

Preparedness and attitude toward personal protective equipment among house officers during COVID-19 pandemic in Egypt

Asmaa Ahmed Sayed, Marwa Mostafa Ahmed, Inas Talaat Elsayed, Soliman Saeed, Alsallout Inas, Elfazary Nouran, Fares Samar

Cairo University Kasr Alainy Faculty of Medicine, Family Medicine, Egypt

Address correspondence to Asmaa Ahmed Sayed, E-mail: asmaa.sayed@kasralainy.edu.eg.

ABSTRACT

Background Coronavirus disease 2019 (COVID-19) struck the world by surprise by the rising numbers that required prompt governmental and hospital staff reaction to the ongoing crisis. A robust preparedness and personal protective equipment (PPE) were yet to be regarded as our best plan.

Methods A survey study was conducted on 254 Egyptian house officers using an anonymous web-based questionnaire that was filled using Google Forms after obtaining online informed consent.

Results The mean age of the participants was 25 years. Only 28.74% of the house officers were categorized as having a good preparedness, while 85.83% of them have a good PPE attitude. The preparedness and willingness were significantly associated with the overall worry related to the pandemic (P value = 0.012). Fear of contracting COVID-19 infection negatively affected their preparedness by 60% (odds ratio (OR) 0.40, 95% confidence interval (CI), 0.17–0.93, P value = 0.034). The House officers with family members at-risk for severe COVID-19 were less likely to be prepared and willing by 70% (OR 0.30, 95% CI 0.15–0.60, P value = 0.001). The house officers with good preparedness and willingness to deal with COVID-19 seemed to have a good PPE attitude (OR 11.48, 95% CI 2.43–54.34, P value = 0.002).

Conclusion A significant number of house officers expressed low levels of preparedness, while most of them have a good PPE attitude.

Keywords COVID-19, house officers, preparedness, personal protective equipment

Introduction

Coronavirus disease 2019 (COVID-19) is a novel emerging viral infection primarily detected late in 2019 in China, then displayed global spread till it was acknowledged as a pandemic.¹ There are >60 million confirmed cases with nearly 1.5 million deaths attributed to COVID-19 worldwide till December 2020.¹ The virus shows a very swift transmission potency principally through near contact, respiratory droplets, and viral settling on surfaces.² Methods of diagnosis of infection with COVID-19 include real-time polymerase chain reaction) and chest computed tomography.^{3,4} Moreover, the presence of asymptomatic phase of infection and absence of effective treatment with the robust progression of the disease, lead to burdening the health care resources, exploiting hospital capacities, intensive care units, ventilators and personal protective equipment.⁵

The ideal approach to master such a situation is to be well prepared at strategic, institutional, and individual levels which unfortunately most of the world failed to achieve and fell behind the ongoing pace of the disease.⁶ Health organizations all over the world have developed guidelines to set roles on how to be prepared.⁷ This preparedness includes two parts: first is self-preparedness by self-arming with knowledge about COVID-19 and adherence to safety measure such as

Sayed Asmaa, Lecturer

Mostafa Marwa, Assistant professor

Elsayed Inas, Lecturer

Soliman Saeed, Lecturer

Alsallout Inas, House officer

Elfazary Nouran, House officer

Fares Samar, Lecturer

proper use of personal protective equipment (PPE), second is institutional preparedness by affording a clear protocol for handling COVID-19 suspected and confirmed cases.⁸

The first case of COVID-19 was confirmed in Egypt on 14 February 2020, and the curve reached its peak in June 2020, now we have >117 thousand confirmed cases and 6.7 thousand deaths.⁹ At the country level, Egypt has made a lot of wise decisions such as prohibiting flights, lockdown, closing all schools and universities, banning any form of gathering, setting a hotline for the suspected cases and designating isolation hospitals for the confirmed cases.¹⁰ But what we are interested in for this study is the preparedness of the house officers as young trainees involved in the health care system in Egypt and how they perceive their self and institutional preparedness.

