Professional burnout, quality of life issues and psychological burden in anesthesiologists and intensive care specialists in contemporary conditions after COVID-19 pandemic: results of an internet-based survey

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Профессиональное выгорание, особенности качества жизни и психологические проблемы у врачей — анестезиологов-реаниматологов в современных условиях после пандемии COVID-19: результаты интернет-опроса

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Abstract

INTRODUCTION: Anesthesiologists and intensive care specialists are considered to be an extremely vulnerable group of medical specialists, more susceptible to professional stress in the context of the COVID-19 pandemic. **OBJECTIVE:** We aimed to study the severity of professional burnout syndrome (PB), quality of life (QoL) issues and psychological burben in anesthesiologists and intensive care specialists working in a multi-field hospital, as well as to determine the risk factors for PB in these specialists. **MATERIALS AND METHODS:** Physicians completed the online survey questionnaire including MBI, WHOQOL-BREF and HADS for assessment of PB, QoL and anxiety and depression, respectively, as well as the checklists with general questions related to COVID-19. Pairwise or multiple comparisons as well as correlation and regression analyses were performed within the statistical analysis. **RESULTS:** The online survey involved 101 physicians (mean age 38.3 ± 9.8 years, 54.5 % — females). During the pandemic, 68.3 % of specialists worked in the red zone. It was demonstrated that the PB syndrome or its signs were observed 2 years after the start of the pandemic in 75 % of specialists — in 27 % it was formed, and in 48 % its signs were revealed. Decreased levels of the main QoL domains, physical, psychological and social well-being, were observed in 1/3 of physicians. About one third of specialists had borderline or increased levels of anxiety/depression. Working in the red zone during pandemic and elevated levels of depression increase the probability of PB, and a high level of social well-being decreases it. **CONCLUSIONS:** For the prevention

Реферат

АКТУАЛЬНОСТЬ: Крайне уязвимой группой медицинских специалистов, в большей степени подверженных профессиональному стрессу в условиях пандемии COVID-19, являются врачи — анестезиологи-реаниматологи. **ЦЕЛЬ ИССЛЕДОВАНИЯ**: Изучение степени выраженности синдрома профессионального выгорания (ПВ), особенностей качества жизни и психологических проблем у врачей — анестезиологов-реаниматологов, работающих в условиях современного стационара, а также определение факторов риска ПВ этих специалистов. **МАТЕРИАЛЫ И МЕТОДЫ:** В рамках интернет-опроса врачи заполняли опросный лист, включающий анкету с вопросами, а также опросник оценки профессионального выгорания MBI, опросник оценки качества жизни WHOQOL-BREF и Госпитальную шкалу тревоги и депрессии HADS. В рамках анализа проводили парные или множественные сравнения, а также корреляционный и регрессионный анализ. **РЕЗУЛЬТАТЫ:** В онлайн-опросе участвовал 101 врач (средний возраст 38,3 ± 9,8 года, 54,5 % — женщины). Во время пандемии в «красной зоне» работали 68,3 % специалистов. В результате исследования установлено, что сформированный синдром ПВ или его признаки наблюдались через 2 года после начала пандемии у 75 % опрошенных специалистов: у 27 % он был сформирован, а у 48 % отмечались его признаки. Низкие показатели основных аспектов качества жизни — физического, психологического и социального благополучия — выявлены у 1/3 врачей, около трети специалистов имели пограничный или повышенный уровень тревоги/депрессии. Работа в «красной

of the PB development of screening examinations are recommended on the regular basis to reveal those specialists who are at high risk of PB. The results obtained may be used to develop evidence-based practical recommendations for the prevention of PB syndrome and psychosocial disorders in anesthesiologists and intensive care specialists.

KEYWORDS: burnout professional, quality of life, anxiety, depression, anesthesiologists, COVID-19, pandemics, surveys and questionnaires

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зоне» и повышенный уровень депрессии увеличивают вероятность ПВ, а хороший уровень социального благополучия ее понижает. **ВЫВОДЫ:** Полученные результаты могут быть использованы в дальнейшем для разработки научно-обоснованных практических рекомендаций по профилактике синдрома ПВ и нарушений в психосоциальной сфере у врачей — анестезиологов-реаниматологов. Для профилактики развития синдрома ПВ у специалистов этого профиля и своевременного выявления специалистов, относящихся к группе риска по формированию ПВ, рекомендовано проведение периодических скрининговых обследований.

КЛЮЧЕВЫЕ СЛОВА: профессиональное выгорание, качество жизни, тревога, депрессия, анестезиологи-реаниматологи, пандемия, COVID-19, опрос

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Introduction

The professional activity of anesthesiologists and intensive care specialists is associated with a very high emotional load and requires significant stress resistance. It involves the need to make responsible decisions quickly that may cost a patient their life, working under conditions of overload and uncertainty, with patients in extremely serious conditions, in some cases with insufficient diagnostic and therapeutic capabilities, need to make complex ethical decisions to balance the benefit and harm caused to the patient, often lacking proper amenities [1, 2]. These factors lead to a decrease in adaptive personal abilities, mental and physical disorders, and, as a result, to burnout syndrome (BS) [3, 4]. According to various studies, signs of BS are observed in 15–65 % of anesthesiologists and intensive care specialists [4, 5]. According to available data, the prevalence of burnout among such healthcare professionals is high throughout the career [5-8]. It is worth mentioning that only 37–41 % of anesthesiologists and 19 % of intensive care specialists work up to retirement age [9]. To compare to other medical specialties, emotional exhaustion in such healthcare professionals is 7 times more common [10]. Physicians with BS often show signs of depression, a high level of personal and situational anxiety, elevated hostility [11, 12].

