Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Short report

Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: a cross-sectional survey from Pakistan

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SUMMARY

A self-administered validated (Cronbach's alpha=0.077) questionnaire was used to assess knowledge, attitude and practice among healthcare workers (HCWs) in Pakistan regarding coronavirus disease 2019 (COVID-19). Findings showed that HCWs have good knowledge (93.2%, *N*=386), a positive attitude [mean 8.43 (standard deviation 1.78)] and good practice (88.7%, *N*=367) regarding COVID-19. HCWs perceived that limited infection control material (50.7%, *N*=210) and poor knowledge regarding transmission (40.6%, *N*=168) were the major barriers to infection control. Regression analysis indicated that pharmacists were more likely to demonstrate good practice than other HCWs (odds ratio 2.247, 95% confidence interval 1.11–4.55, *P*=0.025). This study found that HCWs in Pakistan have good knowledge, but there are gaps in specific aspects of knowledge and practice that warrant attention.

Introduction

On 31st December 2019, cases of pneumonia of unknown cause in Wuhan, China were reported to the World Health Organization (WHO) [1]. The pathogen identified was severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) [1]. WHO declared coronavirus disease 2019 (COVID-19) a global pandemic on 11th March 2020 [2]. At the time of writing (12th April 2020), SARS-CoV-2 had spread to 210 countries and territories, and accounted for 1,790,550 confirmed cases of COVID-19 and 109,654 deaths [3].

In Pakistan, the first case of COVID-19 was reported on 26th February 2020. As of 12th April 2020, Pakistan had 5038 confirmed cases of COVID-19 and 86 deaths. Punjab has

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experienced the highest number of cases (*N*=2425), followed by Sindh (*N*=1318), Khyber Pakhtunkhwa (*N*=696), Baluchistan (*N*=228), Gilgit Baltistan (*N*=216), Islamabad (*N*=119) and Azad Jammu Kashmir (*N*=35) [4].

Healthcare workers (HCWs) of all levels and groups are involved in caring for patients with this highly transmittable pathogen. COVID-19 has posed serious occupational health risks to HCWs due to their frequent exposure to infected individuals [5]. The literature suggests that lack of knowledge and misunderstandings among HCWs lead to delayed diagnosis, spread of disease and poor infection control practice. Several thousand HCWs have already been infected, mainly in China [5]. Preventing intrahospital transmission of this communicable disease is therefore a priority.

Amidst the current pandemic, WHO has issued several guidelines, and started online courses and training sessions to raise awareness and preparedness regarding prevention and control of COVID-19 among HCWs [6]. A knowledge, attitude and practice survey is a suitable way to evaluate existing programmes and to identify effective strategies for behavioural change in society. Currently, there is scarce information regarding the level of awareness of HCWs in Pakistan.

As such, this study aimed to identify the current status of knowledge, attitude and practice regarding COVID-19 among HCWs in Pakistan. In addition, this study highlighted the information sources utilized and barriers to infection control perceived by HCWs.

Methods

Study design, participants and sample size calculation

A multi-centric cross-sectional survey-based study was conducted in March 2020 during a period of strict lockdown to implement social distancing in order to avoid the spread of COVID-19. As it was not feasible to conduct a population-based survey at this time, the investigators used an online method of data collection. The sample size calculated by Raosoft was 377, assuming a response rate of 50%, 95% confidence interval (CI), Z of 1.96, and margin of error of 5%. A further 10% (*N*=37) was added to counteract any errors in completing the questionnaires, resulting in a final sample size of 414. The survey commenced on 25th March 2020, and the required sample size was achieved on 5th April 2020.

HCWs, including doctors, pharmacists and nurses, from all healthcare facilities in Punjab were eligible for participation in this survey. A questionnaire was designed on Google forms, and a link was shared to WhatsApp groups of HCWs. The link was also shared personally to HCWs in the contact lists of the investigators. Respondents from other provinces were eligible to participate if they were willing to complete the questionnaire.

Measures

A survey instrument was designed based on guidelines, reports, and course material regarding emerging respiratory diseases including COVID-19 by WHO [7]. An initial draft of the questionnaire was designed, and subsequently validated in two steps. Firstly, the study instrument was sent to researchers and professionals from medical backgrounds (pharmacists and doctors) to give their expert opinion with respect to its simplicity, relativity and importance. Secondly, a pilot study was conducted by asking a small sample of HCWs (*N*=40) for their opinions on making the questionnaire simpler and shorter. Participants from all healthcare professions were selected for the pilot study. Reliability was calculated using SPSS Version 20 (IBM Corp., Armonk, NY, USA), and Cronbach's alpha was 0.77. The data from the pilot study were not used in the final analysis.

