Original papers

Different perspectives of doctors and nurses about the continuation of usage of some of the protection measures after the end of the COVID-19 pandemic

Marina Ruxandra Oțelea¹, Dana Mateș², Agripina Rașcu^{1,3}

¹ University of Medicine and Pharmacy "Carol Davila", Bucharest, Romania

² National Institute of Public Health, Bucharest, Romania

³ Colentina Clinical Hospital, Occupational Medicine Department, Bucharest, Romania

Corresponding author
Marina Ruxandra Oțelea
marina.otelea@umfcd.ro

Abstract

The current pandemic pointed toward a revision of the protection measures against infectious diseases. For any given new pathogen against which human species showed no immunity, isolation and personal protection equipment proved to reduce disease transmission. In medical settings, when there is inevitable contact with infected patients, these preventive measures have undoubtedly change the process of care delivery. The study aims to investigate the opinion of the healthcare workers about the utilization of the personal protective equipment after the pandemic stops.

For this purpose, we conducted an online survey about changes related to the COVID-19 pandemic. For the healthcare workers, the survey also included several questions related to personal protective equipment. A total of 512 responders, doctors, and nurses answered to the survey. We performed comparisons between these two categories of personnel using the χ test.

Overall, the results show that doctors are keener to follow the recommendations for the personal protective equipment in the future; there was a statistically significant difference ($p < 0.001$) for the usage of gloves and masks while examining febrile patients, and for the handwashing after the examination of each patient. The type of service (outpatient or inpatient procedures) and direct contact with a COVID-19 patient were other factors to modulate the responses regarding using personal protective equipment in the future. The fact that 14.06% of the responders did not consider it necessary to wash hands after examining each patient underlines the urgent need for safety education in all healthcare workers and nurses.

Keywords: COVID-19, personal protective equipment, doctors, nurses

Introduction

COVID-19 pandemic has substantially modified healthcare procedures for all specialties, in hospitals and ambulatory settings. Experts have already issued some strategies to adopt in the near future to maintain the healthcare system's resilience [1]. In this context,

re-organizing the health system, implementing more strict measures to ensure the spread of infection, and focusing on the efficiency of the protective measures (PM) become priorities for countries worldwide. Lessons learned from SARS during 2002 and 2003 show that wearing gloves, gowns, eye protection, masks, and health self-monitoring [2] were rapidly

recommended, and only the initial scarce resources of personal protective equipment (PPE) prevented their wide implementation in the initial stages of the pandemic [3]. Many studies have debated efficacy, efficiency, and adherence to the usage of different PPE types [4-7]. That also included the problems generated by the PPE, such as sweating, visual issues [8], thirst, headache, pressure areas [3] (and even dermatitis [9].

Experiencing exposure to a new virus, with ill-defined mechanisms of action inside our body and to which the human species was not immunized, would raise awareness for the infection transmission and change the preventive measures to be implemented in the healthcare facilities during the pandemic. In this respect, we have investigated which PMs are considered by the healthcare workers (HCW) for permanent maintenance, even after the COVID-19 threat will have proper control.

Material and methods

We initiated a questionnaire related to the impact of the pandemic in the University of Medicine and Pharmacy Carol Davila of Bucharest. The survey dedicated a specific question about using some PPE or basic PM during the medical examination and if examiners should maintain that use after the pandemic. The response was completed only by HCWs.

Initially, we distributed the survey to the internal email list of the faculty staff. Afterward, we extended the survey to other professional groups via the personal networks of the initial responders.

We recorded general data (age, gender, occupation, tenure in the current job, workplace).

The hypothesis was that there are possible stressors, which will increase the awareness and prove the efficiency for preventing infectious diseases during the medical examination in the circumstances of the current pandemic. The question investigated this: "What are the safety measures for personal protection to be maintained after the pandemic ends?" to which the responders could select one or several of the following answers: 1) Wear of surgical mask any time in contact with a febrile patient (WMFP); 2) Wear of surgical gloves any time when examining a febrile patient (WGFP); 3) Use of the complete protective equipment for the examination of the COVID-19 patients in the operations theatres or any time an invasive procedure is performed (IP) 4) Washing hands after each patient (WH) 5) None of the personal protection measures taken during the

pandemic should be maintained afterward (NMM).

