

## Knowledge and practice of universal precautions among health care workers in four national hospitals in Kabul, Afghanistan

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### Abstract

**Introduction:** This study aimed to assess the knowledge and practice of health care workers (HCWs) towards universal precautions (UPs) and to look into any associations between knowledge and practice.

**Methodology:** A cross-sectional study was undertaken between August and October 2012, involving 300 HCWs from four national public hospitals in Kabul, Afghanistan. A self-administered questionnaire assessing the knowledge and practice of UPs was used.

**Results:** Among the 300 respondents, the mean knowledge score was 5.2 with a standard deviation (SD) of 1.5. On the practice score, the mean was 8.7 (SD = 2.2). A total of 90.6% and 70.8% of HCWs believed that UPs were necessary in contact with urine/feces and tears, respectively, although UPs are not necessary in these cases. On the other hand, 57.8% reported that they *always* recapped the needle after giving an injection, and 31.8% did not *always* change gloves in between patients. There were no associations between the knowledge and self-reported practice of UPs.

**Conclusions:** The HCWs in Kabul had inadequate knowledge and poor practice of UPs. Training for HCWs is needed to encourage them to adhere to practice based on improved knowledge.

**Key words:** universal precautions; health care workers; knowledge; practice; Afghanistan

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### Introduction

Health care workers (HCWs) are at risk of occupational hazards because they perform their clinical activities in hospitals. They are exposed to blood-borne infections from pathogens such as human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV), and from sharps injuries and contact with deep body fluids [1,2]. HCWs working in hospitals frequently provide care to patients whose HIV, HBV, and HCV statuses are unknown. Studies have shown that there is a 0.3%-0.5% occupational risk of infection with HIV after percutaneous exposure to HIV-contaminated blood [3], and the cumulative career risk may be as high as 1%-2% among emergency service staff or surgeons [4]. A survey assessing exposure to HIV among HCWs in South Africa showed that 13.0% of the staff reported accidental exposure when caring for HIV-positive patients [5]. A study in Sweden showed that the majority of reported cases of occupational blood exposure were among nurses [6]. Another

study showed that nurses were the staff most frequently involved in occupationally acquired HIV infection [7]. A study assessing the frequency of body fluid exposure among midwives showed that 65.1% of them had experienced exposure to amniotic fluids or blood at least once in the past six months and that 25.0% reported five or more times that level of exposure [8].

In developing countries, a lack of resources and a lack of appropriate legislation and control are the main reasons for the inappropriate management of health care waste. HCWs' low awareness of the required standards can make the situation worse [9]. However, with limited resources, organizations can put forward appropriate rules and control systems, and raise HCWs' awareness of international standard practices of healthcare waste disposal. In Afghanistan, little information is available about the prevalence of HIV, hepatitis B surface antigen (HBsAg), and HCV among the overall population. However, Todd *et al.* reported that among injecting drug users (IDUs) in Kabul, the prevalence of HBsAg-positive, HCV-positive, and

HIV-positive patients was 6.5%, 36.6%, and 3.0%, respectively [10].

Universal precautions (UPs) are a set of precautions or actions designed to prevent HCWs from being exposed to blood and deep body fluids by applying the basic principles of infection control through hand washing, utilization of appropriate protective barriers such as gloves, masks, gowns, and eye shields, safe handling and disposal of needles, and safe decontamination of instruments and other contaminated equipment [11]. The term *standard precautions* is replacing *universal precautions*, as it expands the coverage of universal precautions by recognizing that any body fluid may contain contagious and harmful microorganisms [12].

The level of practice of universal precautions by HCWs may differ from one type of HCW to another. The differences in knowledge of universal precautions by HCWs may be influenced by several factors that can lead to poor compliance with universal precautions [12]. The absence of an enabling environment in the health institution, such as a lack of constant running water or a shortage of personal protective equipment (PPE), can lead to poor compliance with universal precautions.

