JMSR
Journal of Medical and Scientific Research

ORIGINAL RESEARCH

COVID-19 and hospital infection prevention and control awareness among health care workers in a tertiary care hospital: A questionnaire-based survey

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Abstract

Background: Healthcare workers (HCWs) are the frontline warriors in combating the coronavirus disease 2019 (COVID-19) pandemic and due of the unavailability of targeted therapy, infection prevention and control practices (IPC) remain their key weapon. Effective implementation of recommended IPC strategies is essential for prevention of transmission of COVID-19 infection in health care settings. So, periodic assessment of knowledge, attitude and practices (KAP) of HCWs is required to provide adequate health education and training.

Objective: To assess knowledge, attitude and practices of health care workers regarding COVID-19 relevant IPC practices.

Material and methods: A cross-sectional study was conducted in a tertiary care hospital from 1st April to 15th April 2021. A 21-item questionnaire was developed based on recommendations of World Health Organization (WHO) and Centre for Disease Control (CDC). The questionnaire was shared with faculty, postgraduate residents and medical undergraduates via whatsapp messenger. Statistical analysis was performed using SPSS 22 and Chi-square test was used for comparing variables.

Results: A total of 317 participants had responded, out of which 55% were females. Majority of the respondents were medical undergraduates (70%) followed by medical postgraduates (18%) and faculty (12%). The mean cumulative KAP score of study participants was 18.01±2.08, suggesting that a good number of participants had adequate knowledge, positive attitude and appropriate practices.

Conclusion: Our survey showed that the study participants had adequate awareness and adherence to COVID-19 relevant IPCs recommendations. Periodic training programs are still needed to address the shortcomings in infection control and prevention.

Keywords: COVID-19; knowledge; attitude; practice; healthcare workers; infection prevention; control

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Received 12 July 2021; *Revised* 2 September 2021; *Accepted* 10 September 2021; *Published* 18 September 2021

Citation: Agarwal S, Jafar H, Garg A, Prakash V, Verma D, Sonkar L. COVID-19 and hospital infection prevention and control awareness among health care workers in a tertiary care hospital: A questionnaire-based survey. J Med Sci Res. 2021; 9(4):222-227. DOI: http://dx.doi.org/10.17727/JMSR.2021/9-34

Introduction

Coronavirus disease 2019 (COVID-19) was first reported in December 2019 among patients with viral pneumonia symptoms in Wuhan, China [1, 2]. Within a short span of time, the outbreak exploded and rapidly covered the whole world with catastrophic effect. World health organization (WHO) declared this a global pandemic on 11 March 2020 [3].

COVID-19 disease is caused by novel severe acute respiratory syndrome Coronavirus 2 (SARS CoV2) which belongs to genus betacoronavirus (betaCoV) of the family *Coronaviridae*. The transmission of SARS CoV2 occurs via inhalation of virus laden respiratory droplets from an infected individual. Although individuals of all ages are susceptible for acquiring this infection and progressing to severe disease, old age and pre-existing comorbidities (hypertension, heart disease, lung disease, kidney disease, cancer, diabetes etc.) are potential risk factors for development of severe disease and higher mortality [4]. Till date various treatment modalities for COVID-19 have been introduced however, their efficacy is still doubtful. With the newly introduced COVID-19 vaccines, there is some hope but their long-term effectiveness and success is yet to be proven. Therefore, in absence of specific prophylaxis and treatment, infection prevention and control (IPC) plays a key role in fight against COVID-19 pandemic.

Healthcare workers (HCWs) are the frontline warriors who are actively combating with the pandemic and by default are bearing the brunt of high risk of infection [5]. The 3rd Indian Council of Medical Research (ICMR) serosurvey also showed that doctors and nurses were the most affected group with seroprevalence of 26% and 25%, respectively, before vaccination started [6]. This reinforces the fact that nosocomial transmission is a critical route for spread of COVID-19 infection [2, 3]. Hence, to prevent transmission of COVID-19 infection in health care settings WHO has advised various IPC strategies that include triage, standard precautions, administrative controls, environmental and engineering controls [5]. Among these, standard precautions represent the basic and most effective measures to prevent the spread of COVID-19. For effectual implementation of appropriate IPC strategies, time to time health education programmes and training is required for HCWs.