House officers are fresh graduates who have started their one-year training in different specialities. The house officers would deal with all kinds of patients in the triage, they move all over the hospital dealing with most of the healthcare personnel, so their preparedness and attitude toward PPE are mandatory for the consistency for the whole health system. To the best of our knowledge, this is the first study of its kind, in Egypt focusing on those young doctors with the aim to assess preparedness and willingness of the house officers to participate in COVID-19 management and care, also to assess their attitude toward PPE.

Method

This is a survey study conducted on 254 house officers in Egypt from Cairo and 6 October universities through the period from March 2020 till August 2020. Our target population were house officers being the frontline workforce against COVID-19.

Study participants and sampling

All Participants reported their demographic data, COVID-19 related information, and completed preparedness questionnaires which assessed their preparedness and willingness to participate in medical care throughout COVID-19 pandemic in addition to their PPE attitude. Finally, a total of 254 house officers completed the questionnaires after being informed about the objectives, methods and possible impact of the study. An electronic online consent was obtained prior to their participation in the study.

Sample size was calculated using Gpower version 3.1 software. The anticipated proportion of House Officers with good preparedness of 22.5% based on the levels reported in a study conducted in Libya as a neighbour

country with similar resources,¹¹ with 80% study power and 0.05 alpha error; the required sample size was 254 house officers.

Data collection tools and techniques

An anonymous web-based questionnaire was designed in English language and was adapted from available literature such as the study conducted in Saudi Arabia to assess awareness and preparedness of COVID-19 outbreak among health-care workers.¹² The questionnaire was sent via social media platforms such as Facebook groups and WhatsApp during their 2-week training in the Family Medicine Department, and filled using Google forms. This was done to ensure safety measures and social distancing. Once the required sample was reached, collecting responses was stopped and data analysis was started.

The questionnaire was divided into four sections:

Section one: covering sociodemographic data as age, sex, residence and marital status.

Section two: asking about their worry, risk factors of COVID-19-related exposure and living with family members or close contacts at a higher risk for severe illness from COVID-19 such as old age and comorbidities (hypertension, diabetes, obesity, chronic lung conditions, cardio and cerebrovascular diseases, chronic kidney disease and malignancy).¹³

Section three: assessing House Officers' preparedness and willingness to manage patients with COVID-19. They were asked 12 questions with a scale of 5 format answers (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree) inquiring 3 parts; willingness for training and continuing patients care, personal preparedness and institutional preparedness. The questions covered the willingness to continue to care for patients in the event of COVID-19 outbreak and willing to be involved in crash airway, resuscitation, and management of infectious disease mass casualty courses to learn and participate in COVID-19 outbreak, the personal preparedness in living conditions level, ability to play a direct role in taking care of patients with COVID-19 and other infectious patients. Other questions tackled the institutional preparedness asking about receiving adequate personal protective equipment use training having an experienced person/department to ask if unsure of use of personal protective equipment, fit testing, and having clear policies and pathways in their institution to deal with COVID-19 cases and COVID-19 surge.

Section four: assessing PPE attitude of house officers towards different modalities of PPE through 15 questions with 1–5-scaled answers such as: area of isolation, hand

Table 1 Characteristics of study population ($N = 254$)

	<i>Total</i>	<i>%Total</i>
Age (Mean, SD)	(24.99, 1.19)	
Gender		
Females	137	53.94
Males	117	46.06
Residence		
Great Cairo	217	85.43
Others	37	14.75
Marital status		
Single	240	94.49
Married	14	5.51
Direct contact with COVID cases		
Yes (Exposed)	212	83.46
No	42	16.54
Personal high risk for severe COVID		
Yes	29	11.42
No	225	88.58
Living with family members at high risk for severe COVID		
Yes	187	73.62
No	67	26.38
Overall worry about COVID-19 pandemic (Mean, SD)	(3.46, 1.06)	
1	10	3.95
2	31	12.25
3	94	37.15
4	69	27.27
5	49	19.37
Preparedness and willingness		
Good	73	28.74
Bad	181	71.26
PPE attitude		
Good	218	85.83
Bad	36	14.17

washing, alcohol rubs, prominent notices, N95 mask, surgical mask, paper mask, gauze mask, gloves, gowns, goggles, temperature checks, hair covering, shoe covering and limiting visitors.

