Knowledge, Attitude and Practice of healthcare workers Towards Coronavirus Disease 2019 (COVID-19) Pandemic

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ABSTRACT

Background: The emergence of SARS-CoV 2 pandemic is the greatest public health concern of the century. Healthcare workers are the front liners of pandemic management. Their knowledge, attitudes and practices can influence the outcome of pandemic. The study aims to determine the knowledge, attitude and practices among healthcare workers.

Methods: Knowledge, attitude and practice related questionnaire based online survey through Google forms was conducted from Healthcare workers, following ethical approval from NHRC (ERB protocol registration number: 297/2020 P). Online forms were disseminated via Facebook, Instagram, Whatsapp, Viber and personal messaging. Responses containing anonymized data was collected analyzed in using SPSS-version 26, (Year: 2019). The results were interpreted in terms of percentage response, knowledge score, and practice and discussed on the possible solutions in improving the infection prevention and control practice.

Results: 473 HCWs responded to the questionnaire, out of which 426 responses met inclusion criteria which is 90% of the total responses. The mean score for knowledge was 3.20 ± 1.15 out of maximum seven; with 45.7% correct answers. 70.4 % (300) participants felt that Nepal will be unable to contain the pandemic, 64 % of the total employed participants felt that there was inadequate institutional preparedness to protect HCWs from exposure. 91% participants reported practicing hand hygiene after every patient encounter; whereas 31.7% (77) and 22.1% (59) participants did not know how to check sealing of the N95 masks and use personal protective equipment's respectively.

Conclusions: The survey findings showed deficiencies in knowledge and appropriate practice among the HCWs, in prevention of SARS-CoV-2 transmission. Attitudes towards COVID19 were a mix of both positive and negative viewpoints. Even in health care workers with access to internet, there is significant gap in universal infection prevention and control practices required for self-protection and limiting untoward transmission.

Keywords: Attitude and practice; COVID-19; healthcare workers; infection prevention and control; knowledge, Nepal; SARS CoV 2

INTRODUCTION

Coronavirus that causes the disease COVID-19 is a beta-coronavirus, a RNA virus of the family coronaviridae which are important human and animal pathogens.[1,2] At the end of 2019, a novel coronavirus was identified as the cause of multiple pneumonia cases in Wuhan, China that rapidly evolved into a global pandemic by March.[2,3] Now there have been more than a million cases globally.[4] Recent studies showed that more than 3300 healthcare workers from China and up to 20% of responding healthcare workers(HCWs) in Italy were infected with COVID-19.[5] In Nepal, as of 7th June 2020,

there has been 3448 confirmed cases of COVID-19.[6] Due to its recent origin and rapid spread, it is imperative that healthcare workers be well informed about COVID-19 to protect themselves as well as their patients. This study attempted to understand the Knowledge Attitude and Practice of healthcare workers on universal infection prevention and control practices specifically related to COVID-19 transmission, prevention from infection & untoward transmission.

METHODS

Healthcare workers (intern doctors, medical officers, consultant doctors, registered nurse and dentists) who

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were above 18 years of age, were residents of Nepal and willing to participate were included in the study.

Any participant residing or practicing medicine outside Nepal or any participant with known contact with a COVID 19 case, was excluded from the study.

Minimum sample size required was calculated to be 357 based on a confidence interval of 5 at 95% confidence level for a large (more than 5000) population using the following formula : n = [Z^2p (1 − p)]/ C^2, n= sample size, Z= value at 95% confidence interval,p= percentage of population and C =confidence interval.

The survey questionnaire was validated with a pilot testing in 10 HCWs, with revision based on Cronbach alpha value following which, survey responses were obtained from 473 HCWs, out of which only 426 met inclusion criteria, which is 90 % of the total responses.

A cross sectional online survey based on Google forms was conducted from 18 April 2020 to 25th April 2020, among HCWs of Nepal, following ethical approval from Nepal Health Research Council (ERB protocol registration number: 297/2020 P). The survey was done during the period of nationwide lockdown amid concerns of COVID-19 pandemic. The online survey was disseminated via various healthcare related groups in Facebook, Instagram, Viber, WhatsApp and personal messaging via author's personal contacts. The online form included background information of the study and Informed consent at the beginning. On consenting to participate in the survey, further questions related to study objectives could be answered.