During the global pandemic of coronavirus infection 2019 (COronaVIrus Disease 2019, COVID-19), the prevalence of BS among intensive care specialists reached critical levels [13]. It is the physicians who have been subject to extremely high physical and emotional stress; their working

conditions during the pandemic are regarded as extreme. It is worth noting, however, that during the COVID-19 pandemic, there has been a global increase in reports of mental health problems among healthcare professionals, high levels of emotional exhaustion, distress, post-traumatic stress disorder and long-term psychological consequences [11, 14]. Ongoing stress during the COVID-19 pandemic, if one lacks sufficient personal and external resources, is highly likely to lead healthcare professionals to deplete their functional reserves and disrupt not only the emotional, but also physical health, reduce their quality of life, despite financial aid from the state [15, 16]. There are domestic and foreign studies that focus on the emotional state of physicians during the pandemic and the prevalence of BS in this professional category [6, 17, 18]. At the same time, publications describing their emotional state and the quality of life in different periods of the pandemic are few [6, 19, 20]. Risk factors for BS among anesthesiologists and intensive care specialists at different stages of the COVID-19 pandemic have not been investigated.

The study objective was to investigate the intensity of BS, the characteristics of quality of life and psychological problems in anesthesiologists and intensive care specialists working in a multi-field hospital, and to determine the risk factors for BS as well.

Materials and methods

The study was conducted from July to September 2022 and consisted of a snapshot Internet survey of anesthesiologists and intensive care specialists working in multi-field hospitals of the Russian Federation. The study was approved by the Bioethics Committee of the N.I. Pirogov Clinic of High Medical Technologies at St. Petersburg State University (extract from Minutes No. 07/22 dated July 7, 2022). To conduct the survey, an online questionnaire was used, a link to the survey was sent to the physicians via e-mail, as well as via instant messengers (Telegram, WhatsApp). Anonymous survey was conducted after confirming voluntary consent to participate in the study. Three questionnaires were included in the survey — Maslach Burnout Inventory, World Health Organization's Quality of Life-Bref (WHOQOL-BREF) questionnaire, Hospital Anxiety and Depression Scale (HADS). The checklist included the questions regarding factors that may be associated with the development of BS, impaired quality of life, and elevated levels of anxiety/depression as well: common factors (sex, age, marital status, habitation, presence of chronic diseases, financial satisfaction), professional factors (work experience (years), a source of professional stress, working in red zone during the pandemic, work hours during the pandemic compared to the work hours before the pandemic), as well as additional factors (open-ended questions regarding attitude towards the COVID-19 pandemic and related problems in everyday life: the loss of loved ones due to COVID-19, the degree of satisfaction with the extent of the use of personal protective measures in the hospital, etc.).

The Maslach Burnout Inventory (MBI) was developed by Maslach & Jackson to study burnout [21] and adapted by N.E. Vodopyanova [22]. The tool contains 22 items relating to feelings and experiences associated with professional activities, relationships with colleagues and patients. Each item is scored on a 7-point scale from "0" (never) to "6" (every day). The MBI measures three dimensions of burnout: emotional exhaustion (EE) [9 items], depersonalization (DP) [5 items], and professional accomplishment (PA) [8 items]. The maximum score is 45 points for EE, 25 points for DP, 40 points for PA. On the EE subscale, each item's intensity is rated as follows: high — 25 points and greater, average — 16–24 points, low — 0–15 points; on the DP subscale: high — 11 points or greater, average — 6–10 points, low — 0–5 points; on the PA subscale: high — 30 points or less, average — 31–36 points, low — 37 points or greater.

The World Health Organization's Quality of Life-Bref (WHOQOL-BREF) questionnaire is based on the WHO Quality of Life Questionnaire (WHOQOL-100), designed to assess the quality of life of people based on their subjective feelings, regardless of cultural, demographic, political and social differences [23, 24]. The WHOQOL-BREF questionnaire consists of 26 items, of which the first two items are separate questions to assess the respondent's quality of life and satisfaction with their health. The remaining 24 questions are grouped into 4 domains: physical well-being (includes questions about physical pain, discomfort, activities of daily living, energy, fatigue, mobility, sleep and rest), psychological well-being (includes questions about positive and negative feelings, thinking, learning, memory, self-esteem, appearance), social well-being (includes questions about personal relationships, social support, sexual activity) and the environment (financial resources, physical safety and security, health and social care, home environment, the opportunity to acquire new information and skills, physical environment, transportation). Each item is scored from 1 to 5 (low score of 1 to high score of 5). The scores are then transformed linearly to a 0-100-scale; the higher the score, the better the quality of life. The quality of life for each domain and two separate questions were determined based on the corresponding quartile: 0–25 points (Q1) — poor quality of life, 26–49 points (Q2) — relatively poor, 50–75 points (Q3) — relatively good and 76–100 points (Q4) — good quality of life.

The Hospital Anxiety and Depression Scale (HADS) was developed by Zigmond A.S. and Snaith R.P. to identify and assess the severity of depression and anxiety in general medical practice [25]. The questionnaire contains 14 items. Each item is rated on a four-point scale corresponding to severity: 0 (absence) to 3 (maximum). When interpre-

ting the results, total score (3 ranges) for each of the two subscales is taken into account: 0–7 — normal (absence of significant symptoms of anxiety and depression), 8–10 — borderline level of anxiety/depression, 11 and greater — elevated levels of anxiety/depression.