The validity of the questionnaire was checked by experts' opinion to assess the language clarity, a pilot of 30 participants was done and the questionnaire was tested for reliability with Cronbach's alpha equals 0.849 for preparedness and willingness questions and 0.708 for PPE attitude questions.

Scoring system

For each participant, two scores have been calculated based on his responses to all required questions, one reflecting his preparedness and the other his PPE attitude with total score 60 and 75, respectively. Due to the lack of

similar research addressing a preparedness score, a cutoff score $\geq 60\%$ is considered to have good preparedness (>36) or good PPE attitude (>45) depending on the assessed score.

Ethical considerations

This study was conducted in accordance with the standards of the Declaration of Helsinki. The study objectives were explained to participants, an electronic informed consent was obtained before House officers' participations ensuring confidentiality. House officers had the opportunity to withdraw from participation at any time without providing any justification. Names of the participants were not collected, and data was used solely for statistical analysis. Ethical approval was obtained from the ethical committee of faculty of medicine, Cairo University.

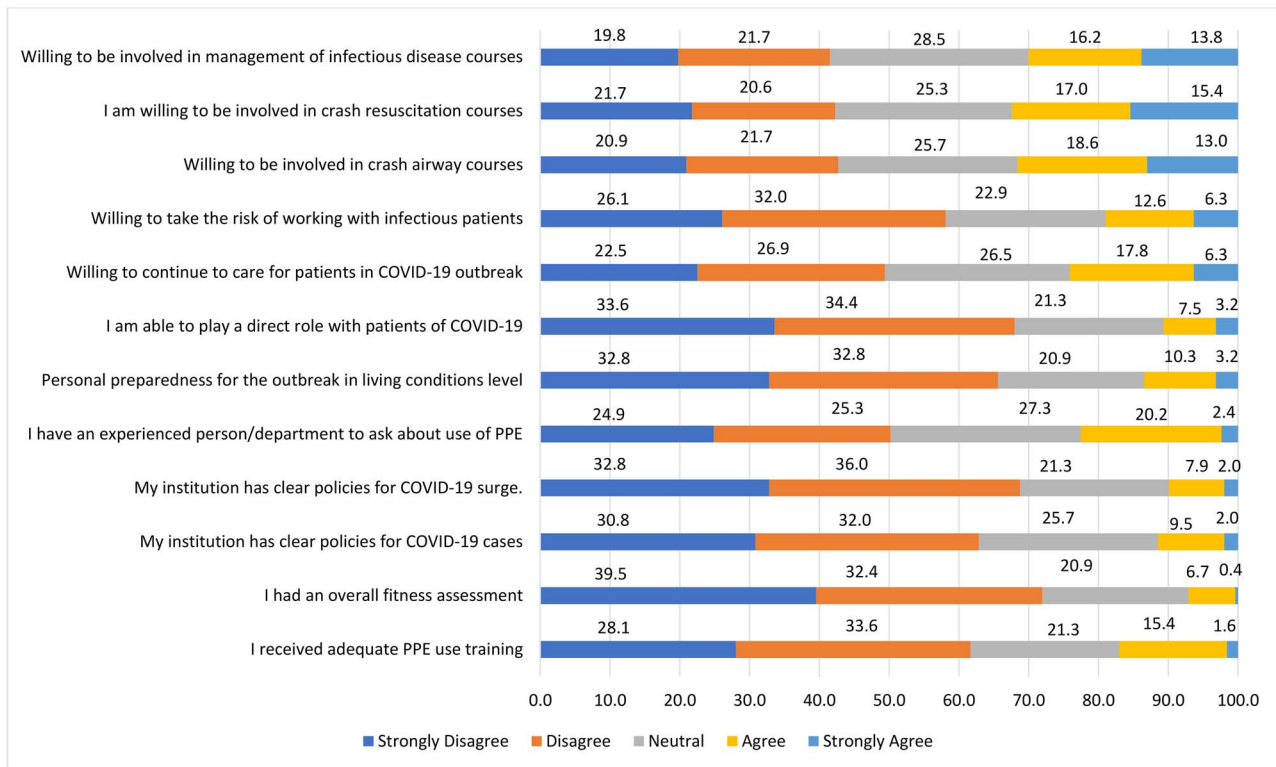


Fig. 1 Visual summary of preparedness and willingness responses.

