BMC Primary Care

RESEARCH

Open Access

# The well-being of Polish general practitioners during the COVID-19 pandemic-cross-sectional questionnaire-based study

Katarzyna Nessler[1*], Krzysztof Studziński[1], Esther Van Poel[2], Sara Willems[2], Ewa Wójtowicz[1], Elżbieta Kryj – Radziszewska[1] and Adam Windak[1]

## Abstract

**Background** The COVID-19 pandemic has caused psychological distress to the population and healthcare workers. Physicians' well-being is essential and contributes significantly to overall health. This study aimed to assess the strain on Polish general practitioners from the effects of the COVID-19 pandemic and to ascertain the potential predictors of their distress.

**Methods** Data was collected using a self-reported online questionnaire from 162 GPs in Poland between December 2020 and August 2021 as part of the international PRICOV-19 study. General practitioners' well-being was evaluated using the validated Mayo Clinic's expanded 9-item well-being index (eWBI). Spearman's correlation was used to measure the strength and direction of association between general practitioners' distress level and continuous variables, and for ordinal variables, Gamma correlation was recommended for many tide ranks. We also checked the association of the level of distress with continuous variables by categorizing them and applying the Kruskal-Wallis test likewise for a comparison of the distress in different practice locations.

**Results** A vast majority (80%) of respondents were considered at risk of distress during the COVID-19 outbreak, with an eWBI score of 2 or more. Higher distress scores were exhibited among general practitioners who reported increased responsibilities during the COVID-19 pandemic and perceived need for additional training. The experience of collaboration with neighbouring practices and the provision of adequate governmental support emerged as significant protective factors against distress. No correlation was observed between Polish general practitioners' distress level and years of professional experience, number of patients in the practice, number of doctors working there, the practice's location, or working with more vulnerable patient populations.

**Conclusions** Our findings proved that COVID-19 placed an extraordinary emotional burden on Polish general practitioners and highlighted the importance of targeted support services and resource allocation to primary healthcare in Poland in case of any potential future crisis similar to the COVID-19 pandemic.

**Keywords** COVID-19, Primary healthcare, General practitioners, Well-being, Poland

*Correspondence:
Katarzyna Nessler
katarzynanessler@gmail.com

[1]Department of Family Medicine, Jagiellonian University Medical College, Kraków 31-061, Poland
[2]Department of Public Health and Primary Care, Ghent University, Ghent 9000, Belgium

## Introduction

With over 6.5 million deaths and 618 million confirmed infections, the COVID-19 pandemic has incurred tremendous financial costs, extensive logistical and infrastructural reorganization, and has heavily affected frontline healthcare workers [1]. Primary care operations have dramatically altered, notably through an increase in teleconsultations at the expense of in-person appointments and an increased use of infection prevention and control (IPC) measures, including personal protective equipment (PPE) and decontamination protocols [2–5]. When combined with other sources of stress related to the pandemic, including a lack of government support, increased workload, changes in work patterns, and treatment delays, a tremendous burden has befallen general practitioners (GPs) as they work to identify and manage COVID-19 cases [6, 7]. This burden has manifested as adverse psychological and professional effects on general practitioners, leading to tangible reductions in the quality of care [8–10].

The effects of the pandemic on the mental health of general practitioners are a subject of increasing interest, with concerns mounting due to the inherent vulnerability of these professionals in times of health crises. GPs have suffered an increase in negative psychological symptoms, including anxiety, depression, emotional exhaustion, social issues, and burnout, amongst several others [11–13]. These manifestations result from increased infection risk, work-related stress, and fears of transmitting COVID-19 to family members. They can potentially reduce patient-care quality levels and negatively impact the overall effectiveness of global health systems [11–15].

Primary healthcare in Poland was crucial in addressing the COVID-19 pandemic by managing the influx of patients, providing initial diagnosis, and ensuring continuity of care for COVID and non-COVID conditions. General practitioners were the frontline responders, assessing patients remotely through telemedicine, monitoring mild-to-moderate COVID-19 cases at home, and deciding when hospitalization was necessary for severe cases. General practitioners were also responsible for coordinating testing, advising on isolation protocols, and later supporting the national vaccination campaign, ensuring high-risk populations were prioritized.

Between January 2020 and August 2021, Poland faced a severe COVID-19 crisis, with more than 75,000 deaths by August 2021 [16]. Excess mortality in Poland was among the highest in the EU and caused life expectancy to fall temporarily by 1.4 years between 2019 and 2020. In 2020, excess mortality in Poland was generally greater than COVID-19 mortality, particularly during autumn. Over the same period, excess mortality from March to December 2020 (80.000 deaths) exceeded the reported COVID-19 deaths (29.100). Older people were disproportionately affected by excess mortality, with deaths among people aged over 65 accounting for 94% of all excess deaths in 2020 [16]. The actual number of deaths from COVID-19 is likely to be higher than officially reported because of limited testing and issues related to the attribution of causes of death.

