



# Knowledge and Attitude of the Physicians and Nurses Regarding Blood Borne Infections in Primary Health Care, Kuwait

<sup>1</sup>ABDULLAH H. Alwutaib, <sup>2</sup>YASMIN A. Abdulghafour,  
<sup>3</sup>AMAL K. Alfadhli, <sup>4</sup>GAMAL Makboul, and  
<sup>5</sup>\*MEDHAT K El-Shazly

<sup>1</sup>Health Attache (Embassy of Kuwait-Washington).

<sup>2</sup>Head of Medical and Professional Development Sector, Technical Department, MOH, Kuwait

<sup>3</sup>Shaeb polyclinic, PHC, MOH, Kuwait

<sup>4</sup>Department of Community medicine, Faculty of Medicine, Alexandria University, Egypt & Department of Health Information and Medical records, Ministry of Health, Kuwait.

<sup>5</sup>Department of Medical Statistics, Medical Research Institute, Alexandria University, Egypt. & Department of Health Information and Medical records, Ministry of Health, Kuwait.

Emails: <sup>1</sup>dr.alwetaib@gmail.com, <sup>2</sup>yasmin.abdulghafour@yahoo.com, <sup>3</sup>akf.ali10@gmail.com, <sup>4</sup>gamalmakboul@hotmail.com

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**\*Corresponding Author**

Medhat K El-Shazly

**E-mail:** medshaz@yahoo.com

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## ABSTRACT

**Background:** Physicians and nurses are a high-risk group of acquiring health care-associated infections and for transmission to their patients and close contacts

**Objective:** The aim of the present study was to evaluate the level of knowledge and attitude of physicians and nurses in the field of blood borne infections (BBIs), and to identify factors associated with their level of knowledge.

**Methods:** This study was a comparative one that was conducted in all primary health centers located in two randomly selected health regions in Kuwait. An anonymous self-administered questionnaire was distributed to all currently working physicians and nurses in the selected centers.

**Results:** Recruitment effort resulted in participation of 277 nurses (64.6%) and 152 physicians (35.4%). The majority of nurses (83.0%, 74.4%, 73.6%) compared to 69.7%, 71.7% and 61.2% of the physicians recognized the possibility of transmission of the three BBIs (HBV, HCV and HIV) from patients to health care workers (HCWs). Lower proportions of participants recognized that HBV, HCV and HIV can be transmitted from HCWs to patients. A significant higher proportion of physicians than nurses were aware that blood and its products and improper usage of needles and sharps are the roots of transmissions (90.6% vs. 96.1% and 89.9% vs. 96.1% respectively). Faeco-oral and contaminated water were answered incorrectly as routes of transmission among nurses than physicians significantly (32.1% vs. 19.7% and 21.7% vs. 10.5% respectively). Positive attitude was encountered in a significant higher proportion among physicians than nurses in certain beliefs regarding the risk of and vaccination against BBIs. On the other hand, higher proportions of nurses had positive attitude than physicians in practical aspects of BBIs control.

**Conclusions:** Generally, the knowledge level was acceptable in the current study. Physicians were more knowledgeable than nurses. Positive attitudes were encountered in a significant higher proportion among nurses than physicians regarding the practical aspects. Older age was an important determinant of lower level of knowledge.

## INTRODUCTION

Knowledge of health care associated infections (HAIs) and adherence to infection control precautions in medical institutions is important to prevent the transmission of infections among health care workers (HCWs) and patients (Low et al., 2008). Occupational exposure to blood and body fluids is a serious concern for HCWs and presents a major risk for the transmission of infections such as hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) (Tarantola et al., 2006; Hutin et al., 2003). HCWs' compliance to standard precautions is an important element of blood borne infections (BBIs) control as it enables assessment of risks from occupational exposure to infection. Studies have extensively reported suboptimal and non-uniform adherence to standard precautions by HCWs in both developed and developing countries (WHO, 2002; and Zhang et al., 2009). Recognizing this threat, the U.S. Centers for Disease Control and Prevention (CDC) proposed a series of procedures for preventing occupational exposures and for handling potentially infectious materials such as blood and body fluids. These procedures, known as standard precautions, advised HCWs to practice regular personal hygiene; use protective barriers such as gloves and gown whenever there is contact with mucous membranes, blood and body fluids of patients; and dispose of sharps, body fluids, and other clinical wastes properly (CDC, 1987; CDC, 1989; Molinari, 2003). Reports indicated that standard precautions are effective in preventing both occupational exposure incidents and associated infections (Hutin et al., 2003; Redecki, 2000).