The survey questionnaire was developed by the authors based on the then effective recommendations by the CDC, WHO, and Ministry of Health and Population, Nepal. Advice and constructive criticism was taken from the experts in the field during the development of the questionnaire. Internal consistency of the questionnaire was ensured with a pilot testing in 10 HCWs, with revision based on Cronbach alpha value.

The first section dealt with Informed consent, demographic variables (Age/Sex/Profession) and screening question for exclusion.

The second section consisted of 7 questions which dealt with knowledge on COVID-19, its prevention and diagnosis. This section was scored based on the number of questions answered correctly. Questions were named K1-K7. K1, K3, K5 to K7 were single best response type and each correct answer scored 1 point. K2 and K4 were multiple response where selection of all correct options and no wrong options awarded 1 point. A blank or incorrect answer was awarded 0 points. Thus the highest possible score was 7 whereas lowest possible score was zero. This section was pretested and cronbachs alpha was calculated to be 74.3% on pretesting hence ensuring an acceptable level of internal consistency.

The third section dealt with attitudes towards COVID-19 pandemic and included 5 questions which were labeled A1 through A5. They dealt with institutional preparedness, pandemic control and healthcare worker's confidence in the present health system. Questions A2, A3 and A4 also included options on current employment status. If the participant answered "I am not currently employed" to any one of these questions; answers to A2,3,4 were automatically changed to "I am not currently employed" and s/he was not directed to the fourth section.

The fourth section consisted of 3 questions named P1 to P3 which dealt with self-reported clinical practices in clinical setting of workplace. Since this section was only applicable to currently employed participants, any participant who chose "I am not currently employed" in A2-4 were not directed to this section.

Upon receiving the filled survey questionnaire, information was entered in SPSS version 26, (year 2019). The frequencies of demographic variables, Knowledge scores, attitudes and practices were described along with relevant descriptive statistics. The knowledge scores between different demographic variables were compared using T- Test and ANOVA as appropriate.

RESULTS

A total of 473 participants filled the survey questionnaire. 47 participants were excluded from the study, because of not meeting inclusion criteria. The excluded responses either were in contact with a COVID-19 case, or were from professions other than HCWs. Responses from non-residents of Nepal were also excluded as the data collected from these respondents would not reflect knowledge, attitude and practices in Nepali context.

Hence the final number of responses used for our analysis consisted of 426 participants. Among these participants 298(70%) were female, 378(88.7%) were from the age group 18-30years and 182(42.7%) were medical officers. Mean knowledge score was 3.20± 1.15. Other demographic details are available in table 1.

The mean knowledge score was 3.20 with a standard deviation of 1.15. This amounts to a percentage score of 45.7%. The scores significantly differed among all demographic variables of sex, profession and age group. Males scored significantly more than females (P<0.001). Among professions, consultants doctors scored highest whereas registered nurse and dentists scored lowest (P<0.05). Furthermore, it was found that participants

aged above 50 scored significantly higher whereas those aged 18-30 scored lowest (P>0.001). (See table 1) Scores on individual question are presented on figure 1.
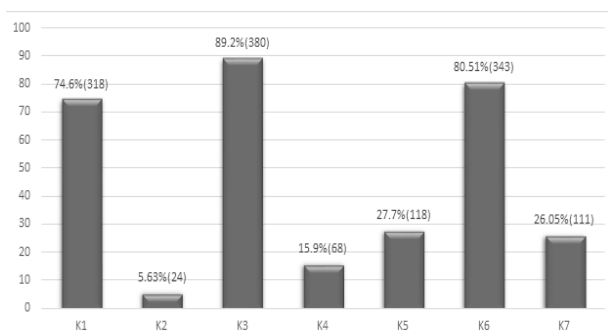

Figure 1. Knowledge Section: Percentage of Correct Answers.