Primary healthcare in Poland played a critical role in managing COVID-19 during this period despite being overwhelmed by the scale of the pandemic, particularly during the third wave in early 2021.

During the COVID crisis in 2020–2021, GPs in Poland encountered high burnout and stress worldwide [17–19]. GPs were often overloaded with COVID-19 cases and anxious about exposure, safety, and lack of resources. In Poland, as well as in other countries, anxiety, depression, and burnout were disturbing healthcare workers, and many general physicians lost their capacity for positive emotions as well as for their patients. Likewise, there was a global picture as healthcare workers endured extensive working hours due to a lack of adequate staff as well as the distressing responsibility that accompanied taking care of severely sick patients in the wake of the pandemic.

Understanding the challenges GPs have faced as they work through the COVID-19 pandemic, including the adaptations they have implemented and changes in their psychological well-being, is critical for aiding healthcare workers and improving the responsiveness of healthcare systems. Efforts have been made in several countries to explore their GPs' response to the COVID-19 pandemic, its associated challenges, and its effects on general practitioners' well-being [20–24].

Limited data is available on the changes in well-being experienced by Polish general practitioners due to the COVID-19 pandemic.

Therefore, our study aimed to answer the following questions:

1. How much emotional burden and threat to the sense of well-being was the COVID-19 pandemic for Polish general practitioners?
2. What variables characterizing the doctors, their practice, and the support system they received correlated with the intensity of the sense of threat related to the pandemic?

*The answers to the above questions should help identify potential future improvement elements in similar crises.*

## Materials and methods

### Study design

This study is part of the PRICOV-19 project (PRICOV-19: Quality and safety in PRImary care in times of COVid-19), a cross-sectional investigation coordinated

by Ghent University which was conducted to explore the effects of COVID-19 on primary care practices across 37 European countries and Israel [25]. The Department of Family Medicine of Jagiellonian University Medical College in Krakow coordinated and conducted the Polish part of the project. PRICOV-19 study received approval from the Research Ethics Committee at Ghent University Hospital (nr BC-07617). The Bioethics Committee at Jagiellonian University approved surveying Poland (nr 1072.6120.302.2020). Permission to use the Mayo Clinic Wellbeing Index was granted, and the expanded 9-item Wellbeing Index (eWBI) version was used in the study questionnaire [25, 26]. The study was conducted according to the guidelines of the Declaration of Helsinki. All Polish participants had signed the informed consent.

### Study tool

The study methodology and data handling protocol have been published elsewhere [25]. Shortly, the PRICOV-19 questionnaire was developed and validated by the research team at Ghent University. The final questionnaire consisted of 53 items divided into six sections: patient flow, infection prevention, information processing, communication with patients, collaboration, collegiality, self-care, and characteristics of participants and GP practices, and is available as supplementary material [Supplementary 1]. Two independent researchers translated the English version forward and backward and piloted it with ten Polish GPs. The final Polish version was uploaded to the Electronic Data Capture (REDCap) platform [26].

The questionnaire used in the study included the expanded 9-item Wellbeing Index (eWBI) [27]. This tool was designed to assess distress across various dimensions of distress and well-being, including quality of life, meaning in work, likelihood of burnout, fatigue, work-life balance, and suicidal ideation in the last month. Participants responded to seven items with 'yes' (assigned 1 point) or 'no' (0 points). The remaining two items used Likert scale answers. For these, the selection of 'strongly disagree' or 'disagree' added a point, while 'agree' or 'strongly agree' subtracted a point. Neutral responses did not change the calculations (0 points). A cumulative score of 2 or more indicated a risk of distress.

### Sampling

Details of recruitment strategies, data collection and participation rates in the PRICOV-19 study were reported elsewhere [28]. In Poland, data was collected from December 2020 till August 2021. For the entire population of 22,000 GPs, the minimum sample size, assuming an 80% Confidence Level and a 5% Margin of Error, was calculated to be 163 [29]. A convenience sample of GPs was recruited from 16 regions of Poland in proportion to the number of inhabitants of each area, the number of participating practices being estimated by the study protocol. After receiving the agreement to conduct the study from practice managers, one general practitioner from each practice was approached by telephone and email. Two additional reminders were sent to non-respondents. Those doctors who returned a signed informed consent form were included in the study and received the link to the online questionnaire.

