THE COVID-19 FRONTIERS – SINK OR SWIM

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SUMMARY

Objectives: The objective of this study is to address issues faced by doctors working in the COVID-19 units during the second phase of COVID-19 in the Czech Republic, when the country registered the highest per capita rate of new COVID-19 cases in the world.

Methods: A prospective study was designed using Google online questionnaire. Inclusion criteria were doctors from medical and surgical specialties working in COVID-19 units. The Czech Medical Association was approached in obtaining permission and helping us distribute the questionnaire with an introductory message with the aims of the study via email to the chairpersons of 18 medical and surgical Czech Societies and their respective members. The online questionnaire link was active for 31 days. Completion of a questionnaire implied consent to participate. Data was collected from the completed responses and statistical analysis was done.

Results: Fifteen out of eighteen invited Societies participated in the study. Out of all the transferred or volunteering doctors at the COVID units, 47.6% were from 9 medical specialties and 52.4% from 6 surgical units. The highest transfers were seen amongst male surgeons with 21 to 35 years of work experience, whilst the youngest group of doctors made the highest contribution. There was no statistical significance between the effects of COVID-19 and gender. Despite adequate medical provisions, 42% of all doctors had issues with procedural diagnostic methods, 40% tested positive for COVID-19 and 31% reported staff reduction leading to diminished patients' admissions and compromised care. Doctors from surgical departments experienced more difficulties in working in COVID-19 units. Furthermore, on contraction of COVID-19, 114 doctors asserted a lack of support and another 26% were unaware of any services.

Conclusions: Our survey reiterates the relationship between factors related to occupational health and safety, standards of patient care and possibility of medicolegal consequences with the continuing COVID-19 pandemic.

Key words: COVID-19, COVID-19 unit, frontiers, occupational risk, lack of employee support, medico-legal claims

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INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) leading to COVID-19 made a significant impact on the healthcare systems and workers worldwide. The continuous wave of the disease has caused a serious burden to the health, financial and professional aspects of those practicing medicine during the COVID-19 era (1–6). One study identified that the countries which faced the pandemic in the early months of 2020 have had a huge surge in mortality amongst doctors due to COVID-19; this showed that male gender, elderly doctors and those belonging to black, Asian, and minority ethnic (BAME) community seemed to be predisposing factors in the Western world (5).

During the first phase of COVID-19, we completed a national survey amongst otorhinolaryngologists (very high-risk specialty professionals) in the Czech Republic for evaluating their reaction to COVID-19, thus identifying the strengths and weaknesses amongst both hospital-based and private practices (6–8). Large cross-sectional studies recognized occupational factors that contribute to infection risk amongst healthcare workers (HCWs) (2, 9); one concluded that those working in COVID-19 units experience more physical and psychological risk (2), whilst another reported that procedural issues were due to inequalities in power between frontline workers and managements (3). Some other high-risk specialties were also evaluated accordingly (10–15). Interestingly, the risk of infection amongst frontline HCWs such as anaesthetists and intensivists, who are most likely to be exposed to patients at all phases of the illness, are variable (12). According to the SAFER study, intensive care staff had the lowest rates of SARS-CoV-2 infection (10), whereas the intubation COVID study reported that 10.7% of staff involved in tracheal intubation either tested positive for the SARS-CoV-2 antigen, developed symptoms consistent with COVID-19 or were hospitalised (11). Despite long-term exposure to the infection, the relative and absolute risks related to the development of SARS-CoV-2-related infection, increasing severity of COVID-19 and death amongst

such frontline HCWs remain debatable. Apart from individual risk factors such as age, gender, ethnicity, or comorbidities, frontline workers have an additional risk of environmental factors, which plays a greater role. Risk of transmission is estimated to be 19-fold higher indoors than outdoors (12).

Amongst a population of 10.7 million people in the Czech Republic, a steep rise was seen in the number of infected cases from the first 3 on 1 March 2020 to around 750,000 during the first week of January 2021, thus registering the highest per capita rate of new COVID-19 cases in the world (16). This led to insufficient preparation time and prompted immediate reorganisation of healthcare resources within a very short notice. The unexpected rise over time led to partial or total conversion of medical and surgical units into dedicated COVID-19 units in order to cope with ailing patients. HCWs were either relocated or volunteered to work in the newly designated COVID-19 units. Therefore, we decided to analyse the impact of the disease on frontline doctors working in COVID-19 units in the Czech Republic in this more severe and unexpected phase of the pandemic. In this paper, we focussed on practical problems faced in the COVID-19 units and established a cause-effect relationship.

