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Enhancing the health coverage in India by empowering the corona warriors through educational intervention

Aayushi Rastogi¹, Sabin Syed², Tarika Sharma³, Sarita Ahwal³, Karthik Ponnappan T.⁴, Arpit Kumar², Vinay Kumar⁵, Akanksha Bansal⁵*

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*Correspondence: Ms. Akanksha Bansal, E-mail: abansal1@ilbs.in

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ABSTRACT

Background: The aim of the study was to assess the effect of the training program on knowledge, attitude and practice (KAP) related to prevention and management of COVID-19.

Methods: A pre-post study was conducted among healthcare workers (HCWs) attending ten-days online training program from 29 April to 30 November, 2020. A 37-item questionnaire assessing knowledge (26-items), attitude (6-items) and practice (5-itmes) was administered to the participants before and after the training program. Total score of knowledge, attitude and practice (KAP) was 27, 12 and 20 respectively. Paired t test was used to assess the effect of training on KAP. Association of pre-training KAP with demographic variables was performed using SPSSv-22.

Results: A total of 1428 HCWs were trained across 25 states through nine trainings; however, the data was analysed for only 1167 HCWs (response rate: 82%). Mean age of participants was 30.96±6.62 years and 77.29% were females. Mean KAP scores in pre-training were found to be 17.46±3.24 out of 27, 9.94±1.56 out of 12 and 19.01±1.76 out of 20 respectively which significantly increased to 21.28±3.65, 10.35±1.48 and 19.37±1.49 after attending training program. Pre-knowledge score was found to be associated with age, years of experience, geographical location, type of facility, presence of COVID-19 related facilities in the place of working.

Conclusions: Comprehensively designed training program enhanced the knowledge about prevention and management of COVID-19 in HCWs and also motivated them to maintain an optimistic attitude and good practices while managing the patients.

Keywords: COVID-19, Capacity building, Health personnel, Health education, Educational measurement

INTRODUCTION

Coronavirus disease 2019 (COVID-19), an illness caused by a Novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has evolved as a pandemic across the globe in few months of its existence. COVID-19 disease is evolving at a rapid rate with 135 million cases and more than 3 million deaths reported worldwide as on 16th April 2021. With the rising number of cases, most of the world

implemented stringent measures to curb the spread of the virus such as imposing lockdowns, shutting down of educational institutes, closure of malls, cinema halls, religious places, offices, airports, and railway stations and other necessary activities that require restriction of human movement.² The challenges posed by these restrictions has been overcome by moving towards digitalization. Knowledge seeking and sharing related to the virus are also being predominantly done through digital media.

¹Department of Epidemiology, Institute of Liver and Biliary Sciences, Delhi, India

²Project ECHO, Institute of Liver and Biliary Sciences, Delhi, India

³College of Nursing, Institute of Liver and Biliary Sciences, Delhi, India

⁴Department of Anaesthesia and Critical Care, Institute of Liver and Biliary Sciences, Delhi, India

⁵Project ECHO and PRAKASH, Institute of Liver and Biliary Sciences, Delhi, India

Unfortunately, this digital surge has led to an overwhelming amount of fake news and information related to COVID-19. This has compounded the fears and led to misinformation among the general public as well as healthcare professionals.³

At the beginning, the medical community itself was struggling with the inaccurate and contradictory information on COVID-19. These included conspiracies regarding disease origins, mechanisms behind the outbreak, prevention, treatment, and other management strategies related to COVID-19.⁴ The massive presence of misinformation led to misperception, rumours and hoaxes and also affected the attitudes and practices of healthcare workers (HCW).

Despite this, HCW were battling against COVID-19 with extended duty hours and limited time to update their knowledge. ^{5,6} This eventually resulted in poor-to-moderate knowledge among the HCW as reported by previous studies from the country. ⁷⁻⁹ Since nurses are at the frontline and play a vital role in managing the pandemic cases, it is important to keep them updated about the current advances in knowledge about prevention, diagnosis, treatment and management of COVID-19 and also important to maintain an optimistic attitude and good practices in managing the patients during pandemic crisis. ¹⁰

Considering limited availability of accurate information regarding treatment and management of COVID-19 for HCW and to prepare them for the surge in COVID-19 cases, an online comprehensive training program was conceptualised by ILBS-ECHO (Institute of Liver and Biliary Sciences- Extension for Community Healthcare Outcomes) to strengthen the HCW against COVID-19 across the country. The aim of the study was to assess the effect of the training program on knowledge, attitude and practice (KAP) related to management of COVID-19.

