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## Hand Hygiene Practices among Healthcare Professionals based on Theory of Planned Behaviour during Corona Pandemic in Pakistan.

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### Abstract:

**Introduction:** In the time of novel corona virus pandemic, the improper hygiene practices have significantly associated with high incidence rate of this dreadful disease spread. Theory of planned behavior is the best cognitive model to understand healthcare professional's adherence toward hand hygiene practices.

**Objective:** To evaluate the awareness, professional attitude and practices of health care professionals in relation to theory of planned behaviour during COVID-19.

**Methodology:** We studied health care professionals visiting a health care facility. Systematic random sampling method was adapted for data collection with 384 sample size. Awareness, professional attitudes and practices were calculated and using theory of planned behavior, behavioral beliefs, normative beliefs and control beliefs were accessed.

**Results:** In term of awareness and practices more than 70% of professionals were more prospective to follow hygiene of hands. However, using theory of planned behavior 70.1% of healthcare professionals were more into following hand hygiene practices but insisted to be more followed by their seniors and management.

**Conclusion:** During COVID-19 pandemic, behavioral beliefs are strongly responsible to develop adherence toward hygiene, but such compliance is more motivated by peers, disease outbreak and self-efficacy rather than effect of hygiene itself. Awareness through workshops could be helpful to increase likelihood of compliance of hand washing practices.

**Keywords:** Hand hygiene, normative beliefs, behavioral beliefs, control beliefs, COVID-19.

### Introduction:

Infectious diseases are caused by pathogenic agents which are mostly communicable in nature. To avoid such transmission handwashing practices are commonly adapted to avoid spread. Serious disease-causing pathogens are found in healthcare setting that includes *Streptococcus pyogenes*, *Streptococcus pneumoniae*, *Staphylococcus epidermidis*, and Community-Associated Methicillin-Resistant *Staphylococcus*.<sup>1</sup> Hand washing practices are inexpensive and effective to prevent health detrimental diseases. Improving hand hy-

giene among healthcare professionals has become essential to minimize communicable diseases. Hand washing practices are easy to carry out and it can mitigate the occurrence of disease which can ultimately reduce burden on health systems.<sup>2</sup>

World Health Organization (WHO) has developed guidelines for hand hygiene which has basic steps followed by critical movement which helped to improve hand washing practices.<sup>3</sup> Poor hand hygiene is significantly associated with high incidence rate of all infectious diseases. Individuals who do not follow regular

hand washing has been prone to increased incidence of viral illnesses which lead them to be bed ridden. In year 2002, it has estimated that a good hand washing practice have significant role in recovery among healthcare professionals having nosocomial infections, which has estimated as 1.7 million hospital linked infections and 99 thousand demises in a single year.<sup>4</sup> Thus, close environment and low level of hand hygiene is a key contributor toward infectious diseases.

The study conducted in Northeast Ethiopia has shown that more than 65% of health professionals were vigilant of hand hygiene but 43% were truly practicing hand washing which has shown poor practice.<sup>5</sup> Another study has shown that 22% of adults followed proper hand washing which was determined as low.<sup>6</sup> In Bangladesh, cases of diarrheal diseases have reduced by 14-40% due to proper hand washing practices. It has also shown that even 41% of women belonging from rural area have improved hand washing practices which has decreased many faecal coliform bacterial infections.<sup>7</sup> In 2019, a new novel corona virus has emerged which has caused pandemic of COVID-19. It has caused severe acute respiratory syndrome which eventually destruct alveolar region of lungs and patients could not breathe properly which in rare cases can cause fatality.<sup>8</sup> There is still no cure found but public health measures can reduce the risk of disease transmission among general population and frontline healthcare staff. Among public health measures the most important measure has taken by WHO is proper hand washing. Using proper hand washing method, the lipid layer of COVID 19 can be disintegrated as a result whole viral structure can be deteriorated so that infection can be prevented.<sup>9</sup>