MATERIALS AND METHODS

A prospective questionnaire-based study was designed in 2021 during the second phase of COVID-19 using google questionnaire with 14 mandatory questions to address relevant matters for doctors (including medical and surgical fields) working in the COVID-19 units. We also formulated null hypotheses that the impact of COVID-19 is unrelated to the gender of the doctors as well as the problem faced in the COVID-19 units was not dependent if the doctor was employed at a medical or surgical department. Working conditions, psychosomatic problems including COVID-19 related infection as well as support were primarily evaluated.

Questionnaire Design, Participants Selection Criteria and Distribution

The first 4 questions were based on demographic information (17). Following which, the questionnaire was divided into 2 areas of interest. The first part of the survey mainly dealt with the adequacy of provisions at the COVID-19 unit as well as work related issues. The second studied the psychosomatic status of the doctors in response to COVID-19, support provided by employers along with strategies in reducing COVID-19 in the Czech Republic (17). Questions No. 1–13 were based on a single best answer, whilst question No. 14 had the option of multiple responses. Only 1 question had the additional possibility to comment. For the purposes of this article, the first part of the questionnaire survey (Table 1) was analysed, the data was corelated with the second part of the survey and discussed here. Participants selection criteria and distribution of the questionnaire have been discussed in our previous publication (17).

Data Analysis

Responses from the questionnaire were collected as data in Excel. Descriptive statistical analysis was carried out. Comparison of demographic data to problems encountered whilst working in a COVID-19 unit was done and data was correlated with the second half of the survey.

RESULTS

A total of 225 doctors (125 males, 100 females) responded to the questionnaire within the stipulated time. Amongst the 18 invited specialties, 15 agreed to participate (Fig. 1). No responses were received from gynaecology and obstetrics, occupational medicine as well as plastic surgery, hence were excluded from this study.

Table 1. *Sample questionnaire outlining the first part of survey*

	Type of question	Options for responses
1	Gender	Male/female
2	How many years of work experience do you have after completion of medical school?	0–5; 6–10; 11–20; 21–35; > 35
3	You are currently working at a COVID-19 unit, but primarily employed in	18 specialties were available
4	You are	Volunteering/transferred
5	In which area does COVID-19 have the most significant impact on you? Where do you feel most vulnerable?	None; health (self and family); financial and economic; continuous professional development; all of the above
6	How well is your COVID-19 unit currently equipped to ensure safe patient care to prevent further infection and spread of COVID-19? A. Personal protective equipment (respirators, shields, goggles, etc.) B. Disposable aids (protective coats, gloves, surgical instruments, gowns, etc.) C. Disinfection and sterilization products D. Patients beds E. Ventilators F. Medical supplies (incl. medications)	5-point Likert scale for each subsection: not equipped; minimally; basic; adequately; more than adequately
7	What was the single most serious problem you faced while working at the COVID-19 unit?	None; extended working hours; unsafe working environment; staff reduction; problems associated with uncertainties and frequent changes in methodological procedures
8	In your COVID unit, have you had to reduce the number of beds for patients due to lack of medical personnel?	Yes/no

Questionnaire continued to second section (17)