METHODS

Study design and setting

A pre-post study was conducted among the HCW attending training program titled 'Empowering Corona Warriors' organized under project ECHO, Institute of Liver and Biliary Sciences, New Delhi for participants across India from 29 April to 30 November 2020. Project ILBS-ECHO is an educational program, conceptualized to enhance and update the knowledge and skills of the HCW practicing in any health care facility across the country through the use of information technology.¹¹

Considering the norms of social distancing and to enhance the reach of the training program during the pandemic, the training was organized through online mode. The training program also aimed at training maximum number of HCW in a minimum amount of time. The training program was conducted through Zoom platform.

Study participants

ILBS-ECHO maintains a database of principals, nursing in-charges, nursing officers and other HCW who were part of various trainings conducted under its aegis. The ebrochure of the training program along with registration link was shared with these key stakeholders. HCWs mainly in-service nursing professionals from 25 states across the country registered for the course.

Inclusion criteria

Those who registered for the training program and attended at least 80% of the sessions

Exclusion criteria

There were no exclusion criteria.

Study procedure

A ten-day training program titled 'Empowering Corona Warriors' was conducted for HCW from April 2020 to November 2020. The aim of the training program was to strengthen the HCW about prevention and management of COVID-19.

The scientific outline of the training program was prepared by the project team in consultation with faculty members at ILBS. Based on the training objectives, project team along with ILBS faculties prepared the pre-post KAP assessment questionnaire which was further content validated by other senior faculty members of the institute. An online registration link was shared with the principals, nursing in-charges, nursing officers and other HCW previously associated with project ILBS-ECHO.

Following registration in the training program, an online pre-assessment KAP questionnaire on prevention and management of COVID-19 was shared with the registered participants through online SurveyMonkey platform. The questionnaire was shared on mobile number and email id of the registered participants. The training on scientific sessions were initiated by the experts as per the schedule through online mode using Zoom platform. Considering the duty hours of the participants, the training was planned for approximately 120 minutes per day for 10 continuous days. Topics included in the training sessions were- (i) coronavirus disease and its management; (ii) infection, prevention and control practices in COVID-19; (iii) sample collection in COVID-19; (iv) Bio-medical waste management of patients with coronavirus disease; (v) nursing management of patients with coronavirus disease; (vi) staying positive during COVID-19; (vii) care of dead bodies; (viii) aerosol generating procedures; (ix) plasma therapy and newer treatment modalities; (x) coronavirus disease and mental health. Initially training consisted of ten sessions, scheduled across ten days. The sessions were taken by subject experts such as trained nursing faculty members, biomedical expert, physicians involved in critical care and psychiatrist. At the end of each session, queries of the participants were addressed by the concerned speaker through open panel discussions. At the end of training program, post KAP questionnaire was circulated to assess the change in KAP of the participants. An anonymous feedback was taken orally and verbally at the end of the training program.

Data collection tool

A pre-tested questionnaire comprising of demographic details and KAP related questions focusing on all aspects of prevention and management related to COVID-19 was used to assess the participants enrolled in the training program.

Demographic section collected information on age, gender, geographic location marital status, sector of healthcare facility, educational qualification. It also included questions related to presence of COVID related facilities in their place of working such as presence of isolation ward, diagnostic facilities for COVID-19 patients and their direct involvement in management of COVID-19 patients.

The questionnaire had 26 questions related to knowledge about COVID-19. Knowledge section was further divided into five major domains: (i) general information regarding coronavirus; (ii) symptoms and transmission; (iii) infection prevention and control practices; (iv) sample collection and Bio-medical waste management and (v) management of COVID-19 positive patients. Each question was allotted one mark for correct response except question K25, which was of two marks, making the total score of the Knowledge section to be 27. A total of six questions were used to assess the attitude of the HCW with the responses being 'yes', 'no' and 'may be'. Response of 'No' was coded as 0, 'May be' as 1 and 'Yes' as 2. The score of the attitude section ranged from 0-12. In addition, the questionnaire included five questions on a 5-point Likert scale which assessed practices related to COVID-19 The score ranged from 0-4 (never=0, rarely=1, often=2, sometimes=3 and always=4). The score of the practice section ranged from 0-20.

