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COVID-19 pandemic-related stress level and coping strategies in healthcare professionals from the designated referral hospital in Warsaw, Poland

Poziom stresu związanego z pandemią COVID-19 i strategie radzenia sobie wśród pracowników opieki zdrowotnej z referencyjnego szpitala jednoimiennego w Warszawie

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Abstract

Objective: Due to the COVID-19 outbreak, many healthcare workers had to face challenging and stressful situations. High-stress levels caused by the expected risk of contracting the disease can lead to severe mental disorders. We aimed to identify the stress level caused by the COVID-19 pandemic and coping strategies among staff from the designated referral hospital in Warsaw, Poland. **Materials and methods:** Data collected from 189 participants (152 females) including physicians, nurses, orderlies, and other medical and non-medical staff from various departments. Detailed analyses were performed based on the data of 54 physicians and 54 nurses with a mean age of 43.81 years (standard deviation, *SD* 11.57). The Perceived Stress Scale-10 was used to measure the stress levels, and the Brief COPE Inventory was employed to assess coping strategies. **Results:** Most participants experienced medium stress levels (57.4%), and one-third were severely stressed. In general, obtaining emotional support and acceptance was linked to lower stress levels. Behavioural disengagement and venting increased stress levels, mainly in nurses, who failed to implement any positive strategy, unlike doctors who used positive reframing, acceptance, and self-blame. **Conclusions:** Perceived stress levels depend on the occupation of healthcare professionals. An acceptance and positive reframing help cope with stress caused by the COVID-19 pandemic. Providing emotional support and encouraging the implementation of other effective strategies is of key importance, as using non-adaptive strategies is a risk factor for mental health issues.

Keywords: COVID-19 pandemic, stress, coping, healthcare workers

Streszczenie

Cel: Pandemia COVID-19 zmusiła wielu pracowników ochrony zdrowia do stawienia czoła niezwykle trudnym i stresującym sytuacjom. Wysoki poziom stresu wywołany spodziewanym ryzykiem zarażenia się chorobą może prowadzić do poważnych zaburzeń psychicznych. Celem pracy było zidentyfikowanie poziomu stresu spowodowanego pandemią COVID-19 i strategii radzenia sobie z nim wśród personelu medycznego z referencyjnego szpitala jednoimiennego w Warszawie. **Materiał i metody:** W badaniu wzięło udział 189 osób (152 kobiety): lekarzy, pielęgniarek, sanitariuszy, innych pracowników medycznych i niemedycznych z różnych oddziałów. Szczegółowe analizy przeprowadzono na podstawie danych 54 lekarzy i 54 pielęgniarek w średnim wieku 43,81 roku (odchylenie standardowe – *standard deviation*, *SD* 11,57). Skala Odczuwanego Stresu (Perceived Stress Scale-10) została wykorzystana do pomiaru poziomów stresu, a Inwentarz do Pomiaru Radzenia Sobie ze Stressem (Brief COPE Inventory) został użyty do oceny stosowanych strategii. **Wyniki:** Większość badanych doświadczyła średniego poziomu stresu (57,4%), a jedna trzecia osób odczuwała wysokie poziomy stresu. Uzyskanie wsparcia emocjonalnego i akceptacji wiązało się z niższym poziomem stresu. Natomiast zaprzestanie działań i wyładowanie wpływały na zwiększenie stresu, szczególnie u pielęgniarek, którym nie udało się wdrożyć żadnej pozytywnej strategii, w przeciwieństwie do lekarzy, którzy radzili sobie ze stresem poprzez pozytywne przewartościowanie, akceptację i obwinianie siebie. **Wnioski:** Postrzegany poziom stresu wśród pracowników medycznych zależy od uprawianego zawodu. Akceptacja i pozytywne przewartościowanie pomagają radzić sobie ze stresem spowodowanym pandemią COVID-19. Zapewnienie wsparcia emocjonalnego i zachęcanie do wdrażania innych skutecznych strategii jest kluczowe, ponieważ stosowanie nieadaptacyjnych strategii stanowi czynnik ryzyka rozwinięcia się problemów psychicznych.