A large literature review showed that the existing literature on HAIs primarily focuses on hospital sites and may not be applicable to other health care settings, such as primary health care (PHC) centers (Porta et al., 1999). However, these workers are also at risk of infection with blood-borne pathogens because of occupational exposure to blood and body fluids and may have inadequate knowledge about the risks to which they are exposed (Mongeet al., 2001 and Krishnan et al., 2007). Furthermore, primary HCWs represent a growing occupational group around the world, requiring specific policies to protect their health. Therefore, the objectives of this study were to evaluate the knowledge and attitude of physicians and nurses in the field of BBIs and to identify factors associated with their level of knowledge.

## SUBJECTS AND METHODS:

The health care system in Kuwait is divided into five regional health authorities. PHC is provided through 92 centers distributed in the health regions proportionate to their population. This study was a cross-sectional comparative survey that was conducted from March to December 2011 in all PHC centers located in two randomly selected health regions (Capital and Farwaniya).

Data were collected from physicians and nurses working in these centers through a specially designed questionnaire that was derived from other published studies dealing with the same topic as well as from our own experience. The questionnaire comprised three categories of questions. The first one was related to socio-demographic and occupational characteristics. The second one was designed to reveal participants' knowledge about the risks of acquiring and/or transmitting certain BBIs (HBV, HCV, and HIV) from/to a patient and standard precautions for prevention, and sources from which physicians and nurses received up-to-date information about BBIs. The third part contained questions related to participants' attitude towards precautionary guidelines and perception of the risk of acquiring BBIs.

Twenty questions were related to knowledge. Correct answers to each item were based on a review of the available literature as well as policies and guidelines (Brinsley et al., 2005; Greig, 2011). A positive answer was assigned one point, whereas a negative answer was given zero. Participants were divided according to their answers into two levels according to the median total score of all answers. Low level score was determined as < the median score of all corrected answers and a satisfactory level score was assigned for  $\geq$  median score of corrected answers.

A pilot study was carried out on 30 physicians and nurses. This study was formulated to test the clarity, applicability of the study tools, identify the difficulties that may be faced during the application. Also, the time needed for filling the questionnaire by the staff was estimated during this pilot study. The necessary modifications according to the results obtained were done.

All the necessary approvals for carrying out the research were obtained. The Ethical Committee of the Kuwaiti Ministry of Health approved the research. A written format explaining the purpose of the research was prepared and signed by the physician and nurses before filling the questionnaire. In addition, the purpose and importance of the research were discussed with the director of the health center.

## Statistical analysis

The Statistical Package for Social Sciences (SPSS-17) was used for data processing. Simple descriptive statistics were used (mean  $\pm$  standard deviation for quantitative variables and frequency with percentage distribution for categorized variables). Comparison between physicians and nurses was based on a series of univariate analyses using Chi square test. Participants were divided according to their knowledge score into two groups: cases with low level score and control with satisfactory level. Cases and control were compared to determine possible factors that might affect participants' level of knowledge. For the possible confounding effect of the variables, multiple logistic regression analysis was used. The associations between covariates and the outcome of interest were expressed in terms of odds ratios (OR) together with 95% confidence intervals (95%CLs). All

explanatory variables included in the model were categorized into two or more levels (R =reference category): age :< 30<sup>R</sup>, 30-39, 40-49, ≥50; gender: male<sup>R</sup>, female; nationality: Kuwaiti<sup>R</sup>, non-Kuwaiti Arab, non- Arabs; jobs: nurse, physician; family history of HAV: no<sup>R</sup>, yes; family history of HBV or HCV: no<sup>R</sup>, yes. As there was a significant correlation between age and years of experience, the later was not included in the model. A 0.05 level is chosen as a level of significance.

