Mental health predictors of medical staff in the early stage of COVID-19 pandemic in Poland

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Abstract

Aim of the study: To identify the sociodemographic predictors of general functioning, stress, anxiety and depression in Polish medical workers' group in the early stage of COVID-19 pandemic.

Material and methods: A cross-sectional observational study using an online questionnaire was conducted via both professional organizations and social media groups. A total of 303 completed responses were received. More than half of participants (54.8%) work in public hospitals, the majority was females (77.6%), nurses (38.3%), the age was ranged from 22 to 68 years (M = 41.37; SD = 11.38). The semi-structured online questionnaire covered following areas: (1) general sociodemografic data, including health state and COVID-19 related questions; (2) psychological impact and mental health, measured by GHQ-30 and DASS-21.

Results: Overall, our results showed that sex, years of experience and profession have predictive power to explain mental health being of medical workers during COVID-19. In our study, females reported worse general functioning (GHQ-30) and higher stress (DASS-21) than males. Longer working experience is predictor of better interpersonal relationships (GHQ-30).

Discussion: Years of experience and gender accounted for 27% of the variance of the level of stress in medical staff group. With the years of experience of healthcare professionals, the stress decreases. Nurses reported less severity of anxiety than other medical workers. We assume those results are connected with education process as well as experience level.

Conclusions: It may be important to develop a personalized intervention, considering the main predictors of mental well-being. Authorities should consider creating the tailored-made programs for medical professions.

COVID-19; medical workers; mental health; anxiety; stress

INTRODUCTION

The COVID-19 outbreak was rapidly transmitted in late January 2020 and aroused enormous attention globally. The novel coronavirus disease (COVID-19) was formerly known as the '2019 Novel Coronavirus (2019-nCoV) Pneumonia' and it originated from a wet market in Wuhan, Hubei province, China, in early December 2019. On the 7 January 2020, the Chinese Center for Disease Control and Prevention (CCDC) identified and isolated the novel coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

In Poland, the first case of SARS-CoV-2 coronavirus causing the COVID-19 disease was reported on 4 March 2020. Lockdown-type control

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measures started on 12 March, closing schools and universities, cultural institutions: theatres, concert halls, museums, cinemas, and cancelling mass events. On 20 March the state of epidemic came into force in Poland. According to Polish government data [1], 117,130 people have died. There is still a lack of data on morbidity and deaths strictly in the Polish group of healthcare workers. However, databases of scientific reports are being updated, hence some important findings about their mental health at the peak of the pandemic are available [2-4]. The early stage of pandemic was characterized by lack of sufficient medical knowledge and procedures, high anxiety within the communities and the whole societies. The present study focuses on wellbeing of healthcare professionals at initial stage of pandemic in Poland (Spring 2020).

Main aim of our research was to identify the protective and risk factors for mental health within the sociodemographic variables in healthcare professionals' group. Our findings can be useful for the design of possible solutions to prevent negative consequences of future pandemic in this group. The data referring to previous epidemics and pandemics [5-9] indicated that high percentage of healthcare professionals suffer from the mental health issues, such as: symptoms of anxiety and depressions, perceived stress, sleeping difficulties, symptoms of posttraumatic stress disorder, symptoms of somatization. Further studies showed that the COVID-19 pandemic worsened the mental wellbeing of medical staff [10-11]. In our research we put emphasis on the predictors of mental health. Our two main hypotheses were convergent with mentioned findings and stand: (1) women and younger persons are more affected the worsening of mental wellbeing; (2) the higher professional experience is a protective factor for mental health of medical staff.

This cross-sectional study provided important information about the mental health of a sample of medical workers in response to COVID-19 pandemic stressors. Data for the present study were collected as a part of a larger research project on medical workers' mental health. In this work, we aimed at identifying the sociodemographic predictors of general functioning, stress, anxiety and depression in medical workers' population during the COVID-19 pandemic.