Statistical methods

The data was extracted in excel sheet from SurveyMonkey. The personal details of the participants like name, mobile number and email ids were replaced by assigning of unique identity number in the final analysis sheet. This was done to ensure anonymity and confidentiality of the participants. Following which, the data was cleaned and coded for data analysis.

Descriptive analysis of knowledge related questions included presentation of frequencies and percentages of correct answers. Continuous data such as knowledge, attitudes and practice scores were presented as mean and standard deviation (SD). Pre-knowledge score was

categorized as- (i) poor-to-moderate; if score was less than 66.6% of total possible score (≤18 score) and (ii) good; if score was ≥66.6% of total possible score (>18). ¹² For analytical purpose, age was divided into two categories- (i) less than 30 years and (ii) 30 years and above. ¹³ Similarly, experience was also categorized into two categories- (i) less than five years and (ii) five years and above. ¹⁴ Mean KAP scores were compared with demographic profile of the participants using independent samples t test, or one-way analysis of variance (ANOVA) as appropriate.

Paired t test was used to assess the mean difference before and after the training for overall as well as domain-wise scores for KAP related to COVID-19. The statistical significance level was fixed to conventional value of p<0.05. All analyses were performed using Statistical Package for the Social Sciences (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22 Armonk, Chicago, Illinois: IBM Corp).

Ethics statement

The present training activity was undertaken as a part of outreach activity; however, permission to analyze the data was taken from the Institutional Ethics Committee of ILBS. The first page of the online questionnaire, consisted of digital consent form with detailed information for the participants regarding the study. It also informed the respondent that they were free to withdraw from the study at any time, without any penalty or giving justification for withdrawing. The digital consent also mentioned that all information provided by them would be kept anonymous and confidential.

RESULTS

A total of 1428 participants across 9 trainings were enrolled in the online training program on prevention and management of COVID-19, of which 1290 participants attended more than 80% of the training course. However, a total of 1167 completed the pre-post KAP questionnaire and hence the data was analysed for 1167 participants only (response rate of 81.7%) (Figure 1).

The mean age of the participants was 30.96±6.62 years with 77.29% being female participants. Approximately, 55.53% of the total participants were working in the government sector and more than half (50.30%) of the participants were graduates. Approximately 50.73% of the participants had an experience of more than 5 years. The training program was able to accommodate participants across 25 states of the country; however, majority of participation was limited to Delhi with 63.84% of the participants (Table 1). In addition to demographic details, 70.27% of the participants enrolled in the training course had COVID-19 testing facility in their place of working, whereas 81.06% had isolation wards COVID-19 cases and 39.16% were directly involved in patient care and management of suspected or confirmed cases of COVID-19.

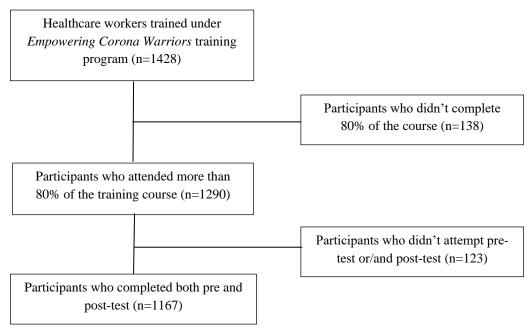


Figure 1: Flow diagram of study participants.

Table 1: Demographic characteristics of the participants (n=1167).

Demographic characteristics	N (%)
Mean age ±SD (in years)	30.96±6.62
Age (in years)	
<30	527 (45.16)
≥30	640 (54.84)
Gender	
Male	265 (22.71)
Female	902 (77.29)
Years of experience	, ,
<5	575 (49.27)
≥5	592 (50.73)
Education qualification	
Diploma	360 (30.85)
BSc nursing	587 (50.30)
MSc nursing	220 (18.85)
Marital status	
Unmarried	462 (39.66)
Married	703 (60.34)
Type of facility	
Government	648 (55.53)
Private	519 (44.47)
Geographical location	
Delhi	745 (63.84)
Outside Delhi	422 (36.16)
Availability of COVID-19 testing facility in workplace	
Yes	820 (70.27)
No	347 (29.73)
Presence of isolation wards for COVID-19 in your hospital	
Yes	946 (81.06)
No	221 (18.94)
Directly involved in management of COVID-19 patients	
Yes	457 (39.16)
No	710 (60.84)

Table 2: Association of demographic factors with knowledge, attitude and practice scores prevention and management of COVID-19.