Statistical analysis

Descriptive statistics included the number of observations, percentages, arithmetic means, standard deviations, medians, and ranges. The distribution was checked for normality using the Shapiro-Wilk test. Group comparisons were made using Student's *t*-test or Mann-Whitney *U*-test for paired data and Kruskal-Wallis multiple comparison test. Correlation and logistic regression analysis was used to study the relationships between variables. Differences were considered statistically significant at $p < 0.05$. SPSS 23.0 software was used for statistical analysis.

Results

Sample characteristic

101 physicians from the North-Western, Central, Southern, Far Eastern, Ural and Volga regions took part in the online survey. Sample characteristic is given in Table 1.

Table 1. Characteristics of physicians who participated in the survey

Characteristic	Value
Age, complete years	
M (SD)	38.3 (9.8)
range	25–63
Age distribution, *n* (%)	
25–29 years old	24 (23.8)
30–39 years old	35 (34.7)
40–49 years old	28 (27.7)
50–59 years old	10 (9.9)
60–69 years old	4 (3.9)
Sex, *n* (%)	
men	46 (45.5)
Marital status, *n* (%)	
married	63 (62.4)
single	24 (23.8)
divorced	11 (10.9)
widowers/widows	3 (2.9)
Habitation, *n* (%)	
with family members	82 (81.2)
alone	19 (18.8)
Presence of chronic diseases, *n* (%)	
Yes	41 (40.6)
No	60 (59.4)
Work experience, years	
M (SD)	14.2 (9.8)
Me (Q1; Q3)	12.5 (6; 21.3)
range	1–38
Work experience distribution, *n* (%)	
less than 5 years	19 (18.8)
5–9 years	19 (18.8)
10–15 years	23 (22.8)
over 15 years	40 (39.6)
Length of employment in the health care facility, years	
M (SD)	8.0 (8.5)
Me (Q1; Q3)	5 (2; 11)
range	0–39.0
Schedule, *n* (%)	
full-time	98 (97)
part-time	3 (3)
Work in the red zone, *n* (%)	
Yes	69 (68.3)
No	32 (31.7)

Table 1 of end

Note: M (SD) — mean value (standard deviation), Me (Q1; Q3) — median (interquartile range).

The majority of anesthesiologists and intensive care specialists were between the ages of 25 and 49 (86.1 %). The number of males and females was approximately the same. 40.6 % of the respondents had chronic diseases. Among chronic diseases, respiratory diseases (31.7 %) and cardiovascular diseases (26.8 %) are most often reported.

The median — Me (Q1; Q3) of the total professional experience was 12.5 (6; 21.3) years. The majority of anesthesiologists and intensive care specialists (62.4 %) had a work experience of ≥ 10 years. The vast majority (97 %) of the respondents worked full-time, while 40.8 % had a full-time and a half rate; the average duration of the working shift — M (SD) was 14 (7.2) hours; 6 to 24 hours). Also, 89.1 % of physicians participating in the study had night shifts, the average number of the shifts — M (SD) was 7 (3), from 1 to 15-night shifts per month). Most specialitsts had a vacation in the past year; 14.9 % of physicians had a vacation more than a year ago.

During the pandemic, 68.3 % of physicians worked in the red zone. The work hours during the pandemic, compared to the work hours before the pandemic, was significantly increased for 43.6 % of physicians; slightly increased for 20.8 %; unchanged for the remaining 35.6 %. Time to rest during the pandemic decreased for 69.3 % of physicians. 65.3 % of respondents are satisfied with the level of personal protective measures in the hospital, the rest are not satisfied.

Among anesthesiologists and intensive care specialists surveyed, the majority (78.2 %) have come down with COVID-19; the rest (21.8 %) have not come down or are not sure if it was a coronavirus infection; 22.8 % have lost loved ones due to COVID-19.

Characteristics of burnout syndrome in anesthesiologists and intensive care specialists

Table 2 shows the distribution of physicians according to the intensity of concerns associated with BS: EE, DP and PA, and the average MBI scores as well.

Table 2. Professional burnout characteristics according to MBI scores among physicians

MBI subscales	Intensity, score M (SD)	Intensity					
		Low		Average		High	
		Score	*n* (%)	Score	*n* (%)	Score	*n* (%)
EE	26.3 (10.3)	0–15	15 (14.9)	16–24	29 (28.7)	≥ 25	57 (56.4)
DP	12.3 (6.0)	0–5	14 (13.9)	6–10	23 (22.8)	≥ 11	64 (63.3)
PA	32.0 (6.7)	≥ 37	24 (23.8)	31–36	36 (35.6)	≤ 30	41 (40.6)

Note: M (SD) — mean value (standard deviation).

According to Table 2, the majority (56.4 %) of physicians had high EE, 28.7 % had average EE, and only 14.9 % had low EE. Also, the majority (63.3 %) of physicians had high DP, 22.8 % had average DP, and 13.9 % had low DP. 40.6 % of physicians had high PA, 35.6 % had average PA, 23.8 % had low PA.

Comparative analysis of the average values of BS subscales in the subgroups of physicians distributed according to factors that may affect its intensity revealed subgroups with significant differences in BS subscales (Fig. 1).