The potential influencing factors considered in this survey were: occupation, contact with COVID-19 patients, a personal diagnostic or close contact (family member) of COVID-19, belonging to a vulnerable health group, and previous diagnosis of anxiety or depression. We analyzed data from all HCWs regarding occupation and health-related vulnerability, including previous mental health issues. For assessing the influence of the contact with COVID-19 patients, we restrained the analysis only to the subgroup of HCWs who declared working in hospital and outpatient facilities.

We conducted the statistical analysis using SPSS software, Statplus for Mac software, 2016, v6 (Walnut, US). We compared the prevalence of possible influencers on the type of methods selected by the responders with the χ^2 test.

Results

We collected a total of 763 answers; 512 responders were doctors and nurses. Their responses are the subject of this analysis. Among the 512 responders, there were 279 doctors and 233 nurses. Their average age was 43.36 years (standard deviation = 10.36), and their job tenure was 14.29 years (standard deviation = 10.93 years).

On the entire sample, the majority of the participants worked in hospitals. However, the distribution of doctors and nurses among hospital and outpatient care facilities was significantly different ($\chi^2 = 24.64$, $p=0.00006$) with a higher percentage of doctors from ambulatory settings and the university (Table 1).

However, the percentage of doctors and nurses who preferred not to answer this item was similar ($\chi^2 = 0.15$, $p=0.69$).

The comparison between the answers given by doctors and nurses is presented in Table 2.

Doctors selected in higher number the usage of gloves ($\chi^2 = 20.69$, $p=5.40205E-6$) and mask ($\chi^2 = 48.52$, $p=2.27475E-12$) when examining febrile patients and handwashing after the examination of each patient ($\chi^2 = 41.5$, $p=1.17862E-10$).

The percentage of doctors and nurses who considered using the PPE for COVID-19 patients in all invasive procedures and who preferred not to answer this item was similar ($\chi^2 = 2.2$, $p=0.14$ and $\chi^2 = 0.15$, $p=0.69$, respectively).

Table 1. Distribution of doctors and nurses according to their working place

	Doctors		Nurses		Total	
	Number	%	Number	%	Number	% by workplace
Hospitals	164	58.78%	167	71.67%	331	64.65%
Out patient clinic	51	18.28%	29	12.44%	80	15.63%
University	24	8.06%	1	0.43%	25	4.88%
Public institutions	12	4.30%	15	6.44%	27	5.27%
Did not answered	28	10.04%	21	9.01%	49	9.57%
Total	279	100%	233	100%	512	100%

Table 2. Types of personal protective measures selected by doctors and nurses

Question	Doctors		Nurses		Total	
	Number	%	Number	%	Number	%
Wear of the surgical mask any time in contact with a febrile patient	259	92.83%	161	69.09%	420	82.03%
Wear of surgical gloves any time in contact with a febrile patient	229	82.08%	150	64.38%	379	74.02%
Use of the full protection equipment for the examination of the COVI-19 patients in the operations theatres or any time an invasive procedure is performed	193	69.18%	147	63.09%	340	66.41%
Washing hands after each patient	285	94.98%	175	75.11%	440	85.94%
None of the personal protection measures taken during the pandemic should be maintained afterwards.	6	2.15%	20	8.58%	26	5.08%

The percentage of doctors and nurses who considered using the PPE for COVID-19 patients in all invasive procedures and who preferred not to answer this item was similar ($\chi^2 = 2.2$, $p=0.14$ and $\chi^2 = 0.15$, $p=0.69$, respectively).

There were 215 doctors and 196 nurses that specified working in outpatient or inpatient facilities. Among these, the majority (164 doctors and 51 nurses) worked in inpatient clinics.