Demographic factors	Knowledge scores Mean±SD	P value	Attitude scores Mean±SD	P value	Practice scores Mean±SD	P value
Age (in years)						
<30	17.15±3.26	0.003	9.95±1.63	0.774	18.72±2.10	< 0.001
≥30	17.72±3.20	0.003	9.93±1.48	0.774	19.25±1.38	
Gender						
Male	17.51±3.4	0.775	10.03±1.50	0.304	19.08±1.79	0.474
Female	17.44±3.18		9.91±1.57		18.99±1.75	0.474
Years of experience						
<5	17.03±3.26	< 0.001	9.98±1.61	0.338	18.79±2.04	< 0.001
≥5	17.87±3.16	_	9.90±1.50	-	19.23±1.41	
Education qualification						
Diploma	17.37±3.49	0.546	9.59±1.59	.0.001	19.16±1.56	0.102
BSc nursing	17.56±3.13	0.546	10.12±1.54	< 0.001	18.91±1.92	0.103
MSc nursing	17.33±3.08		10.03±1.46		19.05±1.61	
Marital status						
Unmarried	17.16±3.31	0.008	9.97±1.65	0.607	18.75±2.08	< 0.001
Married	17.67±3.18	-	9.92±1.49		19.18±1.49	_
Type of facility						
Government	17.99±3.17	< 0.001	10.04±1.49	0.010	19.18±1.49	< 0.001
Private	16.80±3.21	_	9.80±1.62		18.75±2.08	_
Geographical location of	f currently working					
Delhi	17.78±3.16	< 0.001	10.00±1.51	0.074	19.19±1.45	0.004
Outside Delhi	16.89±3.30	.01001	9.83±1.62	*****	18.70±2.17	<0.001
COVID-19 testing facilit	ty in your hospital					
Yes	17.72±3.23	< 0.001	10.07±1.52	< 0.001	19.08±1.62	0.035
No	16.85±3.18	_	9.63±1.59		18.84±2.04	_
Presence of isolation wa hospital	rds for in your					
Yes	17.62±3.18	0.001	10.03±1.52	0.004	19.09±1.59	0.004
No	16.79±3.40	< 0.001	9.54±1.1.63	< 0.001	18.65±2.33	< 0.001
Directly involved in mar						
19 patients						
Yes	17.83±3.38	0.002	10.16±1.53	-0.001	19.17±1.45	0.013
No	17.22±3.12	0.002	9.79±1.56	< 0.001	18.91±1.93	

Table 3: Overall and domain wise knowledge, attitude and practice in pre and post assessment (n=1167).

Assessment	Pre-knowledge assessment score Mean±SD	Post-knowledge assessment score Mean±SD	P value
Knowledge assessment			
General Information regarding coronavirus (K6, K11, K12, and K14)	3.03±0.80	3.35±0.77	< 0.001
Symptoms and transmission (K2, K3, K4, and K8)	3.46±0.66	3.55±0.65	< 0.001
Infection, prevention, and control practices (K1, K5, K7, K17, K18, and K22)	4.14±1.13	4.94±0.96	< 0.001
Sample collection and bio-Medical waste management (K9, K10, K15, and K16)	3.17±0.72	3.61±0.55	< 0.001
Management of COVID-19-positive patients (K13, K19, K20, K21, K23, K24, K25, and K26)	3.65±1.89	5.83±2.26	< 0.001
Overall Knowledge	17.46±3.24	21.28±3.65	< 0.001
Attitude assessment	9.94±1.56	10.35±1.48	< 0.001
Practice assessment	19.01±1.76	19.37±1.49	< 0.001

Knowledge, attitude and practice related to prevention and management of COVID-19

The mean knowledge score of the participants was found to be 17.46±3.24 (range 5-27) out of total score of 27. The correct responses received by the participants varied from as low as 20.48% to as high as 97.34% across various questions on the knowledge domain (Annexure Table I). Approximately, one third of the participants (33.16%) had good knowledge whereas remaining were found to have poor-to-moderate knowledge.