In a battle against the pandemic, healthcare providers can successfully deter the spread of COVID-19 with good knowledge, positive attitude and appropriate practices pertaining to infection prevention and control [7]. Poor knowledge and improper practices of HCWs can lead to infection spread rather than containment. Therefore, this study was conducted with the aim to assess the awareness of COVID-19 relevant IPC practices among health care workers and to identify the critical gaps that should be emphasized in future training programs.

Material and methods

This cross-sectional study was conducted at a tertiary care hospital and teaching institute in Bareilly, Uttar Pradesh. A 21-item questionnaire was developed to collect information on knowledge, attitude and practices regarding control of spread of COVID-19 infection based on previously published articles and recommendations of WHO and Centre for Disease Control (CDC) [8-11]. The questionnaire was designed in English. Ethical approval was obtained from the Institutional Ethics Committee before the formal survey was conducted.

This study was conducted as online survey using Google forms from 1st April to 15th April 2021. The questionnaire link was shared with faculty, postgraduate residents and medical undergraduates of our institute via whatsapp messenger. The participation and completion of the questionnaire was regarded to be an informed consent to the study. It was ensured to keep all the information collected from the study participants confidential.

Questionnaire was divided into four parts. The first part explored socio-demographic characteristics of the participants (age, gender, designation, working area), previous exposure with COVID-19 positive patient, previous COVID-19 infection and chemoprophylaxis taken.

The second part assessed participants' knowledge regarding COVID-19 and infection control by multiple-choice questions. For each question or statement, a score of 1 was given for the correct response and 0 for the incorrect response. A total knowledge score was calculated, ranging from 0 to

11. Knowledge level was classified into two groups according to the total score of each respondent; adequate (≥9) and inadequate (<9).

The third part assessed participants' attitude and opinions towards preventive measures regarding COVID-19 via five multiple-choice questions. Respondents who answered more than three questions correctly were considered to have "positive" attitude.

The fourth part included questions to gauge participants' IPC practices in hypothetical situations. It involved five multiple-choice questions. A score of four or more was considered as "appropriate" practice.

Data was tabulated in excel and statistical analysis was performed using SPSS 22. Descriptive statistics were used to depict participants' socio-demographic variables and frequencies/percentage of participants with adequate knowledge, positive attitude and appropriate practices. Chi-square test was used for comparing the participants' knowledge, attitude, practice (KAP) score and their demographics. P value <0.05 was used for statistical significance.

Results

A total of 317 healthcare professionals from a tertiary care hospital in Bareilly responded to the survey. The majority of the responders were less than 25 years of age (n=209), with minimum and maximum age 18 years and 58 years. Female participants (55%) outnumbered male participants. In our study, majority were medical undergraduates (70%) followed by medical postgraduates (18%) and faculty (12%). Among study participants, 19.6%, 22.4% and 58% participants had worked in high risk, moderate risk and low risk areas, respectively (Table 1).

Table 1: Distribution of mean KAP score among demographic variables of study participants.