As it can be seen from the figure, physicians who had worked in the red zone had higher scores on all BS subscales compared to physicians who had not worked in the red zone. At the same time, DP among physicians who had worked in the red zone was significantly higher than among those who had not worked in the red zone (13.3 *vs.* 10.3, $p = 0.021$). Physicians with chronic diseases also had higher scores on all BS subscales than physicians without chronic diseases. EE score in physicians with chronic diseases was significantly higher than in those without chronic diseases (29.0 *vs.* 24.4, $p = 0.028$). Moreover, physicians who are dissatisfied with their financial situation had lower EE and DP scores than physicians who are completely satisfied with their financial situation (28.0 *vs.* 22.3, $p = 0.012$; 13.3 *vs.* 10.2, $p = 0.016$).

Among the surveyed anesthesiologists and intensive care specialists, 27 % had a developed BS, and almost half of them (48 %) had its signs (Fig. 2).

Additionally, the causes of work-related stress were analyzed. The vast majority of physicians (96 %) checked several causes of work-related stress proposed in the questionnaire used. More than a third of respondents named the following as causes of work-related stress: a large workload (70.1 %), organizational difficulties (62.9 %), difficult working conditions (45.4 %), information overload regarding the pandemic (34 %) (Table 3).

The most important support measures during the COVID-19 pandemic according to the surveyed physicians were financial incentives (85.2 %) and the opportunity to take breaks for rest (54.5 %), as well as support from colleagues (43.6 %). In addition, as support measures, the importance of family support was indicated by 37.6 % of physicians, the importance of being informed by the management about the current situation and objectives by 33.7 %.

Additionally, open-ended questions were analyzed. These questions allowed anesthesiologists and intensive

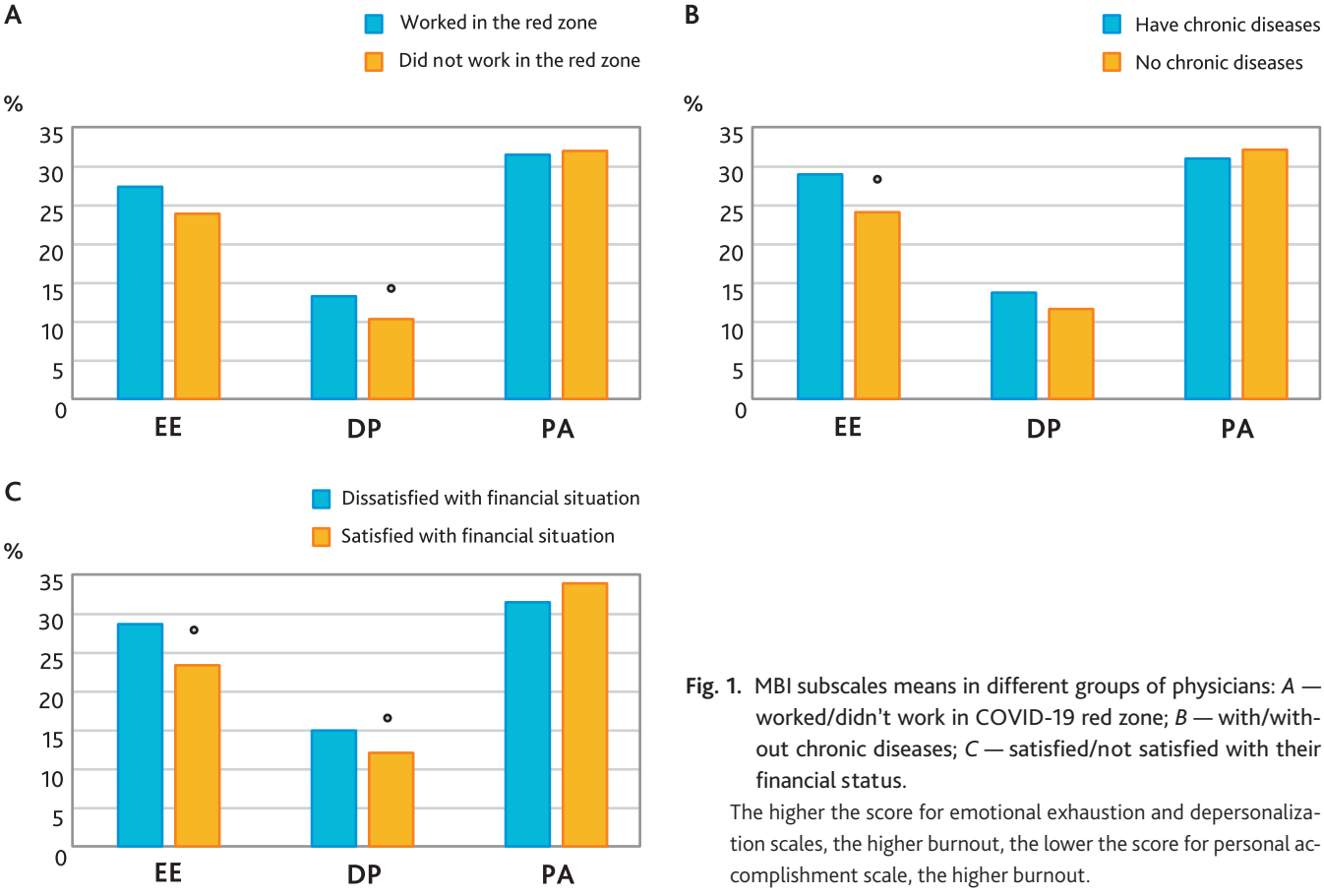

Fig. 1. MBI subscales means in different groups of physicians: *A* — worked/didn't work in COVID-19 red zone; *B* — with/without chronic diseases; *C* — satisfied/not satisfied with their financial status.