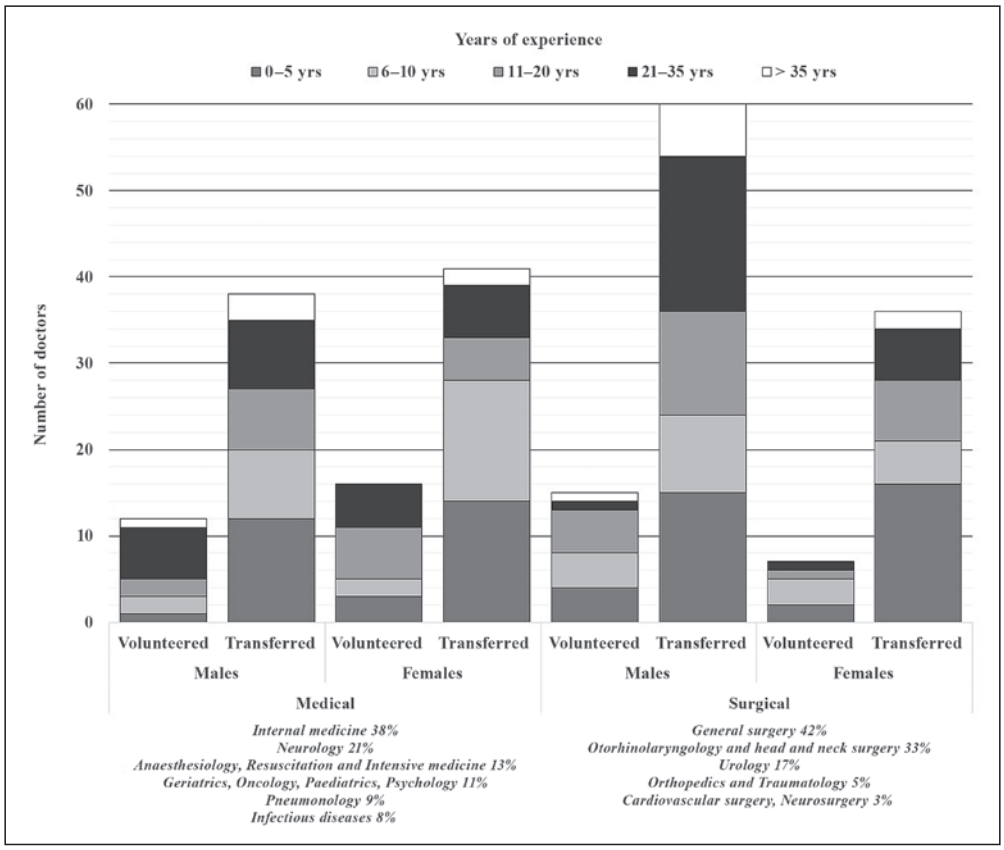

Fig. 1. *Distribution of doctors from medical and surgical units according to gender and work experience.*

One hundred and seven doctors responded from medical units whilst 118 doctors were from surgical fields. Amongst the 107 medical participants, 46.7% were males, and within the 118 surgical participants 63.6% were males. A total of 79 doctors from medical specialities and 96 from surgical units were transferred to COVID-19 units, whilst 50 volunteered from both fields (Fig. 1).

The highest percentage of transfers were seen amongst male surgeons with 21 to 35 years of work experience. Within the 5 different groups of work experience, the youngest group of doctors with 0 to 5 years of work experience showed the highest contribution.

Here, the most interesting comment made by a female surgeon with 11 to 20 years of work experience was "we were not transferred but we were reborn as a COVID-19 unit".

In response to the most serious impact of COVID-19 on doctors' lives, approximately 35% of all doctors had health (self and family) concerns and around 29% reported problems with all issues (Table 2). We did a nonparametric chi-squared (χ^2) test to assess the relationship of gender to COVID-19 related issues that doctors faced. Our test showed that $\chi^2 = 4.09$ and critical value of 9.488, which means $p = 0.394$ at $\alpha = 0.05$ and null hypothesis cannot be rejected. This means that the difference between observed and expected distribution between gender and effects of COVID-19 was not statistically significant.

Most doctors agreed that they had adequate provisions at the COVID-19 unit (Fig. 2) for safely carrying out patient care; 61 doctors worked in standard units without ventilators.

In terms of the single most serious problem faced whilst working on such units, 93 doctors faced issues with procedural methods and 69 reported staff reduction (Fig. 3). The null hypothesis was rejected at $p < 0.001$ ($\chi^2 = 27.59$, critical value = 9.488). There was a difference in the problems faced by the staff amongst medical and surgical units, which was statistically significant. Unfortunately, 31% of all doctors also agreed that admission beds for COVID-19 patients had to be reduced due to decreased staffing.

A male otorhinolaryngologist with 11 to 20 years of experience commented that "above all, we perform work with the possibility of judicial consequences" and another younger trainee from the department of surgical oncology wrote "I am a surgeon in internal medicine".