UPs are important because any health care organization has a responsibility to protect its staff from potential dangers and itself from loss of manpower due to occupational injuries or illnesses [13]. Patients may be harmed if staff are uninformed about safe handling of blood or body fluids, and they may be deprived of appropriate care due to HCWs' inappropriate fears or misunderstandings [14,15]. Surveys have shown that the use of UPs significantly decreases the number of incidents of occupational exposure to blood [16,17]. Nevertheless, the level of compliance with UPs has been reported to be generally low [18,19]. The reported weakest aspects were not practicing hand decontamination [20], not using barrier protection, and not recapping needles [21]. A study of occupational injury history and awareness of UPs showed a low level of knowledge of the basic principles of UPs among HCWs in hospitals in Kabul [22]. Although a few studies have been conducted regarding knowledge of UPs among HCWs in Afghanistan, there has been no study of practice.

This cross-sectional study aimed to assess HCWs' knowledge and practice of UPs and to examine the associations between their knowledge and practice.

## Methodology

This cross-sectional study took place in Kabul. Among 10 national public hospitals in Kabul city, four hospitals were randomly selected using a list provided by the Ministry of Public Health.

Subjects were all official HCWs of the selected hospitals and had direct contact with patients. They were surgeons, obstetrician/gynecologists (OBGYNs), physicians, and allied medical professionals (midwives, nurses, and blood bank/lab technicians) with more than one year of experience. The HCWs who agreed to take part in the survey were enrolled.

### Data collection

Data were collected between August and October 2012. A self-administered questionnaire was adapted from other studies [13,22]. One of those studies had taken place in Afghanistan [22]. The questionnaire consisted of three parts. Part one was about respondent's personal information including age, sex, occupation, and length of service. Part two was about HCWs' knowledge of UPs. In this section, respondents were asked to select the correct answer from 11 true or false statements, and a knowledge score was calculated for each respondent. Part three investigated HCWs' practices with UPs in their daily work. This section included 11 questions related to the use of protective devices, disposal of sharps, disposal of waste, decontamination of spills/used articles, and prevention of infection from person to person. The subjects were required to choose from four descriptions (*never*, *seldom*, *sometimes*, or *always*) that best illustrated their usual practices.

The questionnaire was adapted to the context of the health care setting of Afghanistan. To reduce risks of misinterpretation of the questionnaire, translation of the questionnaire to the local language and back translation into English were carried out by different translators. Prior to distribution, the questionnaire was pretested on 10 subjects at a separate national public hospital in a pilot study to test feasibility issues and internal consistency of the knowledge and practice with UP scales. Based on respondents' recommendations, some minor changes were made. The content validity of the questionnaire was assessed by experts having expertise in UPs. The reliability was assessed by using Cronbach's alpha. The value for practice was 0.71.

### Data analysis

The collected data were entered into an Excel spreadsheet and then transferred to Statistical Package

for Social Science (SPSS) version 20.0 (SPSS Inc., Chicago, IL, USA) for analysis. Descriptive statistics were computed for all items in the questionnaire. Knowledge scores were calculated by giving 1 for correct answers and 0 for incorrect answers, and practice scores were calculated by giving 1 for *always* and 0 for the other responses (*sometimes*, *seldom*, and *never*) to each item. Total knowledge and practice scores were computed for each participant. Adequate knowledge and good practice were defined as correctly answering more than 60% of the items (7 or more points out of 11 for both knowledge and practice) and others were defined as inadequate knowledge and poor practice. Logistic regression was used to obtain odds ratios (ORs) of having adequate knowledge good practice of UPs. All tests were two-sided, and  $p$ -value < 0.05 was considered statistically significant.

#### *Ethical approval*

Ethical approval was obtained from the Institutional Review Board (IRB) of the Ministry of Public Health of Afghanistan. An information sheet was attached to the questionnaires, providing information about the study. Furthermore, the anonymity and confidentiality of the responses, voluntary participation, and the right to refuse participation were emphasized.

## **Results**

#### *Demographic data*

Of the 410 questionnaires distributed, 300 (73.1%) were completed and returned. Of 300 valid respondents, 92 (30.7%) were from staff at hospital A, 60 (20.0%) from staff at hospital B, 75 (25.0%) from staff at hospital C, and 73 (24.3%) from staff at hospital D. Surgeons/OBGYNs constituted 86 (29.1%) of respondents, physicians 77 (26.0%), and allied medical professionals 133 (44.9%). Overall, 153 (51.3%) had working experience of seven years and more. The mean age of the respondents was 37.4 years, with a range of 20-63 years, and a standard deviation (SD) of 9.2 years. There were 195 (65.6%) male respondents. Among the respondents, 65 (22.0%) had not been vaccinated against hepatitis B. The main demographic data of the study subjects are summarized in Table 1.