The questionnaire consisted of questions assessing demographics; information source; knowledge, attitude and practice towards COVID-19; and perceived barriers to infection control (see online supplementary material). Demographic characteristics included were gender, age, profession and experience, and one item regarding source of information about COVID-19.

The knowledge section had 14 items and each question was answered 'yes', 'no' or 'I don't know'. Correct answers scored 1 and incorrect answers scored 0. The attitude section had seven items, and responses were recorded on a five-point Likert scale (1, strongly agree; 2, agree; 3, undecided; 4, disagree; 5, strongly disagree). The practice section had six items and each item was answered 'yes' (1 point), 'no' (0 points) or 'sometimes' (0 points).

Seven items assessed the perception of HCWs regarding barriers to infection control. Responses were recorded on a five-point Likert scale (strongly agree, agree, undecided, disagree, strongly disagree). Responses are presented as frequencies and percentages.

Ethics

This study was performed in accordance with the Declaration of Helsinki. Due to lockdown, universities were closed so the study protocol was approved by the Hospital Board (756/THQ/HR). The study questionnaire contained a consent section that stated the purpose of the study, nature of the survey, study objectives, voluntary participation, declaration of confidentiality and anonymity.

Statistical analysis

Descriptive and inferential statistics were applied using SPSS Version 21 (IBM Corp.). Chi-squared test, independent sample *t*-test and one-way analysis of variance were used to compare differences in knowledge, attitude and practice of HCWs by demographic characteristics. Pearson's rank correlation test was used to identify any correlation between knowledge, attitude and practice. A binary logistic regression analysis was applied to identify possible determinants of good knowledge and practice, with results expressed as odds ratio (OR) and 95% CI. $P<0.05$ was considered to indicate significance in all tests.

Results and discussion

In total, 414 respondents were included in the final analysis: 29.98% (*N*=120) were doctors, 46.65% (*N*=189) were pharmacists and 25.36% (*N*=105) were nurses (Table I).

For HCWs, good knowledge, a positive attitude and good practice regarding precautionary measures such as wearing gloves, protective clothing, goggles and a facemask are imperative to deal with infected patients with minimum risk.

Table I
Differences in knowledge, attitude and practice of healthcare workers by demographics (N=414)

Characteristics	Total	Knowledge[a]			Attitude[b]			Practice[c]		
	N (%)	Poor	Good	χ^2 (*P*)	Mean	SD	*t*/*F* (*P*)	Poor	Good	χ^2 (*P*)
Overall		28 (6.8)	386 (93.2)		8.43	1.78		47 (11.3)	367 (88.7)	
Gender				0.699 (0.403)			0.269 (0.788)			0.286 (0.592)
Male	209 (50.5)	12 (5.7)	197 (94.3)		8.41	1.77		22 (10.5)	187 (89.5)	
Female	205 (49.5)	16 (7.8)	189 (92.2)		8.46	1.79		25 (12.2)	180 (87.8)	
Age (years)				9.836 (**0.020**)			0.198 (0.699)			0.295 (0.957)
<30	310 (74.9)	26 (8.4)	284 (91.6)		8.44	1.73		36 (11.6)	274 (88.4)	
31–39	69 (16.7)	5 (7.2)	64 (92.8)		9.43	2.07		8 (11.6)	61 (88.4)	
40–49	23 (5.6)	1 (4.5)	22 (95.5)		8.26	1.51		2 (8.7)	21 (91.3)	
≥50	12 (2.9)	2 (16.7)	10 (93.2)		8.16	1.65		1 (8.3)	11 (91.7)	
Experience (years)				3.059 (0.281)			1.347 (0.259)			9.827 (**0.012**)
<1	110 (26.6)	6 (5.5)	104 (94.5)		8.78	1.99		19 (17.3)	91 (82.7)	
1–3	131 (31.6)	12 (9.2)	119 (90.8)		8.53	1.81		16 (12.2)	115 (87.8)	
3–5	56 (13.5)	5 (8.9)	51 (91.1)		8.34	1.69		7 (12.5)	49 (87.5)	
>5	117 (28.3)	5 (4.3)	112 (95.7)		8.25	1.68		5 (4.3)	112 (95.7)	
Profession				1.920 (0.383)			1.030 (0.358)			4.802 (0.091)
Doctor	120 (29.98)	8 (6.7)	112 (93.3)		8.41	1.78		6 (5.7)	114 (94.3)	
Pharmacist	189 (46.55)	10 (5.3)	179 (94.7)		8.43	1.71		18 (9.5)	171 (90.5)	
Nurse	198 (25.37)	10 (6.8)	95 (90.5)		8.64	1.88		9 (8.6)	96 (91.4)	

COVID-19, coronavirus disease 2019; SD, standard deviation.
P<0.05 was considered to indicate significance. Bold values show significant differences.
[a] Total score ranged from 0 to 14. A score of ≤10 was set for poor knowledge and ≥11 for good knowledge regarding COVID-19.
[b] Total score ranged from 7 to 35. An overall lower mean score indicates a positive attitude towards COVID-19.
[c] Total score ranged from 0 to 6. A score of 1–4 indicates poor practice regarding COVID-19.