We noticed significant differences among them, as seen in Fig 1.

The number of HCWs selecting the negative answer (NMM) was too low for statistical analysis and is not represented in this figure.

HCWs from outpatient clinics were more favorable for mask-wearing ($\chi^2 = 4.82$, $p=0.02$) and washing hands after each patient ($\chi^2 = 5.06$, $p=0.02$). In contrast, HCWs from inpatient clinics considered changes during invasive procedures in the same way as during the pandemic necessary in a higher proportion ($\chi^2 = 9.29$, $p=0.002$).

Figure 1. Differences among HCW working in an inpatient or an outpatient facility

When we divided the inpatient and outpatient groups between doctors and nurses, the differences changed their statistical significance: the MWFP difference remained significant only for nurses ($\chi^2 = 6.05$, $p=0.01$). In contrast, doctors agreed to the utility of this PPE measure in similar percentages (95.13% in inpatient versus 92.15% in outpatient). In what concerned GWFP, although the overall figures did not indicate a difference, doctors from inpatient care were in higher percentage keen to follow this rule (87.2% vs. 74.5% inpatient clinics, $\chi^2 = 4.7$, $p=0.03$). In respect to the PPE for the invasive procedures, we recorded a difference between doctors working in the inpatient clinics, who agreed to this answer in a more significant number (164, representing 75.61% of them) as compared to the ones from the outpatient clinics (24, representing 47.06% of the doctors from outpatient clinics) ($\chi^2 = 14.78$, $p=0.0001$). The nurses' population agreement was similar in inpatient and outpatient healthcare facilities (65.27% vs. 62.07%, $\chi^2 = 0.11$, $p=0.73$) for PPE usage for invasive procedures. Almost all doctors mentioned handwashing after examining each patient, irrespective of the workplace

(95.12% and 96.08% in outpatient). Overall, nurses were less favorable to this procedure (75.51%), but those working in ambulatory settings gave positive answers in higher percentages (89.66% versus 73.05% than in the outpatient care services, $\chi^2 = 3.68$, $p=0.052$).

The contact with COVID-19 patients at work was also a factor influencing the perception about the necessary PPE to prevent occupational exposure to airborne transmission or through direct contact (Fig 2). Following the general trend, doctors scored higher than nurses on all responses. Doctors in contact with COVID-19 patients agreed in a significant higher proportion to MWFP ($\chi^2 = 16.33$, $p=0.00005$), to GWFP ($\chi^2 = 4.37$, $p=0.03$) and to WH ($\chi^2 = 9.52$, $p=0.002$) than nurses. Although there were more doctors than nurses to promote PPE for IP during the pandemic, the difference was not significant. The difference between the two HCWs was maintained in the group that did not have contact with COVID-19 patients for MWFP ($\chi^2 = 24.1$, $p=9.13208E-7$), for GWFP ($\chi^2 = 8.26$, $p=0.004$) and for HW ($\chi^2 = 27.07$, $p=1.96518E-7$).

Figure 2. Distribution of PM selected by doctors and nurses according to previous work contact with COVID-19 patients

Belonging to a vulnerable group, having a close member of the family or co-worker diagnosed with COVID-19, a personal history of anxiety or depression were not associated with any of the answers.

The highest percentage of HCWs who agreed to follow all the 4 PM proposed (56.09%) consisted of doctors from inpatient care clinics, followed by

nurses from both inpatient and outpatient services (Fig 3). There were differences in the distribution of PM selected total only between the doctors from the hospitals and outpatient clinics ($\chi^2 = 19.68$, $p=0.0005$). Nurses working in outpatient or inpatient clinics did not significantly differ in the total number of selections ($\chi^2 = 7.53$, $p=0.11$).