#### *Knowledge of universal precautions*

Of the full score of 11, the mean knowledge score in this study was 5.2 (SD 1.5); the minimum score was 1 and the maximum was 9.

Table 2 shows the questions regarding the knowledge of UPs in the order of the questionnaire. The number of correct answers were highest for question 8 on the application of UPs with all patients (89.2%), followed by question 6 on HCWs with non-intact skin (74.2%), question 1 on targeted diseases (73.4%), and question 7 on how to clean up blood spills (71.5%), while for question 11 on application of UPs during contact with urine/feces (9.4%), question 9 on wearing gloves during all caring procedures for HIV patients (12.8%), question 10 on contact with tears (29.2%), and question 3 on recapping of used needles (48.6%), the number of correct answers were lowest.

The ORs of having adequate knowledge of UPs are shown in Table 3. Significant ORs were observed for female HCWs compared to male HCWs (adjusted OR = 0.20, 95% CI: 0.08-0.51,  $p < 0.01$ ) and for HCWs between 31 and 39 years of age compared with those 30 years and younger (adjusted OR = 0.28, 95% CI: 0.11-0.69,  $p < 0.01$ ).

#### *Practice of universal precautions*

Table 4 shows the questions for the practice of UPs in the order of the questionnaire. The proportion of the respondents who answered *always* was highest in question 3 on wearing gloves (92.6%), followed by question 1 on using sharps boxes (90.3%), question 2 on washing hands (88.6%), and question 8 on wearing facemasks (87.7%), while the proportion was lowest in question 7 on non-decontamination of devices and surfaces after use (21.5%), and question 10 on not recapping used needles (42.2%).

The ORs of having good practice of UPs are shown in Table 5. Significant ORs were observed for HCWs with seven or more years of service compared to HCWs with one to three years of service (adjusted OR = 3.72, 95% CI: 1.16-11.88,  $p = 0.02$ ), and allied medical professionals compared with surgeons/OBGYN (adjusted OR = 8.78, 95% CI: 2.68-28.77,  $p < 0.01$ ). Female HCWs also showed a significantly higher OR compared to male HCWs (adjusted OR = 3.12, 95% CI: 1.26-7.73,  $p < 0.01$ ). HCWs who were vaccinated against hepatitis B were more likely to adhere to practice of UPs than those who were not vaccinated (adjusted OR = 1.28, 95% CI: 0.54-3.05,  $p = 0.57$ ), but this was not statistically significant. There was no association between the knowledge and practice of UPs.

**Table 1.** Socio-demographic characteristics of respondents

Variables	Hospital				Total N (%)
	A N (%)	B N (%)	C N (%)	D N (%)	
<b>Gender</b>					
Male	74 (81.4)	3 (5.0)	66 (90.4)	52 (71.2)	195 (65.6)
Female	17 (18.6)	57 (95.0)	7 (9.6)	21 (28.8)	102 (34.4)
Total	91 (100)	60 (100)	73 (100)	73 (100)	297 (100)
<b>Age (years)</b>					
30 and below	22 (23.9)	23 (41.8)	7 (9.7)	26 (36.1)	78 (26.8)
31-39	25 (27.1)	17 (30.9)	31 (43.0)	29 (40.2)	102 (35.0)
40 and over	45 (48.9)	15 (27.2)	34 (47.2)	17 (23.6)	111 (38.1)
Total	92 (100)	55 (100)	72 (100)	72 (100)	291 (100)
<b>Length of service (years)</b>					
1-3	17 (18.5)	26 (43.3)	17 (22.7)	29 (40.8)	89 (29.9)
4-6	18 (19.6)	9 (15.0)	10 (13.3)	19 (26.8)	56 (18.8)
7 and more	57 (61.9)	25 (41.7)	48 (64.0)	23 (32.4)	153 (51.3)
Total	92 (100)	60 (100)	75 (100)	71 (100)	298 (100)
<b>Occupation</b>					
Surgeons/OBGYN	31 (33.7)	20 (33.3)	0 (0.0)	35 (50.7)	86 (29.0)
Physicians	7 (7.6)	6 (10.0)	42 (56.0)	22 (31.9)	77 (26.0)
Allied medical professionals	54 (58.7)	34 (56.7)	33 (44.0)	12 (17.4)	133 (44.1)
Total	92 (100)	60 (100)	75 (100)	69 (100)	296 (100)
<b>Hepatitis B vaccination</b>					
Not vaccinated	19 (20.9)	12 (20.3)	20 (27.0)	14 (19.7)	65 (22.0)
Vaccinated	72 (79.1)	47 (79.7)	54 (73.0)	57 (80.2)	230 (78.0)
Total	91 (100)	59 (100)	74 (100)	71 (100)	295 (100)

