

Health workforce management in the context of the COVID-19 pandemic: A survey of physicians in Serbia

Milan Dinić¹ | Milena Šantrić Milićević²  |
Stefan Mandić-Rajčević³  | Katica Tripković⁴ 

¹Serbian Medical Chamber, Belgrade, Serbia

²Faculty of Medicine, University of Belgrade, Belgrade, Serbia

³Faculty of Medicine, Institute of Social Medicine and the Centre-School of Public Health and Health Management, University of Belgrade, Belgrade, Serbia

⁴Department for Analysis, Planning and Organization of Health Care, Institute of Public Health of Belgrade, Belgrade, Serbia

Correspondence

Milena Šantrić Milićević, Faculty of Medicine University of Belgrade, Centre-School of Public Health and Health Management, Institute of Social Medicine, 15 Dr Subotica Street, Belgrade 11000, Serbia.
Email: milena.santric-milicevic@med.bg.ac.rs and msantric@yahoo.com

Abstract

Background & Aim: The study describes the experiences and opinions of Serbian physicians regarding workforce management during the COVID-19 pandemic.

Materials & Methods: A total of 1553 licensed physicians (65% males; average age 44.0 years) responded to an online survey in September 2020. Differences in the respondents' general data and attitudes regarding workforce management and outbreak preparedness in Serbia were analysed in relation to their engagement during the COVID-19 pandemic (Pearson χ^2 and the independent samples *t*-test, $p < 0.05$). The logistic regression model explained the need for changing health workforce management.

Results: The results reveal that the physicians engaged in the fight against the spread of COVID-19 (64.4% of the respondents) more often than their counterparts, were clinicians from the public sector, younger, with less work experience, influenced negatively by the pandemic, and reassigned to other positions ($p < 0.001$). Health workers dissatisfied with workplace preparedness and those reassigned due to COVID-19 were by 2.61 times and 1.38 times, respectively, more likely than their counterparts to consider changes in health workforce management.

Discussion & Conclusion: COVID-19 underlines the need for changes in health workforce management during public health emergencies. An internal incident management team and a panel of external experts may support health workforce management during the prolonged and rapidly changing crises.

KEYWORDS

COVID-19, health workforce planning, human resource management, physicians, Serbia

1 | INTRODUCTION

The coronavirus (SARS-CoV-2) disease (COVID-19) is a multifaceted disease whose persistent transmission throughout the year 2020 has shaken the whole world and has brought uncertainty to everyone. The COVID-19 pandemic has profound implications regarding the health workforce, in terms of the rapid deployment of remote and flexible work arrangements to meet medium-term needs and long-term goals and in terms of reliable and transparent calibration of responses to balance short-term pressures.¹ Since its appearance in December 2019, healthcare system stakeholders have been continuously examining and adjusting regulations to attain and expand the healthcare workforce capacity to fight against the COVID-19 pandemic,² ensure the necessary continuity of healthcare provision better prevent COVID-19 transmission, and secure the medical supply chain for the treatment of patients with COVID-19.³⁻⁶ Responsive anticipation and adoption of adjustments and innovations in the workforce management and planning systems and regulations might be necessary to enable a timely and continuous strengthening of the healthcare workforce capacity as well as an equitable delivery of healthcare services. Management at all healthcare system levels needs the necessary support to align its needs and priorities with the well-being of the workforce and reduce the risks and threats to overall health outcomes. This is particularly important given the evidence showing that relaxing various public health measures against COVID-19 increases the risk of new waves of infection across countries, thus requiring the lasting endurance of health workers.^{7,8}

The impact of the COVID-19 pandemic on the healthcare workforce capacity, competencies, performance, safety and motivation may require a different set of management skills.^{1,9} According to the latest report on the Human Capital Index,¹⁰ the COVID-19 economic shock is expected to affect child mortality and child health through disrupted coverage and reductions in health services due to healthcare workforce and supply chain issues in healthcare systems. The comprehensive role of healthcare managers during the COVID-19 pandemic is emphasized by their responsibility for providing equitable access to quality and safe healthcare services for various vulnerable population groups (e.g., persons requiring long-term care and migrants), for preserving the health of personnel at risk of contracting the COVID-19 infection, and for coordinating and organizing multidisciplinary teams for the purpose of the timely achievement of necessary productivity and efficiency. Therefore, research on healthcare workforce management in the context of COVID-19 and the specificities of the country, healthcare system and culture, is an opportunity to learn about management and workplace preparedness and to understand the need for replacing inefficient practices with innovative ones.

In this study, the focus is on physicians' opinions and views on workforce management in the context of the COVID-19 pandemic. The aim of the study was to gain insight into the experiences and opinions of physicians regarding workforce management during the COVID-19 outbreak. The study findings can inform stakeholder strategic and tactical efforts in this rapidly changing epidemic.

2 | BACKGROUND: THE COVID-19 SITUATION IN SERBIA

In Serbia, a country in Southeast Europe, news of the SARS-Cov-2 virus became topical in December 2019 and January 2020. The state of emergency and measures taken in China, as well as the sharp rise in the number of infected people in Italy, produced apocalyptic scenes observed by Serbian viewers in disbelief. Just before the outbreak, the Law on Health Care and the Law on Health Insurance were changed in Serbia.¹¹ Their adoption initiated the process of amendment of most bylaws. These regulatory changes were planned to affect the work and organisation of institutions. The changes with the greatest impact were the transfer of founding rights (from local government to the republic level) and the method of financing. Not all of the bylaws were amended and harmonised with the laws in force, in 2020. Institutions at the secondary and tertiary levels have started implementing funding based on the diagnosis-related group method of calculation, while at the level of primary health care, there has been a change in the capitation formula.