MATERIAL AND METHODS

Procedure

A cross-sectional, observational study was conducted in Poland during one month in the early stages of pandemic (in spring 2020). Research aimed at analysing the mental health predictors of medical workers. An online semi-structured questionnaire was developed by using Google forms, with a consent form appended to it. Invitations to participate in the study were disseminate among relevant professional organizations and associations (i.e. medical chambers, nursing chambers, pharmaceutical chambers, associations of laboratory diagnosticians, associations of physiotherapists) and posted on social media, mostly on close groups of particular profession residents of the largest Polish cities.

Ethical approval

This study was conducted in accordance with the Declaration of Helsinki. All participants provided their signed informed consents to participate in the study. The Maria Grzegorzewska University of Ethics Committee approved the study procedures. The participants voluntarily responded to the anonymous survey and expressed their informed consent within the survey. The procedures were clearly explained, and participants could interrupt or quit the survey at any point without explaining their reasons for doing so. Confidentiality was maintained by omitting personal identifiers.

Present Survey Development

The online questionnaire covered following areas: (1) general sociodemografic data, including health state and COVID-19 related questions; (2) psychological impact and mental health, measured by GHQ-30 and DASS-21.

Sociodemographic Data

Sociodemographic data were collected on biological sex, age, profession, marital and parental status, employment status, place of residence,

and medical problems. Moreover, further information related to COVID-19 was collected, such as quarantine or change of working hours and the place of employment during the pandemic. To examine general health status, participants were asked about their chronic diseases (both mental and somatic).

Psychological Impact and Mental Health

To measure psychological impact and mental health used: 30-item General Health Questionnaire (GHQ-30) [12-14] and The Depression, Anxiety and Stress Scale–21 items (DASS-21) [15,16].

The GHQ-30 is a screening instrument for assessing mental health of adults in the general population. It allows to estimate the severity of non-psychotic disorders and to identify a significant likelihood of their occurrence. GHQ-30 items are frequently used to assess clinically significant but non-specific psychological distress. In the Polish study conducted by Frydecka et al. [14], the authors indicated the following factors: anxiety and depression, general functioning, interpersonal relations; Huppert et al. [13] indicated five distinct factors corresponding to anxiety, feelings of incompetence, depression, difficulty in coping, and social dysfunction. In this study, a total score was calculated with Likert's method, a higher total score indicating worse conditions. The DASS-21 consist of three self-report scales designed to measure the emotional states of depression, anxiety, and stress. Each of the three scales contains seven items, divided into subscales with similar content All subscales are rated on a four-point Likert scale. In this study, as in original version of the DASS-21 [15], the subscales are scored as follows: normal (0–9), mild (10–12), moderate (13–20), severe (21–27), and extremely severe (28–42) for Depression; normal (0–6), mild (7–9), moderate (10–14), severe (15–19), and extremely severe (20–42) for Anxiety; and normal (0–10), mild (11–18), moderate (19–26), severe (27–34), and extremely severe (35–42) for Stress.

Statistical analysis

The series of stepwise multiple regression analysis were conducted to determine variables that could predict the mental wellbeing factors. The scores on GHQ-30 subscales (general functioning, anxiety and depression, interpersonal relationships) and DASS factors (depression, anxiety, stress) were included as dependent variables in the separate regression models. The independent variables were sex, years of experience, contact with the person who has COVID-19, chronic mental and physical diseases and profession (physician, nurse, laboratory diagnostician, pharmacist). To investigate possible collinearity or multicollinearity among the predicting variables, we used variance inflation factors (VIF) to detect multicollinearity in the regression analysis. A rule of thumb, VIF parameter greater than 10 indicate multicollinearity. The higher value of VIF indicates a more problematic amount of collinearity between predictors [17]. However, there is no consensus on the threshold value of VIFs. VIFs greater than 4 is also considered as indicator of possible problem with multicollinearity [18]. In this study, the maximum value of VIF was 1.52 (see the VIFs in Table 3-6). These results allow us to assume no multicollinearity among the explanatory variables. The variables measured on the ordinal scale (profession) were recoded using the Dummy Coding method (coded variables: 0 = no, 1 = yes).

All statistical analyses were done with SPSS version 25 for Windows [19]. The level of significance was set at $p < 0.05$ in all statistical tests.