Słowa kluczowe: pandemia COVID-19, stres, radzenie sobie, pracownicy ochrony zdrowia

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreak was first identified in China, in mid-December 2019. On 11 March 2020, the World Health Organization (WHO) declared a pandemic. In this exceptional situation, there were people on the front lines in the fight against the pandemic, namely doctors, nurses, and other medical workers (healthcare professionals, HCPs). However, the Polish healthcare system employees had not dealt with a pandemic before. For example, HCPs from the Hospital of the Ministry of Internal Affairs and Administration (MSWiA Hospital) in Warsaw suddenly faced a very unusual situation, as the facility was transformed into a single-purpose hospital for infectious diseases.

HCPs caring for infected patients are not only at risk of becoming ill, but also experiencing very severe stress. A large scale of infections additionally inflated the stress level, along with the increasing number of deaths and the unpredictable course of the disease. Studies conducted during previous viral outbreaks (severe acute respiratory syndrome, SARS; middle east respiratory syndrome, MERS) show that HCPs also reported a high level of stress and concerns focused on the viral infection itself and the fear of contracting the disease (Lee et al., 2018). An increased stress level is linked with the onset of anxiety and depression (Liu et al., 2012), and can even result in post-traumatic stress disorder (PTSD).

Considerable evidence indicates that there are many ways to deal with stress, including rational thinking, physical exertion, relaxation methods, meditation, and much more. There have also been reports warning against inefficient stress coping ways, e.g. avoiding strategies or excessive use of psychoactive substances (Folkman and Moskowitz, 2004). Recent reports highlight the importance of meeting basic needs, taking breaks during working hours, healthy diet, exercising, and maintaining a personal routine in helping to gain a sense of security and control (Petzold et al., 2020). It has also been shown that even though working in an infectious ward during any epidemic is stressful, not everyone experiences stress in the same way, while effective coping methods reduce the level of experienced stress, helplessness, and fear (Folkman and Moskowitz, 2004).

This paper aimed to assess the severity of stress and the effectiveness of the identified strategies for coping with the novel stressful situations experienced by the HCPs of the MSWiA Hospital in Warsaw.

MATERIALS

Initial data were collected from 189 participants (152 females and 34 males, other lacked marking) consisting of various HCPs including physicians (57), nurses (62), orderlies (15), other medical (21) and non-medical (12) professionals, and 22 responders, who did not mark their occupation. The participants were recruited from the following departments of the MSWiA Hospital: Neurology, Cardiology and Hypertension, Internal Diseases with Allergology and Lungs Diseases, Endocrinology and Diabetology,

		<i>n</i>	%
Gender	Female	131	80.4
	Male	29	17.8
	Non-specified	13	1.8
Occupation	Physicians	54	33.1
	Nurses	54	33.1
	Orderlies	10	6.1
	Different medical practitioners	20	12.3
	Non-medical workers	7	4.3
Education	Master's degree or higher	115	70.5
	Secondary school and studying	5	3.1
	Secondary school	38	23.3
	Primary	4	2.5
Marital status	Married	86	52.8
	Single	52	31.9
	Windowed	8	4.9
	Divorced	12	7.4
	Separated	1	0.6
Children	Yes	102	62.6
	No	61	37.4

Tab. 1. Demographic characteristics of participants (fully completed questionnaires)

Rheumatology, Hepatology, Ophthalmology, Gastroenterology, and Neurological Rehabilitation. The age of the participants ranged between 22 and 69 years ($M = 43.81$, standard deviation, $SD = 11.57$).

Incomplete questionnaires were excluded, and due to huge differences between groups, no meaningful comparison could be made between physicians and nurses and the rest of the medical and non-medical professionals. Therefore, it was decided that only the final data obtained from 54 physicians and 54 nurses would be used for further detailed analysis.