Shortly after the World Health Organization (WHO) declared a pandemic, Serbia registered 135 infected patients and its first death due to COVID-19, and an epidemic and state of emergency were declared.¹² The same day, Norway donated five million euro to Serbia to help fight COVID-19. On the following day, the first group of Chinese experts brought their experience and medical equipment to the country. In the first week of the epidemic, the European Union (EU) approved financial aid to Serbia to fight COVID-19. At that time, the focus of intensive communication amongst physicians was on experience exchange and on significant changes in the system of organizing health care, according to the decisions of the Ministry of Health of the Republic of Serbia and the recommendations of the Crisis Working Group and the Institute of Public Health of Serbia. Decisions made during the state of emergency included the establishing of temporary COVID-19 hospitals, the introduction of bans and restrictions on movement, central distribution of consumables, the abolition of election programs, the introduction of COVID-19 treatment protocols, the decision on remunerating 100% sick leave to health workers suffering from COVID-19 and a regulation on a 10% salary supplement to all healthcare employees.^{13–17} By the end of March 2020, more than 300 diaspora medical workers applied to return to the country.¹⁸ During the pandemic, the Minister of Health sent a letter to the directors of institutions founded by the Republic of Serbia to ban additional engagement of health workers by a second employer. Private practices and private healthcare institutions have not been systematically involved in the organized fight against COVID-19.

According to the records of the Serbian Medical Chamber, Serbia has about 30,000 licensed and professionally active physicians (of whom 60% are specialists) working in the public and private healthcare sector (86% and 14%, respectively). Those who were on the front line of the response to the COVID-19 pandemic were likely to become 'second victims'¹⁹ because they may have become exposed and quarantined, or may have been infected or sick.²⁰ For 10 months now, the same individuals, in some cases from dual-doctor households, have been working in very demanding circumstances in healthcare facilities; many healthcare workers have had extended working hours, and they have been under pressure to make quick decisions regarding several patients at the same time and have felt a decrease in morale.²¹ They are at risk of suffering from anxiety, depression or insomnia.^{21–24} These facts support the research on the policies and regulations urgently needed to regulate the organisation, support, workload balance, recognition and safety of the health professionals.²²

3 | THE SCOPE OF THE STUDY

The attention given to health workforce issues is considered a success factor in the implementation of health policies.^{25,26} Levels of the healthcare workers preparedness for the COVID-19 outbreak are unknown²⁷ while effective health workforce management during the COVID-19 pandemic poses a challenge.^{9,28,29} The pandemic is also a challenge for frontline physicians who lack the expertise in infectious diseases management and intensive care

and are faced with a work environment that includes the risk of contracting a severe infection, such as COVID-19.^{30,31}

During the SARS epidemic, both health workers and SARS survivors experienced mental health problems—elevated levels of stress and psychological distress.³² However, 1 year after the epidemic, higher pressure and psychological distress levels in healthcare workers than in non-health workers were registered among SARS survivors.³² The Ebola outbreak changed health workers' professional lives and made them feel scared, sad, depressed, isolated, lonely and stigmatized.^{33–35}

In Serbia's public healthcare sector, the capacity for modern health workforce management²⁵ is reduced to personnel administration.¹¹ In light of the legislative framework,¹¹ crisis management and planning in Serbia's healthcare facilities need to be strengthened before, during and after the crisis. A recent study has shown that a hospital lacked a hazard-specific, emergency and disaster response plan, even 5 years after.³⁶

The COVID-19 pandemic is a type of natural experiment³⁷ in which researchers did not manipulate either exposure to the coronavirus or intervention of interest. As in all real-life experiments, the intervention's effect can be identified using an observational approach involving the comparison of exposed and unexposed participants. In this study, the exposed participants were physicians engaged in the fight against COVID-19 versus the unexposed participants, that is, the non-engaged participants. The intervention's studied effect is the physicians' opinion and experiences regarding the preparedness for COVID-19 and health workforce management. The intervention is the health workforce management and training and safety measures during the COVID-19 in Serbia, guided mainly by the COVID-19 protocols. It goes beyond assessment based on routinely collected data on the impact of the COVID-19 pandemic on the health workforce, which may be restrained or time consuming. In the cross-sectional design and natural experiments, an accurate assessment of the relationship between the studied independent variables and the respondents' opinions as a dependent variable is multivariate regression analyses.³⁷ An insight into physicians' attitudes and experiences towards health workforce management during the COVID-19 pandemic could attract sufficient attention for developing learning organizations³⁸ in Serbia's public healthcare sector. As a result of the pressures towards a continuous transform for better response to the COVID-19 surges, relying on common knowledge to solve health workforce problems needs to be balanced with innovative services regarding COVID-19. It is essential to know whether new knowledge on safety measures gets applied and how new personal protective equipment (PPE) practices have become established.

Little is known about health workers actively engaged during epidemics or other emergencies, as compared to those not engaged in these emergencies. In a study on the willingness to respond to emergencies, females and personnel under the age of 40 were the staff most prone to absenteeism.³⁹ The evidence published before this study shows that unlike women who have schoolchildren, clinical workers and those familiar with the emergency plan are more likely to be willing to be mobilised in an emergency.⁴⁰ A systematic review and meta-analysis⁴¹ found that men, physicians, full-time employees, who perceived personal safety and risk of a pandemic, confidence in individual skills and who were trained to respond had a significantly increased readiness to work during a pandemic. Therefore, in our study of the opinions and experiences related to the COVID-19 pandemic, the role of sex and age of physicians as cultural and social variables⁴² is explored among other independent variables. The study findings on the relevance of respondents' variables could contribute to a better understanding of mobilized and redeployed frontline physicians and the needed workplace changes during a crisis.^{40,41,43–45}

4 | METHODS

An online survey was conducted among physicians licensed by the Serbian Medical Chamber during two weeks in September 2020. The Ethics Committee of the Serbian Medical Chamber approved the cross-sectional study design and purpose and the questionnaire (Decision No: 1462/15 September 2020). The first part of the online questionnaire included the following information: the purpose of the study, data protection and confidentiality

statements (contact details known only to the Medical Chamber of Serbia), information on the management and use of the data and information stating that participation in the study was voluntary and anonymous (no personal identification). Therefore, the respondents who decided to fill out the questionnaire and send the answers also gave their consent to participate in the study and allowed their data to be used in scientific publications.

