

Polish ophthalmology residents' perspectives from the battlefield in the time of the coronavirus disease 2019 pandemic: an online survey

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ABSTRACT

BACKGROUND: The aim of the study was to collect the opinions of ophthalmology residents on the impact of the coronavirus disease 2019 (COVID-19) pandemic on their working conditions, well-being, and specialisation training.

MATERIAL AND METHODS: We created an anonymous online survey with 41 closed and multiple-choice questions dedicated to Polish ophthalmology residents. The primary outcome measure was the degree of the negative impact of the COVID-19 pandemic on the implementation of the specialisation program in the field of ophthalmology, the acquirement of practical skills in ophthalmology, and the well-being of residents.

RESULTS: Sixty-six percent of respondents felt constant anxiety related to the pandemic, and 38% of residents constantly felt sad and depressed. Residents who worked with patients with COVID-19 expressed higher levels of anxiety at work than residents who did not work with such patients (5-point Likert scale score: 3.10 ± 1.16 vs. 2.64 ± 1.27 , respectively; $p = 0.049$).

CONCLUSIONS: Support from peers, seniors, faculties, and professional counsellors can be encouraging for residents during the COVID-19 pandemic and may be supportive for residents' well-being. In addition, the results accentuate the need to prepare appropriate psychological interventions to improve the residents' mental health in the event of a similar situation in the future.

KEY WORDS: COVID-19 pandemic; healthcare workers; ophthalmology residents; psychological support; quality of life

Ophthalmol J 2024; Vol. 9, 1–7

INTRODUCTION

The instant spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the first case of which was registered in Poland on March 4,

2020, has led to a complete reorganisation of not only units operating on the front line of the fight against the pandemic but also of the entire health-care system. Poland, the second most populous

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country in Central Europe, experienced a delayed and lower incidence of coronavirus disease 2019 (COVID-19) compared to the surrounding countries. However, unlike regions more affected by the pandemic, its hospitals have not been massively overloaded [1, 2]. Nevertheless, despite the initial success in flattening the COVID-19 curve, escalating restrictions, and further restructuring of the healthcare system (including opening hospitals dedicated to COVID-19), the pandemic negatively impacted Polish medical staff and their work.

Although SARS-CoV-2 is transmitted via droplets and ophthalmologists do not take an active part in the treatment of COVID-19, the pandemic influences all areas of ophthalmology, including emergency rooms, outpatient clinics, and elective surgeries, as well as ophthalmology residents' mental health. Ophthalmology is a surgical specialisation, and improving practical skills is one of the goals of the specialisation program. The suspension of admissions and elective procedures and the redistribution of ophthalmology residents to work in COVID-19 wards limited their opportunities to improve their professional qualifications. In addition, the close physical proximity between the doctor and the patient during the ophthalmological examination, as well as contact with eye secretions (the virus has been detected in tears and conjunctival fluids), raises the risk of infection, which negatively affects the medical staff's mental state and increases the risk of anxiety, depression, and insomnia [3–6]. Moreover, the deteriorating mental state of the medical staff during the pandemic may be associated with fear of infecting their families, insufficient access to personal protective equipment (PPE), physical and mental exhaustion, excessive workload, and a sense of hopelessness.

The advance of technology enabling quick access to a specific group of respondents has made surveys one of the most frequently used methods of obtaining information. In many countries in Europe and around the world, COVID-19-related surveys have already been conducted among residents of ophthalmology [7, 8] and other specialties, such as surgery [9], urology, [10] and anaesthesiology. Although the above-mentioned medical staff are not directly involved in the fight against the pandemic, the surveys revealed that the pandemic had a significant impact on the course of residency and the functioning of their departments [11, 12]. We decided to use a survey for this study, the aim of which was to collect the opinions of ophthalmology

residents on the impact of the COVID-19 pandemic on their working conditions, mental health, and specialisation training. In order to illustrate the changes brought about by the pandemic and obtain first-hand information, an online questionnaire was created and disseminated via e-mail and social media. This allowed us to reach a large group of residents from all over the country. To our knowledge, our study is the first conducted among ophthalmology residents in Poland to assess the impact of the COVID-19 pandemic on their well-being, training, and clinical practice.

MATERIAL AND METHODS

The study was conducted in accordance with the tenets of the 1964 Declaration of Helsinki and its amendments. The study was approved by the Bioethics Committee of the Medical University of Białystok (no. APK.002.87.2021). Our anonymous online questionnaire was created using Google Forms and distributed via e-mail and WhatsApp messenger. In addition, it was shared on the social media profile of Professor Marek Rękas, the national consultant for ophthalmology, from 1 to 14 March 2021. The anonymous survey consisted of 41 closed, multiple-choice questions. Volunteers completed the questionnaire at home in their free time.