### Statistical analysis

The descriptive analyses are given in percentages (for categorical variables) or means with standard deviations and medians with interquartile ranges (for continuous variables). To measure the strength and direction of the association between GPs' distress level and continuous variables, we used Spearman's correlation (for the number of patients in the practice and the number of doctors working there). For ordinal variables, Gamma correlation was recommended for many tide ranks. We also checked the association of the level of distress with continuous variables by categorizing them and applying the Kruskal-Wallis test likewise for a comparison of the distress in different practice locations. A P-value of $<0.05$ was considered as the level of statistical significance. All analyses were completed with the Statistica 13 software package (Statsoft Inc.).

## Results

### Characteristics of the general practitioners and their practices

207 Polish GPs were recruited; however, not all questions from the expanded 9-item Wellbeing Index were filled out completely, and as a result, after data cleaning, answers from 162 respondents with valid eWBI scores were included in the study (response rate 78%). A comprehensive overview of respondents and their practice characteristics is outlined in Table 1. Approximately 80% of respondents provided information about their experience as a GP. Roughly one-quarter of them had less than 15 years of experience, while a similar proportion possessed at least 25 years of practice. Predominantly (69.7%), practices were within urban and suburban areas. The distribution of GPs managing practices was relatively equitable, with an inclination towards practices comprising 3–4 GPs. Regarding patient demographics, approximately one-third of respondents indicated that the proportion of patients over 70 in their practice exceeded the Polish average. Conversely, the proportion of patients experiencing financial difficulties was less than 10%.

### The distribution of eWBI scores

Among respondents, the total eWBI scores ranged from −2 to 8, with a mean of 3.5 (SD 2.4) and a median of 3.

**Table 1** Main characteristics of the general practitioners and their practices during the COVID-19 pandemic ($n=162$)

| | | *n* | % |
|---|---|---|---|
| GP Individual Factors | | | |
| | Years of experience ($n=130$) | | |
| | 0–14 | 34 | 26.2 |
| | 15–24 | 58 | 44.6 |
| | 25 + | 38 | 29.2 |
| Practice Factors | Location of practice ($n=162$) | | |
| | Big (inner) city | 83 | 51.2 |
| | Suburbs /(Small) town | 30 | 18.5 |
| | Mixed urban—rural | 24 | 14.8 |
| | Rural | 25 | 15.4 |
| | Number of GPs ($n=162$) | | |
| | 1 | 36 | 22.2 |
| | 2 | 33 | 20.4 |
| | 3—4 | 52 | 32.1 |
| | 5+ | 41 | 25.3 |
| | Patients over the age of 70 ($n=158$) | | |
| | Below average | 23 | 14.6 |
| | Approx. average | 85 | 53.8 |
| | Above average | 50 | 31.6 |
| | Patients with financial problems ($n=151$) | | |
| | Below average | 30 | 19.9 |
| | Approx. average | 108 | 71.5 |
| | Above average | 13 | 8.6 |

Lower scores on the scale denote better well-being, while higher scores denote heightened distress (see Table 2). Notably, 80.2% (130 out of 162) of respondents garnered a score of ≥ 2, indicating a susceptibility to distress.

### Assessment of the impact of the COVID-19 pandemic on general practice

Table 3 presents the findings regarding GPs' perceptions of the repercussions of the COVID-19 pandemic on their practices.

The results indicate that many respondents encountered challenges during the pandemic. Specifically, 66% reported a lack of support from other practices in their vicinity if staff were absent due to COVID-19. Moreover, 65.4% expressed dissatisfaction with the government's provision of adequate support for the proper functioning of their practice. Furthermore, a vast majority (90.7%) observed an increase in their responsibilities since the outbreak of COVID-19. Almost 60% of respondents confirmed insufficient time to review guidelines and scientific literature.

### Analysis of potential predictors for GPs' distress (total eWBI score) during the COVID-19 pandemic

Our findings revealed a lack of correlation between Polish GPs' years of professional experience and their level of