Figure 3. Number of protective measures selected by doctors and nurses from inpatient and outpatient medical services

Discussion

Occupational medicine can not avoid its destiny to evolve while facing the changes in the work environment and organization. The current pandemic raised numerous questions in the preventive and medium to long-term intervention areas of this specialty. Even if the recommendations and guidelines related to the risk management of this pandemic are re-assessed periodically, a perspective change about the infectious risk in a large number of members of the general population and HCWs is already noticeable [10]. One way to address the lessons learned from the COVID-19 pandemic is to investigate the changes considered by HCWs for continuation afterward.

We evaluated PM related to both the airborne (masks) and contact transmission (gloves and handwashing) as part of this study. We found a significant willingness to continue these measures between doctors and nurses. Overall, doctors seem to approve in greater number a more prudent approach and foresee the continuation of the current practices to prevent future outbreaks of SARS-COV2 or other unknown infectious diseases.

Several studies found contradictory results in risk perception and usage of the PPE between these two categories of healthcare personnel. For example, research conducted on 1134 HCWs from public hospitals showed that wearing a face mask and hand wash was less frequently used by nurses than doctors despite more prevalent fears and worries inside the nurses' communities [11]. Another national survey also related education and the appropriate training to the relevant practice regarding safety measures during the pandemic [12]. On the opposite, an online interview found nurses to be as cautious as doctors using the PPE [13]. Knowledge about the pathogen, routes of transmission, and protective measures was lower during the Ebola outbreak was lower in nurses compared to doctors [14].

The level of education influences the risk perception by the nurses [15], with those with a Ph.D. diploma having the highest awareness. These results partially align with our findings, considering that doctors have a higher education level. It also leads to the conclusion that one should customize strategies of training to each category of personnel.

Implementation of safety measures is influenced not only by the perceived risk but also by other factors such as workload, day or nightshift, and even the mental representation of the "patient zone".

A Danish study published before the pandemic [16] showed that nurses make more safety risk decisions

than doctors due to the higher time pressure in their work. During the night shift, the order, tidiness, and hand hygiene were lower. Nightshifts and sleep deprivation diminish attention [17] and are directly related to the level of compliance with the usage of the PPE [18].

World Health Organization defined the "patient zone" as "the geographical visualization of key moments for hand hygiene that typically includes the intact skin of the patient and all inanimate surfaces that are touched by or in direct physical contact with the patient, such as bed rails, bedside table, bed linen, infusion tubing, and other medical equipment."

It further contains surfaces frequently touched by HCWs while caring for the patient, such as monitors, knobs, and buttons, and other "high-frequency touch surfaces" [19].

Despite this relatively clear and comprehensive definition, in the real world, the "patient zone" gives room to a certain ambiguity in interpretation [20] concerning the applicability of handwashing. HCWs interpret differently the decision about when to apply hand hygiene and reporting the hand hygiene practice, which is driven somewhat by desirability than by the realistic estimation. This subjective evaluation overestimated implementing the best practice recommendations, even in the current pandemic circumstances, when someone would expect a greater awareness for transmitting the infectious disease [21].

Another finding of this study is that healthcare personnel working in inpatient facilities and dealing with already diagnosed COVID-19 patients are more concerned with improving the prevention of infectious diseases. Other researchers who found significantly highest scores for the risk awareness in HCW from the intensive care units who admitted COVID-19 patients also supported our results [15]. This relation seems not to be influenced by the incidence of COVID-19 in the city's local population, being dependent solely on working in the high-risk department of the hospital [22].

Personel in outpatient settings perceived lower risk, although it might not be the case for all outpatient settings, in which the number of patients/day is higher than in hospitals. Many COVID-19 are paucisymptomatic, and the disease, while not positively diagnosed, makes the patient contagious. Because the condition is not positively diagnosed and the risk perception is lower, HCWs considered the protective measures of lesser value for future use.

There are two main conclusions derived from our results: the first is that perception about the PMs

is different among nurses and doctors. Knowledge transmission about PMs should follow different strategies. The second refers to integrating the PMs in a primarily preventive approach, independent of previous personal contact and the number of patients potentially contagious by reinforcing the information towards a more proactive attitude.

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