Statistical analysis

Using Stata[®] version 16 software, descriptive summary statistics were provided to describe data by numbers and percentages beside mean and standard deviations for quantitative variables. Bivariate analysis was performed to investigate associations of preparedness and PPE attitude with independent variables using chi-square test (χ^2). Multivariate logistic regression analysis was performed to determine predictors of good preparedness and PPE attitude. Covariates examined in the regression model were those that revealed significant association in the bivariate analysis (Two-tailed P value < 0.05 was considered statistically significant). Testing for multicollinearity was done with mean variance inflation factor for preparedness regression model 2.44 and for PPE attitude regression model 2.39.

Results

This study aimed to assess preparedness and willingness of the house officers to participate in COVID-19 management and care, also to assess their attitude toward PPE. It was conducted on 254 house officers during the COVID-19 pandemic.

As shown in Table 1, the mean age of the house officers was 25 years, the majority were single and living in Great Cairo. The level of overall worry regarding COVID-19 pandemic was high with a mean of 3.46 (± 1.06) out of five in a numerical scale. Only 28.74% of the house officers were categorized as having a good preparedness and willingness, while 85.83% of them have a good PPE attitude.

Figures 1 and 2 visualize the detailed responses' scale for all questions of preparedness, willingness to participate in COVID-19 patients' care and PPE attitude. As shown in figure 1, personal willingness to be involved in training crash courses related to life support and infectious diseases is widely agreed upon among the house officers while institutional preparedness was perceived to be unsatisfying to the house officers. Figure 2 shows that hand washing, limiting visitors, wearing N95 mask and alcohol rub are the most prevalent personal protective strategies among house officers besides the overall good adherence and attitude toward PPE.

Bivariate associations of preparedness and willingness using Pearson chi square found significant association with house officers living with family members at risk for severe COVID-19, with fear of infecting loved ones, and with fear to contract COVID-19 infection (P values < 0.001 , 0.019 and 0.014, respectively) as shown in Table 2. Also,