**Table 2** GPs' eWBI components and total scores during the COVID-19 pandemic ($n=162$)

| | | *n* | % |
|---|---|---|---|
| During the past month, have you felt burned out from your work? | No | 42 | 25.9 |
| | Yes | 120 | 74.1 |
| During the past month, have you worried that your work is hardening you? | No | 23 | 14.2 |
| | Yes | 139 | 85.8 |
| During the past month, have you often been bothered by feeling down. depressed. or hopeless? | No | 72 | 44.4 |
| | Yes | 90 | 55.6 |
| During the past month, have you fallen asleep while sitting inactive in a public place? | No | 147 | 90.7 |
| | Yes | 15 | 9.3 |
| During the past month, have you felt that all the things you had to do were piling up so high that you could not overcome them? | No | 67 | 41.4 |
| | Yes | 95 | 58.6 |
| During the past month, have you been bothered by emotional problems (such as feeling anxious. Depressed or irritable)? | No | 37 | 22.8 |
| | Yes | 125 | 77.2 |
| During the past month, has your physical health interfered with your ability to do your daily work at home and/or away from home? | No | 105 | 64.8 |
| | Yes | 57 | 35.2 |
| The work I do is meaningful to me. | 1 (Strongly disagree) | 4 | 2.5 |
| | 2 | 2 | 1.2 |
| | 3 | 4 | 2.5 |
| | 4 | 7 | 4.3 |
| | 5 | 26 | 16.0 |
| | 6 | 40 | 24.7 |
| | 7 (Strongly agree) | 79 | 48.8 |
| My work schedule leaves me enough time for my personal/family life. | 1 (Strongly disagree) | 44 | 27.2 |
| | 2 | 37 | 22.8 |
| | 3 | 40 | 24.7 |
| | 4 | 29 | 17.9 |
| | 5 (Strongly agree) | 12 | 7.4 |
| eWBI scores | -2 | 5 | 3.1 |
| | -1 | 4 | 2.5 |
| | 0 | 9 | 5.6 |
| | 1 | 14 | 8.6 |
| | 2 | 24 | 14.8 |
| | 3 | 26 | 16.0 |
| | 4 | 13 | 8.0 |
| | 5 | 26 | 16.0 |
| | 6 | 29 | 17.9 |
| | 7 | 10 | 6.2 |
| | 8 | 2 | 1.2 |
| | 9 | 0 | 0.0 |

Mean 3.5; SD 2.4; Median: 3.0

**Table 3** Respondents' opinions of the effects of the COVID-19 pandemic on their practice

| | *n* | Strongly Disagree % | Disagree % | Neutral % | Agree % | Strongly Agree % | Mean (SD) |
|---|---|---|---|---|---|---|---|
| If staff members in this practice are absent because of COVID-19 this practice can count on the help of other PC practices in the neighbourhood | 150 | 28.7 | 37.3 | 12.7 | 18.0 | 3.3 | 1.30 (1.16) |
| There is adequate support from government for proper functioning of practice | 159 | 25.8 | 39.6 | 20.1 | 12.6 | 1.9 | 1.25 (1.04) |
| Since COVID-19 my responsibilities in this practice increased | 162 | 0.6 | 7.4 | 1.2 | 40.7 | 50.0 | 3.32 (0.88) |
| I need further training for these amended responsibilities since COVID-19 | 161 | 8.7 | 27.3 | 14.9 | 44.1 | 5.0 | 2.09 (1.12) |
| Since COVID-19 in this practice there is enough protected time provided for reviewing guidelines scientific literature | 160 | 31.3 | 26.9 | 10.6 | 23.1 | 8.1 | 1.50 (1.36) |

**Table 4** Results of analysis of potential predictors for GPs' distress (total eWBI score) during the COVID-19 pandemic

| | *n* | gamma coefficient | *p* |
|---|---|---|---|
| *If staff members in this practice are absent because of COVID-19, the work can be distributed in such a way that the well-being of colleagues is not compromised* | 160 | -0,28 | $p < 0.0005$ |
| *If staff members in this practice are absent because of COVID-19, this practice can count on the help of other PC practices in the neighbourhood* | 150 | -0,15 | 0,0308 |
| *The COVID-19 pandemic has promoted cooperation with other PC practices in the neighbourhood* | 154 | -0,15 | 0,0318 |
| *The guidelines imposed by the government on PC practices as a consequence of COVID-19 pose a threat to the good organisation of this practice* | 160 | 0,16 | 0,0123 |
| *The guidelines imposed by the government on PC practices as a consequence of COVID-19 pose a threat to the personal well-being of the staff in this practice* | 161 | 0,21 | 0,0013 |
| *Adequate support is provided by the government for the proper functioning of this practice* | 159 | -0,22 | 0,0011 |
| *If staff members leave this practice, is there a transfer to another colleague of the files that need follow-up?* | 144 | -0,15 | 0,0326 |
| *Since the COVID-19 pandemic, my responsibilities in this practice increased* | 162 | 0,35 | $p < 0.0005$ |
| *I am happy with the task shifting in my professional role since the COVID-19 pandemic* | 158 | -0,38 | $p < 0.0005$ |
| *I do not feel prepared for the task shifting in my professional role since the COVID-19 pandemic* | 160 | 0,33 | $p < 0.0005$ |
| *I need further training for these amended responsibilities since the COVID-19 pandemic* | 161 | 0,32 | $p < 0.0005$ |

distress. Similarly, no correlation was observed between general practitioners' distress and various factors characterizing their practices, including the number of patients on their lists, the number of doctors working there, or the extent to which they worked with more vulnerable patient populations. Also, the location of the practice was not a significant factor overall.