The higher the score for emotional exhaustion and depersonalization scales, the higher burnout, the lower the score for personal accomplishment scale, the higher burnout.

* $p < 0.05$.

Table 3. Causes of professional stress among physicians

Cause of work-related stress	Number of physicians who indicated this reason, *n* (%)*
Organizational difficulties	61 (62.9)
Fear of contracting COVID-19	7 (7.2)
Large work-load	68 (70.1)
Family safety concerns due to COVID-19	28 (28.9)
Difficult working conditions	44 (45.4)
Physical discomfort at work	24 (24.7)
Bad social conditions	16 (16.5)
Information overload regarding the pandemic	33 (34)
Other reasons	17 (17.5)

* % calculated out of the number of specialists who had professional stress.

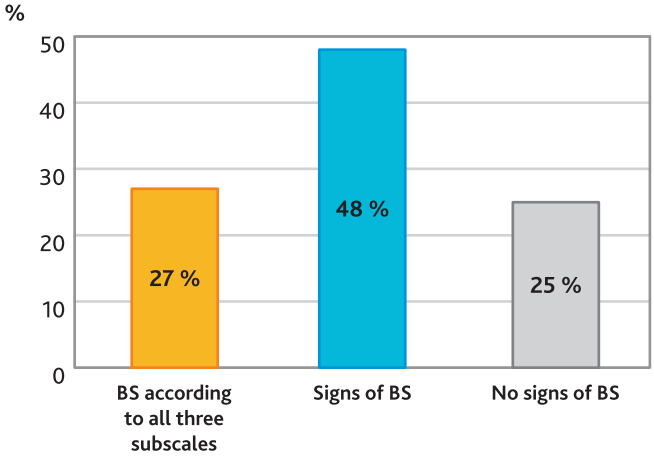

Fig. 2. Distribution of physicians according to grade of BS

care specialists to indicate the most serious changes in their professional life due to the pandemic, the most significant problems in the work of a physician due to the pandemic, and take into account the possible changes in the work process related to the special military operation. To the first question, 50 specialists (49.5 %) left their responses; the responses included: a large number of lethal outcomes and hopeless patients, a feeling of helplessness and powerlessness, a difficult ethical choice (which patient to give the last ventilator), supply difficulties, routing problems, issues of legal protection of physicians in the face of high risks of medical errors as a result of overwork and a large inflow of patients, a significant number of so-called anti-vaxxers, poor organization of COVID-19 prevention, complications after a coronavirus infection, apathy towards other life activities outside of work, as well as team conflicts, difficulties with foreign contacts related to the start of the special military operation. More than half of the physicians (55.4 %) noted significant problems in the work of a physician arising from the pandemic. The most significant were high physical and emotional stress, excessive documentation, lack of equipment and consumables, lack of personnel and other problems.

Characteristics of quality of life and psychological problems

Fig. 3 shows the average quality of life scores according to the WHOQOL-BREF questionnaire among the surveyed physicians in different age and gender groups. In the age group of 25–29 years, the highest scores were found in the domain of physical well-being, the lowest in the domain of psychological well-being; in the age group of 30–39 years, the highest scores were in the domain of psychological well-being, the lowest in the domain of environment; in the age group of 40–49 years, the highest scores were in the domain of psychological well-being, the lowest in the domain of social well-being; in the age group ≥ 50 years, the highest scores were in the domain of physical well-being, the lowest in the domain of social well-being. There were no significant differences between age groups in any of quality of life domains ($p > 0.05$). Average scores for all domains are slightly higher for men than for women. There were no significant differences in any domain of the WHOQOL-BREF questionnaire between men and women ($p > 0.05$).

Among physicians, the majority (81.2 %) had good (24.8 %) or relatively good (56.4 %) physical well-being. Only 18.8 % had poor (3 %) or relatively poor (15.8 %) physical well-being. Good (23.7 %) or relatively good (59.4 %) psychological well-being was observed in 83.1 % of physicians; the rest (16.9 %) had poor (5 %) or relatively poor (11.9 %) psychological well-being. Good (14.9 %) or relatively good (59.4 %) social well-being was observed in 74.3 % of physicians; the remaining 25.7 % had poor (10.8 %) or relatively poor (14.9 %) social well-being. In the domain of physical environment, good (12.9 %) or relatively good (73.1 %) quality of life scores were observed in 86 % of physicians; poor (4 %) or relatively poor (10 %) scores were observed in the remaining 14 % of physicians. It is noteworthy that about a fifth of the physicians are not satisfied with their health (19 %).

During a comparative analysis of the average scores on the domains of the WHOQOL-BREF questionnaire in subgroups of surveyed physicians according to factors that may affect the quality of life, subgroups with significant differences were identified. Anesthesiologists and intensive care specialists who had worked in the red zone during the pandemic had worse mean scores for psychological well-being, as well as the quality of life in general compared to those who had not worked in the red zone (62.0 *vs.* 67.8, 64.1 *vs.* 72.7, $p < 0.05$). Mean physical well-being scores were worse for physicians with chronic diseases compared to those without chronic diseases (58.1 *vs.* 67.5, $p = 0.002$). In addition, the quality of life was worse for physicians living alone compared to those who lived with family members (psychological well-being, 52.4 *vs.* 66.5; social well-being, 53.6 *vs.* 62.0; $p < 0.05$), as well as for physicians who are not satisfied with their financial situation, compared with physicians who are completely satisfied with their financial situation (physical well-being, 60.7 *vs.* 70.8; psychological well-being, 60.5 *vs.* 71.7, $p < 0.01$). No differences in the quality of life between subgroups according to other factors have been established ($p > 0.05$).