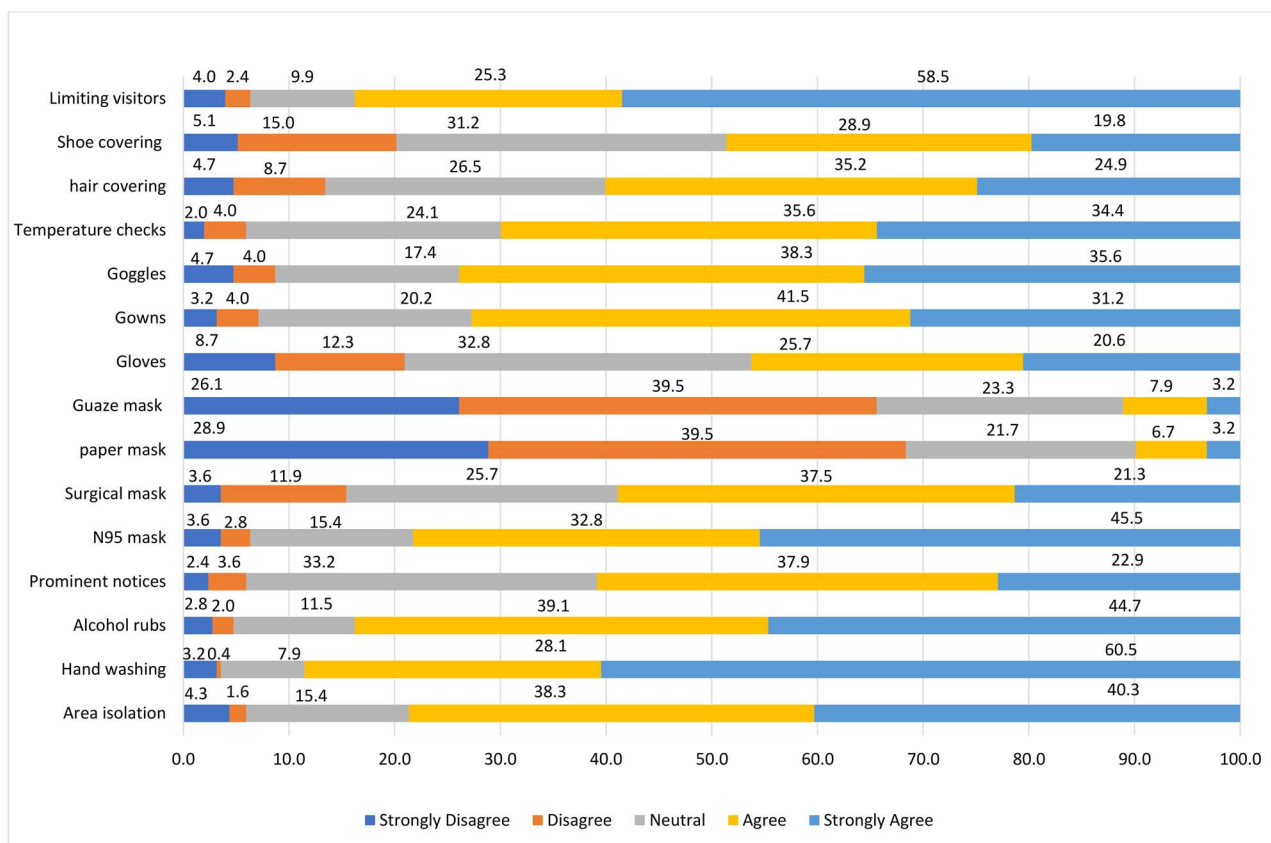


Fig. 2 Visual summary of PPE attitude responses.

the overall worry related to the pandemic was significantly associated with the level of preparedness and willingness (P value = 0.012). Gender, residence, personal risk, contact with COVID-19 cases and their perceived role in dealing with COVID-19 patients were not associated with the level of preparedness.

Regarding associations of PPE attitude, Table 3 revealed that house officers who were well prepared and willing to deal with COVID-19 seemed to have good personal protective equipment (PPE) attitude (P value < 0.001).

Logistic regression after controlling for other variables (age, residence, marital status, overall COVID worry . . .) was used to investigate predictors and determinants of preparedness and willingness. House officers having family members at risk for severe COVID-19 were less likely to be well prepared and willing by 70% (odds ratio (OR) 0.30, 95% CI 0.15-0.60, p value 0.001). Fear to contract COVID-19 infection negatively affected their preparedness and willingness by 60% (OR 0.40, 95% CI, 0.17-0.93, P value = 0.034) as provided by Table 4.

The only significant predictor of good PPE attitude was good preparedness and willingness (OR 11.48, 95% CI, 2.43-54.34, P value = 0.002).

Discussion

COVID-19 struck the world by surprise by the rising numbers which required prompt governmental and hospital staff reaction to the ongoing crisis in order to deal with the patients and stop the spread. Robust preparedness was yet to be regarded as our best plan. The preparedness of the frontline warriors (house officers) facing and dealing with all patients including COVID-19 patients, should be prioritized during the current pandemic to avoid self and peer infection. This will ensure the consistency and prevent disruption of the health system. This study was conducted on 254 house officers rotating in different departments to ensure that it is efficiently reflecting the self and institutional preparedness.

The study demonstrated that a significant number of house officers expressed low levels of preparedness concerning COVID-19. Only 28.74% of the house officers were categorized with good preparedness and willingness raising a concern regarding their competency to battle COVID-19. House officers could easily be a source of infection during their rotations all over the hospital dealing with numerous patients, that is why it is mandatory for them to be prepared