Demographic variables		*Total (n)*	*%*	*Mean KAP score*	*P-value*
Age					
	<25	209	65.93	17.65	0.006
	25-35	75	23.6	18.70	
	36-45	19	5.99	19.0	
	>45	14	10.72	18.29	
Gender					
	Male	144	45.42	17.87	0.0313
	Female	173	54.57	18.24	
Designation					
	Undergraduates	222	70.03	17.86	0.000
	Postgraduates	57	17.98	18.38	
	Faculty	38	11.98	18.82	
Working area					
	High risk (ICU, OT, dialysis unit, laboratory)	62	19.6	18.59	0.139
	Moderate risk (wards, emergency wards)	71	22.4	17.98	
	Low risk (OPD, administrative section)	184	58	17.92	

Of the total participants, 26.5% participants were previously exposed to confirmed COVID-19 positive patients while a small number (7.6%) were previously infected with COVID-19 (Figure 1, 2). More than half of the responders (54.3%) had not taken any chemoprophylaxis for COVID-19 while

45.7% had taken either zinc, vitamin C, ivermectin or hydroxychloroquine (Figure 3).

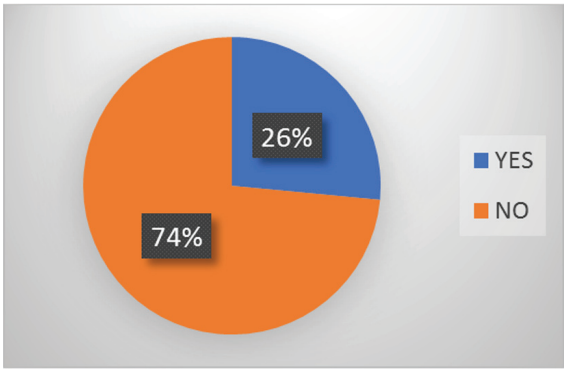

Figure 1: Distribution of previous exposure to confirmed COVID-19 patient among study participants.

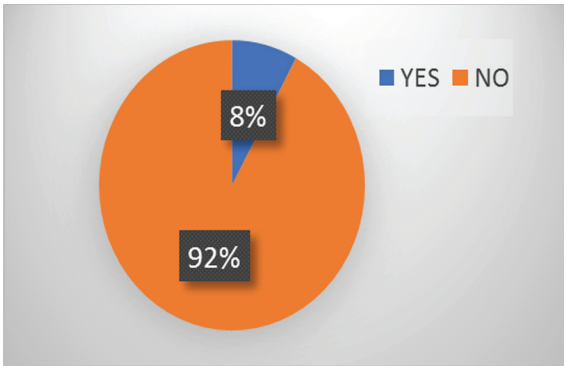

Figure 2: Distribution of previous infection with COVID-19 in study participants.

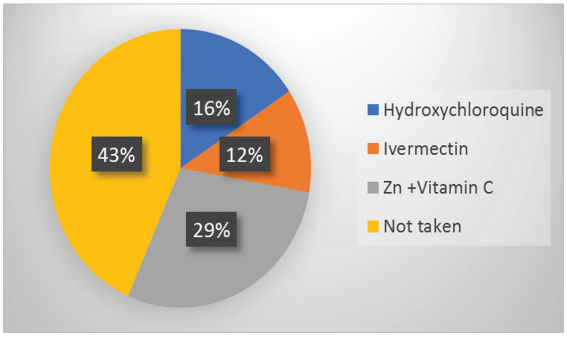

Figure 3: Chemoprophylaxis taken for COVID-19 by study participants.

Knowledge

The mean knowledge score in our study participants was 9.17±1.152. A significantly higher (P <0.05) level of knowledge regarding COVID-19 was found in 36-45 years aged participants. Faculty and professionals who had worked in high-risk areas had a relatively better average knowledge score than the others.

Attitude

The mean attitude score was 4.87±0.465 suggesting that majority of participants (>90%) had a good attitude towards COVID-19 prevention and control. No significant variation was found between the demographic variables and attitude score of healthcare professionals.

In our study, we also questioned the study participants about their opinion regarding the efficacy of recently introduced COVID-19 vaccines and we have found that majority (52.68%) were not sure about the efficacy while 35.64% thought it will be effective.

Practice

The average practice score was 4.03±1.20. Higher score was found in age more than 45 years and in trained healthcare professionals who had worked in high-risk areas. Female participants had significantly (P<0.05) better IPC practices. No other demographic variables were significantly associated with better practices (Table 2).