Theory of planned behaviour (TPB) is an integrated model to explain practices and perceived behaviour of washing practice of hands. Understanding cognitive factors of washing practices of hands which lead to understand how attitude, subjective norms and perceived control behaviour eventually effects the hand washing practices among common populace.<sup>10</sup> Moreover, after the outbreak of COVID-19, most of healthcare professionals have developed good understanding regarding importance of hand washing practices to prevent disease.<sup>11</sup> The study conducted among nursing students has shown that the students have moderate knowledge, practice good and high positive belief toward hand hygiene practices. It has also shown that seminars and

workshops have improved the rate of perceived control behaviour among healthcare students.<sup>12</sup> Similarly, Australian nurses demonstrated that determinants of hand hygiene practices has improved after two weeks of implementing theory of planned behaviour which has shown positive improvement.<sup>13</sup> The behavioural beliefs were strongly responsible for improving hand washing practices but adherence toward this behaviour was more driven by peer pressure and self-efficiency instead of understanding impact of hand hygiene. A study from Pakistan, conducted in different hospitals of Lahore has shown that, there is satisfactory knowledge and attitude levels were observed in healthcare professionals but level of practice wasn't significantly high among them which shows that they need training and awareness regarding hand washing practices.<sup>14</sup> The government of Pakistan at national level in collaboration with World health organization emphasized on the importance of good hand washing practices in clinical settings with implementation of pilot surveys.<sup>15</sup>

Researcher believed that use of theories of behaviour change for the development of interventional programs could change the outcome of specific behaviour. Furthermore, it has been observed that promoting hand washing practices are bit challenging and outcomes could not be desired in most of cases. Thus, using social cognitive models will help to identify reason behind their potential change in behaviour.

#### **Objective:**

The objective of current study is to evaluate the awareness, professional attitudes and practices of health care professionals in relation to theory of planned behavior during COVID-19.

#### **Methodology:**

The investigation was constructed on the cross-sectional dataset of health care professionals visiting a health care facility in Islamabad. Systematic random sampling method was adapted for data collection which has 50% prevalence so, the confidence Interval taken as 95% and z value is 1.96 and sample size was calculated as 384. Ethical approval taken from institutional review board of Institute of Health and Management Sciences and Begum Iqbal Clinic via letter no IHMS/BIC/03/EC-09 of March 2020. Written and verbal permission was taken from all the contributors. Confidentiality and anonymity of the research participant was maintained. Respondents level of knowledge and professional practices were

evaluated by WHO recommended questionnaire<sup>16</sup> and other factors for Theory of Planned Behaviour was accessed by pre-validated questionnaires which included elements of behavioural beliefs, normative beliefs and control beliefs which helped to determine self-reported adherence towards hand washing practices among healthcare professionals.<sup>17</sup> The questionnaires were administered in English language to the survey participants. Healthcare professionals which have employment  $\geq 20$  hours/week, the one who have working tenure of more than a year, the one who have

worked in pharmacies, ICU, cardiovascular, medical and surgical units were included. However, those healthcare professionals who have work status of travel or contract or float pool were excluded. The statistical data analysis was conducted on SPSS 25.0. Quantitative variables presented as mean and standard deviation while qualitative variables presented as frequency and percentage.



**Results:**

Among all, 29.2% were males and 70.8% were female participants. Most of the participants were between ages of 26 to 35 years old, 44.3% were doctors, 53.9% were nurses and 1.8% was pharmacists and 41.1% were working in medicine department and remaining 57% of the participants were working in surgery department as presented in table 1.

**Table No 1: General Characteristics of healthcare participants: Age, profession and department in Islamabad (n=384)**

Variables		Frequency	%	Mean ±SD
Gender	Male	112	29.2	1.70
	Female	272	70.8	±.455
Age	21-25	16	4.2	4.04
	26-30	82	21.4	±1.93
	31-35	98	25.5	
	36-40	38	9.9	
	41-45	50	13.0	
	46-50	38	9.9	
	51-55	47	12.2	
	56-60	15	3.9	
Profession	Doctor	170	44.3	1.47
	Nurse	207	53.9	±0.53
	Phar- macist	7	1.8	
Department	Medi- cine	158	41.1	1.58
	Surgery	219	57.0	±0.49
	Phar- macy	7	1.82	