Table 4 displays the analysis results concerning GPs' distress and various potential practice-related predictors. Respondents who reported an increase in responsibilities since the COVID-19 pandemic, as well as with a perceived need for additional training, exhibited higher distress scores. Conversely, the experience of collaboration with neighbouring practices and the provision of adequate governmental support emerged as significant protective factors against distress.

## Discussion

### Summary of main findings

The study revealed that Polish GPs experienced significant challenges during the COVID-19 pandemic. More than 80% of respondents were considered at risk of distress.

A substantial proportion of respondents reported a lack of support from other practices in their neighbourhood (66%) and dissatisfaction with government support (65.4%) for the proper functioning of their practices. Additionally, 90.7% of GPs observed an escalation in their responsibilities since the COVID-19 outbreak, indicating a substantial strain on their workload. Notably, only around one-third (31.2%) agreed they needed more time to review guidelines or read the relevant scientific literature, potentially hindering their ability to stay up-to-date with evolving medical recommendations.

Respondents who reported an increase in responsibilities since the COVID-19 pandemic, as well as those perceiving a need for additional training, exhibited higher distress scores. Conversely, the experience of collaboration with neighbouring practices and the provision of adequate governmental support emerged as significant protective factors against distress.

No correlation was observed between Polish GPs' distress level and various factors, including years of experience, the number of patients in the practice, the number of doctors working there, the practice's location, or working with more vulnerable patient populations.

### Comparison with other publications

The percentage of the respondents considered at risk of distress is significantly higher than those reported by Belgian or European GPs in total, 57% and 64%, respectively [11].

Our study identified that the increased responsibilities following the COVID-19 outbreak and inadequate governmental support were crucial contributors to distress. Zgliczyński et al. similarly observed this trend among Polish resident doctors, reporting that more than half believed the pandemic had adversely affected their work environment [30]. Furthermore, majority of doctors in that study noted a negative impact on their mental health, and almost half of the group reported a deterioration in sleep quality. These findings highlight the widespread effect of increased workloads and insufficient systemic support across various medical groups in Poland during the pandemic.

Our study also revealed respondents' perception of inadequate collaboration from practices in the neighborhood. Similar findings have been reported in other studies, and they are well-described factors for doctors' distress [11, 31]. In contrast, support and recognition from the healthcare team, government, and community were identified as a protective theme [31, 32]. We revealed that an escalation of doctors' responsibilities and lack of time to update quickly changing recommendations were potential reasons for additional stress.

No significant correlation between distress levels and factors such as years of professional experience or the number of patients was found in our study. However, Niewiadomska et al., in their study of the health status of medical doctors from the Silesian Voivodeship, reported that older doctors, particularly those aged 50–80, were more vulnerable to symptoms of anxiety and depression [33]. In another Polish study Zgliczyński et al. found that female doctors, those working directly with COVID-19 patients, and individuals who had contracted COVID-19 were at higher risk of depression, stress, and anxiety [30].

In a study performed in New Zealand, most general practices reported moderate strain throughout the survey period with rural practices reporting less strain than urban practices [24]. It's worth noting that surveys performed internationally before the pandemic suggest that rural GPs were less likely to experience burnout than urban GPs [34, 35]. While sociodemographic differences between rural GPs and urban GPs may account for some of the differences in stress and burnout, in our study, rural GPs were not found to have lower levels of job stress.

A study published by Jefferson et al. has reported more anxiety and depression in younger groups and higher burnout levels among older GPs. Even though, in our research we did not collect GPs' age, our results did not show that doctors with fewer years of experience, who most probably were also younger, showed higher distress [36].

Meaningful work was reported to be essential for most of the respondents in our study, and one of the studies conducted in Belgium also proved that finding meaning in work and having a good work-life balance are protective factors against overall distress [23].

Other studies have shown that GPs working in larger practices are more satisfied and have fewer burnout symptoms than those working in single-handed practices [37]. These findings align with the results of the PRICOV-19 survey; however, they were not revealed in our study, possibly due to a small number of participants.

### Strengths and limitations of the study

Our study measured the impact of the COVID-19 pandemic on well-being of Polish GPs, which undoubtedly is an utmost importance public health issue. The undoubtful strength of the study is a diverse sample of Polish GP practices, including those from rural areas, small towns, and large cities. Practices and doctors were recruited proportionally to the region size and came from the whole country. Another strength of this study is also the high response rate and usage of the validated tools, with high quality translation, (including backward translation) and cultural adaptation. Therefore, the trends observed in the study regarding the impact of COVID-19 on examined doctors may be considered to apply to Polish GPs at large at that time.