Cumulative score

The mean cumulative KAP score of study participants was 18.01±2.08, ranging from 8 to 22. Age and designation were found to be significantly correlated with good knowledge, positive attitude and proper practices. Gender and working area were not significantly associated but relatively higher cumulative KAP scores were found in females and participants who had worked in high-risk areas (Table 1).

Discussion

This study was conducted with a purpose of evaluating the awareness of healthcare professionals regarding COVID-19 in our tertiary care hospital. Knowledge of healthcare professionals is valuable because it leads to positive attitude and proper practice skills, which influences the well-being of the community.

Adequate knowledge was found in 73.2% study participants. A study conducted by Modi PD et al in Mumbai found comparable number of respondents (71.2%) having adequate knowledge whereas Gopalakrishnan et al. observed that 82.9% healthcare workers had adequate knowledge [12,

Table 2: Distribution of adequate knowledge and appropriate practices based on participants' demographic variables.

Demographic variables	*Total (n)*	*Adequate knowledge (Score >9)*	*P-value*	*Appropriate practices (Score >4)*	*P-value*
Age					
<25	209	142	0.019	139	0.234
25-35	75	63		57	
36-45	19	17		14	
>45	14	10		12	
Gender					
Male	144	106	0.876	89	0.004
Female	173	126		133	
Designation					
Undergraduates	222	158	0.244	151	0.241
Postgraduates	57	42			
Faculty	38	32		31	
Working area					
High risk (ICU, OT, dialysis unit, laboratory)	62	47	0.862	45	0.89
Moderate risk (wards, emergency wards)	71	51		49	
Low risk (OPD, administrative section)	184	134		128	

13]. The lower adequate knowledge score in our study can be attributed to the higher percentage of undergraduates as participants. Among 36-45 years aged participants a significantly better level of knowledge regarding COVID-19 was found. Higher knowledge might be due to active and direct involvement of this age group in patient care.

Major number of participants (>90%) had a positive attitude towards IPC via use of proper personal protective equipment (PPE), environmental sanitation and social distancing. Concordantly positive attitude was found by Gopalakrishnan et al and Asdaq et al while many previous studies conducted during the first peak of COVID-19 had shown poor attitude [13-16]. This can be attributed to the fact that the study was conducted after the end of first wave of COVID-19 so the healthcare workers had enough time to change their behavioral beliefs and to develop optimistic attitude for combating with pandemic situation.

Majority of the healthcare workers had appropriate IPC practices regarding COVID-19 which is in line with other findings [13, 15, 17]. Incidentally, female participants were found to have significantly better practices as compared to males. In our view, ideally assessment of infection control practices should be directly observed and not by questionnaire-based survey because there is a high probability to choose the most appropriate option as self-reported practice irrespective of the actual practice being followed by the healthcare workers.

Overall awareness among the study participants, appeared to be comparable in three domains (KAP) regardless of their demographic variables. The reason of this may be because this study was conducted just before the onset of second peak of COVID-19. Thus, they would have had enough sources and training to acquire relevant information and practices.

The major limitation of this study is that we have not included paramedical staff (nurses, laboratory

technicians etc.), which constitute an important part in patient care. Moreover, major portion of respondents consisted of medical undergraduates. So, the results cannot be extrapolated to all healthcare professionals. Like in all questionnaire-based studies, the responses might not reflect the actual attitude and practices of the participants.

Conclusion

The survey indicated that the majority of participants had adequate knowledge about preventive measures and were well prepared to fight against pandemic. This will definitely lead to better patient care and will also curtail the nosocomial transmission of COVID-19. To overcome the limitations of the study, further studies are required to assess the accurate level of awareness of healthcare workers. As we are still under the threat of impending waves of COVID-19 in foreseeable future, it is pertinent to sustain and enhance IPC strategies of healthcare workers. Thus, it is worthwhile to conduct continued health education and training to promote positive attitude and better work practices.