OBGYNs: obstetrician/gynecologists; allied medical professionals: midwives, nurses, and lab/blood bank technicians

**Table 2.** HCWs' knowledge of UPs

Questions (Correct answers)	N	(%)
1. Universal precautions are applied to patients with HIV and hepatitis only. (F)	217	(73.3)
2. Isolation is necessary for patients with blood borne infections. (F)	77	(26.3)
3. Used needles can be recapped after giving an injection. (F)	143	(48.6)
4. For decontamination of devices (with only contact with skin) washing with usual detergent is enough. (T)	152	(51.4)
5. Universal precautions are not necessary in situations that might lead to contact with saliva. (T)	106	(35.6)
6. HCWs with non-intact skin should not be involved in direct patient care until the condition resolves. (T)	221	(74.2)
7. Blood spills should be cleaned up promptly with sodium hypochlorite. (T)	211	(71.5)
8. Universal precautions should be applied to all persons regardless of their infectious status. (T)	263	(89.2)
9. Gloves are necessary in all caring procedures for HIV patients. (F)	38	(12.8)
10. Universal precautions should apply to situations that might lead to contact with tears. (F)	87	(29.2)
11. Universal precautions should apply to situations that might lead to contact with urine or feces. (F)	28	(9.4)

**Table 3.** Odds ratios (OR) and 95% confidence interval (CI) of adequate knowledge for socio-demographic characteristics

Factors	Adequate N (%)	Inadequate N (%)	Crude OR	95% CI	p	Adjusted OR*	95% CI	p
<b>Gender</b>								
Male	49 (89.1)	129 (61.4)	1	(Ref)		1	(Ref)	
Female	6 (10.9)	81 (38.6)	0.19	0.08-0.47	< 0.01	0.20	0.08-0.51	< 0.01
<b>Age (years)</b>								
30 and below	19 (33.9)	50 (24.4)	1	(Ref)		1	(Ref)	
31-39	13 (23.2)	78 (38.0)	0.43	0.19-0.96	0.04	0.28	0.11-0.69	< 0.01
40 and over	24 (42.9)	77 (37.6)	0.82	0.40-1.65	0.57	0.48	0.17-1.34	0.16
<b>Length of service (years)</b>								
1-3	14 (24.6)	62 (29.7)	1	(Ref)		1	(Ref)	
4-6	13 (22.8)	40 (19.1)	1.43	0.61-3.37	0.40	1.51	0.58-3.38	0.39
7 and more	30 (52.6)	107 (51.2)	1.24	0.41-3.53	0.73	1.74	0.62-4.83	0.28
<b>Occupation</b>								
Surgeons/OBGYN	14 (25.0)	62 (30.0)	1	(Ref)		1	(Ref)	
Physicians	20 (35.7)	53 (25.6)	1.05	0.50-2.22	0.88	0.89	0.38-2.07	0.79
Allied medical professionals	22 (39.3)	92 (44.4)	1.67	0.77-3.62	0.19	1.02	0.44-2.36	0.94
<b>Hepatitis B vaccination</b>								
Not vaccinated	10 (17.5)	48 (23.3)	1	(Ref)		1	(Ref)	
Vaccinated	47 (82.5)	158 (76.7)	1.42	0.67-3.03	0.35	1.89	0.81-4.45	0.14

\*adjusted for all factors listed; OBGYNs: obstetrician/gynecologists; allied medical professionals: midwives, nurses, and lab/blood bank technicians