The questionnaire was divided into four sections:

- sociodemographic data;
- the course of specialisation training and workplace conditions;
- well-being during the pandemic;
- opinions on COVID-19 vaccinations.

Before the publication of the survey, we conducted a pilot study on a group of 12 residents to optimize it. The participants read all the questions and were interviewed to determine whether the questionnaire was understandable. Based on these interviews, we made minor adjustments to the questionnaire. One of the questions concerned the respondents' consent to the statistical analysis and scientific publication of their responses. The exclusion criterion was the lack of consent for data analysis and/or publication. Of the 127 respondents who completed the questionnaire, the data of one participant was excluded for this reason. Contribution to the study was anonymous and voluntary.

We analysed the literature regarding ophthalmology residents' mental health and constructed our survey accordingly by adjusting to the Pol-

ish healthcare system and the current pandemic situation. The collected data were cleaned afterward: the responses were entered into the spreadsheet, and negatively phrased questions were reverse-coded. The responses were evaluated to ensure that responses to negatively phrased questions were consistent with the answers to the positively phrased questions. We also assessed the minimum and maximum values for the questionnaire.

Statistical analysis

Statistical analysis was performed using R software, version 3.5.1. The normality of the distribution of quantitative variables was assessed using the Shapiro-Wilk test, indicators of skewness and kurtosis of the data, and visual assessment of histograms. The equality of variances was evaluated using Levene's test. Statistical hypotheses were tested using the chi-square test or Fisher's exact test for qualitative variables. The t-test or Mann-Whitney U test was used for hypotheses pertaining to continuous variables between two groups. An analysis of variance with the Tukey post-hoc test or the Kruskal-Wallis test with Dunn's post-hoc test was used to compare quantitative variables among three or more groups. The significance level was set as $p = 0.05$.

RESULTS

Socio-demographic data are summarised in Table 1, and the pandemic's impact on specialisation training and workplace conditions are sum-

| Sociodemographic data | Respondents (%) (n = 126) |
|-------------------------------------|------------------------------|
| Sex | |
| Female | 102 (81.0%) |
| Male | 24 (19.0%) |
| Marital status | |
| Single | 53 (42.1%) |
| Married with children | 46 (36.5%) |
| Married without children | 27 (21.4%) |
| Lives with | |
| Family | 61 (48.4%) |
| Partner | 36 (28.6%) |
| Friends | 1 (0.8%) |
| Alone | 28 (22.2%) |
| Place of residence | |
| Countryside | 9 (7.1%) |
| City up to 50,000 inhabitants | 6 (4.8%) |
| City of 50,000–150,000 inhabitants | 19 (15.1%) |
| City of 150,000–500,000 inhabitants | 35 (27.8%) |
| City over 500,000 inhabitants | 57 (45.2%) |

marised in Tables 2 and 3. Residents transferred to COVID-19 wards expressed a more significant negative impact of the pandemic on implementing the ophthalmology specialisation program and acquiring surgical skills than those not transferred to COVID-19 wards. Women declared a more significant negative impact of the pandemic on the completion of the ophthalmology specialisa-

Table 2. Impact of coronavirus disease 2019 (COVID-19) on course of specialisation training and workplace conditions depending on the workplace

| Parameter | Respondents n (%) | Transferred to COVID-19 ward n (%) | Not transferred to COVID-19 ward n (n) | p |
|-------------------------------------------------------------------------------------------|----------------------|---------------------------------------|-------------------------------------------|-------|
| Degree of negative impact of the pandemic on implementation of the specialisation program | 113 | 37 | 76 | |
| < 25% | 28 (24.8) | 4 (10.8) | 24 (31.6) | 0.008 |
| 25–50% | 49 (43.4) | 14 (37.8) | 35 (46.1) | |
| 50–75% | 23 (20.4) | 11 (29.7) | 12 (15.8) | |
| 75–100% | 13 (11.5) | 8 (21.6) | 5 (6.6) | |
| Degree of negative impact of pandemic on acquisition of practical skills | 112 | 38 | 74 | |
| < 25% | 16 (14.3) | 3 (7.9) | 13 (17.6) | 0.014 |
| 25–50% | 50 (44.6) | 14 (36.8) | 36 (48.6) | |
| 50–75% | 26 (23.2) | 8 (21.1) | 18 (24.3) | |
| 75–00% | 20 (17.9) | 13 (34.2) | 7 (9.5) | |