Acknowledgements

Dr. Rashmi Katyal for her help in statistical analysis.

Conflicts of interest

Author declares no conflicts of interest.

References

[1] Li Q, Guan X, Wu P, Wang X, Zhou L, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus–infected pneumonia. N Engl J of Med. 2020; 382:1199–1207.

[2] Hui DS, Azhar IE, Madani TA, Ntoumi F, Kock R, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health - The latest 2019 novel coronavirus outbreak in Wuhan, China. Int J Infect Dis. 2020; 91:264–266.

[3] World Health Organization. Coronavirus disease (COVID-19): Situation report-194. World Health Organization; 2020. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200801-covid-19-sitrep-194.pdf?sfvrsn=401287f3_2.

[4] Hu B, Guo H, Zhou P, Zheng LS. Characteristics of SARS-CoV-2 and COVID-19. Nat Rev Microbiol. 2020; 19:141–154.

[5] World Health Organization. Infection prevention and control during health care when coronavirus disease (COVID-19) is suspected or confirmed: interim guidance, 29 June 2020. World Health Organization; 2020.

[6] Dutta SS. Large proportion of India still vulnerable to Covid-19: ICMR serosurvey. The new Indian express. Newspaper on the internet- 4 Feb 2021. Available from: https://www.newindianexpress.com/nation/2021/feb/04/large-proportion-of-india-still-vulnerable-to-covid-19-icmr-serosurvey-2259602.html

[7] Polychronis G, Roupa Z. Health Workers' knowledge and perception regarding the risk of spread of COVID-19 during the pandemic: A systematic review. J Public Affairs. 2020; e2558.

[8] World Health Organization. Q&A on Coronaviruses (Covid-19). Accessed on 10 Mar 2021, available online from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/q-a-coronaviruses.

[9] Infection Control Guidance for healthcare professionals about coronavirus (COVID-19); 2020. Available from: https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control.html.

[10] Maheshwari S, Gupta PK, Sinha R, Rawat P. Knowledge, attitude, and practice towards coronavirus disease 2019 (COVID-19) among medical students: a cross-sectional study. J Acute Dis. 2020; 9(3):100–104.

[11] Huynh G, Nguyen TN, Tran VK, Vo KN, Vo VT, et al. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. Asian Pac J Trop Med. 2020; 13(6):260–265.

[12] Modi PD, Nair G, Uppe A, Modi J, Tuppekar B, et al. COVID-19 awareness among healthcare students and professionals in Mumbai metropolitan region: a questionnaire-based survey. Cureus. 2020; 12(4):e7514.

[13] Gopalakrishnan S, Kandasamy S, Almohammed OA, Abraham B, Senthilkumar M. Knowledge, attitude and practices associated with COVID-19 among health care workers: A cross-sectional study in India. Accessed on 9 October 2020, available from: https://doi.org/10.21203/rs.3.rs-87496/v1.

[14] Asdaq SMB, Alshrari AS, Imran M, Sreeharsha N, Sultana R. Knowledge, attitude and practices of healthcare professionals of Riyadh, Saudi Arabia towards covid-19: A cross-sectional study. Saudi J Biol Sci. 2021; 28(9):5275–5285.

[15] Olum R, Bongomin F. Uganda's first 100 COVID-19 cases: Trends and lessons. Int J Infect Dis. 2020; 96:517–518.

[16] Albahri AH, Alnaqbi SA, Alnaqbi SA, Alshaali AO, Shahdoor SM. Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in primary healthcare centers in Dubai: A Cross-Sectional Survey, 2020. Front Public Health. 2021; 9:6176–6179.

[17] Zhang M, Zhou M, Tang F, Wang Y, Nie H, et al. Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. J Hospital Infection. 2020; 105(2):183–187.