K1: Envelope and genetic material of SARS COV, K2: Risk factors for severe disease and high mortality, K3: Preferred method of hand hygiene, K4: When to use N95 mask, K5: Recommended formulation of Handrub, K6: Diagnostic modality of choice, K7: Common clinical features at symptom onset

In the attitude section, 70.4 % (300) participants felt that Nepal will be unable to contain the pandemic if a widespread outbreak occurs, 63.7 % (170) of the total employed participants thought that their institution do not have adequate measures to protect healthcare workers from COVID19. Only 10% (27) employed participants planned to quit the job or apply for a leave if widespread COVID19 pandemic occurred in Nepal. Furthermore, 96% (258) of the total employed participants were concerned that they would carry the infection from hospital to household and family members. A total of 71.8% (306) participants believed that fever clinics were effective triage tool for COVID 19. Further details on categorical descriptions are presented in Table 2 and 3.

91% (243) employed participants reported washing hands after every patient encounter. Whereas 42% of them reported that they checked seal of N95 masks before every use and 31.7% (77) participants reported not knowing how to check the seal. 49.4% (132) employed participants reported always following proper guidelines while putting on (donning) and taking off (doffing) personal protective equipments, whereas 22.1%(59) participants were unaware of any specific guidelines on this matter. Further categorical distribution of the data is presented in table 4 and 5.

Table 1. Knowledge and Demography.

		Percentage	Mean± SD	T(or F) statistic	Degree of freedom	P value
Sex	Female	70%(298)	3.0±1.13	-5.683	424	<0.001
	Male	30%(128)	3.7±1.07			
Profession	Consultant Doctor	5.9%(25)	4.0±1.04	17.911	2	<0.05
	Dentist	5.4%(23)	3.1±1.20			
	Intern Doctor	8%(34)	3.1±1.20			
	Medical Officer	42.7%(182)	3.6±1.00			
	Registered Nurse	35.2%(150)	2.6±1.05			
	Resident Doctor	2.8%(12)	3.5±1.00			
Age group	18 to 30	88.7%(378)	3.1±1.14	5.834	5	<0.001
	30 to 50	10.6%(45)	3.6±1.11			
	above 50	0.7%(3)	4.7±0.58			

Table 2. Attitudes (Part 1).

	A1			A2			
	Containment of outbreak			Effective institutional measures			
	I do not know	No	Yes	I am not currently employed	I do not Know	No	Yes
AGE							
18 to 30	19.0%(72)	70.1%(265)	10.8%(41)	39.9%(151)	5.3%(20)	39.2%(14)	15.6%(59)
30 to 50	13.3%(6)	73.3%(33)	13.3%(6)	17.8%(8)	6.7%(3)	44.4%(20)	31.1%(14)
Above 50	33.3%(1)	66.7%(2)	0.00%	0.00%	0.00%	66.7%(2)	33.3%(1)
SEX							
Female	20.1%(60)	67.8%(202)	12.1%(36)	39.3%(117)	5.7%(17)	37.9%(113)	17.1%(51)

Male	14.8%(19)	76.6%(98)	8.6%(11)	32.8%(42)	4.7%(6)	44.5%(57)	18.0%(23)
PROFESSION							
Consultant doctor	12.0%(3)	80.0%(20)	8.0%(2)	0.00%	8.0%(2)	52.0%(13)	40.0%(10)
Dentist	17.4%(4)	65.2%(15)	17.4%(4)	60.9%(14)	8.7%(2)	17.4%(4)	13.0%(3)
Intern Doctor	14.7%(5)	73.5%(25)	11.8%(4)	35.3%(12)	8.8%(3)	47.1%(16)	8.8%(3)
Medical Officer	15.4%(28)	79.1%(114)	5.5%(10)	44.5%(81)	3.3%(6)	39.0%(71)	13.2%(24)
Registered Nurse	23.3%(35)	58.7%(88)	18.0%(27)	34.0%(51)	6.7%(10)	38.7%(58)	20.7%(31)
Resident Doctor	33.3%(4)	66.7%(8)	0.00%	8.3%(1)	0.00%	66.7%(8)	25.0%(3)

Table 3. Attitudes (Part 2).