The knowledge before the training was found to be highest in the domain related to symptoms and transmission about coronavirus (mean score of 3.46 out of 4) and sample collection and biomedical waste management of COVID-19 (mean score of 3.17 out of 4) whereas least score was observed in domains related to management of coronavirus patients (mean score of 3.65 out of 9), followed by infection, prevention and control measures during coronavirus pandemic in health setting (mean score of 4.14 out of 6).

The overall mean score of the attitude before the training was found to be 10.04±1.44 (range 3-12) out of total score of 12 whereas the mean practice score was found to be 19.01±1.76 (range 5-20) out of total score of 20.

Association of demographic profile with knowledge, attitude and practice related to prevention and management of COVID-19

The univariate analysis with knowledge, attitude and practice before training and demographic profile suggested, knowledge level significantly varies across age, years of experience, geographical location, type of facility, presence of COVID related facilities in the place of working whereas no significant difference was seen in knowledge score with respect to gender and education qualification of the participants (Table 2). There was no significant difference observed in attitude scores of the participants across age groups, gender, years of experience and marital status.

However, higher attitude scores were observed in participants with higher educational qualification and those working in government facility.

Moreover, presence of COVID related facilities resulted in higher attitude score as compared to absence of COVID related facilities. Practice score varied significantly across age groups, years of experience, type of facility, marital status, geographical location of currently working and presence of COVID related facilities (Table 2).

Change in knowledge, attitude and practice related to COVID-19 after attending COVID-19 training

The mean pre-knowledge assessment score of participants was found to be 17.46 ± 3.24 whereas the post-knowledge

assessment score was 21.28 ± 3.65 out of total score of 27; this difference of 3.82 units (95% CI: 3.59-4.05) in the knowledge scores was found to be significant with p<0.001.

Significant increase in knowledge was observed across all domains (Table 3). Approximately, 33.16% were found to have good knowledge before the training, however, post training 77.63% of the participants were having good knowledge.

The mean pre-attitude score of the participants before attending the training was 9.94±1.56 out of 12 whereas a significant increase (p<0.001) in attitude was seen after attending ten-days training program with mean post assessment score being 10.35±1.48 out of 12.

Similarly, significant increase in mean practice score was observed from 19.01±1.76 to 19.37±1.49 (out of 20) after attending training program. The responses of KAP are described in Annexure Table I-III.

DISCUSSION

The present study was undertaken by project ILBS-ECHO to assess the change in KAP of the HCW after attending ten-day training program themed on prevention and management of COVID-19. The results of the present study highlighted poor-to-moderate knowledge among 66.84% of the participants before attending the training which was found to be in line with other national and international studies, emphasizing a poor-to-moderate knowledge among HCW in absence of any comprehensive training program.^{7-9,15,16} The knowledge among the study participants was found to be lower as compared to other international studies undertaken in the Egypt (80.4%), Uganda (82.4%), and Ethiopia (86.4%). 17-19 The higher knowledge score in previous studies can be explained as these studies emphasised on basic knowledge related to COVID-19 such as clinical manifestation and transmission of the virus whereas the present study gave more emphasis on questions related to prevention and management of COVID-19. However, participants had good knowledge related to questions assessing the general knowledge related to COVID-19 in our study. The study reported exceptionally high attitude and practice score when compared to knowledge score. The possible explanation for higher attitude and practice scores could be attributable to tendency to provide socially desirable responses.