METHODS

To evaluate the stress level, the Polish version of the Perceived Stress Scale-10 (PSS-10) (Cohen et al., 1983) was used (Juczyński and Ogińska-Bulik, 2012). We also employed the Brief COPE Inventory (BCOPE) (Carver, 1997) in the Polish version (Ogińska-Bulik and Juczyński, 2008) to assess stress coping strategies. The rationale for the used questionnaires was their brevity, as implementing more detailed but at the same time more extended methods would be too time-consuming and possibly discouraging. Therefore, the participants were asked to complete a paper form of all questionnaires. The study was conducted between July and August 2020.

The study was approved by the Committee of Bioethics in the MSWiA Hospital in Warsaw.

Statistical analysis

Correlations, models with a dependent variable (linear regression), and group comparison (analysis of variance) were used

Stress level	Nurses		Physicians		Total sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Low	4	7.4	8	14.8	21	12.9
Medium	33	61.1	28	51.8	93	57.4
High	17	31.4	18	33.3	49	30.2
Σ	54		54		163	

Tab. 2. Differences in stress levels among nurses and physicians

to analyse variables. All models included all covariates listed above. Ascertained data were stored in an Excel file. All analyses were performed using the R Studio and Statistica 13.3.

RESULTS

After removing incomplete answers, the HCP group consisted of 163 persons, most of them female ($n = 131, 80.4\%$). Almost one-third ($33.1\%, n = 54$) of the participants were physicians (doctors) and another third [$33.1\% (n = 54)$] were nurses. Most of the respondents had higher education ($n = 115, 70.5\%$). The demographics are shown in Tab. 1. When viewing the data set from the viewpoint of stress level, there were 21 cases (12.9%) of low-stress level, 93 (57.4%) of medium stress level, and 49 (30.2%) of high-stress level. Twice as many doctors as nurses declared low-stress levels. Tab. 2 illustrates differences among stress levels among the nurses and physicians studied.

Stress levels and coping strategies

The first regression analysis was done with computed values of the stress level as a dependent variable and coping strategies as independent variables. The regression explains 31% (adjusted $R^2 = 0.318$), which is considered a substantial effect, and it is significant ($F(14,148) = 6.4033; p = 0.000$) (Tab. 3).

Emotional support ($\beta = -0.806; p = 0.032$) and acceptance ($\beta = -0.742; p = 0.049$) had a significant negative impact. This indicates that reaching for emotional support and accepting current events were strongly related to lower stress levels. Furthermore, behavioural disengagement ($\beta = 0.974; p = 0.010$) and venting ($\beta = 0.806; p = 0.040$) had a significant positive effect, and implementing those strategies was highly correlated with an increased stress.

The model's assumptions were verified. The linear patterns were analysed in a residual plot. The Durbin-Watson test was carried out, and the statistic indicates $d = 1.724$, which is considered acceptable.

A one-way ANOVA analysis was conducted to explore further these relationships to the compartment effect of coping strategies on stress levels.

There was a significant difference in the evaluated stress level and the following strategies: active coping ($F(2,160) = 5.644, p = 0.004$), planning ($F(2,160) = 7.712, p = 0.001$), behavioural disengagement ($F(2,160) = 12.808, p = 0.001$), venting ($F(2,160) = 3.754, p = 0.025$), positive reframing ($F(2,160) = 11.835, p = 0.001$), acceptance ($F(2,160) = 11.250, p = 0.0001$), self-blame ($F(2,160) = 10.493, p = 0.001$), and denial ($F(2,160) = 4.263, p = 0.016$).

Post hoc comparisons using the Tukey test indicated that the mean score for active coping differed significantly at the low-stress level (median deviation, $MD = 5.33, SD = 0.856$) and high level of stress ($MD = 4.244, SD = 1.267$). It also varied between low and medium stress levels ($MD = 4.612, SD = 1.302$).