4.1 | Study population and variables

The population of interest in the study covered all physicians in Serbia, currently licensed by the Serbian Medical Chamber. In this study, the voluntary response sample consisted of a total of 1553 licensed physicians, who completed the online questionnaire. Respondent variables of interest were grouped as general characteristics (sex, age, marital status, education level, work experience and type of workplace), job satisfaction (dissatisfied/mostly dissatisfied vs. mostly satisfied/satisfied), opinion regarding the degree of impact of the COVID-19 pandemic on everyday

operation at the respondent's workplace (on the scale from no/minimal impact vs. medium/major impact), and type of impact (positive vs. negative), professional preparedness for pandemics (dissatisfied/mostly dissatisfied vs. mostly satisfied/satisfied), being reassigned to another work position (yes vs. no) and the opinion regarding the necessary changes in health workforce management (yes, no, do not know) including methods of workforce requirements planning, education and training, recruitment and dismissal, organizational models, workload measurement, performance assessment, reward and incentive system, payment and compensation, and control during the COVID-19 pandemic and engagement in the work with SARS-CoV-2-positive patients. Also, the study describes the sex compositions of the group of physicians who were reassigned to different workplaces during the COVID-19 pandemic and of those who were trained in the use of personal protective equipment. It also provides information regarding the availability and utilization of the appropriate PPE.

The study instrument was constructed on the basis of the questionnaires used for risk assessment and management of the exposure of healthcare workers in the context of the COVID-19 pandemic²⁴ and human resource management.⁴⁶

Statistical analyses in the study included the analysis of the respondents' differences (Pearson χ^2 and the independent samples *t*-test); all tests were set at the significance level $p < 0.005$. Logistic regression models (odds ratio, and 95% confidence interval) were used to identify a significant univariate and multivariate association between the outcome variable (necessary changes in health workforce management: yes vs. no/do not know) and explanatory variables (all other variables observed in the study). All analyses were performed with the IBM SPSS ver. 25.

5 | RESULTS

Among 1553 study respondents, there were more males, married persons, specialists, and physicians working in public hospitals. The mean age was 44; the average work experience was 16 years. More respondents were satisfied with the job and job preparedness for pandemics and had the opinion that the COVID-19 pandemic had a major negative job impact and did not change the work position due to the pandemic (Table 1).

Physicians engaged in the fight against COVID-19 (64.4% of the total number) differed significantly from their colleagues without such engagement ($p < 0.001$). More of them were young (the mean age was 42 vs. 47 years) and less-experienced physicians (mean work experience was 14 vs. 19.5 years). Non-specialists were more often engaged (over one-third of all physicians engaged in the fight against COVID-19 vs. less than one-quarter of their counterparts). Almost half of them are employed at secondary and tertiary public healthcare institutions (47.6%).

TABLE 1 General characteristics of the respondents—physicians, according to their engagement in the work with patients with COVID-19

General characteristics of the respondents	Physicians: Grouped by their engagement with patients with COVID-19 ^a			Test
	[ALL] N = 1553	Yes N = 992	No N = 561	p
Sex:				0.191 ^b
Male	1011 (65.1%)	634 (63.9%)	377 (67.2%)	
Female	542 (34.9%)	358 (36.1%)	184 (32.8%)	
Age, years (mean ± standard deviation)	44.0 ± 11.8	42.1 ± 10.6	47.0 ± 13.0	<0.001 ^c
Marital status:				0.186 ^b
Married	921 (59.3%)	576 (58.1%)	345 (61.5%)	
Other (e.g., engaged)	632 (40.7%)	416 (41.9%)	216 (38.5%)	
Education:				<0.001 ^b
Undergraduate medical studies	483 (31.1%)	347 (35.0%)	136 (24.2%)	
Specialization	806 (51.9%)	515 (51.9%)	291 (51.9%)	
Doctorate	264 (17.0%)	130 (13.1%)	134 (23.9%)	
Workplace:				<0.001 ^b
Public: Primary health care	574 (37.0%)	425 (42.8%)	149 (26.6%)	
Public: Secondary/tertiary health care	684 (44.0%)	472 (47.6%)	212 (37.8%)	
Public: Institution with all three levels	61 (3.9%)	38 (3.8%)	23 (4.1%)	
Private: Primary health care	69 (4.4%)	18 (1.8%)	51 (9.1%)	
Private: Secondary/tertiary health care	76 (4.9%)	13 (1.3%)	63 (11.2%)	
Other	89 (5.7%)	26 (2.6%)	63 (11.2%)	
Years of work experience (mean ± standard deviation)	16.0 ± 12.2	14.0 ± 11.1	19.5 ± 13.4	<0.001 ^c
Job satisfaction:				<0.001 ^b
Dissatisfied/mostly dissatisfied	513 (33.0%)	367 (37.0%)	146 (26.0%)	
Mostly satisfied/satisfied	1040 (67.0%)	625 (63.0%)	415 (74.0%)	
Professional preparedness for epidemics (including COVID-19) at the workplace:				<0.001 ^b
Dissatisfied/mostly dissatisfied	726 (46.7%)	516 (52.0%)	210 (37.4%)	
Mostly satisfied/satisfied	827 (53.3%)	476 (48.0%)	351 (62.6%)	
Degree of the COVID-19 impact on everyday operation at the respondent's workplace:				<0.001 ^b
No impact	29 (1.9%)	11 (1.1%)	18 (3.2%)	
Minimal impact	83 (5.3%)	28 (2.8%)	55 (9.8%)	
Medium impact	335 (21.6%)	179 (18.0%)	156 (27.8%)	
Major impact	1106 (71.2%)	774 (78.0%)	332 (59.2%)	