## RESULTS

Recruitment effort resulted in participation of 277 nurses (64.6%) and 152 physicians (35.4%). Table 1 summarizes their general characteristics. Physicians were found to be significantly older than nurses (39.5±10.5 vs. 35.7±8.3 years), with more years of experience (13.1±9.9 vs. 10.7±8.2), with higher monthly income, and with higher proportions family history of HAV and HBV or HCV. Also, significant higher proportions of physicians gained knowledge from different sources of information than nurses. Female gender and non-Arab nationalities were encountered more significantly in nurses than physicians.

**Table 1: General characteristics of the study population**

Characteristics	Nurses (n = 277)		Physicians (n = 152)		P value
	No.	%	No.	%	
<b>Age groups</b>					
<30	64	23.1	31	20.4	<0.100*
30-	142	51.3	49	32.2	
40-	44	15.9	46	30.3	
50+	27	9.7	26	17.1	
<b>Years on current job</b>					
<10	146	52.7	66	43.4	0.101
10-	93	33.6	52	34.2	
20+	38	13.7	34	22.4	
<b>Gender</b>					
Male	67	24.2	64	42.1	<0.001*
Female	210	75.8	88	57.9	
<b>Nationality</b>					
Kuwaiti	44	15.9	61	40.1	<0.001*
NonKuwaiti Arab	49	17.7	85	55.9	
Non-Arab	184	66.4	6	3.9	
<b>Marital status</b>					
Single	27	9.7	22	14.5	0.217
Married	246	88.8	126	82.9	
Widowed or divorced	4	1.4	4	2.6	
<b>Income</b>					
<500	195	70.4	16	10.5	<0.001*
500-999	34	12.3	33	21.7	
1000-1499	14	5.1	57	37.5	
1500+	34	12.3	46	30.3	
<b>Family history of HAV</b>					
No	273	98.6	145	95.4	<0.048*
Yes	4	1.4	7	4.6	
<b>Family history of HBV or HCV</b>					
No	273	98.6	142	93.4	<0.004*
Yes	4	1.4	10	6.6	
<b>Sources of information *</b>					
Scientific journals	155	56.0	108	71.1	0.001*
Mass-media	131	47.3	108	71.1	<0.001*
Educational courses and seminars	175	63.2	125	82.2	<0.001*
Physicians	161	58.1	111	73.0	0.001*

\*: Multiple responses are allowed

Regarding participants' knowledge table 2 showed that the majority of nurses (83.0%, 74.4%, 73.6%) compared to 69.7%, 71.7% and 61.2% of the physicians recognized the possibility of transmission of all the three BBIs (HBV, HCV and HIV) from patients to HCWs. The difference was statistically significant only for HBV and HIV. On the other hand, in both groups,

lower proportions recognized that HBV, HCV and HIV can be transmitted from HCWs to patients with no significant difference. About three quarters and above in both groups recognized that the three diseases are serious and physicians recognized that HCV is serious disease in a significant higher proportion than nurses (73.3% vs. 82.2%).

