July 2020 period of the COVID-19 restrictions? | | |
| Decreased | 137 (83.5) |  |
| Increased | 11 (6.7) |  |
| Stayed the same | 8 (4.9) |  |
| What percentage of your monthly income dropped during March–July 2020 owing to COVID-19 restrictions? | | |
| 0 | 12 (7.3) |  |
| 20 | 17 (10.4) |  |
| 50 | 51 (31.1) |  |
| 75 | 68 (38.4) |  |
| 100 | 13 (7.9) |  |
| What percentage of your work was telemedicine versus face-to-face clinical practice during March–July 2020? | | |
| Telemedicine 0% of the time | 58 (35.4) |  |
| Telemedicine 25% of the time | 53 (32.3) |  |
| Telemedicine 50% of the time | 17 (10.4) |  |
| Telemedicine 70% of the time | 25 (15.2) |  |
| Telemedicine 100% of the time | 3 (1.8) |  |
| If you practiced ophthalmology using telemedicine during the COVID-19 pandemic, how has your experience been while using telemedicine? | | |
| Excellent | 6 (4.8) |  |
| Good | 23 (14.5) |  |
| Natural | 47 (37.9) |  |
| Poor | 30 (24.2) |  |
| Very poor | 10 (8.2) |  |
| N/A | 40 |  |
| Do you envision yourself continuing to practice telemedicine beyond the COVID-19 pandemic? | | |
| Yes | 48 (33.4) |  |
| No | 81 (42.4) |  |
| I do not know | 27 (18.6) |  |
| N/A | 20 |  |
| In your experience, how did the COVID-19 pandemic impact the Canadian ophthalmology community? | | |
| Brought it closer than before | 54 (32.9) |  |
| Distanced the community apart | 43 (26.2) |  |
| Stayed the same | 59 (36) |  |
| Personal impacts of COVID-19 questions | | |
| Including yourself, how many individuals lived in your residence from March to July 2020? | 13 (7.9) |  |
| 0 | 2 (1.2) |  |
| 1 | 12 (7.9) |  |
| 2 | 37 (23.2) |  |
| 3 | 9 (5.6) |  |
| 4–5 | 11 (6.7) |  |
| 5 | 12 (7.3) |  |
| 6 | 8 (4.9) |  |
| 7 | 3 (1.8) |  |
| From March to July 2020, who was living in your residence? | | |
| Children | 89 (54.3) |  |
| Spouse | 129 (78.7) |  |
| Parent | 5 (3) |  |
| Sibling | 4 (2.4) |  |
| In-law | 3 (1.8) |  |
| Roommate | 4 (2.4) |  |
| Lived alone | 13 (7.9) |  |
| Prefer not to disclose | 5 (3) |  |
| During the COVID-19 restrictions from March to July 2020, how much free time did you feel you had compared with before the pandemic? | | |
| Much higher | 46 (28) |  |
| Higher | 62 (37.8) |  |
| No change | 23 (14) |  |
| Lower | 18 (11) |  |
| Much lower | 5 (3) |  |
| How would you rate your overall mental health from March to July 2020? | | |
| Very poor | 1 (0.6) |  |
| Poor | 66 (37.8) |  |
| Natural | 47 (37.9) |  |
| Good | 23 (14) |  |
| Excellent | 6 (3.7) |  |
| How would you rate your stress levels during March–July 2020 compared with before the pandemic? | | |
| Much higher | 46 (28) |  |
| Higher | 62 (37.8) |  |
| No change | 23 (14) |  |
| Lower | 18 (11) |  |
| Much lower | 5 (3) |  |
| How has COVID-19 affected your personal relationships? | | |
| Mostly positively affected my relationships | 50 (30.5) |  |
| Mostly negatively affected my relationships | 25 (15.2) |  |
| No change | 79 (48.2) |  |
| Did you engage in physical activity from March to July 2020? | | |
| Always | 41 (25) |  |
| Very often | 55 (33.5) |  |
| Sometimes | 34 (20.7) |  |
| Rarely | 20 (12.2) |  |
| Never | 4 (2.4) |  |
| The pandemic changed me in the following sense: | | |
| Made me more patient | 34 (20.7) |  |
| Made me less patient | 41 (25) |  |
| Made me more depressed/stressed | 66 (40.2) |  |
| Made me see life in a whole new way | 66 (40.2) |  |
| Made me appreciative and grateful | 93 (56.7) |  |

There was a wide range of personal and psychological impacts of COVID-19 on Canadian ophthalmologists. Although 69.5% of ophthalmologists reported having more free time during the period March–July 2020, 28% and 37.8% reported having “much higher” or “higher” stress levels, respectively. One comment highlighted a few of the pertinent stressors at the time: “Multiple sources of stress... COVID protocols, office issues, poor remuneration, no holiday time, telephone care of patients, etc.” (See Appendix B, available online, for additional comments that represent the mixed feelings ophthalmologists had toward the pandemic.) Given that practitioner well-being directly affects patient care, this is a worrisome finding. It is therefore important for strong employee wellness programs to prevent and mitigate burnout, including but not limited to promoting a healthy work environment, discussion groups, and mindfulness training.

Our study had a relatively low response rate, likely because participation was voluntary. Moreover, survey studies, especially those distributed digitally, are prone to sampling biases. Nevertheless, it has been argued that the representativeness of the population may be more important than the response rate. Our study participants are representative of Canadian ophthalmologists, that is, mainly from...
Ontario (39.6%) and working in private practice (66%) and urban–suburban areas (82%).

This is the first study that looks at the impacts of COVID-19 on Canadian ophthalmologists both professionally and personally. It identifies challenges and areas of improvement and serves as a meaningful learning opportunity for all physicians.

**Supplementary Materials**

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jcjo.2022.06.022.

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**References**

1. Kang L, Ma S, Chen M, et al. Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: a cross-sectional study. Brain Behav Immun 2020;87:11–7.
2. Blumenthal D, Fowler EJ, Abrams M, Collins SR. Covid-19—implications for the health care system. N Engl J Med 2020;383:1483–8.
3. Hollander JE, Carr BG. Virtually perfect? Telemedicine for COVID-19. N Engl J Med 2020;382:1679–81.
4. Patel RS, Bachu R, Adikey A, Malik M, Shah M. Factors related to physician burnout and its consequences: a review. Behav Sci 2018;8:98.
5. Kowalski LP, Imamura R, Castro Junior GD, et al. Effect of the COVID-19 pandemic on the activity of physicians working in the areas of head and neck surgery and otorhinolaryngology. Int Arch Otorhinolaryngol 2020;24:258–66.
6. Smith GM, Witte M, Rocha S, Basner M. Effectiveness of incentives and follow-up on increasing survey response rates and participation in field studies. BMC Med Res Methodol 2019;19:1–13.

**Footnotes and Disclosure**

The authors have no proprietary or commercial interest in any materials discussed in this article.