Table 2. *Impact of COVID-19 on doctors working in COVID-19 units*

Impact	Medical unit		Surgical unit		Total
	Males	Females	Males	Females	
No effect on me	7	6	12	1	26
Health (self and family)	18	24	23	13	78
Financial and economic	0	0	1	0	1
Continuous professional development	11	10	18	16	55
All of the above	14	17	21	13	65

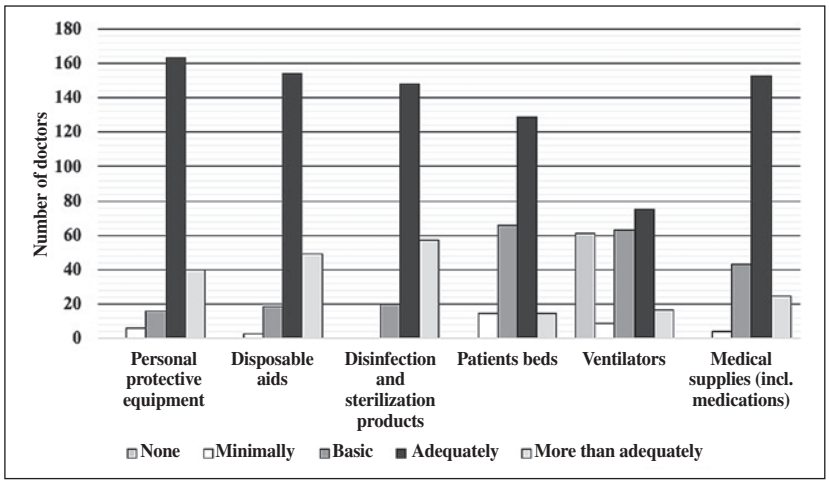

Fig. 2. *Adequacy of provisions at COVID-19 units.*

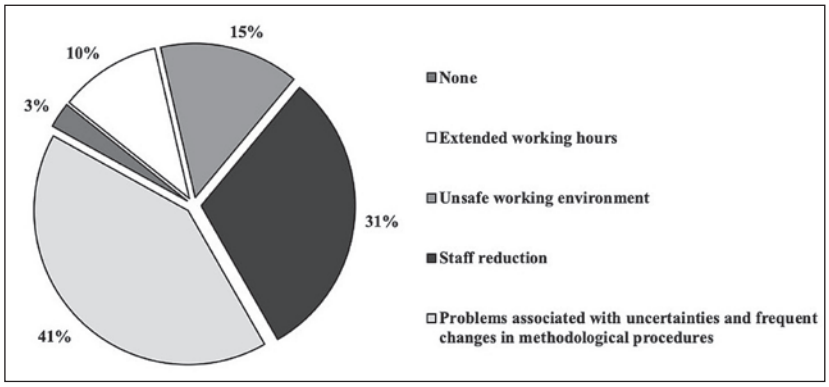

Fig. 3. *Single most serious problem faced at COVID-19 units.*

Furthermore, nearly 40% of all participants had tested positive for SARS-CoV-2 antigen and only 19% of all seropositive were asymptomatic (17).

Up to 51% of all doctors from both medical and surgical units claimed that no support was provided by their employers (Table 3), if they contracted the disease; another 26% said they were unaware of any services (17).

DISCUSSION

A total of 225 doctors (125 males, 100 females) from 15 different medical and surgical specialities in the Czech Republic who worked at a designated COVID-19 unit completed the questionnaire survey. A total of 107 doctors responded from medical units and 118 from surgical fields. Medical specialties had a higher percentage of female than male doctors, the reverse was true for surgical units. The effects of COVID-19 were not related to gender distribution and were not statistically significant.

The number of cases in the Czech Republic rose abruptly during the time of our survey (16). Apart from rearranging standard departments and organizing into COVID-19 units for patients and staff in the fastest possible way, there was little time for preparation. Here, we demonstrate the interrelationship between standards of patient care, occupational health and safety of healthcare workers as well as the risk of medicolegal issues based on our results.

Standards of Patient Care

Around 78% (including 96 surgeons) of all participants were directly relocated or transferred to COVID-19 units. In addition, our survey showed that most doctors had 0–5 years of work experience after completion of medical school, which is another key risk factor. Unfortunately, facing the dynamics of the pandemic challenge with limited knowledge or experience in the field of intensive care medicine and infectious diseases not only risks the quality of care and patients' lives, but also increases