Table 2 Bivariate Associations of Preparedness and Willingness

	<i>Good</i>		<i>Bad</i>		<i>P value</i>	χ^2*	
	<i>N</i>	(%)	<i>N</i>	(%)			
Gender							
	Females	33	24	104	75.91	0.076	3.143
	Males	40	34.19	77	65.81		
Residence							
	Great Cairo	63	29.03	154	70.97	0.803	0.0621
	Others	10	27.03	27	72.97		
Had direct contact with COVID cases							
	Yes	65	30.66	147	69.34	0.129	2.308
	No	8	19.05	34	80.95		
Personal high risk for severe COVID							
	Yes	5	17.24	24	82.76	0.146	2.113
	No	68	30.22	157	69.78		
Living with family members at high risk for severe COVID							
	Yes	42	22.46	145	77.54	<0.001	13.652
	No	31	46.27	36	53.73		
Fear of infecting loved ones with COVID							
	Yes	46	24.47	142	75.53	0.019	5.498
	No	22	40.74	32	59.26		
Fear of contracting COVID infection							
	Yes	9	15.52	49	84.48	0.014	5.977
	No	59	32.07	125	67.93		
Thinking no need for him in dealing with COVID 19 pandemic							
	Yes	8	18.18	36	81.32	0.106	2.618
	No	60	30.3	138	69.7		
Overall worry about COVID-19 pandemic							
	1	2	20.00	8	80.00		
	2	16	51.61	15	48.39		
	3	29	30.85	65	69.15	0.012	12.816
	4	17	24.64	52	75.36		
	5	8	16.33	41	83.67		

*Pearson chi square.

with knowledge and adequate PPE attitude.¹² In a study in Libya ~45% of doctors and 37% of nurses were not prepared to deal with infectious cases in the hospital. The majority of healthcare workers (77.4%) felt personally unprepared to address COVID-19 infection.¹¹

More than 90% of doctors were afraid of transmitting the disease to their family or others in the study conducted in Jordan⁸ and ~98% in Pakistan,¹³ which was higher than what was revealed in our study to be 74%.

Inadequate knowledge is a risk factor for disease transmission, and also leads to low levels of care. This study demonstrated that the majority of House Officers were willing to participate in training courses and interestingly, 88.5% were aware of the proper hand sanitation and disinfectants. This

finding came in agreement with the study in Pakistan where the usage of sanitizer was highly prevalent among all health-care workers,¹² but higher than what was reported by Elhadi *et al.*¹¹ in Libya where only 43.2% of doctors and nurses were aware of proper hand sanitation techniques. Overall, 85.83% of house officers in our study have a good PPE attitude, which is surprisingly great compared to what was revealed in the Libyan study where half of the participants were uneducated or untrained on PPE.¹¹ Awareness of social distancing, hand hygiene and using face masks are mandatory to stop the spread of the disease (CDC 2020). Our study revealed that house officers were adherent to them meticulously. In agreement with Tripathi *et al.*,¹² a similar level of awareness was reported in recent studies in China.¹⁰

Table 3 Bivariate associations of PPE attitude

		<i>Good</i>		<i>Bad</i>		<i>P value</i>	χ^2 *
		<i>N</i>	(%)	<i>N</i>	(%)		
Gender	Females	118	86.13	19	13.87	0.880	0.0227
	Males	100	85.47	17	14.53		
Residence	Cairo	189	87.10	28	12.90	0.160	1.9752
	Others	29	78.38	8	21.62		
Had direct contact with COVID cases	Yes	186	87.74	26	12.26	0.050	3.8413
	No	32	76.19	10	23.81		
Personal high risk for severe COVID	Yes	27	93.10	2	6.90	0.233	1.4250
	No	191	84.89	34	15.11		
Living with family members at high risk for severe COVID	Yes	161	86.10	26	13.90	0.837	0.0423
	No	57	85.07	10	14.93		
Fear of infecting loved ones with COVID	Yes	161	85.64	27	14.36	0.675	0.1760
	No	45	83.33	9	16.67		
Fear of contracting COVID infection	Yes	50	86.21	156	84.78	0.790	0.0706
	No	8	13.97	28	15.22		
Thinking no need for him in dealing with COVID pandemic	Yes	37	84.09	7	15.91	0.831	0.0453
	No	169	85.35	29	14.65		
Overall worry about COVID-19 pandemic	1	8	80.0	2	20.00	0.157	6.6229
	2	23	74.19	8	25.81		
	3	81	86.17	13	13.83		
	4	64	92.75	5	7.25		
	5	41	83.67	8	16.33		

*Pearson chi square.