**Knowledge level of health professionals**

Knowledge of healthcare regarding hand hygiene shows that 41.1% of participants believed that if their hands were not clean then this could be source of disease spread among their patients. Also, 4.9% believed that the source of disease among patient is due to patient's detrimental health issues. More than 75% of the participants have believed that cleaning hands before touching patients, body fluids exposure and after having any procedure can be beneficial preventing disease transmission. Furthermore, it has estimated that 70.3% believed cleaning their hands after touching their patients, 82.8% believed that immediately after touching their patients and 82.8% believed that after immediate exposure to patients surrounding will help healthcare professionals to prevent disease. In term of soap utilized hand washing or alcohol-used

hand rub, 75% believed that rubbing of hands is more effective, 28.4% do not believed that rubbing can cause dryness in hands and 65.6% believed that 20 seconds are enough to kill germs. Moreover, more than 65% believes that after palpation of abdomen, giving injection, removal of examination gloves and after assembly of patient's bed; proper hand washing with rubbing is essential to avoid disease spread. Also, more than 70% of healthcare professionals believed that wearing jewellery, damaged skin, artificial nails were considered as main source of contamination as presented in table 2.

**Hand hygiene practices among healthcare professionals**

Hand hygiene practices shows that 73.7% follows hand washing all the time, 70.1% believed that there are others things more important as compared to hand washing, 70.6% believed that wearing gloves helps to reduce hand washing practices, 75% believed that they feel frustrated while they skip hand hygiene, 83.9% more likely to ask other health professional to consider hand hygiene and feel guilty to omit hand hygiene practice and 71.1% believed that it is easy to adhere with hand washing practices while they were at their work place; see table 3.

**Professional Attitude of healthcare professionals**

Among all participants, 70% of believes that hand washing is their essential habit; at the same time 67.4% participants confessed that they sometime forget to wash their hands as shown in table 4.

**Healthcare Worker's Beliefs About hand hygiene based on Theory of Planned Behaviour**

Using theory of planned behaviour three major components evaluated includes; behavioural beliefs, normative beliefs and perceived control behaviour. Results shows that 69.8% believes that up to 10% of patients may get healthcare associated infections, 73.7% believes that up to 2% mortality rate among patients was due to health care settings, 87% believes that up to 10 more days will be required for patients to get recovered if he/she gets hospital acquired infections, 85.9% of patients get hospital acquired infections which was severe and 51.6% believed that up to 50% of patients may be prevented from hospital acquired infection provided that healthcare professionals adheres to hand washing practices.

**Table 2: Knowledge level of healthcare professionals regarding hand hygiene in Islamabad (n=384)**

Variables	N	%	P-value	
1	Not properly cleaned hands of health care workers may serve as a source of microbial communication between patients (Yes)	158	41.1	<0.05
2	Microbes from patients are most common cause of health care linked infections (Yes)	19	4.9	
3	<b>Hand hygiene activities that can stop microbial communication to the patients.</b>			<0.05
	Patient examination by touching (yes)	299	77.9	
	Risk of contact with body fluid (yes)	272	70.8	
	Direct patient surroundings contact (no)	98	25.5	
	Instantly before a cleaning or aseptic procedural practice (yes)	334	87.0	
4	<b>Hand Hygiene activities that can stop microbial communication to the health care workers</b>			<0.05
	Patient examination by touching (yes)	270	70.3	
	Risk of contact with body fluid (yes)	318	82.8	
	Direct patient surroundings contact( no)	318	82.8	
	Instantly before a cleaning or aseptic procedural practice (yes)	61	15.9	
5	<b>Alcohol used hand-rub and washing of hand with water and soap</b>			<0.05
	Rubbing of hand is quicker for cleansing of hand than washing (true)	288	75.0	
	Rubbing of hand results in dryness of skin than washing (false)	109	28.4	
	Rubbing of hand is more effective against germs than washing of hands. (false)	91	23.7	
	Washing of hand and rubbing are suggested as sequence performing activity. (false)	95	24.7	
	Standard minimum time for alcohol used hand rubbing is 20 seconds (true)	252	65.6	
6	<b>Recommended method of acquiring hygiene of hands before following situations?</b>			<0.05
	Rubbing beforehand abdomen to be palpated	248	64.6	
	Rubbing beforehand injection to be administered	231	60.2	
	Washing afterwards evacuating a bed pan	62	16.1	
	Rubbing/Washing afterwards removal of examination gloves.	296	77.1	
	Rubbing afterwards assembly of patient bed.	231	60.2	
	Washing afterwards observable blood exposure	61	15.9	
7	<b>Avoided measures to prevent probability of microbial colonization on hands</b>			<0.05
	Use of jewellery in hands (Yes)	276	71.9	
	Working with skin damage on hand (Yes)	276	71.9	
	Fingers with artificial nails (Yes)	294	76.6	
	Daily hand cream users (No)	88	22.9	