(Continues)

TABLE 1 (Continued)

General characteristics of the respondents	Physicians: Grouped by their engagement with patients with COVID-19 ^a			Test
	[ALL] N = 1553	Yes N = 992	No N = 561	p
The type of COVID-19 impact on everyday operation at the respondent's workplace:				0.324 ^b
Positive impact	300 (19.3%)	199 (20.1%)	101 (18.0%)	
Negative impact	1253 (80.7%)	793 (79.9%)	460 (82.0%)	
Being reassigned to another work position due to the pandemic?				<0.001 ^b
Yes	541 (34.8%)	507 (51.1%)	34 (6.1%)	
No	1012 (65.2%)	485 (48.9%)	527 (93.9%)	

^aPhysicians' engagement in the COVID-19 system of health care institutions or with SARS-CoV-2-positive patients.

^bPearson χ^2 test.

^cIndependent samples *t*-test.

In the public healthcare sector, the share of primary healthcare physicians within the group of those engaged in the fight against COVID-19 versus their counterparts was significantly higher (over two-fifth vs. over one-quarter). Among the personnel engaged in the fight against COVID-19, there were almost five times less physicians from private and other sectors than among those who did not treat SARS-CoV-2-positive patients ($p < 0.001$). A lower share of personnel engaged in the fight against COVID-19 as compared to their counterparts expressed satisfaction with the job and with professional preparedness for pandemics ($p < 0.001$). A major impact on the job and reassignment to another work position due to the pandemic was reported more by the personnel engaged in the fight against COVID-19 (78% and 51.1%, respectively) than by their counterparts (59.2% and 6.1%, respectively) ($p < 0.001$).

Among the physicians who worked with SARS-CoV-2-positive patients, some more men than women were reassigned to a different work position due to the COVID-19 pandemic. Also, despite the fact that many physicians had access to the appropriate PPE to use on daily basis, they were not trained to use the equipment (Table 2). Women less frequently than men used PPE as recommended ($p = 0.013$) (Table 2).

Opinions on the need for change differ significantly among physicians who were and who were not engaged in the fight against COVID-19 in their workplace. Most of the study respondents (about or over two-thirds of them) perceive the need for change in workforce management, methods of workforce requirements planning, education and training, recruitment and dismissal, organizational models, workload measurement, performance assessment, the reward and incentive system, payment and compensation and control in order to be able to address COVID-19 appropriately (Table 3). However, there were significantly more physicians with such perception among those who treated SARS-CoV-2-positive patients than among their counterparts ($p < 0.05$).

There was a significant correlation between the respondents' opinions on the necessary changes in workforce management and the workforce requirements planning, education and training, recruitment and dismissal models, organization, workload measurement, performance assessment, the reward and incentive system, payment and compensation and control (Appendix 1). Therefore, the univariate and multivariate logistic regression showed a significant association between the general characteristics of physicians and their opinion on the necessary changes in the management of the healthcare workforce (Table 4).

Physicians dissatisfied with occupational preparedness for pandemics (including COVID-19) in the workplace and who were relocated due to the pandemic were also more likely than their peers to consider the need for

TABLE 2 Assessment of training and safety measures in the COVID-19 system of health care institutions in Serbia: physicians who worked with SARS-CoV-2-positive patients, by sex

Training and safety measures for COVID-19 at the workplace	Physicians who worked with SARS-CoV-2-positive patients ^a			Chi-square test
	All N = 992	Male N = 634	Female N = 358	p
Reassigned to another work position due to the COVID-19 pandemic:				0.788
Yes	507 (51.1%)	322 (50.8%)	185 (51.7%)	
No	485 (48.9%)	312 (49.2%)	173 (48.3%)	
Trained for the use of personal protective equipment:				0.585
Yes	453 (45.8%)	286 (45.1%)	167 (46.9%)	
No	537 (54.2%)	348 (54.9%)	189 (53.1%)	
Appropriate personal protective equipment was available daily:				0.227
Yes	658 (66.5%)	430 (67.8%)	228 (64.0%)	
No	332 (33.5%)	204 (32.2%)	128 (36.0%)	
Personal protective equipment has been used as recommended:				0.013
Yes	901 (91.4%)	588 (93.0%)	313 (88.4%)	
No	85 (8.6%)	44 (7.0%)	41 (11.6%)	

^aPhysicians' engagement in the COVID-19 system of health care institutions or who worked with SARS-CoV-2-positive patients.

necessary changes in healthcare workforce management by 2.61 times and 1.38 times, respectively (Table 4). Also, male respondents and physicians from private primary healthcare and private secondary and tertiary healthcare institutions were less likely than their peers to believe that changes in the health workforce management during the COVID-19 pandemic were necessary, by 31%, 81% and 61%. The multivariate regression model was accurate (Nagelkerke $R^2 = 0.667$) and had a good fit (Hosmer–Lemeshow test, Sig. = 0.589).