The results of the study revealed good knowledge among 33.16% of the participants before attending the training program whereas it increased to 77.63% of the participants after attending the training program. This eventually resulted in increase in mean knowledge score post training. The findings of the study were corroborated by previous studies which suggests that educational interventions provided through various mediums such as online training, educational videos or any other mode help in increasing the knowledge among HCWs. ²⁰⁻²²

Further the study was also able to demonstrate improvements in attitude and practice scores related to prevention and management of COVID-19 after attending ten-day training program. Although there was no control arm, many of the responses which improved were specifically covered in the scientific sessions, so it is likely that this improvement could be attributable to the training program and was also confirmed by the participant's comments in the feedback. The present training program helped in improving the practice associated with processes involved in donning and doffing of personal protective equipments (PPE) and its use; these findings have been confirmed by a previous study which resulted in modified practice after educational intervention on use of PPEs.²³

A great proportion of participants reported that they feel safer while using PPE, post training which could be indicative of assuaging the anxiety and fear related to COVID-19 in HCWs. The training program also motivated HCWs to volunteer themselves for duties in COVID-19 isolation wards. These findings can't be compared with previous studies as most of the voluntary online surveys don't have a follow-up assessment or absence of an education intervention program for COVID-19. However, there have been previous educational intervention training studies to improve KAP for other diseases similar to COVID-19. For another virus of the same family, SARS, a telephonic health education program was found to be effective in improving the knowledge about transmission of the virus and also helped in reducing the anxiety among elderly in Hong Kong.²⁴ Similarly, an intense educational intervention on Middle East respiratory syndrome (MERS-CoV) in Saudi Arabia was known to improve the knowledge and attitude, however, no effect was observed in practice of HCWs.²⁵

Moreover, this online training program was found to be effective with minimum resource requirements for the trainers as well as for the trainees. In addition, it had a wide reach within the limited time period. Moreover, the resource materials and recorded lectures were shared with the participants through project website which could be accessed via provided credentials. This was done to ensure accessibility of the content at a time and place convenient for the audience.

The major limitation of our study included, its online conduction via the internet in order to ensure social distancing norms, hence participants not having the access to internet facility could have been overlooked. Thus, the study conclusions are limited to individuals who have access to a source of internet and have good digital skills. The training was organised in english language only, and hence participants not having a better understanding of the language could have difficulty in understanding the training program at a regular pace. However, it was ensured that the presentations, recorded videos and important points of the lectures are shared with the participants for better understanding. An additional

limitation of the study is that the assessment of change was performed immediately after the training and the study was not able to assess the continued effect over time.

Despite these limitations, the training program had a participation of more than 1000 HCW across 25 states. The training program over the ten days was able to achieve modification in in knowledge, attitude and practice of HCW, which will not only help in management of COVID-19 patients but also keep themselves safe and motivated while managing COVID-19 patients. In light of the study findings, an online comprehensive training program is recommended for enhancing and empowering the HCW, considering the surge in COVID-19 cases.

CONCLUSION

Comprehensively designed training program enhanced the knowledge about prevention and management of COVID-19 in healthcare workers and also motivated them to maintain an optimistic attitude and good practices while managing the patients. This health education program empowered and strengthened the corona warriors; thus, such holistic training programs should be encouraged among healthcare workers to win the battle against COVID-19.

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Conflict of interest: None declared

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ANNEXURE

Table I: Knowledge related responses.