**Table 2: Proportions of participants answered correctly statements regarding blood born infections**

Knowledge items	Nurses (n = 277)	Physicians (n = 152)	P value
<b>HCW can acquire from a patient</b>			
HBV	83.0	69.7	0.001*
HCV	74.4	71.7	0.551
HIV	73.6	61.2	0.007*
<b>HCW can transmit to a patient</b>			
HBV	62.5	52.6	0.050*
HCV	56.7	53.3	0.499
HIV	56.0	48.7	0.149
<b>Infections could be serious</b>			
HBV	78.3	73.7	0.275
HCV	73.3	82.2	0.037*
HIV	87.0	89.5	0.453
<b>Routes of transmission of blood borne diseases</b>			
Blood and blood products	90.6	96.1	0.034*
Needles and sharps	89.9	96.1	0.049*
Sexual intercourse	79.4	80.3	0.448
Faeco-oral (false)	32.1	19.7	0.008*
Contaminated water (false)	21.7	10.5	0.006*
<b>Ways of preventing blood borne diseases</b>			
Vaccination	49.5	31.6	<0.001*
Proper disposal of sharps, needles and blood	89.2	94.7	0.141
Avoid needle/sharps injury	90.6	96.1	0.102
Avoid casual sex or/and multiple sexual partners	74.7	77.0	0.805
Avoid drinking contaminated water (false)	31.8	17.8	0.005*
Avoid food not well cooked (false)	28.5	14.5	0.001*

HCW: health care worker, \*: significant difference

Concerning the knowledge about routes of transmission of blood borne diseases (BBDs), a significant higher proportion of physicians than nurses were aware that blood and its products and improper usage of needles and sharps are the roots of transmissions (90.6% vs. 96.1% and 89.9% vs. 96.1% respectively). However, no significant difference was detected for statement of sexual intercourse. On the other hand, faeco-oral and contaminated water were answered incorrectly as routes of transmission among nurses than physicians significantly (32.1% vs. 19.7% and 21.7% vs. 10.5% respectively).

Regarding knowledge about ways of prevention, higher proportions in both groups knew that proper disposal of sharps, needles and blood products, avoiding needle/sharps injury and avoiding casual sex or/and multiple sexual partners are the main ways of prevention of BBIs with no statistically significant

difference. However, vaccination was encountered in a significantly higher proportion among nurses than physicians as a way of prevention (49.5% vs. 38.2%). Avoiding drinking contaminated water and food not well cooked were incorrectly reported as ways of prevention among nurses than physicians significantly (31.8% vs. 17.8 and 28.5% vs. 14.5% respectively).

Participants were classified according to their total knowledge score into two groups: cases with low score and control with satisfactory score. Both groups were compared to detect factors that could be associated with lower knowledge score using multiple logistic regression analysis. Results of the analysis revealed that older age and female gender and positive family history of viral hepatitis infections were significant determinants. (Table 3)

**Table 3: Factors associated with lower knowledge score among participants, results of multiple logistic regression analysis**

Co-variables	Odds ratio	95% CIs
<b>Age groups</b>		
<30	1	
30-	1.6	(1.1 – 2.7)
40-	1.9	(1.1 – 3.6)
50+	6.7	(1.3 – 5.4)
<b>Gender</b>		
Male	1	
Female	1.7	(1.2 – 2.4)
<b>Family history of HAV</b>		
No	1	
Yes	0.8	(0.3 – 0.9)
<b>Family history of HBV or HCV</b>		
No	1	
Yes	0.5	(0.1 – 0.8)

Positive attitude as shown in table 4, was encountered in a significant higher proportion of physicians than nurses when they asked about if their job puts them at risk of BBIs infection (72.2% vs87.5%), if they need to be protected from BBIs (79.1% vs96.7), if a health worker can infect patients with BBIs (60.6% vs70.4%) and if they considered it necessary to receive vaccine (76.9% vs97.4%). Lower proportions in both groups

had positive attitudes when they asked if their lifestyle puts them at a risk of BBIs infection. On the other hand, positive attitudes were more encountered significantly among nurses than physicians concerning hand hygiene after removing gloves (66.4% vs. 46.7%), wearing gloves and masks (75.5% vs. 60.5%), and invasive procedures (55.6% vs. 41.4%).