Additionally, planning differentiated results between low ($MD = 5.285, SD = 4.020$) and high stress levels ($MD = 4.020, SD = 1.377$) in a statistically significant way. Substance use also differed significantly between high ($MD = 3.653, SD = 1.702$) and low levels of stress ($MD = 0.095, SD = 0.436$). Another variable - behavioural disengagement -

	B	SEβ	B	t (148)	p
Intercept	23.41693	2.287773		10.23569	0.000000*
Instrumental support	0.58455	0.582880	0.139539	1.00286	0.317565
Active-copying	-0.10504	0.647612	-0.020457	-0.16220	0.871368
Planning	-1.25723	0.661938	-0.257126	-1.89932	0.059468
Substance use	0.50924	0.433715	0.083167	1.17412	0.242231
Emotional support	-0.81804	0.378211	-0.204132	-2.16292	0.032153*
Behavioural disengagement	0.97429	0.374848	0.202804	2.59915	0.010291*
Venting	0.80605	0.389353	0.161964	2.07023	0.040168*
Positive reframing	-0.46909	0.383584	-0.108709	-1.22292	0.223303
Humour	-0.96897	0.657120	-0.103213	-1.47457	0.142453
Acceptance	-0.74258	0.375145	-0.154814	-1.97946	0.049619*
Religion	-0.01318	0.218253	-0.004291	-0.06037	0.951944
Self-blaming	0.49216	0.578814	0.066645	0.85029	0.396535
Self-distraction	-0.29679	0.317934	-0.068299	-0.93349	0.352086
Denial	0.73216	1.353342	0.123965	0.54100	0.589322

$N = 163$; β – standardised beta; B – unstandardised beta; $SE\beta$ – standard error for standardised beta; t – t test statistic; p – probability value; * – significant value.

Tab. 3. Regression summary for coping strategies as predictors for depended variable – level of stress

varied considerably at each level of stress declared by the respondents: low ($MD = 0.4286$, $SD = 0.870$), medium ($MD = 1.2043$, $SD = 1.315$), and high ($MD = 2.0204$, $SD = 1.346$). Venting shows significant differences between low ($MD = 2.0476$, $SD = 1.322$) and high levels ($MD = 2.9184$, $SD = 1.187$) of stress.

In turn, the post hoc tests have shown that positive reframing differentiates between stress at each level: low ($MD = 4.9524$, $SD = 1.284$) and medium ($MD = 3.6022$, $SD = 1.461$) and high ($MD = 3.1429$, $SD = 1.429$). Acceptance indicated significant differences between low ($MD = 5.0952$, $SD = 0.944$) and medium ($MD = 3.8065$, $SD = 1.253$), as well as low and high ($MD = 3.5306$, $SD = 1.473$) level of stress. An analysis of the relationship between the self-blame variable and stress showed substantial variations between low ($MD = 0.6667$, $SD = 0.856$) and high ($MD = 1.5102$, $SD = 0.960$) levels of stress and medium ($MD = 0.9247$, $SD = 0.769$) and high stress levels. Self-distraction was found to be a variation between low ($MD = 4.0952$, $SD = 1.670$) and medium ($MD = 3.2151$, $SD = 1.451$) stress levels. The variable “denial” at the statistical level differentiated between people with low ($MD = 0.4286$, $SD = 0.870$) and high ($MD = 1.5306$, $SD = 1.529$) levels of stress.

The analysis of the results showed that the differences in the application of the strategy led to varying levels of perceived stress. For example, the respondents with lower stress levels used the following strategies: active coping, planning, positive reframing, and acceptance. Furthermore, the application of some strategies, such as substance use, behavioural disengagement, self-distraction, self-blame, and denial, was shown to be statistically significantly associated with higher stress levels.

Occupational differences in coping strategies

Further analyses were conducted for two separate groups: physicians ($n = 54$) and nurses ($n = 54$).

Although regression analysis of the impact of the coping strategies on stress levels in HCPs from the MSWiA Hospital showed that none of the factors significantly affected the dependent variable ($F(15,38) = 2.9077$; $p = 0.000$), the nurses' results shed more light.