Inevitably our study also had some constraints. Data collection took place over a relatively short period, so the survey results show the situation only in the certain momentum of the COVID-19 pandemic in Poland. This limitation is worth noting when comparing our results with those of other countries. However, due to significant dynamics in Poland, we believe that the study timing allowed us to accurately establish the GPs' burden.

Another limitation may be the method of data collection. As the PRICOV-19 study is a self-reported questionnaire, there is a risk of social-desirability bias in the respondents' answers. Moreover, this risk is even more probable when answering more sensitive and personal questions, covered in the eWBI, regarding an individual's feelings, etc. However, the participants' anonymity was guaranteed, and we noticed a large variation in the responses.

Despite the efforts of the study team the target sample size was missed by one repondent. The shortfall is minimal, however, even small deviations from the target sample size can potentially influence the study's statistical power.

The study's limitation is the lack of information on respondents' gender and age. However, we believe this

provided a sense of greater privacy for respondents and increased the chances of honest answers. Moreover, we also believe that the length of professional experience correlates well with respondents' age.

### Recommendations for practice and research

Further research is needed to investigate the mechanisms underlying the associations identified in our study. A deeper understanding of Polish models of care is critical in developing an evidence base to support and strengthen the well-being of general practitioners. Initiatives that promote safety climate, working conditions, and teamwork may benefit safety attitudes. Expanding learning systems, implementing appropriate training, and securing extra time to help GPs stay updated with adequate guidelines and provide support with task shifting can be crucial. Sharing responsibilities and setting cooperation with other local practices may also be beneficial and lower the strain put on the single GP in times of crisis. These actions should be intensified in GP practices. Determinants of psychological general practitioners' well-being should be evaluated and targeted. The "National Strategy to Protect Clinicians' Well-Being during Crisis" should be considered in Poland, similar to other countries [37, 38].

## Conclusions

Our findings demonstrate a significant burden of distress among Polish GPs in the COVID-19 pandemic. The study highlights the pressing need to improve support mechanisms and resource allocation to relieve the burden on Polish GPs and ensure the effective delivery of primary healthcare services during crises. Creating an effective information transfer system and mutual support among general practitioners may be particularly important.

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12875-024-02699-5.

Supplementary Material 1

### Acknowledgements

The authors would like to thank the staff of the participating GP practices and the participants themselves.

### Author contributions

Study concept and design: KN, AW, SW, EP. Drafting of the manuscript: KN, KS. Data acquisition: KN, SW, EP, AW, EW, EKR. Data analysis and interpretation: EW, KN, KS, AW. Critical manuscript revision for important intellectual content: AW, SW, ES, EW, EKR. Study supervision: AW, SW. Approval of the final manuscript version to be published: All authors.

### Funding

The study was entirely financed from the budget of the Department of Family Medicine, Jagiellonian University Medical College.

### Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## Declarations

### Ethics approval and consent to participate

PRICOV-19 study received approval from the Research Ethics Committee at Ghent University Hospital (nr BC-07617). The Bioethics Committee at Jagiellonian University approved surveying Poland (nr 1072.6120.302.2020). The study was conducted according to the guidelines of the Declaration of Helsinki. All Polish participants had signed the informed consent.

### Consent for publication

Not applicable.

### Grant support

The PRICOV-19 data collection was undertaken without funding in individual countries. A small grant was received by Ghent University from the European General Practice Research Network (EGPRN) to cover data cleaning; no grant number applies.

### Competing interests

The authors declare no competing interests.

Received: 10 July 2024 / Accepted: 26 December 2024
Published online: 04 January 2025