The distribution of physicians according to their level of anxiety and depression according to HADS was analyzed separately (Fig. 4).

About a third of the physicians had a borderline or elevated level of anxiety (32.7 %) and/or a borderline or elevated level of depression (31.7 %). We established a statistically significant weak inverse correlation of the level of anxiety among anesthesiologists and intensive care specialists with age and professional experience ($r = -0.272$, $p = 0.006$; $r = -0.221$, $p = 0.027$). In addition, the average level of anxiety was higher in professionals who lived alone compared to professionals living with family members (9.2 *vs.* 6.2, $p = 0.004$). For other factors, no differences in the level of anxiety and depression were established ($p > 0.05$).

Factors associated with professional burnout syndrome

To determine the factors that are associated with the developed BS or its signs among anesthesiologists and intensive care specialists, a logistic regression was used (Table 4). As independent variables that can be predictors of BS, factors with significant correlation with its severity were considered: working in the red zone ($r = 0.314$; $p = 0.002$), dissatisfaction with the financial situation ($r = -0.277$;

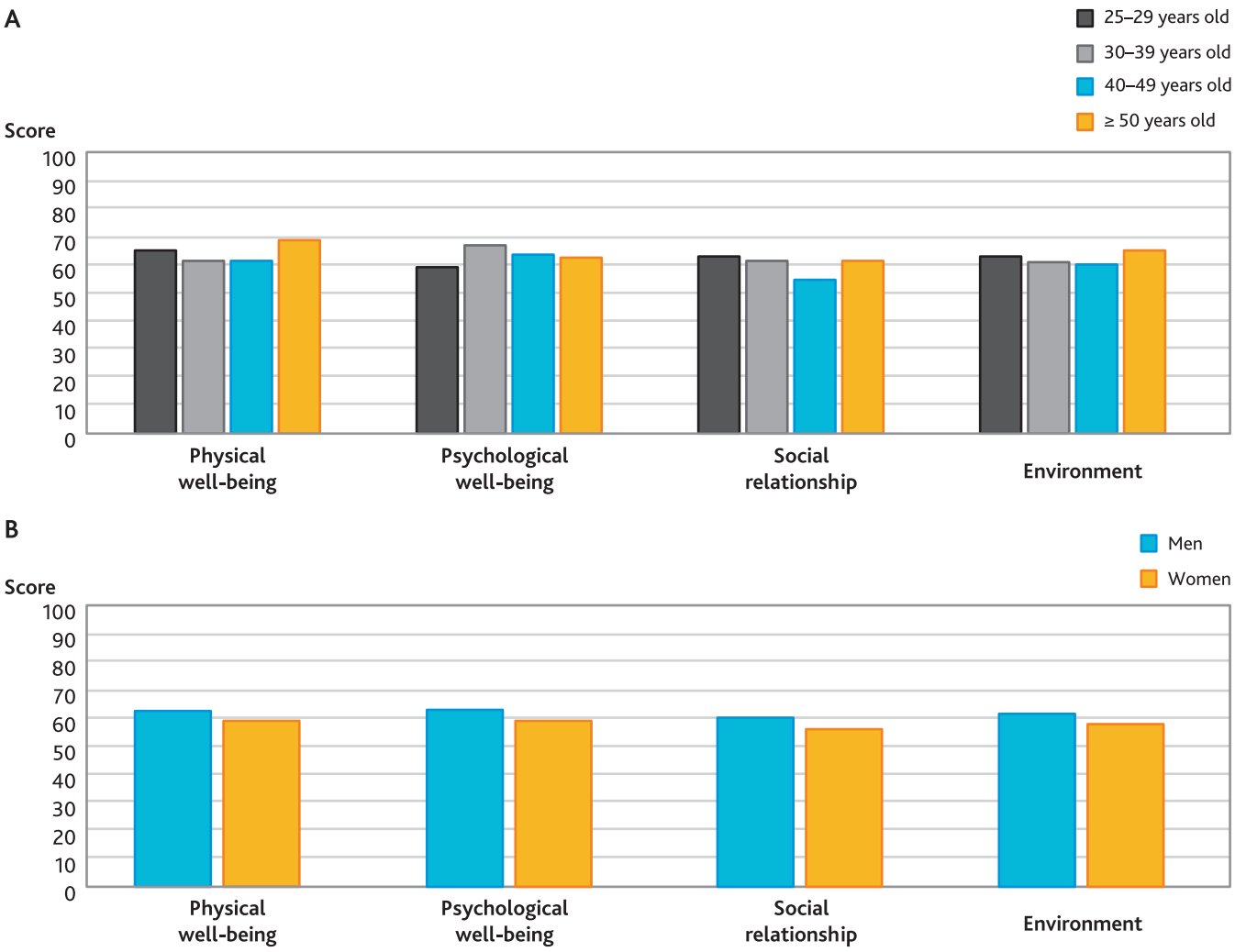

Fig. 3. QoL means for WHOQOL-BREF in different age groups (*A*) and in males and females (*B*)

$p = 0.006$), the presence of a borderline or elevated level of anxiety ($r = 0.332$; $p = 0.001$), the presence of a borderline or elevated level of depression ($r = 0.488$; $p < 0.001$), as well as reduced levels of physical ($r = -0.452$; $p < 0.001$), psychological ($r = -0.416$; $p < 0.001$) and social well-being ($r = -0.447$; $p < 0.001$). There were no strong correlations between the independent variables ($r < 0.7$). Factors that showed a statistically significant relationship with the dependent variable (presence of BS) at the stage of univariate analysis were included in the multivariate model using a one-time introduction of independent variables.