	A3			A4			A5		
	Plan on quitting job or applying for leave			Concern on carrying infection to household			Effectiveness of fever clinic		
	I am not currently employed	no	yes	I am currently not employed	No	Yes	I do not know	no	yes
AGE									
18 to 30	39.9%(151)	53.4%(202)	6.6%(25)	39.90%(151)	2.10%(8)	57.90%(219)	7.7%(29)	20.6%(78)	71.7%(271)
30 to 50	17.8%(8)	77.8%(35)	4.4%(2)	17.80%(8)	2.20%(1)	80.00%(36)	4.4%(2)	22.2%(10)	73.3%(33)
Above 50	0.00%	100.0%(3)	0.00%	0.00%	0.00%	100.00%(3)	0.00%	33.3%(1)	66.7%(2)
SEX									
Female	39.30%(117)	54.70%(163)	6.00%(18)	39.3%(117)	2.0%(6)	58.7%(175)	8.1%(24)	17.1%(51)	74.8%(223)
Male	32.80%(42)	60.20%(77)	7.00%(9)	32.8%(42)	2.3%(3)	64.8%(83)	5.5%(7)	29.7%(38)	64.8%(83)
PROFESSION									
Consultant doctor	0.00%	100.0%(25)	0.00%	0.00%	4.0%(1)	96.0%(24)	4.00%(1)	28.00%(7)	68.00%(17)
Dentist	60.9%(14)	26.1%(6)	13.0%(3)	60.9%(14)	0.00%	39.1%(9)	4.30%(1)	13.00%(3)	82.60%(19)
Intern Doctor	35.3%(12)	58.8%(20)	5.9%(2)	35.3%(12)	2.9%(1)	61.8%(21)	2.90%(1)	14.70%(5)	82.40%(28)
Medical Officer	44.5%(81)	49.5%(90)	6.0%(11)	44.5%(81)	0.5%(1)	54.9%(100)	8.20%(15)	25.30%(46)	66.50%(121)
Registered Nurse	34.0%(51)	60.0%(90)	6.0%(9)	34.0%(51)	3.3%(5)	62.7%(94)	8.70%(13)	16.70%(25)	74.70%(112)
Resident Doctor	8.3%(1)	75.0%(9)	16.7%(2)	8.3%(1)	8.3%(1)	83.3%(10)	0.00%	25.00%(1)	75.00%(9)

Table 4. Practice (part 1).

	P1			P2			
	Hand hygiene after patient encounter			Seal check in N95 masks			
	No	Sometimes	Yes	Always	I do not know how to seal check	Never	Sometimes
AGE							
18 to 30	2.6%(6)	5.3%(12)	92.1%(209)	39.6%(90)	30.4%(69)	5.7%(13)	24.2%(55)
30 to 50	10.8%(4)	5.4%(2)	83.8%(31)	56.8%(21)	21.6%(8)	5.4%(2)	16.2%(6)
Above 50	0.0%(0)	0.0%(0)	100.0%(3)	66.7%(2)	0.0%(0)	0.0%(0)	33.3%(1)

SEX							
Female	2.8%(5)	4.4%(8)	92.8%(168)	44.2%(80)	32.0%(58)	4.4%(8)	19.3%(35)
Male	5.8%(5)	7.0%(6)	87.2%(75)	38.4%(33)	22.1%(19)	8.1%(7)	31.4%(27)
PROFESSION							
Consultant doctor	4.0%(1)	4.0%(1)	92.0%(23)	52.0%(13)	20.0%(5)	8.0%(2)	20.0%(5)
Dentist	0.0%(0)	0.0%(0)	100.0%(9)	33.3%(3)	33.3%(3)	0.0%(0)	33.3%(3)
Intern Doctor	9.1%(2)	13.6%(3)	77.3%(17)	31.8%(7)	36.4%(8)	9.1%(2)	22.7%(5)
Medical Officer	2.0%(2)	5.9%(6)	92.1%(93)	34.7%(35)	24.8%(25)	8.9%(9)	31.7%(32)
Registered Nurse	3.0%(3)	3.0%(3)	93.9%(93)	48.5%(48)	33.3%(33)	2.0%(2)	16.2%(16)
Resident Doctor	18.2%(2)	9.1%(1)	72.7%(8)	63.6%(7)	27.3%(3)	0.0%(0)	9.1%(1)

Table 5. Practice (Part 2)