6 | DISCUSSION

The study depicts the experiences and opinions of 1533 licensed physicians related to workforce management in the context of the COVID-19 pandemic. The main study findings show that COVID-19 had a major negative job impact on physicians in Serbia, in particular on those who work with SARS-CoV-2-positive patients, and who were more often reassigned to a different work position. To scale up workforce capacity, countries undertake various policy measures, including reassignment of medical staff.^{9,47–49} Working in a different work environment, under difficult circumstances with unfamiliar people, new procedures and equipment, the reassigned staff faces many concerns (e.g., lack of adequate training, sense of unpreparedness for additional job responsibilities, missing their family, worrying about becoming infected, etc.).^{28,29,48,50}

On the other hand, there are positive aspects of such a practice, that is, recognition of the reassigned workers' hard work by the society, solidarity between colleagues and implementation of supportive policies.^{28,29} Evidence from China demonstrated even a higher level of both job satisfaction and working enthusiasm among reassigned

TABLE 3 General characteristics of the respondents - physicians, according to their engagement in the treatment of patients with COVID-19

Areas of necessary changes	Physicians: Grouped by their engagement with patients with COVID-19 ^a			Chi-square test
	[ALL] N = 1553	Yes N = 992	No N = 561	p
Workforce management:				<0.001
Yes	1130 (72.8%)	782 (78.8%)	348 (62.1%)	
No	207 (13.3%)	103 (10.4%)	104 (18.5%)	
I do not know	216 (13.9%)	107 (10.8%)	109 (19.4%)	
Workforce requirements planning:				<0.001
Yes	1250 (80.5%)	859 (86.6%)	391 (69.7%)	
No	176 (11.3%)	83 (8.5%)	93 (16.6%)	
I do not know	127 (8.2%)	50 (5.0%)	77 (13.7%)	
Education and training:				<0.001
Yes	1140 (73.4%)	779 (78.5%)	361 (64.3%)	
No	201 (12.9%)	109 (11.0%)	92 (16.4%)	
I do not know	212 (13.7%)	104 (10.5%)	108 (19.3%)	
Recruitment and dismissal:				<0.001
Yes	933 (60.1%)	643 (64.8%)	290 (51.7%)	
No	269 (17.3%)	140 (14.1%)	129 (23.0%)	
I do not know	351 (22.6%)	209 (21.1%)	142 (25.3%)	
Organizational models:				<0.001
Yes	1230 (79.2%)	831 (83.8%)	399 (71.1%)	
No	133 (8.6%)	69 (7.0%)	64 (11.4%)	
I do not know	190 (12.2%)	92 (9.2%)	98 (17.5%)	
Workload measurement				<0.001
Yes	1254 (80.7%)	851 (85.8%)	403 (71.8%)	
No	152 (9.8%)	73 (7.4%)	79 (14.1%)	
I do not know	147 (9.5%)	68 (6.9%)	79 (14.1%)	
Performance assessment:				<0.001
Yes	1153 (74.3%)	781 (78.7%)	372 (66.3%)	
No	207 (13.3%)	111 (11.2%)	96 (17.1%)	
I do not know	193 (12.4%)	100 (10.1%)	93 (16.6%)	
Reward and incentive system:				<0.001
Yes	1309 (84.3%)	878 (88.5%)	431 (76.8%)	
No	138 (8.9%)	68 (6.9%)	70 (12.5%)	
I do not know	106 (6.8%)	46 (4.6%)	60 (10.7%)	

TABLE 3 (Continued)

Areas of necessary changes	Physicians: Grouped by their engagement with patients with COVID-19 ^a			Chi-square test
	[ALL] N = 1553	Yes N = 992	No N = 561	p
Payment and compensation:				<0.001
Yes	1266 (81.5%)	852 (85.8%)	414 (73.8%)	
No	142 (9.2%)	70 (7.1%)	72 (12.8%)	
I do not know	145 (9.3%)	70 (7.1%)	75 (13.4%)	
Control:				0.037
Yes	1155 (74.4%)	759 (76.5%)	396 (70.6%)	
No	209 (13.5%)	123 (12.4%)	86 (15.3%)	
I do not know	189 (12.1%)	110 (11.1%)	79 (14.1%)	

^aPhysicians' engagement in the COVID-19 system of health care institutions or physicians who worked with SARS-CoV-2-positive patients.

frontline medical staff in comparison with their colleagues who were engaged by their own institution.²⁸ For optimized health workforce capacity and improving pandemic preparedness and responsiveness, it is of great importance to pay special attention to reassigned health workers' concerns, by implementing support measures (including providing appropriate training for redeployed staff, improving working conditions, ensuring care for their physical and mental health, etc.).^{9,28,29,47,48,50}

According to official reports by the Health System Supervisor, the WHO Regional Office for Europe, the European Commission and the European Observatory on Health Systems and Policies and the public healthcare workforce in Serbia (including several dozen retired military physicians under 65 and with special permission to work) were able to solve up to 1000 COVID-19 cases.⁵¹ However, for several months now, Serbia has been reporting several thousand positive cases each day,^{13,14} and health officials have been warning that inpatient care capacities are at their maximum (46% of all health workers are employed in hospitals and 55% of almost 42,000 hospital beds are for acute and intensive inpatient care¹¹). In Serbia, retired professionals were exempt from mobilization, while in other countries, initial measures also included the recruitment of retired health professionals in low-risk settings.² Considerable support has come from medical students volunteering on telephone lines dedicated to COVID-19 related communication with patients.