The regression results among the nurses showed that only behavioural disengagement was significantly affecting the stress level ($F(15,38) = 2.5517$; $p = 0.001$) and explained 150% of the variance, which is considered a considerable proportion ($R^2 = 0.501$). The presented attitude of surrendering to problems and failing to cope with the situation only increased the perceived stress level, creating a vicious circle. On the other hand, we found no significant regression results in the group of physicians.

Further analysis was carried out of the relationship between perceived stress levels and coping strategies for physicians and nurses. The purpose of the analysis was to empirically verify the most effective coping strategies used by the studied HCPs separately.

Physicians

The analysis of variance in the group of physicians showed a significant difference in the perceived level of stress and the following coping strategies: behavioural disengagement ($F(2,51) = 4.045$, $p = 0.023$), positive reframing ($F(2,51) = 5.718$, $p = 0.006$), acceptance ($F(2,51) = 3.336$, $p = 0.043$) and self-blame ($F(2,51) = 7.002$, $p = 0.002$).

Post hoc analyses using the Tukey test revealed statistically significant differences between the perceived low ($MD = 0.125$, $SD = 0.354$) and high ($MD = 1.778$, $SD = 1.517$) stress level and behavioural disengagement among the physicians. Higher stress levels were specific to those physicians who declared giving up the pandemic-related problems. Subsequent post hoc tests, in turn, showed that the positive reframing strategy made a statistically significant difference between high ($MD = 2.944$, $SD = 1.162$) and low ($MD = 5$, $SD = 1.414$) levels of stress. Additionally, the analysis revealed a difference between medium ($MD = 3.107$, $SD = 1.729$) and low stress levels. The physicians who tried to see their current situation differently to make it seem more positive and expecting a happy outcome had lower stress levels. Moreover, acceptance was linked to the level of stress perceived by the physicians. Significant differences were observed between high ($MD = 3.667$, $SD = 1.534$) and low ($MD = 5.250$, $SD = 0.707$) stress levels. Those doctors who were able to accept the reality that the pandemic had happened, and declared to learn to live with it, were less stressed. Also, the analyses confirmed a significant difference between the medium ($MD = 1.214$, $SD = 0.995$) to high ($MD = 2$, $SD = 0.840$) levels of stress experienced and the use of self-blame strategies by the physicians. Higher levels of stress characterised those who blamed and criticised themselves for the current situation.

Nurses

The verification of the relations between using the behavioural disengagement strategy and stress levels among the studied nurses based on the post hoc test revealed significant differences between low ($MD = 0.250$, $SD = 0.5$) and high ($MD = 2.529$, $SD = 1.375$) as well as medium ($MD = 1.03$, $SD = 1.045$) and high levels of stress among those declaring to use this strategy. In addition, the higher usage of behavioural disengagement was significant for the higher declared stress of the nurses studied.

Concluding the analysis of links between the use of individual strategies and the declared level of stress among the nurses and physicians, the analyses confirmed the assumption that the strategies related to lower stress were primarily positive-reframing and acceptance for physicians. The nurses failed to implement any strategy to reduce the stress level.

In both groups, behavioural disengagement was related to a high level of perceived stress. However, as doctors did, the investigated nurses were more likely to use only behavioural disengagement, without implementing any positive strategy. This detailed analysis also revealed the significance

of the self-blame strategy among the physicians, who tended to criticise and disapprove of themselves for the situation relating to the COVID-19 pandemic.

DISCUSSION

There are only a few publications addressing the stress level in Polish physicians before the outbreak of the COVID-19 pandemic, and they pointed to elevated perceived stress levels among medical doctors. The findings revealed high stress levels (Białek and Sadowski, 2019), similarly to our results. Despite reporting a high level of perceived stress (mean PPS-10 = 17.3; *SD* = 6.85), our results failed to prove its increment due to pandemic-related stressful situations. The majority of our physicians reported medium intensity of stress, and only one-third declared a high level of stress, also experienced by the one-third of nurses. In general, nurses in Poland, similarly to physicians, had already perceived alarming medium to high levels of stress long before the COVID-19 pandemic. It seems that there were no changes in stress levels related specifically to the current coronavirus situation. Similar findings were also reported among Romanian HCPs during the first month of the pandemic (Man et al., 2020), but most research points to an elevated stress level in HCPs (Cabarkapa et al., 2020). One of the explanations is that data were collected during a period of relatively small numbers of daily infections and deaths reports. In addition, governmental restrictions addressing mask-wearing and social distancing were loosened, similarly to the conditions reported in the Romanian study (Man et al., 2020).