Table 3. *Support provided by employer if doctors contract COVID-19 (N = 225)*

Doctors	Unaware	Medical	Financial	Medical and financial	None
Medical	27.1%	11.2%	5.6%	7.5%	48.6%
Surgical	24.6%	9.3%	8.5%	5.1%	52.5%

the likelihood of transmission of infection amongst HCWs. This experience of working in unfamiliar specialities and stepping out of their comfort zones due to COVID-19 has been published by a junior doctor (18). Many medical schools fast-tracked the degree to cope with staff reduction. Major considerations are whether it is appropriate to deploy totally inexperienced doctors as frontline doctors in a highly infectious environment and how much they can cope with such complicated patients. The hospital management has a responsibility towards their physicians and patients, therefore, some form of simple integration training programmes should be organized in liaison with the staff working in COVID-19 units. Even with adequate work experience, the complex management of such patients can leave a doctor handicapped. Essential training should include the use and interpretation of laboratory diagnostics (19), handling of medical equipment like ventilators, dispensation of certain medications, as well as infection prevention and control training (20). We demonstrated in this study that uncertainties and frequent changes in methodological procedures (reported by 41% participants) were the main issues, irrespective of any work experience or the existence of international guidelines followed by hospitals. There was a statistically significant difference between issues faced by doctors from the surgical and medical departments, the former experiencing more difficulties. With the shifting dynamics associated with new waves and variations of the disease, coping strategies with undertrained, inexperienced and inadequate staff continue to pose a huge problem.

Occupational Health and Safety of Healthcare Workers

Healthcare staff guidelines for reducing COVID-19 transmission have been discussed by many authors (6, 9, 20, 21), but practical applications of certain measures are still under consideration. A cross-sectional survey done in the USA evaluated the occupational factors (clinical role, work environment, availability of personal protective equipment) that can contribute to HCWs' infection and assessed the disease transmission risk. This study showed that about 29% of the respondents met the criteria for being probably infected due to positivity or symptoms (2). They also reported that workers in emergency departments were at higher risk than those in intensive care units or inpatient settings, in contrast to a systemic review and meta-analysis, that revealed most worked at nonemergency wards (20). Although our cohort reported that COVID-19 units were well equipped with personal protective equipment (PPE) and other provisions, in accordance with WHO guidelines (20), we still demonstrated 40% positivity for the infection. The high seropositivity amongst our respondents supports the fact that more than 72,000 HCWs in the Czech Republic were infected during the second wave of the pandemic (22), thus leading to staff reduction. This is in accordance with 2 other studies. A systemic review and meta-analysis identified 28 studies and noted that 51.7% of 119,338 HCWs were seropositive; implying that prolonged exposure to an infected environment as encountered in COVID-19 units poses a real threat for reduction in hospital staff (23). Another observational cohort study demonstrated that not only did frontline HCWs have a significantly higher seroprevalence but those working on dedicated COVID-19 wards had a significantly higher seroprevalence than other frontline HCWs. Unfortunately, the prevalence of HCWs with antibodies against SARS-CoV-2 was also low (24). It is difficult to conclude whether working in a dedicated COVID-19 unit carries the highest risk of infection but it definitely proves that there is a very high risk of transmission of the disease in such an environment. Advocating infection control also includes the timely immunization of medical staff and public. At least 196 participant doctors agreed that preventive measures with vaccination was the best strategy in controlling the pandemic situation in the Czech Republic (17). Although disease control has been achieved to a certain extent in hospital settings with the early application of vaccines against COVID-19 to HCWs, the third wave of COVID-19 still affected 6,356 HCWs (including 900 doctors) in the Czech Republic. This also revealed that most hospitalized adult patients (approximately 90%) were unvaccinated. If there is no medical contraindication, vaccination should be mandatory for all medical staff, especially for those working in COVID 19 units or high-risk specialties or attending more than one medical practice, otherwise this will lead to high rates of cross-infection. Despite the availability of vaccines, current data from the Institute of Health Information and Statistics of the Czech Republic shows that only 64.1% of the entire population (85% of all HCWs) have received basic vaccination doses (25). The importance of vaccinating as well as the concept of wearing a mask and social distancing even after completion of vaccination are problematic worldwide. In order to encourage vaccinating, aimed at reducing the number of emerging cases, the Ministry of Health of the Czech Republic implemented new stricter regulations on indications for PCR testing from 1 December 2021.