The ongoing pandemic nature of the disease made it necessary for HCWs to adopt increased precautions in accordance with the critical situation, and to put effort into implementing appropriate hygienic conditions and follow recommendations [6,8].

The survey found that the majority of HCWs have good knowledge (93.2%, *N*=386), a positive attitude (mean 8.43) and good practice (88.7%, *N*=367) towards COVID-19 (Table I). Of note, 87.68% (*N*=363) of HCWs used social media as their main source of information, followed by radio and television (45.89%, *N*=190) and seniors/other colleagues (42.51%, *N*=176) (Figure S1, see online supplementary material). These findings are consistent with other studies [6,8] which reported that the majority of HCWs use social media to seek information on COVID-19 [6]. HCWs should consult reliable sources, such as guidelines and reports published by WHO and the US Centers for Disease Control and Prevention (CDC), to seek information regarding COVID-19. This is important as in this global pandemic, there is also a pandemic of misinformation regarding COVID-19; a serious concern might lead to xenophobia in the world, and warnings have been made by scientists and WHO officials [6].

The current finding of good knowledge (93.2%, *N*=386) among HCWs is in agreement with the findings of Giao et al. who reported that 88.4% participants, had sufficient knowledge regarding COVID-19 [8]. Another study reported that only 56.5% of respondents had sufficient knowledge regarding transmission, symptoms and treatment of COVID-19 [9]. The current findings provide confidence in terms of the knowledge of HCWs regarding the symptoms, transmission and preventive measures of COVID-19. This is of particular significance in the current scenario when no vaccine exists and research is ongoing, so HCWs must be aware of all the updates and take precautions in treating and preventing the infection.

Interestingly, when questions were asked regarding at-risk groups, testing and protectiveness of the influenza vaccine against COVID-19, 21.01%, 23.91% and 23.19% respondents, respectively, were unable to identify the correct response (Figure S2, see online supplementary material). Despite the provision of easily accessible sources by both national National Institute of Health (NIH), Pakistan and international (WHO) healthcare authorities, these findings have shown a knowledge gap among HCWs [6].

Interestingly, Chi-squared analysis revealed that pharmacists (94.7%, *N*=179) had greater knowledge than doctors (93.3%, *N*=112) and nurses (90.5%, *N*=95), but the difference was not significant (*P*=0.383) (Table I). In contrast, Bhagavathula *et al.* found that doctors had greater knowledge than pharmacists [6]. This could be due to disparities of knowledge among HCWs. Both doctors and pharmacists are actively involved in seeking information due to their active roles in improving treatment outcomes of patients with COVID-19.

The survey identified a highly positive attitude (mean 8.43) among HCWs towards COVID-19. A possible explanation is that good knowledge about COVID-19 among HCWs might lead to a positive attitude. This is augmented by a positive linear correlation found between knowledge and attitude in this study. Giao *et al.* and Bhagavathula *et al.* reported that the majority of HCWs have a positive attitude towards COVID-19 [6,8]. Interestingly, attitude did not differ significantly (*P*>0.05) with age, gender, experience or profession. Giao *et al.* also found that attitude regarding COVID-19 was not associated with age (*P*=0.151), gender (*P*=0.129) and experience (*P*=0.453), but found a significant association between attitude and profession [8].

Table II
Logistic regression analysis for factors associated with good knowledge and practice regarding coronavirus disease 2019 (COVID-19) (*N*=414)