### References

1. Ritchie H, Mathieu E, Rodés-Guirao L, Appel C et al. April. Coronavirus Pandemic (COVID-19). Published online at OurWorldInData.org. Available online: https://ourworldindata.org/coronavirus (accessed on 30 2024).
2. Collins C, Van Poel E, Šantrić Milićević M, et al. Practice and System Factors Impact on Infection Prevention and Control in General Practice during COVID-19 across 33 countries: results of the PRICOV cross-sectional survey. Int J Environ Res Public Health. 2022;19(13):7830. https://doi.org/10.3390/ijerph19137830.
3. World Health Organization. Infection Prevention and Control of Epidemic- and Pandemic-Prone Acute Respiratory Infections in Health Care; World Health Organization: Geneva, Switzerland. 2014; Available online: https://apps.who.int/iris/handle/10665/112656 (accessed on 30 April 2024).
4. Broussard IM, Kahwaji CI, Universal Precautions. StatPearls Publishing. 2022. Available online: https://www.ncbi.nlm.nih.gov/books/NBK470223/ (accessed on 1 May 2024).
5. World Health Organization. Infection Prevention and Control during Health Care When Coronavirus Disease (COVID-19) Is Suspected or Confirmed. Interim Guidance 12 July 2021. Available online: https://www.who.int/publications/i/item/WHO-2019-nCoV-IPC-2021.1 (accessed on 29 April 2024).
6. Mitchell EP. Clinician wellbeing during COVID-19. J Natl Med Assoc. 2021;113(5):481. https://doi.org/10.1016/j.jnma.2021.09.001.
7. Kearon J, Risdon C. The role of primary care in a pandemic: reflections during the COVID-19 pandemic in Canada. J Prim Care Community Health. 2020;11:2150132720962871. https://doi.org/10.1177/2150132720962871.
8. Deng D, Naslund JA. Psychological impact of COVID-19 pandemic on Frontline Health Workers in low- and Middle-Income Countries. Harv Public Health Rev (Camb). 2020; 28.
9. Vanhaecht K, Seys D, Bruyneel L, et al. COVID-19 is having a destructive impact on health-care workers' mental well-being. Int J Qual Health Care. 2021;33(1):mzaa158. https://doi.org/10.1093/intqhc/mzaa158.
10. Collins C, Clays E, Van Poel E, et al. Distress and wellbeing among General practitioners in 33 countries during COVID-19: results from the cross-sectional PRICOV-19 study to inform Health System interventions. Int J Environ Res Public Health. 2022;19(9):5675. https://doi.org/10.3390/ijerph19095675.
11. Serrano-Ripoll MJ, Meneses-Echavez JF, Ricci-Cabello I, et al. Impact of viral epidemic outbreaks on mental health of healthcare workers: a rapid systematic review and meta-analysis. J Affect Disord. 2020;277:347–57. https://doi.org/10.1016/j.jad.2020.08.034.
12. Cabarkapa S, Nadjidai SE, Murgier J, et al. The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and