**Table 4.** HCWs' practices of UPs

Questions*	Always N (%)
1. I put used needles or scalpels in sharps box.	271 (90.3)
2. I wash my hands after I take care of patients.	265 (88.6)
3. I wear gloves when I am exposed to deep body fluids or blood products.	277 (92.6)
4. I cover my wound(s) or lesion(s) with waterproof dressing before caring of patients.	247 (82.6)
5. I wash my hands immediately after removal of gloves.	249 (83.0)
6. I change gloves between patients.	204 (68.2)
7. I do not decontaminate surfaces and devices after use.	233 (21.5)
8. I wear a disposable facemask whenever there is a possibility of a splash or splatter.	263 (87.7)
9. I wear a gown/apron if soiling with blood or deep body fluids is likely.	237 (79.3)
10. I do not recap needles after giving an injection.	171 (42.2)
11. I wear eye shield/goggles when I may be exposed to the splashing of bloody discharge/fluid.	178 (59.3)

\*responses were categorized as *never*, *seldom*, *sometimes*, or *always*

**Table 5.** Odds ratios (OR) and 95% confidence interval (CI) of good practice for socio-demographic characteristics

Factors	Good N (%)	Poor N (%)	Crude OR	95% CI	p	Adjusted OR*	95% CI	p
<b>Gender</b>								
Male	153 (63.5)	35 (77.8)	1	(Ref)		1	(Ref)	
Female	88 (36.5)	10 (22.2)	2.01	0.95-4.26	0.06	3.12	1.26-7.73	< 0.01
<b>Age (years)</b>								
30 and less	62 (26.2)	13 (30.2)	1	(Ref)		1	(Ref)	
31-39	74 (31.2)	23 (53.5)	0.67	0.31-1.44	0.31	0.87	0.36-2.06	0.42
40 and above	101 (42.6)	7 (16.3)	3.02	1.14-7.99	0.02	1.88	0.50-6.99	0.34
<b>Length of services (years)</b>								
1-3	62 (25.7)	24 (52.2)	1	(Ref)		1	(Ref)	
4-6	39 (16.2)	13 (28.3)	1.16	0.53-2.54	0.70	0.88	0.36-2.16	0.78
7 and more	140 (58.1)	9 (19.6)	6.02	2.64-13.70	< 0.01	3.72	1.16-11.88	0.02
<b>Occupation</b>								
Surgeons/OBGYN	59 (24.6)	20 (44.4)	1	(Ref)		1	(Ref)	
Physicians	56 (23.3)	20 (44.4)	0.94	0.46-1.94	0.88	1.37	0.58-3.24	0.47
Allied medical professionals	125 (52.1)	5 (11.1)	8.47	3.03-23.68	< 0.01	8.78	2.68-28.77	< 0.01
<b>Hepatitis B vaccination</b>								
Not vaccinated	50 (20.9)	13 (28.9)	1	(Ref)		1	(Ref)	
Vaccinated	189 (79.1)	32 (71.1)	1.53	0.75-3.14	0.24	1.28	0.54-3.05	0.57

\*adjusted for all factors listed; OBGYNs: obstetrician/gynecologists; allied medical professionals: midwives, nurses, and lab/blood bank technicians

## Discussion

The HCWs' knowledge of UPs in general was inadequate except in the question about application of UPs to all patients regardless of their infectious status and the question about HCWs with non-intact skin who should not be involved in direct patient care until the condition resolves. Although practice was better than knowledge, poor practice in general was also reported. We could not find any significant association between HCWs' knowledge and practice of UPs.

The fact that 51.4% of the HCWs reported recapping the needle after giving an injection suggested that knowledge of sharps safety was incomplete. More than 90.0% of the HCWs did not know that UPs were not necessary for contact with urine or feces, 87.2% thought gloves were necessary for all caring procedures for HIV patients – which actually is not always the case – and 73.7% of HCWs incorrectly believed that isolation was necessary for patients with blood-borne infections. The low level of knowledge of UPs among HCWs in this study was similar to findings reported in previously published studies both in Afghanistan and neighboring Iran [22,23].