RESULTS

Characteristics of the research group

The sample was consisted of 303 people: 235 (77.6%) females and 68 (22.4%) males who work in the medical sector. The age was ranged from 22 to 68 years (M = 41.37; SD = 11.38). The majority of participants were in the relationship (married: 57.8%; no-formal: 20.5%). The research sample consists of 53 physicians (17.5%), 116 nurses (38.3%), 35 laboratory diagnosticians (11.6%), 29 pharmacists (9.6%) and 68 participants (22.4%) working in other medical positions. More than half of participants (54.8%) work in public hospitals and eight persons (2.6%) work in private hospitals. A similar number of participants

work in public and private outpatient clinic (17 (5.6%) and 14 (4.6%), respectively). Only six people mainly work in a private practice (2.0%) and three persons work in community settings (1.0%). Twenty-six (8.6%) participants work in diagnostic laboratory and twenty-eight (9.2%) persons work in emergency medical teams (ambulance). The most majority of respondents has been working in cities (95.4%) and only 4.6% in rural area. One hundred three persons (34%) declared that they have had a direct contact with people with COVID-19. Forty-two participants (13.9%) experienced the someone's death from COVID-19 and twenty respondents (6.6%) had the suspicion that patient's death was caused by COVID-19. Six (2.0%) participants were quarantined and 55 (18.2%) stated that his/her member of family and/or friend was in isolation. Only three persons (1.0%) had COVID-19 and 48 respondents (15.8%) declared that their relatives or friend/s have tested positive for infection with SARS-CoV-2. During the pandemic 32 respondents (10.6%) get a psychological assistance and 17 (5.6%) was under psychiatric care. One hundred fourteen participants suffer from chronic illness (physical: 34.7%; mental: 1.3%; both: 1.7%). Characteristics of the participants are presented in Table 1.

Table 1. Characteristics of participants in the study (N = 303)

Socio-demographic characteristics	Statistics	Value
Age	Mean (SD)	41.37 (11.38)
	Median	40
	Min-max	22-68
	Q1; Q3	30; 51
Gender	Female	235 (77.6%)
	Male	68 (22.4%)
Marital status*	Single	30 (9.9%)
	Divorced	14 (4.6%)
	Widow/er	4 (1.3%)
	No-formal relationships	62 (20.5%)
	Married	175 (57.8%)
Workplace	Public hospital	166 (54.8%)
	Private hospital	8 (2.6%)
	Public outpatient clinic	17 (5.6%)
	Private outpatient clinic	14 (4.6%)
	Community settings	3 (1%)
	Diagnostic laboratory	28 (9.2%)
	Private practice	6 (2.0%)
	Emergency medical teams (ambulance)	26 (8.6%)
	Other	35 (11.6%)
Position	Physicians	53 (17.5%)
	laboratory diagnosticians	35 (11.6%)
	Nurse	116 (38.3%)
	Pharmacists	29 (9.6%)
	Other	68 (22.4%)

Work area	Rural	14 (4.6%)
	Small city (< 20,000)	46 (15.2%)
	Medium city (20-100,000)	72 (23.8%)
	Big city (100-300,000)	51 (16.8%)
	Very big city (> 300,000)	120 (39.6%)
Direct contact with COVID-19	Yes	103 (34%)
	No	171 (56.4%)
	Does not know	29 (9.6%)
Experience the someone's death from COVID-19	Yes	42 (13.9%)
	Probably	20 (6.6%)
	No	241 (79.5%)
Quarantine experiences	Yes, personal	6 (2.0%)
	Yes, my friend/member of family was in isolation	55 (18.2%)
Diagnosed with COVID-19	Yes	3 (1.0%)
	No	300 (99.0%)
Friend/member of family with diagnosis of COVID-19	Yes	48 (15.8%)
	No	255 (84.2%)
Under psychological care	Yes	32 (10.6%)
	No	271 (89.4%)
Under psychiatric care	Yes	17 (5.6%)
	No	286 (94.4%)
Chronic illness	Somatic	105 (34.7%)
	Mental	4 (1.3%)
	Both	5 (1.7%)
	During diagnosis	10 (3.3%)
	None	179 (59.1%)

Note: Q1 – first quartile; Q3 – third quartile

* – The percentages do not sum up to 100, since some of the respondents did not choose answer.