Availability of equipment is an essential factor in proper application of protocols and thus strongly affects preparedness Ranney *et al.*¹⁶ In our study, the institutional preparedness was perceived to be unsatisfying to the house officers regarding setting clear policies to deal with COVID-19 cases and surge which is a crucial point in healthcare and could significantly affect the preparedness as reported by Suleiman *et al.*⁸ in Jordan in 2020 that studied the preparedness of healthcare facilities. It could also lead to improper prevention and management manners risking patient and health workers life.¹⁴ Only 17% of the house officers reported receiving adequate PPE training. Elhadi *et al.*¹¹ in 2020 reported that only 13% of the healthcare workers reported good hospital preparedness for the COVID-19 outbreak. Also, a total of

47.3% of doctors and 54.7% of nurses did not receive adequate training in the use of PPE.¹¹ This finding could highlight the self-dependence of the house officers in gaining their knowledge regarding PPE.

Regarding the gender of the house officers, there was no significant difference in gender in association with good preparedness (P value = 0.880). This was not the case in the study performed in Jordan that showed that males had higher preparedness scores compared to females which could be attributed to the male participation predominance in this study.⁸ The overall worry related to COVID-19 pandemic significantly affected the house officer's preparedness and willingness agreeing with the Jordanian study where the knowledge and concerns levels were significantly associated.⁸

Table 4 Predictors of preparedness and willingness

	Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)	P
Residence				
Outside Great Cairo	0.91 (0.41, 1.98)	0.803	1.26 (0.49, 3.23)	0.622
Gender				
Male	1.64 (0.95, 2.83)	0.077	1.35 (0.70, 2.60)	0.366
Age				
	1.31 (1.02, 1.69)	0.037	1.20 (0.92, 1.56)	0.173
Direct contact with COVID cases				
Exposed	1.88 (0.82, 4.28)	0.133	2.44 (0.89, 6.73)	0.084
Personal high risk for severe COVID				
Yes	0.48 (0.18, 1.31)	0.153	0.92 (0.30, 2.82)	0.892
Family members at high risk for severe COVID				
Yes	0.34 (0.19, 0.61)	<0.001	0.30 (0.15, 0.60)	0.001
Fear of infecting loved ones with COVID				
Yes	0.47 (0.25, 0.89)	0.021	0.66 (0.31, 1.38)	0.266
Fear of Contracting COVID infection				
Yes	0.39 (0.18, 0.84)	0.017	0.40 (0.17, 0.93)	0.034
Think not needed				
Yes	0.51 (0.22, 1.16)	0.110	0.45 (0.18, 1.10)	0.080
PPE attitude				
Good	8.21 (1.92, 35.14)	0.005	11.48 (2.43, 54.34)	0.002
Overall worry about COVID-19 pandemic				
2	4.27 (0.78, 23.4)	0.095	8.96 (0.82, 97.25)	0.071
3	1.78 (0.36, 8.93)	0.481	5.12 (0.51, 51.12)	0.165
4	1.31 (0.25, 6.76)	0.749	2.82 (0.27, 28.89)	0.383
5	0.78 (0.14, 4.38)	0.778	3.11 (0.28, 34.80)	0.357

OR: odds ratio; CI: confidence interval.

Despite the expected logic, this study revealed that House Officers who expressed fear of infecting self, loved ones or living with at-risk family members actually had significantly lower odds for preparedness as opposed to their peers. Also, in the Jordanian study, 90% of the participants expressed their concerns to transmit infection to their families and other patients.⁸ This finding confirmed the negative impact of healthcare personnel fear and concerns that were reported during COVID-19 pandemic.¹⁵

Understanding the risks is something and the willingness to act upon is another. This study confirmed that house officers who dealt with confirmed COVID-19 cases were well aware of the importance of proper PPE attitude and adherence in decreasing the risks of COVID-19 (P value = 0.05). Compared to their peers, house officers who were well prepared to deal with COVID-19 cases seemed to be more aware with 11.5 times the odds to be adherent to PPE with (P value = 0.002).

The current study highlighted the limitations of ascertainment of the institutional preparedness perceived by the house

officers, as it needs more objective method of assessment, and interviewing nurses, senior healthcare workers and stakeholders. Further qualitative research is needed to investigate the sources of information of PPE among the house officers and its availability. The risk of COVID contacts was not predictive of good preparedness. And it is evident that how good attitude related to utilization of PPE.