Our findings also demonstrated a low level of practice of UPs among HCWs in Kabul; only 19.0% of respondents reported full practice with all 11 items of UPs. It was encouraging to find that 90.3% of the respondents reported that they adhered to safe disposal of used needles and sharps and other blood contaminated items, and 92.6% of them reported

wearing gloves when they were exposed to deep body fluids or blood products. However, it is of concern that 57.8% of the respondents reported that they *always* recapped used needles in their daily practices, that 31.8% of the HCWs reported that they did not *always* change gloves in between patients, and that 40.7% of the HCWs reported that they did not *always* wear an eye shield/goggles when they were exposed to the splashing of bloody discharge/fluids. A similar study in rural northern India also found that HCWs had a low level of overall practice of UPs [24].

Our findings that female HCWs were less likely to have adequate knowledge was in contrast with the results of a study in Nigeria [25], which reported that female HCWs had better knowledge of UPs compared to male HCWs. During the Taliban regime in Afghanistan (1996-2001), girls were prohibited from going to school. Tens of thousands of girls were left without education and no female HCWs were trained in this period. Lack of basic education for females during that period, gender inequality, and the male-dominant culture of Afghanistan may have affected female HCWs' level of knowledge.

In our study, the HCWs between the ages of 31 and 39 were less likely to have adequate knowledge of UPs compared to the younger age group. This finding was similar to the results of a study conducted in Iran [23], which showed that the 20-30 year age group had the highest knowledge of UPs. The HCWs who were vaccinated against HBV were more likely to have adequate knowledge of UPs compared to HCWs

who were not vaccinated, although this was not significant. In Afghanistan, vaccination of HCWs against HBV is not covered by the government; HCWs who wish to be vaccinated receive vaccination from private clinics and pay from their own pockets. Therefore, we could assume that those who are willing to pay for vaccine might be more aware of infection prevention.

In our study, we did not find statistically significant differences in UPs knowledge regardless of length of services and professional categories of HCWs. We assumed that a lack of in-service training in health facilities in Afghanistan, including training of UPs, might have resulted in the finding that length of service did not influence knowledge.

Our study showed that HCWs with more years of experience had significantly higher ORs of adhering to UPs. A study of compliance with UPs in rural northern India was consistent with the current finding that staff who had been at their jobs for more years were more compliant with UPs [24]. In Afghanistan, HCWs do not receive enough formal training, especially about UPs; better adherence to UPs among HCWs with more years might be linked to their on-the-job experience, but not to their formal training.

Furthermore, this study revealed that allied medical professionals had a significantly higher OR of adhering to UPs. A similar study in the United Kingdom (UK) showed that nurses had a much better compliance with UPs compared to physicians [26]. In the UK case, nurses received significantly more formal training in taking blood than doctors did. But in Afghanistan, neither doctors nor allied medical professionals receive enough formal UPs training. Allied medical professionals' good practices of UPs in Afghanistan might have a direct relationship to their greater involvement with infectious agents, injections, and taking blood that might have made them more careful about proper practices of UPs.

In addition, female HCWs were more likely to adhere to UPs compared to male HCWs in our study. A study in Canada regarding compliance with infection control procedures also showed that male HCWs were less compliant with all types of infection control procedures [27]. Female HCWs' good practices might be due to natural tendencies of female HCWs to obey the rules and regulations and also to their extra caution against infections and infectious disease. However, there was no previous study in this regard. Though significant differences between age of HCWs and their applications of UPs had been found in

a similar study in Malaysia, we did not see these findings in our study [28].

Practice of UPs in this study was assessed by self-reporting methods, which might differ from the actual level of practice properly assessed by observations because HCWs tend to overestimate the extent to which they comply with UPs in practice [24]. In addition, there might be respondent bias; characteristics of the HCWs who failed to complete or return the questionnaire might be different from those who did return it. However, this might not affect the study because the response rate was quite high (73.1%). This study took place in Kabul public hospitals, and the results of the study cannot be generalized at the country level.

The current findings could be useful in identifying the specific areas that may need further continuing HCWs education in relation to UPs and may give indications to HCWs about the areas that need more attention in order to provide safer practices.

## Conclusions

The HCWs in Kabul had inadequate knowledge of and poor practice in applying UPs. We found no association between the knowledge and practice of HCWs regarding UPs. These findings suggest that appropriate pre-service and in-service training is needed for HCWs to encourage them to apply UPs and increase their knowledge of UPs.

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