	P3			
	Donning and doffing PPE			
	Always	I am not familiar with any guidelines in this matter	Never	Sometimes
AGE				
18 to 30	49.3%(112)	21.6%(49)	4.0%(9)	25.1%(57)
30 to 50	48.6%(18)	24.3%(9)	5.4%(2)	21.6%(8)
Above 50	66.7%(2)	33.3%(1)	0.0%(0)	0.0%(0)
SEX				
Female	51.4%(93)	20.4%(37)	3.3%(6)	24.9%(45)
Male	45.3%(39)	25.6%(22)	5.8%(5)	23.3%(20)
PROFESSION				
Consultant doctor	64.0%(16)	16.0%(4)	8.0%(2)	12.0%(3)
Dentist	66.7%(6)	11.1%(1)	0.0%(0)	22.2%(2)
Intern Doctor	40.9%(9)	40.9%(9)	4.5%(1)	13.6%(3)
Medical Officer	36.6%(37)	22.8%(23)	6.9%(7)	33.7%(34)
Registered Nurse	58.6%(58)	18.2%(18)	1.0%(1)	22.2%(22)
Resident Doctor	54.5%(6)	36.4%(4)	0.0%(0)	9.1%(1)

DISCUSSION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the cause of a rapidly spreading illness, Coronavirus Disease 2019 (COVID-19), having cascading effect worldwide, since its initial outbreak in China in December 2019. In Nepal, as of 7th June 2020, there has been 3448 confirmed cases of COVID-19.[6] HCWs are the frontline workers in the management of suspected and potential cases of the COVID-19. Their knowledge, attitude and practice will likely have an important bearing on the course and containment of the pandemic. In this study the mean knowledge score for the 7 questions in the questionnaire was 3.20 with a standard deviation of 1.15, this amounts to a percentage score of 45.7%. Since other studies do not use the same questionnaire in similar/same settings as the current one, a comparison was not possible. CDC recommends washing hands often with soap and water for at least 20 seconds or use of hand sanitizer that contains at least 60% alcohol.[7] Awareness regarding recommended time for washing hands and knowledge regarding the viral morphology was high among the study participants. According to "Interim Clinical Guidance For Care of Patients with COVID-19 in Healthcare Settings" preferred method for diagnosis of COVID-19 is Reverse Transcription Polymerase Chain Reaction (RT-PCR).[8] The study findings showed that 80.5% knew the preferred method for diagnosis of SARS-CoV-2.

For healthcare workers performing aerosol generating procedures on patients with potential COVID-19, use of fitted respirator masks like N-95 is recommended.[9] In current survey, we found that only 15.9% participants were aware about the indications for using N-95 masks.

Established and possible epidemiologic risk factors for severe COVID-19 are age >65 years, pre-existing pulmonary disease, chronic kidney disease, diabetes

mellitus, history of hypertension, obesity (BMI ≥30), use of biologic immuno-modulators, history of transplant or other immunosuppression, HIV, and CD4 cell count <200 cells/microL or unknown CD4 count.[10-14] Current survey found that only 5.63% of the HCW's were able to pick all the implicated risk factors for severe disease and high mortality from a given list, which is an alarming situation for prevention and containing untoward transmission of the infection.

The most common clinical features at the onset of COVID-19 illness are fever, fatigue, dry cough, anorexia, myalgia, dyspnea, and sputum production. Rhinorrhea, however has been described as an uncommon presenting symptom.[12,15] Only 26% participants were able to correctly pick common and uncommon sign and presenting symptoms at the onset of the disease, which is another barrier for timely and accurate identification of suspected cases for further diagnostics and case management.

There were significant differences in score between different genders and professions, the difference in gender was because a large proportion of females were registered nurses who consistently scored low (P<0.001). Consultants have scored the highest followed by resident doctors. The difference in scores seems to reflect their level of education and practice. Although it is good that the treating doctors are aware of prevention and control of the disease, the poor level of understanding on prevention and control by the nurses who are more close to the possible patients may lead to higher risk of disease transmission at/from health care settings. This may indicate high vulnerability of health care set ups. There was also a statistically significant difference in scores between age groups; however, it has limitation of having only 3 participants who were above 50 years old, with higher degrees, knowledge and experiences.

In the attitude section; most participants felt that Nepal may not be able to contain the pandemic if a widespread outbreak occurs.