Conclusion

This study, conducted during a crucial period, shed light on the preparedness and willingness of the house officers to participate in COVID-19 management and their attitude toward PPE. Surprisingly, a significant number of house officers expressed low levels of preparedness concerning COVID-19, while most of them have a good PPE attitude. Fear of contracting COVID-19 infection and having a family member at-risk for severe COVID-19 negatively affected their preparedness. Multiple challenges and difficulties were revealed in this study, which can significantly affect house

officers' preparedness. Despite the governmental efforts, the training and preparedness of young doctors with lack of experience should be a chief priority especially that they showed no reluctance to work and train during the current pandemic.

Conflict of interest

The authors declare that there is no conflict of interest.

References

- World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard. Available at: https://covid19.who.int/?gclid=Cj0KCQjwojX8BRCZARIsAEWBFMLPMEkWFtwjXr7-Qa0fWV3VDzR3_jWGix09vpXb71M93CVvODxib9UaAuz5EALw_wcB. (1 December 2020, date last accessed).
- Lai CC, Shih TP, Ko WC *et al*. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): the epidemic and the challenges. *Int J Antimicrob Agents* 2020;**55**(3):105924.
- Kanne JP, Little BP, Chung JH, Elicker BM, Ketai LH. Essentials for Radiologists on COVID-19: An Update-Radiology Scientific Expert Panel. *Radiology*. 2020;**296**(2):E113–E114. doi: 10.1148/radiol.2020200527.
- Ying S, Zheng S, Li L, *et al*. Deep learning Enables Accurate Diagnosis of Novel Coronavirus (COVID-19) with CT images. *medRxiv*; 2020. doi: 10.1101/2020.02.23.20026930.
- Assadi M, Gholamrezanezhad A, Jokar N, Keshavarz M, Picchio M, Seregni E, Bombardieri E, Chiti A. Key elements of preparedness for pandemic coronavirus disease 2019 (COVID-19) in nuclear medicine units. *Eur J Nucl Med Mol Imaging*. 2020;**47**(8):1779–1786.
- Sanger DE, Lipton E, Sullivan E *et al*. *Before virus outbreak, a cascade of warnings went unheeded*, Vol. 19. New York Times, 2020.
- Greenberg N, Docherty M, Gnanapragasam S *et al*. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ* 2020;**368**:m1211 doi: 10.1136/bmj.m1211.
- Suleiman A, Bsisu I, Guzu H *et al*. Preparedness of frontline doctors in Jordan healthcare facilities to COVID-19 outbreak. *Int J Environ Res Public Health* 2020;**17**(9):3181.
- WHO. Regional Office of Eastern Mediterranean. *latest updates on Covid-19*. Available at: <http://www.emro.who.int/entity/media/introduction.html>. (1 December 2020, date last accessed).
- Saba AI, Elsheikh AH. Forecasting the prevalence of COVID-19 outbreak in Egypt using nonlinear autoregressive artificial neural networks. *Process Saf Environ Prot*. 2020;**141**:1–8.
- Elhadi M, Msherghi A, Alkeelani M *et al*. Assessment of healthcare workers' levels of preparedness and awareness regarding COVID-19 infection in low-resource settings. *Am J Trop Med Hyg* 2020;**103**(2):828–33.
- Tripathi R, Alqahtani SS, Albarraq AA *et al*. Awareness and preparedness of COVID-19 outbreak among healthcare workers and other residents of south-West Saudi Arabia: a cross-sectional survey. *Front Public Health* 2020;**8**:482.
- Fang X, Li S, Yu H *et al*. Epidemiological, comorbidity factors with severity and prognosis of COVID-19: a systematic review and meta-analysis. *Aging (Albany NY)* 2020;**12**(13):12493.
- Zafar N, Jamal Z, Khan MM. Preparedness of the healthcare personnel against the coronavirus disease 2019 (COVID-19) outbreak: an audit cycle. *Front Public Health* 2020;**8**. doi: 10.3389/fpubh.2020.00502.
- Hashim L, Khan H R, Ullah I, *et al*. Physician Preparedness in Response to the Coronavirus Disease 2019 Pandemic: A Cross-Sectional Study From a Developing Country. *Cureus* 2020;**12**(9):e10383. doi: 10.7759/cureus.10383.