**Table 3: Hand hygiene practices among healthcare professionals in Islamabad (n=384)**

Questions (answers as yes)	N	%	P-value	
8	Compliance to practice every time	283	73.7	<0.05
9	Occasionally other things are more important than hand hygiene	269	70.1	
10	Hygiene practice become difficult in emergency cases and additional priorities	271	70.6	
11	The requirement of cleaning hands is reduced by using gloves	288	75.0	
12	I am upset when observe other neglecting hand hygiene	293	76.3	
13	I feel hesitant to encourage others for hand hygiene.	322	83.9	
14	I feel embarrassed when neglect hand hygiene	313	81.5	
15	Compliance to practice is easier in my hospital settings	273	71.1	

**Table 4: Correct responses to hand hygiene practices of healthcare professionals in Islamabad (n=384)**

Questions (answers as yes)	N	%	P-value
16 Hand hygiene not practiced by me sometimes because I did not remember.	259	67.4	<0.05
17 Hand hygiene is an important part of my duty as professional	277	72.1	
18 Hand hygiene compliance frequency makes it problematic to carry it out as habitually as required	277	72.1	
19 Infection prevention program have a positive inspiration on my practices	285	74.2	
20 Infection prevention awareness material work as reminder for hygiene practice	271	70.6	
21 Trainings related to good hygiene practices were difficult to attend due to time constrains.	331	86.2	

**Table 5: Healthcare Worker's Beliefs About hand hygiene based on Theory of Planned Behaviour (Behavioural beliefs, normative beliefs and perceived control behaviour) (n=384)**

Behavioural Beliefs:			N	%	P-value
22	Patients percentage with Hospital -related infections	0%-10%	268	69.8	<0.05
		11%-20%	77	20.1	
		>20%	39	10.2	
23	Death rate of infected populace	0%-2%	283	73.7	
		3%-5	79	20.6	
		15%	22	5.7	
24	Increased hospital duration of infected populace	0-10 days	334	87.0	
		11-20 days	45	11.7	
		>20 days	5	1.3	
25	Hospital -related infections are severe for patients	Yes	330	85.9	
		No	54	14.1	
26	Good hand hygiene efficiently stops contagions	Yes	303	78.9	
		No	81	21.1	
27	Infection percentage prevented by adopting good hand hygiene	0%-50%	198	51.6	
		51%-70%	132	34.4	
		>70%	54	14.1	
<b>Normative Beliefs: (Yes responses)</b>					
28	Hygiene practices of hands was a topmost preference for hospital administration	298	77.6	<0.05	
29	Colleagues' adherence is good	229	59.6		
30	Superiors expect adherence	195	50.8		
31	Colleagues expect adherence	363	94.5		
32	Patients expect adherence	261	68.0		
33	Individual supposed to be most dominant expects compliance	263	68.5		
34	Compliance set a role model of good practices for others	275	71.6		
<b>Perceived Control Behaviour: (Yes responses)</b>					
35	Hand cleanliness is comparatively easy to achieve	275	71.6	<0.05	

**Table 6: Demographics Association with Behavioral and Normative Beliefs based on Theory of Planned Behaviour (n=384)**

Variables	Response (n=384)	Percentages	$\chi^2$	p-value	
<b>Behavioral beliefs</b>					
<i>Hospital -related infections are severe for patients</i>					
<b>Age</b>					
21-25 years	Yes	15	3.90	25.59	0.00*
	No	1	0.02		
26-30 years	Yes	77	20.0		
	No	05	1.30		
31-35 years	Yes	80	20.83		
	No	18	4.68		
36-40 years	Yes	32	8.33		
	No	06	1.56		
41-45 years	Yes	34	8.85		
	No	16	4.16		
51-55 years	Yes	33	8.59		
	No	05	1.30		
56-60 years	Yes	46	11.97		
	No	01	0.02		
<b>Normative Beliefs</b>					
<i>Percentage of infections prevented by good hand hygiene</i>					
<b>Gender</b>					
Male	0-50%	70	18.22	18.24	0.00*
	51-70%	39	10.15		
	>70%	03	0.78		
Female	0-50%	128	33.33		
	51-70%	93	24.21		
	>70%	51	13.21		
<i>Individual supposed to be most dominant expects compliance</i>					
<b>Gender</b>					
Male	Yes	89	23.17	8.82	0.00*
	No	23	5.98		
Female	Yes	174	45.31		
	No	98	25.52		
<b>Department</b>					
Medicine	Yes	100	26.04	3.36	0.04*
	No	58	15.10		
Surgery	Yes	163	57.39		
	No	63	16.40		