The lockdown countries during the COVID-19 pandemic represented a natural experiment that tested national self-sustainability and the ability to quickly recruit, attain, train, retain and deploy the required health workforce. Serbia has taken all possible measures, given its capabilities, and cooperated with the EU to fight against the spread of the coronavirus. Due to the growing demand for health workers to cope with the surge of new cases in the COVID-19 pandemic, during the state of emergency, the Minister of Health announced the employment of 1500 physicians.⁵¹ The additional deployment, for a period of 6 months, of 200 health workers was funded by EU funds, amounting to approximately 1 million euros.⁵¹ These workers primarily assisted in detecting cases in public health institutes.

During a pandemic, a serious shortage of medical staff is common.^{47,48} Sufficient capacity of qualified staff is needed to manage rapidly increasing numbers of infected patients. To avoid amplification of the negative features of the public healthcare sector of Serbia, such as inequitable distribution of health workers,⁵²⁻⁵⁴ job dissatisfaction and the intention to leave,^{52,55} healthcare stakeholders should be able to make decisions based on evidence generated with the specific tools and techniques for estimating workforce requirements during the COVID-19 pandemic, developed by the WHO.^{2,6}

TABLE 4 General characteristic as determinants of the physicians' opinion regarding the necessary changes in health workforce management

General Characteristics of physicians (n = 1553)	Opinion on the necessary changes in workforce management (yes = 1, No/I do not know = 0)	
	Univariate logistic regression analysis: Odds ratio (95% confidence interval) ^a	Multivariate logistic regression analysis: Odds ratio (95% confidence interval) ^a
Sex:		
Male	0.696 (0.546–0.886)**	0.702 (0.535–0.921)*
Female	Reference range	Reference range
Age, years (continuous)	0.991 (0.981–1.000)	0.972 (0.940–1.006)
Marital status:		
Married	Reference range	Reference range
Other (e.g., single, divorced, partnership, widowed, engaged, etc.)	0.767 (0.612–0.961)*	0.814 (0.625–1.059)
Education:		
Undergraduate medical studies	Reference range	Reference range
Specialisation	1.149 (0.895–1.475)	1.193 (0.841–1.694)
Doctorate	1.314 (0.933–1.851)	1.580 (0.959–2.602)
Workplace:		
Public: Primary health care	Reference range	Reference range
Public: Secondary/tertiary health care	1.234 (0.949–1.605)	0.957 (0.707–1.296)
Public: institution with all three levels	0.867 (0.480–1.565)	0.781 (0.416–1.466)
Private: Primary health care	0.137 (0.079–0.238)***	0.190 (0.105–0.342)***
Private: Secondary/tertiary health care	0.318 (0.195–0.517)***	0.390 (0.228–0.667)**
Other	0.730 (0.449–1.186)	0.963 (0.568–1.631)
Years of work experience, years (continuous)	0.994 (0.985–1.003)	1.019 (0.985–1.053)
Job satisfaction:		
Dissatisfied/mostly dissatisfied	2.564 (1.959–3.357)***	1.277 (0.924–1.764)
Mostly satisfied/satisfied	Reference range	Reference range
Professional preparedness for epidemics (including COVID-19) at the workplace:		
Dissatisfied/mostly dissatisfied	3.881 (3.017–4.992)***	2.609 (1.933–3.521)***
Mostly satisfied/satisfied	Reference range	Reference range
Degree of the COVID-19 impact on everyday operation at the respondent's workplace:		
No impact	Reference range	Reference range
Minimal impact	0.723 (0.307–1.700)	0.747 (0.286–1.950)
Medium impact	1.333 (0.616–2.885)	1.241 (0.514–2.994)
Major impact	2.368 (1.116–5.023)*	1.633 (0.689–3.871)

TABLE 4 (Continued)

General Characteristics of physicians (n = 1553)	Opinion on the necessary changes in workforce management (yes = 1, No/I do not know = 0)	
	Univariate logistic regression analysis: Odds ratio (95% confidence interval) ^a	Multivariate logistic regression analysis: Odds ratio (95% confidence interval) ^a
The type of COVID-19 impact on everyday operation at the respondent's workplace:		
Positive impact	Reference range	Reference range
Negative impact	1.979 (1.517–2.580)	1.287 (0.953–1.737)
Reassigned to another work position due to the pandemic		
Yes	2.033 (1.578–2.620)***	1.380 (1.039–1.832)*
No	Reference range	Reference range

^aNote: Reference category = 0.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In dealing with COVID-19 frontline health workers, operating in complex and challenging work environments negatively influences their job satisfaction.^{29,56} Physicians in Serbia who work with SARS-CoV-2-positive patients were less satisfied with their job and with professional preparedness for epidemics than their counterparts. The share of dissatisfied physicians in the study was higher than recent estimates, but dissatisfaction with the job in the public healthcare sector has a variable trend over the last 5 years.⁵⁷ In contrast, health workers in China expressed a higher level of job satisfaction during the pandemic. However, Chinese healthcare workers with a higher level of education were more dissatisfied, which partially confirms our results.²⁹ In Jordan, only 28.2% of physicians expressed satisfaction with the epidemic prevention policies at their facilities.⁵⁸ Bearing in mind the well documented direct association of job satisfaction with the effectiveness of measures for improving control of major crises, tailoring strategies according to reasonable demands of frontline physicians would be of great importance for ensuring their full dedication to the fight against COVID-19²⁹.