There were no significant differences between medical professions subgroups in the results of GHQ-30 and DASS-21 (see Table 2).

Table 2. Kruskal-Wallis (H) test for comparison of GHQ and DASS-21 results between medical professions

GHQ-30				
	Mrang	*M (SD)*	*H* (4)	*p*
Physicians	156.04	68.42 (15.52)	0.902	.924
Nurses	152.09	67.49 (15.02)		
Laboratory diagnosticians	155.26	67.97 (14.82)		
Pharmacists	151.76	68.72 (18.33)		
Other	142.69	66.43 (15.37)		

GHQ General functioning				
Physicians	161.44	22.15 (3.98)	1.28	.865
Nurses	150.29	21.60 (4.34)		
Laboratory diagnosticians	152.36	21.66 (4.04)		
Pharmacists	150.41	21.93 (5.22)		
Other	143.63	21.34 (3.98)		
GHQ Anxiety and depression				
Physicians	152.50	30.64 (9.11)	1.29	.862
Nurses	155.89	30.92 (8.77)		
Laboratory diagnosticians	153.41	30.80 (9.53)		
Pharmacists	148.76	30.79 (11.08)		
Other	141.20	29.66 (9.48)		
GHQ Interpersonal relationships				
Physicians	156.38	15.62 (3.31)	2.94	.567
Nurses	141.24	14.97 (3.05)		
Laboratory diagnosticians	159.29	15.51 (2.83)		
Pharmacists	166.26	16.00 (3.02)		
Other	152.69	15.43 (3.06)		
DASS-21 Stress				
Physicians	155.05	7.26 (5.88)	0.96	.916
Nurses	151.66	6.60 (4.83)		
Laboratory diagnosticians	159.66	7.20 (5.31)		
Pharmacists	145.98	6.69 (5.64)		
Other	144.40	6.53 (5.46)		
DASS-21 Anxiety				
Physicians	140.17	3.23 (4.59)	2.69	.612
Nurses	159.31	3.68 (4.14)		
Laboratory diagnosticians	157.40	3.86 (4.41)		
Pharmacists	143.05	2.79 (3.00)		
Other	145.36	3.51 (4.66)		
DASS-21 Depression				
Physicians	153.42	4.55 (5.07)	0.37	.985
Nurses	147.40	4.18 (4.58)		
Laboratory diagnosticians	155.13	4.74 (4.95)		
Pharmacists	154.21	5.03 (6.00)		
Other	151.77	4.54 (5.05)		

General functioning (GHQ-30)

First, multiple stepwise regression analysis was performed to verify the possibility of predicting general functioning among persons in a medical sector based on the following predictors: sex, years of experience, contact with the person who has COVID-19, chronic mental and physical diseases and profession (physician, nurse, laboratory diagnostician, pharmacist).

The results indicated that only two predictors, years of professional experience and sex were significant predictors that in combination contributed significantly to general functioning measured by GHQ-30, $F(2, 298) = 4.27$, $p = 0.015$) of people working in medical sector. The model including two predictors accounted for 2.8% of the variance of the general functioning, $R2 = .028$.

As apparent from the standardized coefficient (β), years of professional experience has the predictive power ($\beta = -.14$, $t = -2.42$; $p = 0.016$) for general functioning of healthcare professionals and contributed about 1.4% of the variance of general functioning ($\Delta R^2 = .014$, $F (1, 299) = 4.38$; $p = 0.037$). This indicates that the longer working experience, the general functioning of healthcare professionals improves.

Sex emerged as the next significant potential predictor ($\beta = -.12$, $t = -2.03$; $p = 0.043$) of general functioning of healthcare professionals which contributed approximately 1.3% ($\Delta R^2 = .013$, ΔF $(1, 298) = 4.12$; $p = 0.043$) of variance in general functioning of healthcare professionals. Females have obtained more scores on general functioning scale. It means that among healthcare professionals, females reported worse general functioning than males (see Table 3).