The pattern of workload was also altered in both COVID-19 (as reported by at least 10% of our respondents) and non-COVID-19 units due to reduction of staff, related to seropositivity or transfer of doctors. The conversion of specialty units into COVID-19 wards led to either partial or total closure of the preliminary specialties or even moving the preliminary specialty into another department. In surgical departments, it caused even more disruptions with moving operating theatres, surgical staff and instruments as well as patients. This reduction in staff led to a decline in patients' beds (according to 31% of our doctors), thus risking the lives of patients. The care of non-COVID patients was also severely compromised and overburden of work was felt across medical and surgical departments of other hospitals. Work hours statistics in the Czech Republic showed that in comparison to 2019, there was an increase in total working hours by 2,595 in the year 2020 (26). The extended working hours, as shown in our results, was another source for higher risk of exposure to infection amongst HCWs. In the Czech Republic, leave for medical staff was cancelled and employees were encouraged to work if they were asymptomatic whilst maintaining quarantine regulations in order to cater for the shortage. Presumably, many other countries must have faced the same issues.

Another issue highlighted by a publication based on COVID-19 confessions is one of hierarchy of power and inequality within the healthcare system. They identified that there were perceptions that many operational difficulties stemmed from inequalities of power between management and frontline workers (3), thus creating another domain of unpleasant working environment. The World Health Organization has made very clear recommendations for the health and safety of HCWs working with COVID-19 patients to maintain balance in a working environment and protect the

psychosomatic wellbeing of medical staff whilst observing safe medical practice (20).

Medicolegal Issues During the COVID-19 Era

The financial loss in healthcare systems will suffer even more losses from COVID-related and COVID-unrelated claims during this pandemic. The medicolegal aspects involve patient-doctor, patient-hospital and hospital employee-employer relationships. Several factors discussed above also risks severe judicial consequences for a doctor working under unfamiliar and hazardous conditions and can ultimately lead to suspension from medical practice. This issue has also been raised by doctors in our survey. The medico-legal implications of malpractice during the COVID-19 era have been seriously considered (27–29).

Patient-related claims can range from patients' claims of contracting the infection in hospital settings (29), negligence claims from misdiagnosis, treatment delay or even bereaved families arising from COVID-19 (29) and non-COVID-19 cases. Duty of care to the ill can be challenging during these times, and even an unintentional factor like a lack of hospital beds leading to compromised care or death of a patient can amount to negligence of care. Similarly, inadequate training and experience amongst doctors can also directly lead to medical malpractice. This has posed a difficult decision, if doctors should be provided with immunity from medical negligence arising out of the COVID-19 pandemic (28).

More than 50% of our doctors claimed to have a lack of support from their employers if they contracted the disease whilst working in COVID-19 units. Single payments were issued by the Ministry of Health after each wave of the disease to all HCWs, irrespective of frontline or second-line workers. Insufficient remuneration whilst practicing in life-threatening situations can lead to serious legal consequences for employers. Other claims can also be made by medical staff for insufficient PPE or testing, unsafe working environment, inadequate damage compensation for monetary loss, and so on. Definitive guidelines should be made as to the support and compensation with very high occupational risk. Risk categories can be determined by an occupational risk pyramid for COVID-19 as demonstrated by the Occupational Safety and Health Administration, Department of Labor, and Centers for Disease Control and Prevention, USA (30). Alternatively we recommend a risk tool that includes personal, environmental and mitigating factors to enable dynamic 'point of time' risk assessments (12).

CONCLUSIONS

The ferocity of the pandemic has actually given birth to a new multispecialty unit called the COVID-19 unit. The adequacy of provisions in a COVID-19 unit does not necessarily guarantee the effective functioning of that unit. This survey discussed the factors that lead to decline in patient care and the possibility of medicolegal consequences. Serious effects in healthcare systems have been incurred worldwide by the loss of frontline HCWs. Lack of protection and support for HCWs not only affects the psychosomatic wellbeing of those working in COVID-19 units, but also discourages others to volunteer in such emergency situations or even prompt the HCW to leave employment. The equilibrium of patient care and work practice ethics is lost. Standards of healthcare systems should be evaluated through regular assessments and international comparative analyses to identify key issues related to COVID-19 practice.

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Conflicts of Interest

None declared

Adherence to Ethical Standards

Research involving human participants and/or animals: formal ethical approval was not required for this questionnaire-based survey. The protocols followed in studies involving human subjects were in compliance with the Helsinki declaration and further in accordance with local ethical guidelines of the institutional Ethical Committee of Charles University, Prague, Czech Republic. Furthermore, it was also approved by the Czech Medical Association.

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