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Challenges with healthcare workers' protection during the COVID-19 pandemic in Iran

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Abstract

During the COVID-19 pandemic, healthcare workers stand in the frontline of the fight against the disease. This study aimed to assess the challenges with personal protection during the pandemic in Tehran, Iran. Seven-hundred healthcare workers were surveyed between April and May 2020, and the study was performed in surgical care wards. Questionnaires, which were sent to 1000 workers via online platforms, social networks, and emails to different associations, were used to assess the use of personal protective equipment (PPE) and the reasons for not using it. A total of 700 replied. Face masks and face shields had the highest and lowest use, respectively. Equipment shortage, time constraint, low supervision, and lack of information were the reasons for personnel not using PPE. To reduce the burden of COVID-19 and accelerate the process of patient care, it is important to protect and maintain the well-being of staff. Organised national and international arrangements to protect them are critical.

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Introduction

Severe acute respiratory syndrome (SARS-CoV-2) is the pandemic COVID-19 agent that began in December 2019 in Wuhan, China. The source of this syndrome is unknown.¹ Transmission of the virus is thought to be through the inhalation of respiratory droplets from an infected person or deposition of the virus on mucous membranes such as the lining of the eye, nose, and mouth from infected respiratory droplets or, less commonly, by touching a contaminated

object.² In Iran the first case of COVID-19 was reported on 19 February in Qom, the capital of Qom Province, which is located 140 km to the south of Tehran. It then spread rapidly in neighboring provinces.³

By 12 March 2020, the Centers for Disease Control and Prevention (CDC) had released recommendations postponing all non-urgent elective procedures and permitting only urgent or emergency procedures.⁴ Interpreting the meaning of 'elective' and balancing this definition with the health of the patient can be challenging even for the most experienced surgeon.⁵ A current estimate suggests that more than 50% of all elective surgical cases have the potential to inflict significant harm on patients if cancelled or delayed.⁶ For healthcare workers, providing care to surgical patients in medical centres during a pandemic is inevitable.

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Due to the growing incidence of COVID-19, healthcare workers are faced with additional workloads and stress. Although workers play a vital role in controlling, managing, and preventing diseases, many of them unfortunately become infected due to high exposure to the virus.⁷ In China, Italy, and Spain, large numbers of workers have been infected and have died, indicating the importance of active management and protection.^{8,9} Therefore, it is essential to follow the principles of infection control and especially, to protect healthcare workers.¹⁰ To reduce cross contamination, surgical scrubs within the hospital environment for all staff are commonplace, along with personal protective equipment (PPE) including surgical masks, gloves, and surgical gowns, visors, and goggles.¹¹ Although the use of PPE is the most important protection strategy against infection, the requirement to wear it for a long time causes workers to face the challenges and complications of its continuous use.

This study therefore aimed to investigate the challenges of using PPE during the COVID-19 pandemic in Tehran, Iran.

Methods

This cross-sectional study was carried out from April to May 2020 in Tehran. Seven hundred healthcare workers (physicians, nurses, physiotherapists, and midwives) working in hospitals affiliated to Tehran University of Medical Sciences were selected to take part. Only those who directly provided care to surgical patients and were obliged to use PPE during their shift were included. The research was performed in surgical departments (head and neck surgery, gynaecology, general surgery, and cardiac surgery).

A questionnaire in three parts was used to collect the data. These were sent to the workers via online platforms, social networks, and emails to different associations. The first part included questions on demographic characteristics including age, gender, occupation, work experience, ward, and background history. A researcher-designed section (second part) was used to examine the use of PPE according to standards. In this part, the standards for using each piece of equipment were given separately in four sections (section one: face shield or goggles; section two: gown, coverall, shoe cover; section three: surgical or N95 face mask; section four: latex surgical gloves). Questions were designed based on a five-point Likert scale (always done: 4; frequently done: 3; sometimes done: 2; rarely done: 1, and never done: 0).

The third part of the questionnaire contained 24 questions in four sections and was designed to assess the reasons for non-use of available equipment. These sections contained questions about equipment shortage, lack of knowledge, time constraints, and low monitoring. The responses to the questions included three options: 'Yes', 'No', and 'No comment'.

Part one of the questionnaire contained four questions with a maximum score of 16. Parts two and four included eight questions with a maximum score of 32, and part three contained seven questions with a maximum score of 28. The

following formula was then used to obtain the total score out of 100

$$\text{Total score} = \text{score of each questionnaire} \times \left(\frac{100}{\text{Maximum score for PPE}} \right)$$

Finally, based on the total score obtained, the compliance of workers was classified as non-compliant (score 0), very poor (score 1-20), poor (score 21-40), moderate (score 41-60), good (score 61-80), or excellent (score 81-100).

A panel of 12 experts (in the field of treatment and biostatistics) was invited to determine the quantitative content validity of the questionnaires. The content validity ratio (CVR) was used to ensure that the most important and accurate content (the necessity of the question) was selected. Moreover, the content validity index (CVI) was used to ensure that the questions were designed in the best way to measure the variables.

The CVR for the questionnaires that assessed the use of PPE, and the reasons for not using the available equipment, was 0.86, and 0.85, respectively. Again, the questionnaires were given to 12 of the experts to calculate their CVIs. The CVI for the each questionnaire was 0.85.