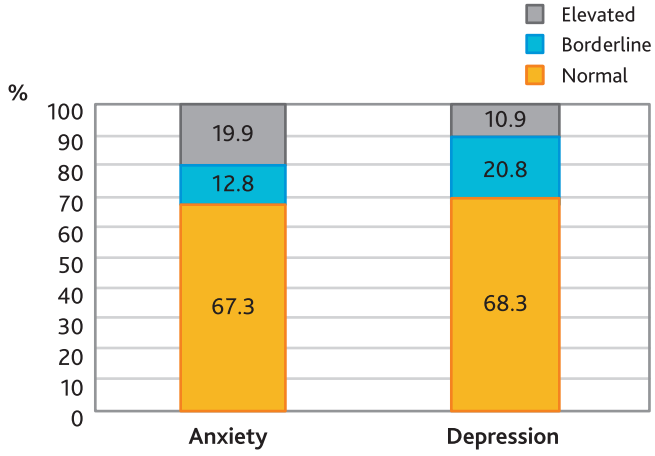

Fig. 4. Distribution of physicians according to grades of anxiety and depression by HADS

Univariate analysis revealed statistically significant associations between BS and working in the red zone (OR = 4.512, $p = 0.003$), dissatisfaction with financial situation (OR = 3.786, $p = 0.008$), levels of anxiety (OR = 1.359, $p = 0.001$) and depression (OR = 1.624, $p < 0.001$), as well as levels of physical (OR = 0.919, $p < 0.001$), psychological (OR = 0.928, $p = 0.001$) and social well-being (OR = 0.928, $p < 0.001$). At the second stage of the regression analysis, an optimal multivariate model was generated, which included three independent predictors of BS: working in the red zone (OR = 8.826, $p = 0.007$), level of depression (OR = 1.419, $p = 0.039$) and social well-being (OR = 0.943, $p = 0.028$).

Table 4. Results of regression analysis

Independent factors[1]	Univariate analysis			Multivariate analysis[3]		
	p	OR	95 % CI	*p*	OR	95 % CI
Work in the red zone						
Yes	0.003	4.512	1.684–12.085	0.007	8.826	1.812–42.990
No[2]						
Satisfaction with financial situation						
Not satisfied	0.008	3.786	1.421–10.088	0.446	1.807	0.394–8.282
Completely satisfied[2]						
Level of anxiety, score	0.001	1.359	1.070–1.650	0.167	1.265	0.907–1.764
Level of depression, score	< 0.001	1.624	1.420–1.810	0.039	1.419	1.017–1.979
Level of physical well-being, score	< 0.001	0.919	0.879–0.960	0.425	0.975	0.916–1.038
Lebel of psychological well-being, score	0.001	0.928	0.890–0.968	0.330	1.036	0.965–1.113
Level of social well-being, score	< 0.001	0.928	0.892–0.966	0.028	0.943	0.895–0.994

[1] Presence/absence of professional burnout syndrome or it's signs was considered as dependent variable.

[2] Reference category.

[3] Entry method, Nagelkerke $R^2 = 0.589$, $p < 0.001$.

CI — confidence interval; OR — odds ratio.

Discussion

This study is devoted to the investigation of relevant issues related to BS, disruption of various aspects of quality of life and psychological issues among anesthesiologists and intensive care specialists working in multi-field hospitals, two years after the start of the COVID-19 pandemic. Nowadays, there is still quite a lot of research focused on BS among anesthesiologists and intensive care specialists. This is due to the special nature of the profession, which imposes serious responsibility and is characterized by great physical and psychological stress [2–5, 8, 27]. After the COVID-19 pandemic started all over the world, including Russia, the workload on anesthesiologists and intensive care specialists has increased significantly, and BS has become a pressing issue [28, 29]. Since the epidemiological situation associated with the novel coronavirus infection developed in a wave-like nature over a long time, the working conditions of these specialists have become critical. This necessitated the development of effective measures for psychological relief, social protection and financial support of physicians subject to chronic work-related stress. Meanwhile, aspects associated with a high risk of BS and psychological problems, as well as a disruption of quality of life of anesthesiologists and intensive care specialists in the context of a long-term COVID-19 pandemic, are currently little investigated. This determines the scientific and practical significance of our study.

In this study, standardized, widely accepted questionnaires were used: MBI to assess BS severity, WHOQOL-BREF to assess the quality of life, and HADS to assess psychological problems in physicians who participated in an online survey. As a result, it was found that a developed BS or its signs were observed in 75 % of the surveyed HCPs ($n = 101$): developed in 27 %, signs were observed in 48 %. At the same time, 56.4 % of physicians had high EE, presented with suppressed emotions, loss of interest in the surroundings or emotional oversaturation, as well as aggressive reactions or symptoms of depression; 63.3 % had high DP, characterized by problems relating to other people; 40.6 % had high PA, which consisted in trivializing their own achievements, limiting beliefs, reduced self-esteem and professional motivation. According to these, a significant proportion of the physicians surveyed are at a significant risk of BS, i. e. it is an extremely vulnerable group of professionals who need measures of social and psychological support to reduce emotional exhaustion and depersonalization. Overall, these figures appear significantly higher than those observed in other studies of BS among anesthesiologists and intensive care specialists before the COVID-19 pandemic [8, 26, 27, 30, 31], as well as during the COVID-19 pandemic [6, 20, 29, 32]. It is possible that such high rates of burnout among physicians in our study are associated with the effect of chronic fatigue and psychological problems accumulation