Characteristics	Knowledge[a]				Practice[b]			
	Poor	Good	OR	*P*	Poor	Good	OR	*P*
Overall	*N* (%)	*N* (%)	95% CI		*N* (%)	*N* (%)	95% CI	
Gender								
Male	12 (5.7)	197 (94.3)	1.00	-	22 (10.5)	187 (89.5)	1.00	-
Female	16 (7.8)	189 (92.2)	0.696 (0.301–1.608)	0.396	25 (12.2)	180 (87.8)	0.977 (0.51–1.89)	0.445
Age (years)								
<30	26 (8.4)	284 (91.6)	1.00	–	36 (11.6)	274 (88.4)	1.00	–
31–39	5 (7.2)	64 (92.8)	1.398 (0.06–2.63)	0.089	8 (11.6)	61 (88.4)	1.377 (0.14–2.04)	**0.05**
40–49	1 (4.5)	22 (95.5)	1.419 (0.14–4.78)	**0.041**	2 (8.7)	21 (91.3)	1.406 (0.07–2.93)	0.313
≥50	2 (16.7)	10 (93.2)	1.497 (0.17–4.18)	**0.038**	1 (8.3)	11 (91.7)	1.444 (0.04–4.73)	0.501
Experience (years)								
<1	6 (5.5)	104 (94.5)	1.00	–	19 (17.3)	91 (82.7)	1.00	–
1–3	12 (9.2)	119 (90.8)	1.555 (1.19–2.54)	0.260	16 (12.2)	115 (87.8)	1.453 (0.69–3.03)	0.319
3–5	5 (8.9)	51 (91.1)	1.619 (1.26–2.84)	0.190	7 (12.5)	49 (87.5)	2.11 (0.73–6.11)	0.169
>5	5 (4.3)	112 (95.7)	1.999 (1.29–4.81)	0.481	5 (4.3)	112 (95.7)	10.71 (2.8–40.75)	**<0.001**
Profession								
Doctor	8 (6.7)	112 (93.3)	1.00	–	6 (5.7)	114 (94.3)	1.00	–
Pharmacist	10 (5.3)	179 (94.7)	1.44 (0.54–3.87)	0.461	18 (9.5)	171 (90.5)	2.247 (1.11–4.55)	**0.025**
Nurse	10 (6.8)	95 (90.5)	0.616 (0.21–1.78)	0.369	9 (8.6)	96 (91.4)	1.178 (0.48–2.90)	0.724

OR, odds ratio, CI, confidence interval.
P<0.05 was considered to indicate significance. Bold values show significant differences.
[a] Total score ranged from 0 to 14. A score of ≤10 was set for poor knowledge and ≥11 for good knowledge regarding COVID-19.
[b] Total score ranged from 0 to 6. A score of 1–4 indicates poor practice regarding COVID-19.

Of 414 participants, 88.7% (n=367) reported good practice (score=5–6) in terms of following precautions to avoid COVID-19 (Table I). The survey found that pharmacists were more likely to show good practice compared with other HCWs (OR 2.247, 95% CI 1.11–4.55, P=0.025) (Table II). A possible explanation is that pharmacy is an emerging profession in developing countries such as Pakistan, and pharmacists are actively involved in educational and training activities to seek knowledge and develop competence for involvement in clinical decision-making with other HCWs. Logistic regression revealed that experienced (>5 years) HCWs were more likely to follow precautionary practices (OR 10.71, 95% CI 2.8–40.75, P=0.025), showing that this group had skills and experience of dealing with public health emergencies.

Overcrowding in emergency rooms was perceived as a barrier to infection control by the majority (52.9%, N=219) of HCWs. On the other hand, 31.6% (N=131) and 36.7% (N=152), respectively, of HCWs believed that not wearing a mask and not performing handwashing was not a barrier to infection control (Figure S3, see online supplementary material). These findings are important and should be addressed by the government and policy makers to establish effective policies focusing on the aforementioned barriers to infection control and, ultimately, spread of disease.

Pearson's correlation tests revealed significant positive linear correlations as follows: knowledge–attitude (r=0.106, P=0.030), knowledge–practice (r=0.142, P=0.016) and attitude–practice (r=0.174, P=0.004) (Table S1, see online supplementary material). This correlation may be explained by reasoned action theory. This theory states that a person's intention to undertake a specific behaviour is a function of their attitude towards that behaviour [10]. Future studies should be conducted to understand possible factors that underlie knowledge patterns and attitudes expressed by HCWs.

This study has a number of implicit limitations. Firstly, it was a cross-sectional study conducted during a period of lockdown; as universities were closed, the institutional review board was not approached. Secondly, this was an online survey. Responses were dependent on honesty and were affected by recall ability; as such, they may be subject to recall bias. Potential sample clustering may also have limited the generalizability of the study.

This study found gaps in specific aspects of knowledge and practice that should be focused on in future awareness and educational campaigns. The findings also demonstrated that HCWs were using less authentic sources for information; this should be addressed immediately as it ultimately affects knowledge and is reflected in attitude and practice. The study recommends that health ministeries should provide a comprehensive training programme, targeting all HCWs, to promote all precautionary and preventive measures of COVID-19, to achieve equilibrium in terms of clinical knowledge about COVID-19.

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Conflict of interest statement
None declared.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jhin.2020.05.007.

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