Our results indicate that emotional support and acceptance could significantly help reduce stress in HCPs. Obtaining emotional support, mainly by getting comfort and understanding from others, accepting reality, adapting to the new reality, decreasing perceived stress, and promoting mental health during the COVID-19 pandemic (Gurvich et al., 2021). Moreover, implementing active coping, planning, and positive reframing by studied HCPs also reduced the stress levels observed in Polish studies published before the pandemic (Białek and Sadowski, 2019).

On the other hand, behavioural disengagement, and venting, suggesting using a dysfunctional, maladaptive, and avoidant approach to the problem, correlated with increased stress levels. It was also recently reported, along with self-blame and self-distraction, being a risk factor for poorer mental health (Gurvich et al., 2021). We observed the vast negative impact of substance use and denial on the perceived stress levels in the HCPs included in our study. This type of coping was common among medical professionals before the COVID-19 pandemic (Lala et al., 2016; McKinley et al., 2020). The use of the above strategies is a risk factor for mental health issues due to stress, but our doctors also implemented positive reframing to effectively cope with pandemic-related stress, which was also found in other studies (French-O'Carroll et al., 2021; Salman et al., 2020). Researchers suggest the more frequent use of emotional strategies by nurses than doctors (Salopek-Žiha et al., 2020),

which is confirmed by data revealing that nurses had significantly higher scores in denial, substance use, and behavioural disengagement strategies than doctors (Salman et al., 2020). Our results were similar, and the nurses studied mostly used behavioural disengagement to cope with stress, and failed to reach for adaptive strategies. A similar pattern was observed among Chinese nurses from emergency departments during the SARS outbreak when nurses were more likely to use behavioural disengagement than physicians (Wong et al., 2005).

According to previous studies on Polish nurses, behavioural disengagement is considered a rare coping mechanism compared to the most implemented strategy of focusing on the problem. As mentioned above, dealing with the COVID-19 pandemic-related stressful situations did not impact the stress level. However, it likely had shifted the coping mechanism toward using less effective emotional and avoiding strategies (physicians) or even implementing the maladaptive and dysfunctional ones (nurses). This suggests that the nurses included in the study were already burnt out, severely stressed, at an increased risk of developing mental health issues due to another problem – a dangerous factor, nearly impossible to control and anticipate – a novel disease. It is also confirmed by other Polish data, suggesting that HCPs working with COVID-19 patients are under a higher risk of developing symptoms of anxiety, depression, and sleep disturbances (Wańkiewicz et al., 2020). The study has some limitations, and the relatively small number of hospital workers other than nurses and physicians precluded their inclusion in the comparisons between groups. The number of obtained responses might be assumed as not large enough. However, one should bear in mind that the participants were assessed during their shifts or immediately after, and were not required to fill them, as we respected their right to refuse due to physical or emotional reasons. The fact that data were collected from HCPs from only one hospital limits the potential for extrapolation to other medical professionals.

CONCLUSION

The study provided an insight into the degree of perceived stress levels and the implementation of coping strategies by HCPs during the ongoing COVID-19 pandemic. One of the contributions of this article is to highlight the differences in the perceived stress level depending on the professional group: physicians vs. nurses. Also, the present study exemplifies effective coping strategies to reduce stress in the context of high epidemiological emergencies. In particular, acceptance and positive reframing are associated with lower levels of perceived stress among the physicians surveyed. Finally, the findings of the study carry implications for the effective management of HCPs in times of pandemics. Specifically, the study emphasises the role of providing emotional support and encouraging the implementation of effective coping strategies.

Conflict of interest

The authors do not report any conflicts of interests. The article was funded from own resources.

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