S. no.	Knowledge	Correct respon	
	WHO has recommended that hand rub by sanitizer should be conducted for	Pre	Post
K1	minimum of 21 seconds: True False	1039 (89.03)	1104 (94.6)
K2	Persons with COVID-19 can only infect other people if they have fever: True False	1019 (87.32)	994 (85.18)
К3	Corona viruses can be transmitted from person to person: True False	1136 (97.34)	1134 (97.17)
K4	Lactating mothers having COVID-19 cannot breast feed to their child: True False	731 (62.64)	855 (73.26)
K5	Disinfecting hands with sanitizer is more effective than washing hands with soap and water: True False	925 (79.26)	936 (80.21)
K6	0-4 days is time period between exposure to COVID-19 infection and the appearance of the first symptoms (incubation period): True False	1117 (95.72)	1130 (96.83)
K7	One should ideally maintain a minimum of 3 feet distance from others to prevent spread of COVID-19 infection: True False	854 (73.18)	910 (77.98)
K8	People older than 61 years of age and those with underlying comorbidities are at risk of severe illness with the COVID-19: True False	1155 (98.97)	1160 (99.4)
К9	As a precaution double-layered bags (2 bags) should be used for collection of bio medical waste from COVID-19 isolation wards: True False	1066 (91.35)	1139 (97.6)
K10	Biomedical waste from COVID-19 wards should be separately labelled as 'COVID-19 waste': True False	1143 (97.94)	1159 (99.31)
K11	Zoonotic diseases are a) diseases that are caused by bacteria, b) diseases that have appeared in a population for the first time, c) diseases that are naturally transmitted between vertebrate animals and humans, d) diseases that have a mortality rate of greater than 50%.	1006 (86.2)	1062 (91)
K12	A spill over event is a) When a pathogen's geographic range extends from one country to another, b) The worldwide spread of a new disease, c) When a pathogen that is circulating in an animal species is found to be transmitted to humans, d) An extraordinary event which is determined to constitute a public health risk to other states through the international spread of disease.	458 (39.25)	737 (63.15)
K13	All of the following are the contraindications for the use of the non-invasive ventilation (NIV), a) multi organ failure, b) hemo dynamic instability, c) hypoxemic respiratory failure, d) abnormal mental status.	372 (31.88)	642 (55.01)
K14	SARI stands for a) systematic acute respiratory infection, b) severe acute respiratory injury, c) systemic acute respiratory injury, d) severe acute respiratory infection	962 (82.43)	982 (84.15)
K15	All of the following are correct about sample collection in COVID suspected patients, a) do not sample nostrils, b) ask the patient for sputum induction, c) both upper respiratory tract as well as lower respiratory tract sample can be taken, d) use droplet and contact precautions for upper respiratory tract specimens.	504 (43.19)	789 (67.61)
K16	Nasopharyngeal and oropharyngeal swab obtained from suspected COVID-19 patient is tested for a) SPA (Strand Displacement Amplification), b) RT – PCR (Real Time Polymese Chain Reaction), c) ELISA (Enzyme Linked Immunosorbent Assay), d)Nucleic Acid Amplification Test (NAAT)	985 (84.4)	1127 (96.57)
K17	What is the best disinfectant for disinfecting the surfaces, equipment's and linens in COVID-19 wards? a) 2% glutaraldehyde solution, b) 1% hypo chlorite solution, c) 70% iso propyl alcohol, d)40% formaldehyde solution	885 (75.84)	1116 (95.63)
K18	At least how many air changes per hour are recommended in negative pressure rooms? a) 8 air changes per hour, b) 12 air changes per hour c) 16 air changes per hour, d)20 air changes per hour	633 (54.24)	998 (85.52)
K19	Which of the following finding should alarm a nurse for immediate action to prevent the onset of septic shock? a) Serum lactate level of 0.8 mmol/l, b)Mean arterial pressure of 60 mmhg, c)Total leucocyte count of 6500 cell/cumm d)Serum procalcitonin level of 0.12 ng/ml	563 (48.24)	809 (69.32)

Continued.

S. no.	Knowledge	Correct responses (%)		
S. IIO.	Kilowieuge	Pre	Post	
K20	Management of septic shock among COVID-19 patients include all, a) Crystalloid such as ringer lactate, b) Colloids such as Gelatin and Starches, c) Vasopressors, d)Anti-microbial therapy	427 (36.59)	722 (61.87)	
K21	A Normal person breathing room air i.e. PaO2 of approximate 100 mmHg would have a PaO2/Fio2 ratio of a) less than 50, b) 50 – 200, c) 200 - 400, d) Greater than 400	239 (20.48)	667 (57.16)	
K22	Which type of precautions are required while performing aerosol Generating procedures a) Droplet Precautions, b) Airborne Precautions c) Contact Precautions, d) Transmission based Precautions	501 (42.93)	698 (59.81)	
K23	Aerosol generating procedures include all, a) Endotracheal suctioning with inline suctioning, b)Upper GI endoscopy, c) Oral Suctioning, d) Endotracheal suctioning after disconnecting ventilator	365 (31.28)	726 (62.21)	
K24	Donor eligibility criteria for convalescent plasma therapy includes all, a) Evidence of COVID-19 documented by a diagnostic test at the time of illness, b)Complete resolution of symptoms at least 28 days prior to donation, c) Complete resolution of symptoms at least 10 days prior to donation and negative results for COVID-19, d) A positive serological test for SARS-COV 2 antibodies after recovery, if prior diagnosis testing is not performed at the time of COVID-19 was suspected.	383 (32.82)	586 (50.21)	
K25	Off label indication of hydroxychloroquine for management of COVID-19 is not recommended in (mark all correct options) a) Patients with smoking history, b) Children less than 12 years of age, c) Patients with existing comorbidities d) Pregnant and lactating women	1455 (124.68)	1779 (152.44)	
K26	All of the following statements about the management of COVID-19 dead bodies of patients are true, a) All tubes, drains, catheters on the dead bodies should be removed; b) Any puncture holes or wounds should be disinfected with 1% hypo chloride solution and dressed; c) After placing the dead body in leak proof plastic body bag, the exterior of the body bag should be disinfected with 1% hypo-chloride solution; d)Dead body should not be handed over to the relatives as it poses high infection and possesses the risk of transmitting the infection	452 (38.73)	869 (74.46)	