in the HCPs that we surveyed due to prolonged exposure to stress (over two years) after the start of the pandemic. At the same time, anesthesiologists and intensive care specialists, who worked in the red zone, who have chronic diseases and are not satisfied with their financial situation, had higher scores on some BS subscales. It should be noted that compared to some other studies [3, 6, 17], we did not establish differences in BS subscales between groups of physicians depending on gender, age, professional experience, and other factors. The main causes of professional stress in the context of the COVID-19 pandemic which were in the questionnaire, more than half of specialists indicated an increase in workload (70.1 %) and organizational difficulties (62.9 %). It is essential that the list of the most important support measures during the pandemic, according to the majority of the physicians surveyed, included financial incentives (85.2 %) and the opportunity to take breaks and rest (54.5 %); more than a third of the physicians noted the importance of support from colleagues and family (43.6 % and 37.6 %, respectively). This information is consistent with the results of other studies and surveys that involved various kinds of healthcare professionals [6, 33]. Our survey data was made more valuable by the additional comments of physicians regarding the most sustainable changes in their professional lives due to the pandemic. Among the comments are a large number of hopeless patients, a feeling of professional helplessness and powerlessness, issues of a difficult ethical choice, routing problems and other problems related to work with severe infectious patients during the pandemic.

In terms of quality of life, about a quarter of the physicians who took part in the online survey had low scores on the main aspects of quality of life: physical, psychological and social well-being. Approximately one fifth of the physicians were not satisfied with their health (19 %). The results obtained reflect the general trends in the physicians quality of life impairment during the COVID-19 pandemic, demonstrated in a number of other studies, in particular involving anesthesiologists and intensive care specialists [28, 34–37]. As in the study by Calumbi R.A. et al. [34], compared to males, females had lower quality of life on all domains of the WHOQOL-BREF questionnaire, but the differences in our sample were not significant. As Calumbi R.A., we did not find significant differences between groups when it comes to age in any of the domains of quality of life. An important result of our study was the confirmation of previously published data [33] that anesthesiologists and intensive care specialists who worked in the red zone, as well as those with a low level of financial support, have a significantly worse quality of life.

Another important result of our study is information about the level of psychological problems among physicians who participated in the online survey in the long term after the start of the COVID-19 pandemic: about a third of HCPs had borderline or elevated levels of anxiety/depression. In general, the findings correspond to those described in a number of foreign and domestic research works devoted to the study of psychological problems among anesthesiologists and intensive care specialists during a pandemic [28, 31] and significantly exceed the data of Chinese authors who presented the results of a study of psychological problems of physicians after the lockdown [38]. The level of anxiety decreased with age and professional experience. It is noteworthy that the level of anxiety, as well as disruption of psychological and social well-being during the pandemic, were higher among physicians living independently, compared to those living with family members. Perhaps this trend is related to social and cultural aspects and indicates the need for timely support measures for those professionals who do not have a family and are more susceptible to stress under social isolation during the COVID-19 pandemic.

Our research work is remarkable for its investigation of aspects that are associated with the risk of BS in physicians during the protracted pandemic. Evidence suggests that working in the red zone and higher levels of depression increase the likelihood of BS, while a good level of social well-being lowers it. Similar data are presented in the work of Podhorodecka K. et al. in the study of BS among Polish anesthesiologists and intensive care specialists [18]. It should be noted that in our sample during the pandemic, 68.3 % of specialists worked in the red zone; borderline or elevated levels of depression were observed in 31.7 % of physicians, poor or relatively poor social well-being was observed in 25.7 % of physicians.

The limitations of this study include a relatively small sample of anesthesiologists and intensive care specialists and the lack of follow-up, as well as the absence of a control group to compare the level of burnout and related problems among physicians of different profiles and levels.

The results of this study can be used to develop practical recommendations for the prevention of BS and addressing related problems among anesthesiologists and intensive care specialists working in a multi-field hospital in the period after the start of the COVID-19 pandemic. Based on the data obtained, periodic screening of the BS intensity and the levels of anxiety and depression among specialists, especially those working in the red zone may be recommended. It is also recommended to assess the level of social well-being among anesthesiologists and intensive care specialists: specialists with impaired social well-being need targeted psychological and social support for the BS prevention and support.

For the timely identification of physicians at risk of developing BS and psychological/social disorders, it is recommended to use standardized questionnaires: MBI to assess the intensity of BS, WHOQOL-BREF to assess quality of life and HADS to identify psychological problems.

In general, the data obtained on the intensity of BS, the quality of life level and psychological concerns among Russian anesthesiologists and intensive care specialists two years after the start of the COVID-19 pandemic can be used

in the future to develop evidence-based practical recommendations for the prevention of BS and psychological/social disorders for these physicians.

Conclusion

Two years after the start of the COVID-19 pandemic, the developed BS or its signs were observed in 75 % of anesthesiologists and intensive care specialists: it was developed in 27 %, signs were observed in 48 %. A quarter of physicians had low scores on the main aspects of quality of life: physical, psychological and social well-being; a third had borderline or elevated levels of anxiety/depression.

Working in the red zone, depression, and social well-being are predictors of BS: working in the red zone and higher levels of depression increase the likelihood of BS, while good social well-being lowers it.

To prevent the development of BS among anesthesiologists and intensive care specialists and to timely identify those at risk, periodic screening of BS intensity, the levels of anxiety and depression, as well as the level of social well-being is recommended.

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