| Parameter | Respondents n (%) | Women n (%) | Men n (%) | p |
|----------------------------------------------------------------------------------------------------------------|-------------------|-------------|-----------|-------|
| Degree of negative impact of COVID-19 pandemic on completion of specialisation program in ophthalmology | 113 | 93 | 20 | |
| < 25% | 28 (24.8) | 19 (20.4) | 9 (45.0) | 0.015 |
| 25–50% | 49 (43.4) | 40 (43.0) | 9 (45.0) | |
| 50–75% | 23 (20.4) | 23 (24.7) | 0 | |
| 75–100% | 13 (11.5) | 11 (11.8) | 2 (10.0) | |
| Degree of negative impact of pandemic on acquirement of practical skills | 112 | 93 | 19 | |
| < 25% | 16 (14.3) | 9 (9.7) | 7 (36.8) | 0.021 |
| 25–50% | 50 (44.6) | 44 (47.3) | 6 (31.6) | |
| 50–75% | 26 (23.2) | 24 (25.8) | 2 (10.5) | |
| 75–100% | 20 (17.9) | 16 (17.2) | 4 (21.1) | |

| Questionnaire item | Total group ¹ | MD (95% CI) |
|---------------------------------------------------------------------------------------|--------------------------|---------------------|
| I am experiencing severe anxiety at work during the COVID-19 pandemic | 2.79 ± 1.25 | 0.10 (–0.53; 0.74) |
| I am experiencing severe anxiety outside of work/at home during the COVID-19 pandemic | 2.53 ± 1.52 | 0.19 (–0.54; 0.93) |
| I am feeling very depressed at work during the COVID-19 pandemic | 2.67 ± 1.35 | 0.42 (–0.16; 0.98) |
| I am feeling very depressed outside of work/at home during the COVID-19 pandemic | 2.51 ± 1.31 | –0.20 (–0.89; 0.49) |

CI — confidence interval; MD — weighted mean of differences (women minus men); ¹five-point Likert scale: 1 — “definitely NO”, 5 — “definitely YES”

tion program and the acquisition of surgical skills than men.

The scores for mental health items in the questionnaire are summarised in Table 4, and responses regarding the need for mental support are summarised in Table 5. Sixty-six percent of respondents felt constant anxiety related to the pandemic, and 38% of residents constantly felt sad and depressed. Residents who worked with patients with COVID-19 expressed higher levels of anxiety at work than residents who did not work with such patients (3.10 ± 1.16 vs. 2.64 ± 1.27 , respectively; $p = 0.049$).

DISCUSSION

Data from the survey obtained directly from Polish ophthalmology residents indicate the sig-

| Questionnaire item | Respondents (%) (n = 126) |
|----------------------------------------------------------------------------------|---------------------------|
| Fear of SARS-CoV-2 infection | 89 (70.6%) |
| Fear of infecting family members | 116 (92.1%) |
| Fear of infecting patients | 88 (69.8%) |
| Fear of negative impact of the pandemic on specialisation training | 113 (89.7%) |
| Presence of mental support programs for medical staff during the pandemic | |
| Yes | 17 (13.5%) |
| No | 62 (49.2%) |
| I don't know | 47 (37.3%) |
| Using mental support programs during the pandemic | |
| Yes | 6 (4.8%) |
| No | 120 (95.2%) |

COVID-19 — coronavirus disease 2019; SARS-CoV-2 — severe acute respiratory syndrome coronavirus 2

nificant impact of the changes introduced during the pandemic on their mental health, working conditions, and quality of life. The effect of ophthalmology residency can be divided into two aspects: increasing knowledge and improving surgical skills. The COVID-19 pandemic has caused many problems related to the basic residency training program. While theoretical training is necessary to expand residents' knowledge, practice is essential to improve their skills [13, 14]. As theoretical training can be conducted through webinars, the pandemic likely has a more minor effect on this aspect of medical education. However, the situation is different for the second aspect, as webinars are not appropri-

ate tools to improve surgical experience and skills. Owing to the transfer of several ophthalmology residents to emergency departments, as well as the suspension of planned operations and a significant reduction in emergency operations, the training of young ophthalmologists in Poland was almost completely disrupted. Residents could not engage in surgical activities during the pandemic's first months. The majority of residents participating in our survey (88.9%) stated that the pandemic negatively influenced their achieving of surgical skills. This result is consistent with that of Hope et al. [15], who reviewed the impact of the pandemic on training in surgical specialties such as general surgery, neurosurgery, orthopaedics, and urology. They revealed that COVID-19 has had a negative impact on all surgical specialties. The number of procedures performed by residents and the possibility of their gaining experience were reduced. Residents also raised concerns about their ability to meet training requirements [15]. In our study, 89.7% of respondents reported that the pandemic has negatively impacted their medical progress. In similar studies published in other countries, the percentage of respondents reporting the same problem was comparable, ranging from 81% to 93.8% [3, 8, 16].

In our study, relatively few ophthalmologists had been redirected to fight the pandemic in COVID-19 wards (32.7%). Although most respondents remained in their wards (67.3%), their opinions regarding the influence of the pandemic on the course of training were very similar to those of emergency medicine or infectious diseases residents who worked with COVID-19 patients daily. Surgical practice is essential in improving the skills of doctors specialising in surgery and thus is crucial for ophthalmology residents. Their lack of exposure to surgical practice during the first period of the pandemic was unfortunate.