Table 3. Summary of stepwise regression analysis for variables predicting general functioning (GHQ-30)

DV: General functioning (GHQ-30)				
Excluded variable	**β**	**t**	**p**	**VIF**
Contact with COVID	0.077	1.300	.194	1.089
Somatic illness	0.034	0.569	.570	1.066
Mental illness	-0.028	-0.480	.632	1.035
Physicians	0.042	0.718	.473	1.052
Laboratory diagnosticians	-0.041	-0.691	.490	1.052
Nurse	0.035	0.500	.617	1.520
Pharmacists	0.035	0.619	.537	1.004
Final model	**β**	**t**	**95%CI**	**VIF**
Professional experience [years]	-0.140	-2.417	-0.085 – -0.009	1.029
Sex	-0.118	-2.029	-2.379 – -0.036	
	$R^2 = 0.028$; $_{adj}R^2 = 0.021$; $F(2,298) = 4.27$; $p = .015$			

Depression and anxiety (GHQ-30)

Any potential predictors have the predictive power for anxiety and depression of healthcare professionals measured by GHQ-30. No variables were introduced in to the final model.

Interpersonal relationships (GHQ-30)

The following multiple stepwise regression analysis was conducted to evaluate whether different potential predictors predict interpersonal relationships among healthcare professionals. The same predictors were introduced into the regression model: sex, years of experience, contact with the person who has COVID-19, chronic mental and physical diseases, and profession (physician, nurse, laboratory diagnostician, pharmacist). The results are presented in Table 4.

Table 4. Summary of stepwise regression analysis for variables predicting interpersonal relationships (GHQ-30)

DV: Interpersonal relationships (GHQ-30)				
Excluded variable	β	*t*	*p*	VIF
Sex	0.030	0.512	.609	1.029
Contact with COVID	0.080	1.391	.165	1.011
Somatic illness	-0.027	-0.455	.650	1.065
Mental illness	0.008	0.136	.892	1.018
Physicians	0.019	0.328	.743	1.049
Laboratory diagnosticians	-0.005	-0.088	.930	1.040
Nurse	-0.041	-0.608	.544	1.411
Pharmacists	0.072	1.250	.212	1.004
Final model	β	*t*	95%CI	VIF
Professional experience [years]	-0.127	-2.218	-0.057 – -0.003	-
$R^2 = 0.016;\ _{adj}R^2 = 0.013;\ F(1,299) = 4.92;\ p = .027$				

The ANOVA results for the final model indicated that only years of professional experience was significant predictor that contributed significantly to interpersonal relationships of people working in medical sector, $F(1, 299) = 4.92$, $p = 0.027$). The model including one predictor accounted for 1.6% of the variance of the interpersonal relationships, $R2 = .016$.

As apparent from the standardized coefficient (β), years of professional experience has the negative associations with interpersonal relationships of healthcare professionals, $β = – .13$, $t = – 2.22; p = 0.027$). This indicates that the longer working experience, the interpersonal relationships improve of healthcare professionals.

Stress (DASS-21)

In the next step, the multiple stepwise regression analysis was conducted to verify whether potential predictors are significant for level of stress among healthcare professionals. Again, the ffollowing predictors were introduced into the regression model: sex, years of experience, contact with the person who has COVID-19, chronic mental and physical diseases and profession (physician, nurse, laboratory diagnostician, pharmacist). The results are presented in Table 5.

Table 5. Summary of stepwise regression analysis for variables predicting stress (DASS-21)

DV: Stress (DASS-21)				
Excluded variable	β	*t*	*p*	VIF
Contact with COVID	0.094	1.581	.115	1.089
Somatic illness	0.025	0.416	.678	1.066
Mental illness	-0.030	-0.514	.608	1.035
Physicians	0.037	0.631	.528	1.052
Laboratory diagnosticians	-0.007	-0.117	.907	1.052
Nurse	0.011	0.154	.877	1.520
Pharmacists	-0.002	-0.035	.972	1.004
Final model	β	*t*	95%CI	VIF
Professional experience [years]	-0.134	-2.317	-0.102 – -.0008	1.029
Sex	-0.120	-2.073	-2.947 – -0.076	
$R^2 = 0.027;\ _{adj}R^2 = 0.020;\ F(2,298) = 4.14;\ p = .017$				

It was turned out that two predictors, years of experience and gender, have the predictive power for level of stress of healthcare professionals, $F(2, 298) = 4.14$, $p = 0.017$). The model including two predictors accounted for 27% of the variance of the level of stress of participants, $R2 = .027$.