Table II: Attitude related responses.

S.		Pre			Post			
no.	Attitude	No (%)	May be (%)	Yes (%)	No (%)	May be (%)	Yes (%)	
A1	Will you volunteer your services to work in a COVID-19 isolation ward?	105 (9)	371 (31.79)	691 (59.21)	83 (7.11)	255 (21.85)	829 (71.04)	
A2	Do you agree that washing hands frequently can lower the risk of COVID-19 infections in healthcare workforce?	16 (1.37)	37 (3.17)	1114 (95.46)	5 (0.43)	27 (2.31)	1135 (97.26)	
A3	Will you undertake a training on emergency healthcare preparedness post COVID-19?	123 (10.54)	137 (11.74)	907 (77.72)	88 (7.54)	111 (9.51)	968 (82.95)	
A4	Are you confident that the existing protocols (like personal protective equipment, bio medical waste management, 5 moments of hand hygiene etc.) will minimize the spread of COVID-19 infection to medical workforce?	15 (1.29)	89 (7.63)	1063 (91.09)	11 (0.94)	50 (4.28)	1106 (94.77)	
A5	Will you educate your routine patients on importance of social distancing regularly, to curb the impact of COVID-19?	7 (0.6)	15 (1.29)	1145 (98.11)	3 (0.26)	17 (1.46)	1147 (98.29)	
A6	Do you feel fearful and anxious of getting infected while treating a patient with COVID-19; despite take all necessary precautions?	399 (34.19)	313 (26.82)	455 (38.99)	470 (40.27)	312 (26.74)	385 (32.99)	

Table III: Practice related responses.

S. no.	Practice	Pre Post									
		Never (%)	Rarely (%)	Often (%)	Sometimes (%)	Always (%)	Never (%)	Rarely (%)	Often (%)	Sometimes (%)	Always (%)
P1	How often do you follow hand hygiene protocol as per WHO guidelines while touching a patient, before any aseptic procedure and after exposure to body fluids?	0 (0)	4 (0.34)	10 (0.86)	54 (4.63)	1099 (94.17)	2 (0.17)	4 (0.34)	2 (0.17)	29 (2.49)	1130 (96.83)
P2	Do you ensure that high touch surfaces in the clinic/ward are regularly disinfected?	5 (0.43)	9 (0.77)	26 (2.23)	185 (15.85)	942 (80.72)	2 (0.17)	6 (0.51)	11 (0.94)	115 (9.85)	1033 (88.52)
Р3	Do you practice maintaining agreeable social distance with other colleagues in your healthcare setting?	4 (0.34)	15 (1.29)	32 (2.74)	224 (19.19)	892 (76.44)	3 (0.26)	12 (1.03)	8 (0.69)	178 (15.25)	966 (82.78)
P4	Do you follow the donning sequence (gown, mask, goggles, gloves) while putting on the personal protective equipments?	20 (1.71)	11 (0.94)	19 (1.63)	82 (7.03)	1035 (88.69)	20 (1.71)	4 (0.34)	5 (0.43)	47 (4.03)	1091 (93.49)
P5	Do you follow the doffing sequence (gloves, goggles/face shield, gown, mask, washing of hands) while removing the personal protective equipments?	19 (1.63)	12 (1.03)	11 (0.94)	68 (5.83)	1057 (90.57)	16 (1.37)	2 (0.17)	5 (0.43)	43 (3.68)	1101 (94.34)