The main change observed in medical education was the introduction of online teaching. Our survey shows that most ophthalmology residents in Poland (94%) used virtual learning methods during the pandemic. These results are similar to those of Weygandt et al. [17]. In the author's study on a large group of emergency medicine residents in the United States, almost all respondents (99%) reported taking online courses. Moreover, this way of teaching was prevalent in all wards, regardless of whether they were dedicated to patients with COVID-19 [18].

Physical and mental exhaustion from caring for patients during a pandemic can lead to burnout [19]. Our study showed that even residents who are at lower risk of contracting the virus suffer psychological consequences owing to many factors. Feelings of fear, anxiety, and vulnerability described in the literature among doctors fighting on the front line [20–24] are also not uncommon among ophthalmology residents.

Other studies also confirmed a link between work conditions and feelings of depression and anxiety. A study by Drobnic et al. revealed that work conditions significantly impact quality of life, resulting in lower satisfaction with life. Specifically, the

development of the pandemic has forced the health system to reorganise work and prioritise patients with COVID-19 completely. Consequently, medical staff were assigned to work with patients infected with SARS-CoV-2. One-third of our respondents were trained to work with patients with COVID-19 either in special ophthalmological departments or general COVID-19 wards. In other countries, this percentage varies from 5% to 25%. We confirmed that residents working with patients with COVID-19 had a significantly higher level of anxiety at work. This is consistent with the results of a study on Saudi residents, which indicated that first-line health work is significantly linked to insomnia and anxiety. It also revealed that being a woman in that environment was strongly associated with depression, stress, and anxiety. In our study, the risk of contracting SARS-CoV-2 was the leading cause of respondents' fears: 70.6% of respondents feared contracting the virus at work, 92.1% transmitting it to family members, and 69.8% transmitting it to patients. Similar conclusions were reported in Canada: 58% of Canadian eye doctors feared contracting COVID-19, 86% — transmitting the virus to family and friends, and 75% — transmitting it to patients.

Most of our survey participants (71.4%) were willing to be vaccinated against SARS-CoV-2. The fear of self-infection and infecting relatives were common motivations for vaccination, as well as the desire to set a good example for others. Lou et al. [25] revealed that, among healthcare workers, the rate of motivation to be vaccinated for COVID-19 was highest (76.9%) among those at the front lines in university hospitals and centres for COVID-19 diagnosis [26]. Surprisingly, their results were similar to ours among ophthalmology residents. The underlying cause may be the low avail-

ability of PPE, commonly identified as the main stress factor among emergency medicine physicians [27]. Although most respondents did not have direct contact with patients with COVID-19 daily, 50.8% of respondents stated that the PPE supply was insufficient. Our research also showed that residents living with family or close relatives were more likely to be vaccinated than single residents and those without children. These individuals might have been less afraid of COVID-19 because most of them were young and, thus, less susceptible to experiencing severe symptoms.

Limitations

This study has a few limitations. The first is that most participants were women ($n = 102$). This limits the generalisability of the results. The consistency of the results may be limited owing to the use of an online survey, which did not allow the researchers to assess the soundness of the information provided by the respondents. In addition, comparisons of our results with those obtained in other countries (Spain, UK, or Portugal) should be treated with caution, as differences between them have many explanations, including cultural biases in reporting mental health, differences in the policy of introducing COVID-19 restrictions, and differences in compliance with COVID-19 policies. Moreover, our team did not include a psychologist to assess the mental health of respondents professionally.

CONCLUSIONS

This study suggests the need for suitable psychological and psychiatric support for residents during the COVID-19 pandemic. Appropriate psychological interventions may be needed to improve residents' well-being in the event of a similar crisis in the future.

In conclusion, the pandemic has had a considerable impact not only on doctors specialising in dealing with patients with COVID-19 but also on those in other specialisations. Maintaining the effectiveness of specialisation training is essential to prevent potential negative influence on education in the field of ophthalmology. We believe that the results of this study expand our knowledge of the psychological needs of ophthalmology residents as well as changes in working conditions in ophthalmology wards during the pandemic. They may also allow us to suggest actions to improve the course of

specialisation training and the mental comfort of the medical staff. Further studies, especially those with a more extended observation period, would enhance our understanding of the impact of the pandemic on the level of depression, anxiety, and stress of medical residents.

Acknowledgements

None.

Conflicting interest

Authors declare no conflict of interests.

Author contributions

Conceptualisation — J.K.; methodology — J.K. and I.O.; software — Ł.L.; validation — I.O., M.R., and J.K.; investigation — N.D.; writing — original draft preparation — J.K. and D.D.; writing — review and editing — I.O.; supervision — M.R. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no funding.

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