The standardized coefficient indicated that years of experience has the negative predictive power ($\beta = -.134$, $t = -2.32$; $p = 0.021$) for stress of healthcare professionals and contributed about 1.3% of the variance of stress level ($\Delta R^2 = .013$, $F (1, 299) = 3.94$; $p = 0.048$). The persons with more years of experience gained less score of DASS Stress subscale. This indicates that with the years of experience of healthcare professionals, the stress decreases.

Sex also further increases the variance by 1.5% making the prediction to improve further in a significant manner ($\Delta R^2 = .014$, $\Delta F(1,298) = 4.30$; $p = 0.039$) and exerts a significant influence ($\beta = -.120$, $t = -2.07$; $p = 0.039$) on stress of healthcare professionals. This means that among healthcare professionals males reported less severity of stress than females.

Anxiety (DASS-21)

The following multiple stepwise regression analysis was conducted to evaluate whether different potential predictors predict anxiety measured by DASS among healthcare professionals. The same predictors were introduced into

the regression model: sex, years of experience, contact with the person who has COVID-19, chronic mental and physical diseases and profession (physician, nurse, laboratory diagnostician, pharmacist).

The results indicated that years of professional experience and professional (nurses) were significant predictors that in combination contributed significantly to anxiety of people working in medical sector measured by DASS, $F(2,298) = 6.825$, $p = 0.001$). The model including two predictors accounted for 4.4% of the variance of the anxiety, $R2 = .044$ (see Table 6).

As apparent from the standardized coefficient (β), years of professional experience has the positive predictive power ($\beta = .243$, $t = 3.615$; $p < 0.001$) for anxiety of healthcare professionals and contributed about 2.2% of the variance of anxiety ($\Delta R^2 = .022$, $F (1, 299) = 6.79$; $p = 0.01$). This indicates that the longer *working experience*, the severity of the anxiety of healthcare professionals increases.

Profession emerged as the next significant potential predictor ($\beta = -.175$, $t = -2.59$; $p = 0.01$) of the severity of anxiety among healthcare professionals which contributed approximately 2.2% ($\Delta R^2 = .022$, $\Delta F (1, 298) = 6.73$; $p = 0.01$) of variance in anxiety of healthcare professionals. Nurses have obtained less scores on anxiety scale in comparison to other professions. It means that among healthcare professionals, nurses reported less severity of anxiety than others.

Table 6. Summary of stepwise regression analysis for variables predicting anxiety (DASS-21)

DV: Anxiety (DASS-21)				
Excluded variable	β	t	p	VIF
Sex	0.093	1.559	.120	1.109
Contact with COVID	-0.002	-0.028	.978	1.026
Somatic illness	-0.073	-1.238	.217	1.072
Mental illness	0.007	0.120	.904	1.019
Physicians	-0.044	-0.731	.465	1.152
Laboratory diagnosticians	-0.023	-0.391	.696	1.093
Pharmacists	-0.055	-0.932	.352	1.078
Final model	β	t	95%CI	VIF
Professional experience [years]	0.243	3.615	0.496-1.682	1.411
Nurse (1; 0 – other)	-0.175	-2.595	-36.273- -4.982	
	$R^2 = 0.044$; $_{adj}R^2 = 0.037$; $F(2,298) = 6.82$; $p = .001$			

DEPRESSION (DASS-21)

The ANOVA results for the final model indicated that any potential predictors have the predictive power for depression of healthcare professionals measured by DASS-21. No variables were introduced into the final model.

DISCUSSION

The research team aimed at understanding the nature of factors that protect and deteriorate mental well-being of medical workers in the COVID-19 pandemic time. The results of the study identified several groups of factors that are important predictors of general functioning and the level of stress, anxiety and depression among health care workers during the early stage of the COVID-19 pandemic. Although those factors could vary during the course of the pandemic, our results can be important in light of early crisis management in public mental health.