\* indicates level of significance at 0.05

For normative beliefs the results showed that 77.6% believe that hygiene practices of hands were a topmost preference for hospital administration, 59.6% believe that colleagues follow hand hygiene practices, 50.8% believe that seniors adhere to such practices, 94.5% believed that all colleagues expect everyone to follow such practices, and almost 70% of the healthcare professionals believe that patients also expect and adherence models are good

to be followed and practiced. While for perceived control behaviour, 71.6% believed that hand cleanliness was easy to achieve, and it should be adapted.

#### Demographics Association with Behavioral and Normative Beliefs based on Theory of Planned Behaviour

Chi-square distribution was computed to analyze the demographic association between behavioral and normative beliefs based on theory of planned behaviour. The results

showed that all variables were non-significant except hospital-related infections are severe for patients with respect to age in behavioral beliefs and percentage of infections prevented by good hand hygiene with respect to gender and Individual supposed to be most dominant expects compliance with respect to gender and department at 0.05 level of significance presented in table 6.

#### **Discussion:**

During current study we found that most of the participants have good awareness of hand hygiene practices. Feather et al<sup>18</sup> has shown that among 187 participants, only 8.5% of participants washed their hands regularly after touching their patients, but after placing hand hygiene signs, figure rose to 18.3%. Another study from Saudi Arabia has shown that more than 70% of health professionals has adapted hand washing practices.<sup>19</sup>

In term of theory of planned behaviour (TPB); firstly, in term of behavioural beliefs; the results of current study showed that healthcare professionals were more interested toward adapting hand hygiene practices because their colleagues and seniors follow such practices.<sup>20</sup> It has been estimated that, most of the participants reported that having exposed to hand hygiene training and promotion helped them a lot to adhere with this practice.<sup>21</sup> Moreover, the perceived benefits were quite greater expected which was more than 70%. From the social marketing perceptive, hand hygiene practices were considered as most powerful weapon to control spread of disease among potential consumers.<sup>17</sup> The second determinant of TPB for normative beliefs, most of the participants expected that their colleagues and seniors should follow same practices. The impact of the role models helped participants to improve their personal preferences toward hand hygiene practices.<sup>22</sup> Of particular interest, we found that patients also expect from their health care staff to adapt such practices.<sup>23</sup>

The third component control belief, estimated among healthcare professionals toward hand hygiene has showed that, the hand hygiene took little effort if one has good adherence in time of COVID 19 pandemic. This outcome might reflect that, acceptance and widespread use of alcohol-based hand rubs has increased for regular hand hygiene practices. The introduction of hand sanitizers has increased a massive number of

health professional adherences toward hand hygiene practices.<sup>24</sup> Eventually, using theory of planned behaviour in our study it has estimated that 71.6% of participants has increased their interest toward hand hygiene practices in COVID 19 pandemic which has remarkable change in the healthcare settings.<sup>23</sup> Theory of planned behaviour has always been used to understand inherent and elective behaviour among health care professionals, which has developed fruitful outcomes.<sup>25</sup>

#### **Limitation of the Study:**

The most important limitation of our study was that we could not measure the actual real adherence level of hand hygiene. Instead, all based on self-reported by participants and therefore chances of error may not be excluded.

#### **Conclusion:**

In conclusion; behavioural, normative and control beliefs have strongly in favour with hand hygiene practices among health care professionals. Moreover, it has also observed that, exposure to trainings and rules implementation can be helpful in increasing adherence toward hand hygiene practices in COVID 19 pandemic.

#### **Conflict of Interest:**

The authors have declared that there is no conflict of interest.

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