Cronbach's alpha coefficient was used to assess the reliability of the questionnaire. The questionnaire was given to 30 workers from the treatment team who had the same characteristics as those in the units under study, but who were not part of the study. Cronbach's alpha for each questionnaire was 0.86. Statistical analysis was performed with the help of IBM SPSS Statistics for Windows version 22 (IBM Corp).

Tehran University of Medical Sciences' Ethics Committee approved the study. The participants were informed of the objectives and method, and informed written consent was obtained from them all. Explanations about the confidentiality of the information and freedom to withdraw from the study at any time were also given.

Results

The demographic characteristics of the participants are presented in [Table 1](#). The highest mean (SD) of PPE use, 163.8 (19.4), which related to the wearing of face masks including surgical and N95 masks, showed that the level of compliance was good. The lowest, 71.4 (11.2), which was related to the use of a face shield or goggles, indicated poor compliance ([Table 2](#)).

In descending order, lack of equipment, and lack of time, monitoring, and awareness were the main reasons for not using the equipment ([Table 3](#)).

Table 1
Demographic characteristics of the healthcare workers.

	No. (%)
Age (years):	
20-30	324 (46.3)
31-40	299 (42.7)
41-50	77 (11)
Sex:	
Male	305 (43.6)
Female	395 (56.4)
Profession:	
Physician	256 (36.5)
Nurse	294 (42)
Physiotherapist	75 (10.7)
Midwife	75 (10.7)
Ward:	
Head and neck	250 (35.7)
Gynaecology	100 (14.2)
General surgery	278 (39.7)
Cardiac surgery	72 (10.2)
Work experience:	
1-10	312 (44.6)
11-20	229 (32.7)
21-30	159 (22.7)
Underlying comorbidities:	
Yes	228 (32.6)
No	472 (67.4)

Discussion

This study aimed to assess the challenges of protecting healthcare workers on surgical wards during the COVID-19 pandemic. Participants had the highest use of face masks, and the lowest use of face shields. PPE must be used in a correct and standard way. However, it is necessary to guarantee the provision of health care even during this pandemic, while strengthening workers' awareness of the need for protection and optimising the diagnostic and therapeutic pathways.¹² In addition to informing staff about the dangers of COVID-19,

it seems that the existence of standard guidelines for the care of patients with COVID-19 is essential.

According to the findings, the shortage of equipment was one of the challenges observed. Its transfer from research laboratories, beauty salons, dental institutes and practices, and veterinary services, to the healthcare system has been suggested to as a way to overcome the challenges of shortages in healthcare. This can be achieved through charity donations or holistic government assistance.¹³

In addition, the strengthening of crisis management systems at various levels of the healthcare system, especially in hospitals, can further support staff in crises caused by the outbreak of coronavirus, and the challenges posed by equipment shortages. Time, monitoring, and awareness of shortages were other reasons why staff did not use the equipment. Furthermore, training courses, communicating directly with hospital managers, and removing barriers to the use of PPE are other solutions that will help treatment teams use the equipment.

In summary, to overcome these challenges the following methods are recommended: the surveillance of patients and healthcare workers for COVID-19 (screening, testing, reporting of COVID-19 status), training, polices on the prevention of infection and control; PPE courses for staff, including 'donning and doffing' and the proper use of disinfectants, and managing essential supplies (drugs and PPE inventories). Also, telemedicine triage protocols for emergencies and/or clinic visits prioritising surgical care, phased timetables for outpatient and inpatient operations, and outpatient anaesthesia protocols.¹⁴

To reduce the burden of COVID-19 and accelerate the treatment of patients, it is necessary to pay attention to the needs and health of the main healthcare providers. Providing standard equipment, proper working conditions, and designing appropriate guidelines for the use of PPE are essential.

Table 2
Use of personal protective equipment (PPE) among healthcare workers. Data are number (%).

PPE use (score)	Coverall, shoe cover, gown	Masks including surgical or N95	Gloves	Face shield or goggles
Non-compliance (0)	105 (15)	28 (4)	14(2)	224 (32)
Very poor (1-20)	80 (11.5)	39 (5.5)	74 (10.5)	105 (15)
Poor (21-40)	130 (18.6)	74 (10.6)	65 (9.3)	121 (17.3)
Moderate (41-60)	79 (11.3)	32 (4.6)	100 (14.3)	98 (14)
Good (61-80)	156 (22.3)	126 (18)	65 (9.3)	89 (12.7)
Excellent (81-100)	150 (21.3)	401 (57.3)	382 (54.6)	63 (9)
Total	700 (100)	700 (100)	700 (100)	700 (100)
Mean (SD)	110.1 (10.3)	163.8 (19.4)	155.6 (17.8)	71.4 (11.2)

Table 3
Reasons for not using personal protective equipment (PPE) among Iranian healthcare workers. Data are number (%).

Reasons	PPE				Mean (SD)
	Coverall, shoe cover, gown	Masks including surgical or N95	Gloves	Face shield or goggles	
Shortage of equipment	311(44.4)	217 (31)	233 (33.3)	441 (63)	298 (12.5)
Lack of awareness	35 (5)	63 (9)	58 (83.3)	123 (17.6)	70 (6.4)
Lack of time	347 (49.6)	298 (42.6)	318 (45.4)	66 (9.4)	256 (8.3)
Lack of supervision	7 (1)	121 (17.3)	91 (13)	70 (10)	72 (8.9)

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patient permission

Tehran University of Medical Sciences Ethics Committee approved this study. Patients' permission not applicable.

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