Among the employed participants, 63.7 % of them thought that their institution had not implemented adequate measures to protect HCWs from COVID-19. Almost 2/3 of these respondents were not confident of the existing health system capacity in protecting them from the infectious agent transmission, this maybe be related to availability of appropriate Personal Protective Equipment's in different working stations, training/ refreshers for the HCW's on IPC etc, which requires interventions including logistics supply and refresher training/orientation to HCWs.

Very small percentage (10%) of employed participants

planned to quit the job or apply for a leave if widespread COVID19 pandemic occurs in Nepal, which shows higher commitment of HCW's towards their job roles. This is contrary to the concerns in the international setup where healthcare workers are looking forward to quitting their jobs amid safety concerns due to poor infection control and personal protective measures.[16]Almost all participants were concerned that they may carry the infection from hospital to household and family members. This is may be due to limit in their knowledge and practice on universal precaution for prevention and control of the infection.

Healthcare workers should perform appropriate hand hygiene, either with an alchohol based hand rub or soap and water, whichever is easily available and accessible near the work station before and after all patient contact, contact with potentially infectious material, and before putting on and after removing PPE, including gloves.[17,18] Both awareness (89.2%)as well as self-reported practice(91%) regarding hand hygiene was noted to be high among the study participants.

As per WHO recommendations ensuring that N95 particulate filter respirators are providing the intended level of protection, requires that user check the seal of the N-95 masks, including both positive and negative pressures to be conducted each and every time they are worn.[18] Knowledge regarding the use of N95 mask as well as proper practice regarding its use were low. Only 42% of participants reported checking the seal of N95 mask before every use and 22.1% participants did not know how to check the seal.

The guidelines on proper donning and doffing have been endorsed by Center for disease control (CDC), WHO and by Nepal Medical Council in collaboration with MoHP.[9,10,19] Coronavirus Disease 2019 (COVID-19 Approximately half (49.4%) of the employed participants reported always following proper guidelines(by WHO,CDC or MoHP) while putting on and taking off personal protective equipment whereas 22.1% participants were unaware of any specific guidelines on this matter.

Our study has some notable limitations: First, as those without internet access could not take part in survey and were also not updated regarding recent guideline for prevention from COVID-19. Majority of the participants were from junior doctors and nursing staffs. There was also relatively low number of participation of consultants and resident doctors. Furthermore, since the attitudes are based on the healthcare workers' knowledge and availability of specialized logistics like PPE for maintaining the appropriate biosafety along with their perception of the healthcare system, their understanding of institutional preparedness are solely

based on their own observation and perceptions.

The current study aimed to explore the ground reality on knowledge, attitude and practice of HCWs in Nepal towards coronavirus disease 2019 (COVID-19) pandemic, so that the KAP findings could be useful for the understanding the gaps and further quick/ short term and mid-term improvements useful for prevention of HCW's from COVID-19 transmission. We felt that educating HCW's regarding COVID-19 is needed via various platforms like online module, National Guideline/Protocol handbooks, institutional training and discussions. HCW's confidence on existing health-system on appropriate and timely containment of the pandemic so improving the trust/confidence and relation between government policy makers, hospital administration and healthcare workers, is of paramount importance. Many HCW's are still unaware on the proper use of personal protective equipment, to improve this simulation programs and demonstration modules regarding use of personal protective equipment must be done in healthcare facilities at institutional levels at the earliest.[19]

CONCLUSIONS

Proper knowledge, attitude and practices regarding universal precautions and sound understanding on SARS-CoV2 transmission is of paramount importance for healthcare workers, for prevention and control of the global COVID-19 pandemic. Almost half of the HCW's (45.7%) in the study seem unaware of universal precautions needed to prevent themselves form COVID-19. Although, most participants reported good practices regarding hand hygiene, a significant number of them were not well versed with PPE use, particularly donning and doffing of the PPE's, with chances of exposing themselves to infection. Urgent virtual & onsite orientation of HCW's on universal precautions, supply of PPE's, guidelines and administration's backup may bring more confidence to HCWs in the country and would be helpful in good health care service to the needy COVID-19 patients and able to contain the possible untoward transmission.

ACKNOWLEDGEMENTS

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