For pandemic preparedness, proper use of PPE is just as important as its availability. There is consistency in literature findings about the relationship between the access to appropriate PPE and the benefits to the mental health of health workers, improved job satisfaction, and an increased feeling of safety and confidence.⁵⁹ In addition to the shortage in equipment supplies that many facilities worldwide have suffered, there are difficulties with its rational and adequate use.^{58,60} In that respect, this study has shown that Serbia is not different from other countries. Findings from other studies have suggested several factors influencing the healthcare workers' adherence to guidelines and recommendations for PPE use, including unclear and inconsistent information, lack of training and education, as well as the characteristics of the equipment itself, in terms of its size and quality.⁶¹

This study has shown that female frontline physicians have used PPE as recommended less frequently than male physicians. Female staff in the United Kingdom also struggle with PPE, considering it too large and uncomfortable.²⁸ Without effective administrative and engineering controls, and aggressive testing, PPE has a limited benefit as it is the weakest component in the hierarchy of infection prevention and control measures.⁶² The quality of the facility infrastructure and its state of repair also matters. For example, during the Ebola epidemic, poor and inadequate PPE and guidelines, combined with a poor workplace setting, resulted in 'disaster in a disaster' due to the incubation of the disease in hospitals and outbreak intensification among employees.⁶³ In Serbia, many inpatient care institutions in the public sector date from the 1980s and are under renovation,¹¹ implicating that the

safety of work conditions in inpatient care could be an issue in Serbia. In order to overcome barriers to the appropriate use of PPE, having a dedicated team for internal incident management might improve communication strategies and training for its use and ensure the conducting of regulatory oversight, infection prevention, good data management and control at all times.

Our study has revealed that, among the physicians working with SARS-CoV-2-positive patients, there were more men, but female respondents were more likely to express the need for change in the workforce management. Other studies have confirmed that more male physicians have been engaged as a frontline medical staff in fighting against COVID-19, but also that they felt more prepared for that than female physicians.^{58,64} Similarly to our study, a study carried out during the pandemic of influenza A H1N1 in Hong Kong covered predominantly physicians engaged in public primary healthcare clinics, who were younger male staff and specialists.⁶⁵ However, the majority of the health workforce is made up of women, which makes them particularly vulnerable to the risks posed by the pandemic.⁶⁶ As female physicians spend more time at home, they are more burdened by household activities and family concerns (caring for children, elderly parents, etc.).^{64,67,68} They also often face high risk of income loss and an increased risk of violence, and also suffer more from insomnia and anxiety.^{66,67} It is essential that policy responses to the pandemic take measures not to exacerbate but to reduce existing gender inequalities.

Our study has shown that young, less-experienced physicians, non-specialists from public primary health care, are more engaged in the fight against COVID-19 in Serbia. Physicians engaged in the fight against COVID-19 in Serbia are on average middle aged, with a significant work experience. Also, in other countries, the engagement of young medical staff in the first lines of the fight against COVID-19 is a common practice, which is not surprising, given that increasing age poses the greatest risk of serious illness and death.^{58,64,69,70} Physicians treating SARS-CoV-2-positive patients in Jordan, China and Australia were even younger, with a mean age of 30.3, 34.2 and 35.1, respectively.^{58,64,70} Older medical staff might have difficulties to adapt to the rapid changes that occur in situations such as major pandemics, including dexterity in the use of PPE.⁷¹ On the other hand, their rich experience makes it easier for them to make clinical decisions in complex situations.⁷² Therefore, in strengthening the response to a pandemic, it would be wise to maximize the benefits of the older physicians' experience alongside with the practical training of the young physicians.

This study has confirmed previous findings that primary healthcare general practitioners (GPs), as the first point of contact with potentially SARS-CoV-2-positive patients, play an important role in the fight against COVID-19.^{71,73,74} Since the beginning of the COVID-19 pandemic, they have been facing great changes in their work practices, such as an increase in performing patient consultations remotely (as many as 85% of GPs in the United Kingdom perform patient consultations remotely during the pandemic) and shortage of medical staff or PPE.^{58,71,75} Previous studies have shown that primary health care has generally not shown a high degree of preparedness for response to outbreaks, mostly due to difficulties in supply and use of PPE, lack of support from authorities, lack of experience and training and the psychosocial burden.^{76,77} Flemish GPs, however, have shown a satisfactory level of readiness to respond to the outbreak of the COVID-19 epidemic in its early phase.⁷⁴ Timely strategies are needed to reduce the negative impact of the COVID-19 pandemic on primary health care and its core competencies, ensuring the provision of quality and safe health care.

In our study, most frontline physicians fighting against COVID-19, who were dissatisfied with the occupational preparedness for pandemics, relocated due to the pandemic, and from the public sector expressed the need for change in health workforce management. Evidence from the study informs health stakeholders that adjustments to health workforce policy, management, and planning are needed at the institutional level in the public sector, including planning, organization, performance monitoring, reward and control. These issues are particularly relevant bearing in mind the prolonged impact of the COVID-19 pandemic the necessity to prevent healthcare staff exhaustion. Quality health services enable the reduction of disease transmission and rapid recovery, but their provision depends on the accessibility of competent staff, the working conditions and remuneration.⁷⁸

Implementing adjustments is a challenge in a rapidly changing context. A promising approach towards an effective and quickly adaptable system response to the COVID-19 dynamic might be an integration of strategic and ongoing problem solving with specifically developed tools and techniques.^{2,9} An internal incident management team and a panel of external experts are suggested as a support for workforce management during a prolonged and rapidly changing pandemic. To facilitate adjustments, health workforce managers could benefit from developing an internal incident management team of medical specialists in various disciplines, such as emergency and internal medicine, intensive care medicine, microbiology, preventive medicine, occupational health and geriatrics.²

The internal incident management team's role would be to optimize service delivery modalities, speed up information sharing and decision-making, and foster links with individual health workers and other providers, and facilitate communication with patients' families. High-level stakeholders should be supported by an external panel of experts with a mission to regularly provide them with sound and independent evidence and advice on both short-term and long-term policies, procedures and protocols, resources and methods for the following:

- tracking;
- analysis and planning;
- communication and evaluation of health workforce issues in healthcare settings, including flexible workforce mobilization such as scaling up of the supply and surge capacity, for example, through repurposing, reassignment, inclusion of fast tracking trainees, voluntary recall of inactive health workers, redeployment across regions;
- adaptable health workforce organisation to enable a rebalancing of staffing needs to workload, for example, task-shifting, up-skilling, skill-mixing, establishing new staffing levels; and
- sustainability, for example, estimating health workforce requirements through modelling and scenario planning, monitoring and evaluating health workforce response.