ways to address it: a rapid systematic review. Brain Behav Immun Health. 2020;8:100144. https://doi.org/10.1016/j.bbih.2020.100144.
13. Pollock A, Campbell P, Cheyne J, et al. Interventions to support the resilience and mental health of frontline health and social care professionals during and after a disease outbreak, epidemic or pandemic: a mixed methods systematic review. Cochrane Database Syst Rev. 2020;11(11):CD013779. https://doi.org/10.1002/14651858.CD013779.
14. Billings J, Ching BCF, Gkofa V, et al. Experiences of frontline healthcare workers and their views about support during COVID-19 and previous pandemics: a systematic review and qualitative meta-synthesis. BMC Health Serv Res. 2021;21(1):923. https://doi.org/10.1186/s12913-021-06917-z.
15. West CP, Dyrbye LN, Erwin PJ, et al. Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. Lancet. 2016;388(10057):2272–81. https://doi.org/10.1016/S0140-6736(16)31279-X.
16. OECD/European Observatory on Health Systems and Policies. Poland: Country Health Profile 2021, state of Health in the EU. Paris: OECD Publishing; 2021. https://doi.org/10.1787/e836525a-en. [accessed on 15th October 2024].
17. Gustavsson K, Goetz-Kundera Z, Flaga-Łuczkiewicz M, Wichniak A. Which aspects of work safety satisfaction are important to Mental Health of Healthcare Workers during the COVID-19 pandemic in Poland? Int J Environ Res Public Health. 2023;20(4):2870. https://doi.org/10.3390/ijerph20042870. Published 2023 Feb 6.
18. Denning M, Goh ET, Tan B, et al. Determinants of burnout and other aspects of psychological well-being in healthcare workers during the Covid-19 pandemic: a multinational cross-sectional study. PLoS ONE. 2021;16(4):e0238666. https://doi.org/10.1371/journal.pone.0238666. Published 2021 Apr 16.
19. Søvold LE, Naslund JA, Kousoulis AA, et al. Prioritizing the Mental Health and Well-Being of Healthcare Workers: an Urgent Global Public Health Priority. Front Public Health. 2021;9:679397. https://doi.org/10.3389/fpubh.2021.679397. Published 2021 May 7.
20. Kisely S, Warren N, McMahon L, et al. Occurrence, prevention, and management of the psychological effects of emerging virus outbreaks on healthcare workers: rapid review and meta-analysis. BMJ. 2020;369:m1642. https://doi.org/10.1136/bmj.m1642.
21. Trivedi N, Trivedi V, Moorthy A, et al. Recovery, restoration, and risk: a cross-sectional survey of the impact of COVID-19 on GPs in the first UK city to lock down. BJGP Open. 2021;5(1):BJGPO. 2020.0151.
22. Heltveit-Olsen SR, Lunde L, Brænd AM, et al. Experiences and management strategies of Norwegian GPs during the COVID-19 pandemic: a longitudinal interview study. Scand J Prim Health Care. 2023;41(1):2–12. https://doi.org/10.1080/02813432.2022.2142796.
23. Cholewa J, Ponsar C, de Rouffignac S, et al. General practitioners' well-being in Belgium: results from the cross-sectional PRICOV-19 study. BMC Prim Care. 2024;24(Suppl 1):284. https://doi.org/10.1186/s12875-024-02341-4.
24. Eggleton K, Bui N, Goodyear-Smith F. COVID-19 impact on New Zealand general practice: rural-urban differences. Rural Remote Health. 2022;22(1):7185. https://doi.org/10.22605/RRH7185.
25. Van Poel E, Vanden Bussche P, Klemenc-Ketis Z, et al. How did general practices organize care during the COVID-19 pandemic: the protocol of the cross-sectional PRICOV-19 study in 38 countries. BMC Prim Care. 2022;23(1):11. https://doi.org/10.1186/s12875-021-01587-6.
26. Harris PA, Taylor R, Minor BL, et al. The REDCap consortium: building an international community of software platform partners. J Biomed Inf. 2019;95:103208. https://doi.org/10.1016/j.jbi.2019.103208.
27. Dyrbye LN, Satele D, Shanafelt T. Ability of a 9-Item Well-Being Index to identify distress and Stratify Quality of Life in US workers. J Occup Environ Med. 2016;58(8):810–7. https://doi.org/10.1097/JOM.0000000000000798.
28. Tatsioni A, Groenewegen P, Van Poel E, et al. Recruitment, data collection, participation rate, and representativeness of the international cross-sectional PRICOV-19 study across 38 countries. BMC Prim Care. 2023;24(Suppl 1):290.
29. available at. https://www.nfz.gov.pl/ [accessed on 17th October 2024].
30. Zgliczyński WS, Rostkowska OM, Humeniuk E, Baska A, Bojar I, Raczkiewicz D. Burden of COVID-19 on Mental Health of Resident doctors in Poland. Med Sci Monit. 2023;29:e940208. https://doi.org/10.12659/MSM.940208.
31. De Kock JH, Latham HA, Leslie SJ, et al. A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. BMC Public Health. 2021;21(1):104. https://doi.org/10.1186/s12889-020-10070-3.
32. Monterrosa-Castro A, Redondo-Mendoza V, Mercado-Lara M. Psychosocial factors associated with symptoms of generalized anxiety disorder in general practitioners during the COVID-19 pandemic. J Investig Med. 2020;68(7):1228–34. https://doi.org/10.1136/jim-2020-001456.
33. Niewiadomska E, Łabuz-Roszak B, Pawłowski P, Wypych-Ślusarska A. The physical and Mental Well-Being of Medical doctors in the Silesian Voivodeship. Int J Environ Res Public Health. 2022;19(20):13410. https://doi.org/10.3390/ijerph192013410.
34. Cohidon C, Wild P, Senn N. Job stress among GPs: associations with practice organisation in 11 high-income countries. Br J Gen Pract. 2020;70(698):e657–67. https://doi.org/10.3399/bjgp20X710909. Published 2020 Aug 27.
35. Werdecker L, Esch T. Burnout, satisfaction and happiness among German general practitioners (GPs): a cross-sectional survey on health resources and stressors. PLoS ONE. 2021;16(6):e0253447. https://doi.org/10.1371/journal.pone.0253447.
36. Jefferson L, Golder S, Heathcote C, et al. GP wellbeing during the COVID-19 pandemic: a systematic review. Br J Gen Pract. 2022;72(718):e325–33. https://doi.org/10.3399/BJGP.2021.0680.
37. Valaine L, Ancāne G, Utināns A, et al. Mental Health and Associated Demographic and Occupational Factors among Health Care Workers during the COVID-19 pandemic in Latvia. Med (Kaunas). 2021;57(12):1381. https://doi.org/10.3390/medicina57121381.
38. Dzau VJ, Kirch D, Nasca T. Preventing a parallel pandemic - a National Strategy to protect clinicians' well-being. N Engl J Med. 2020;383(6):513–5. https://doi.org/10.1056/NEJMp2011027.

## Publisher's note