Out of the sociodemographic factors, gender and years of experience and profession were the most important. Overall, our results showed that sex, years of experience and profession have predictive power to explain mental health being of medical workers during COVID-19. In our study, females reported worse general functioning (GHQ-30) and higher stress (DASS-21) than males. On that account, we conclude that particular attention should be paid to the mental health of the less experienced, female medical workers as they are the most vulnerable group.

The life-threatening conditions, uncertainty, prolonged exposure to many types of losses and anxiety constitute chronic stress [20]. At the beginning of COVID-19 pandemic dominated sense of danger concerning the rapidity of spread, mode of transmission, and lack of definitive treatment protocols or vaccine. These features were conducive to increased anxiety and a constant sense of danger, which can lead to psychological discomfort, depressed mood, irritability as well as depressive or psychosomatic reactions in a pandemic situation. Consequently, people in high-stress situations are at risk of developing PTSD, and other mental health disorders [20, 21].

According to psychobiological models we can see a clear impact of stress on the activation of brain systems (e.g., amygdala) that process fear and threat. If an event is appraised as a threat, it will trigger affective responses (e.g., worry, fear, or anxiety) and alter the functions of the hypothalamic–pituitary–adrenal system, sympatho-adrenal-medullary mediators, and other regulatory and neuroendocrine systems (e.g., parasympathetic nervous system activity and gonadal steroids), having downstream implications for disease onset and severity [22]. We assume that in the early stage of pandemic the research team could catch only the very early trend and first symptoms of mental health deterioration. The results of studies concerning mental health of medical workers in Poland during successive waves / peaks od COVID-19 pandemic indicate that anxiety, depression, and stress symptoms experienced at an early stage evolved into PTSD and serious mood disorders [2,3,4].

Our results correspond with the results obtained by Polish team of Maciaszek et al. [3]. In many studies, female health care workers and nurses exhibited higher rates of affective symptoms compared to male and other medical staff respectively [10,23-25]. Several studies, younger and less experienced medical staff reported more severe degrees of all psychological symptoms than other health care workers [26, 27].

Longer working experience is predictor of better interpersonal relationships (GHQ-30). Two predictors (years of experience and gender) accounted for 27% of the variance of the level of stress in medical staff group. With the years of experience of healthcare professionals, the stress decreases.

We observed that that years of professional experience and professional (nurses) were significant predictors that in combination contributed significantly to anxiety. The model including two predictors (years of professional experience and nurse profession) accounted for 4.4% of the variance of the anxiety. This study highlights another important finding, nurses reported less severity of anxiety than other medical workers. We assume those variables are connected with education process and study outcomes, but this protective aspect of profession requires further analysis which results may help to restore and main-

tain psychological well-being in medical professions during pandemic.

LIMITATIONS

This study's findings need to be interpreted in the context of some limitations. We need to address the first limitation associated with our sample. As our research was conducted at the very early stage of the pandemic in Poland, an extremely small group of subjects infected with COVID-19 was recruited. We used a non-probabilistic sample; thus the generalizability of our results is limited. In particular, the sampling technique which relies on digital infrastructure and voluntary participation could increase selection bias. Furthermore, the cross-sectional design of presented study precludes comparison the changes in mental well-being during pandemic. Studies focusing on medical workers' mental health could cover several follow-up periods. These elements would help analyze changes in well-being.

CONCLUSIONS

Our results have several implications for research and practice. For research, our findings align with recent studies focusing on medical professionals' group [23-29]. Previous research has demonstrated that the medical workers' well-being deteriorated. Our study confirmed those insights and showed particular risk and protective factors. It is important, especially when it comes to identifying those groups who are most at risk of deteriorating mental health.

For practice, it may be important that assessments and interventions should be more tailored to specific groups of professionals [30-31]. As we demonstrated, the predictors of mental wellbeing of medical workers are years of experience, gender, and profession. The new guidelines in this direction would help mitigate some of the negative effects and prepare medical staff for future health crises by developing personalized interventions.

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