6.1 | Limitations

The study has several limitations. The study sample may be biased, if the physicians who had the time to respond to the survey share similar opinions or find the topic interesting as compared to the rest of the physicians. The response rate, cannot be established, since it is not known how many of around thirty thousand licensed physicians' email addresses from the records of the Serbian Medical Chamber, are, in fact, valid. The study response group is representative of the physicians' population in regard to the mean age, workplace and education level composition. Therefore, the study findings cannot be generally applied to all physicians in Serbia. However, the sample is sufficiently large and resembles the actual population of interest, the survey instrument is reliable and the models are correct. The cross-sectional design could not examine any cause-and-effect relationship in the study; it did, however, help identify potential predictors of necessary changes in physician workforce management in Serbia. The study was conducted in September 2020, when the national health system was stabilized, in terms of the availability of equipment for personal protection and treatment. Therefore, recent events and experiences during the two epidemic peaks may have influenced the type of response. Indeed, the study attempts to capture the difference in the response that reflects the experience of treating patients with COVID-19.

7 | CONCLUSIONS

COVID-19 had a significant negative job impact on the frontline and reassigned physicians. They feel the need for a change in workforce management and dissatisfaction with the job and professional readiness for epidemics. Appropriate personal protective equipment is often available but not the training for its use. Women use personal protective equipment less appropriately than men.

The study findings indicate that the COVID-19 pandemic has underlined the need for change in health workforce management during public health emergencies. An internal incident management team and a panel of external experts may provide the necessary tools and guidelines to plan, monitor and manage the health workforce during prolonged and rapidly changing pandemics. Stakeholders can benefit from the application of evidence that these bodies generate in the decision-making process in the next stages of the COVID-19 pandemic, as well as in future public health crises.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

ETHICAL STATEMENT

The Ethics Committee of the Serbian Medical Chamber approved the cross-sectional study design and purpose and the questionnaire (Decision No: 1462/15 September 2020).

DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID

Milena Šantrić Miličević  <https://orcid.org/0000-0002-0684-359X>

Stefan Mandić-Rajčević  <https://orcid.org/0000-0002-4793-1756>

Katica Tripković  <https://orcid.org/0000-0001-8472-445X>

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APPENDIX 1 Correlation matrix of the respondents' opinions on the necessary changes in workforce management and workforce requirements planning, education and training, recruitment and dismissal models, organisation, workload measurement, performance assessment, reward and incentive system, payment and compensation and control

Areas of necessary changes	Workforce management			Chi-square test p
	Yes N = 1130	No N = 207	I do not know N = 216	
Workforce requirements planning				<0.001
Yes	1065 (94.2%)	77 (37.2%)	108 (50.0%)	
No	46 (4.1%)	120 (58.0%)	10 (4.6%)	
I do not know	19 (1.7%)	10 (4.8%)	98 (45.4%)	
Education and training				<0.001
Yes	987 (87.3%)	77 (37.2%)	76 (35.2%)	
No	72 (6.4%)	111 (53.6%)	18 (8.3%)	
I do not know	71 (6.3%)	19 (9.2%)	122 (56.5%)	
Recruitment and dismissal:				<0.001
Yes	825 (73.0%)	58 (28.0%)	50 (23.1%)	
No	110 (9.7%)	127 (61.4%)	32 (14.8%)	
I do not know	195 (17.3%)	22 (10.6%)	134 (62.0%)	
Organisational models:				<0.001
Yes	1044 (92.4%)	91 (44.0%)	95 (44.0%)	
No	26 (2.3%)	98 (47.3%)	9 (4.2%)	
I do not know	60 (5.3%)	18 (8.7%)	112 (51.9%)	
Workload measurement				<0.001
Yes	1037 (91.8%)	100 (48.3%)	117 (54.2%)	
No	48 (4.2%)	90 (43.5%)	14 (6.5%)	
I do not know	45 (4.0%)	17 (8.2%)	85 (39.4%)	
Performance assessment				<0.001
Yes	968 (85.7%)	88 (42.5%)	97 (44.9%)	
No	83 (7.3%)	100 (48.3%)	24 (11.1%)	
I do not know	79 (7.0%)	19 (9.2%)	95 (44.0%)	
Reward and incentive system				<0.001
Yes	1051 (93.0%)	122 (58.9%)	136 (63.0%)	
No	45 (4.0%)	74 (35.7%)	19 (8.8%)	
I do not know	34 (3.0%)	11 (5.3%)	61 (28.2%)	
Payment and compensation				<0.001
Yes	1026 (90.8%)	118 (57.0%)	122 (56.5%)	
No	50 (4.4%)	75 (36.2%)	17 (7.9%)	

APPENDIX 1 (Continued)

Areas of necessary changes	Workforce management			Chi-square test
	Yes N = 1130	No N = 207	I do not know N = 216	p
I do not know	54 (4.8%)	14 (6.8%)	77 (35.6%)	
Control				<0.001
Yes	956 (84.6%)	101 (48.8%)	98 (45.4%)	
No	95 (8.4%)	90 (43.5%)	24 (11.1%)	
I do not know	79 (7.0%)	16 (7.7%)	94 (43.5%)	