**Table 4: Proportions of participants agreed positively about certain beliefs regarding blood born infections**

Attitudes towards blood borne diseases	Nurses (n = 277)	Physicians (n = 152)	P value
– Your job puts you at risk of BBIs	72.2	87.5	0.000*
– Your lifestyle puts you at risk of BBIs	17.3	23.7	0.000*
– You need to be protected from BBIs	79.1	96.7	0.000*
– A health worker can infect patients with BBIs	60.6	70.4	0.000*
– Considered it necessary to receive vaccine	76.9	97.4	0.000*
– Hands hygiene after removing gloves is a BBIs control measure	66.4	46.7	0.000*
– Changing mask before going to another patient is a BBIs control measure	87.0	80.3	0.155
– Wearing gloves and masks are a BBIs control measures	75.5	60.5	0.004*
– Invasive procedures are a risk factor for BBIs	55.6	41.4	0.000*
– HCWs' hands are a vehicle for transmission of nosocomial pathogens	81.9	78.3	0.627

BBIs: blood born infections, HCWS: health care workers

## DISCUSSION

Occupational exposure to blood and body fluids is well documented among HCWs. All HCWs face a wide range of hazards on the job, including blood and body fluid exposure. Work-acquired infectious diseases are among the risks all HCWs face; and blood borne

pathogens figure prominently among these. (CDC, 2000) Knowledge of HAIs and adherence to infection control precautions in medical institutions is important to prevent the transmission of infections among health care workers (HCWs) and patients (Low et al., 2008). Usually knowledge

are gained through scientific journals, mass media, educational courses, seminars and physicians (colleagues) (Suchitra and Lakshmi, 2007). Consistently, in the present study participants gained their knowledge from the same sources preferring educational courses, workshops and seminars particularly in the physicians group. This might be explained by the fact that a majority of the respondents had been out of college for many years, making workshops and seminars accepted source of information for them. Although various forms of media play a key role in the dissemination of knowledge, more studies are needed to explore which forms of media are more effective to inform and educate health care providers in general and PHC physicians and nurses in particular. However, serial or routine on the job sensitization seminars to HCWs could make a difference that could lead to a better practice of reporting of HAIs. This suggestion is supported by Suchitra and Lakshmi (2007) study in which education sessions for HCWs was found to improve knowledge and attitude scores of HCWs towards nosocomial infections.

HCWs are at an increased risk of BBDs. The most common form of accidental exposures is due to needle stick injury. Exposures could also result from sharp objects such as scalpels and broken glasses, as well as from mucosal exposures after blood splash or bodily fluids (De Villiers, 2007). In the current study, no differences observed between both groups regarding seriousness of HBV or HIV, however, physicians considered HCV more serious than nurses. This was not similar to a study done in Dublin, Ireland, where 82% of nurses knew that HBV transmission was 100 times more infective than HIV (McGrane et al., 2003).

Samuel et al (2009) reported in their similar study that a majority of the respondents demonstrated a high level of knowledge of BBIs, the routes of transmission of the infection, the ways of preventing the infection and the fact that the infection can be transmitted as a nosocomial infection. In the present study, participants' knowledge concerning the various aspects of HBV, HCV and HIV was generally high and consistent with current scientific evidence, since the majority in both groups was aware that a HCW can acquire from a patient and can transmit to the patients as well as the seriousness of these diseases.

In the present study, the knowledge about modes of transmission was also acceptable. Participants showed very good knowledge of routes of transmission of BBDs similar to those studied in Lagos in whom 96.3% were adjudged to have moderate to good knowledge. (Adebajo et al., 2003) Blood and its products was mentioned by higher proportion of physicians than nurses as route of transmission of BBDs, a few questions on knowledge were answered incorrectly by nurses than physicians, where higher proportions of nurses than physicians mentioned that faeco-oral and contaminated water are modes of transmission.

The majority of the participants knew that one could get HBV, HCV and HIV through a needle stick and sharp objects injury, and 80.3% of physicians compared to 79.4% of nurses knew that sexual

intercourse is a mode of transmission. This is in contrast to studies done in Iran and the UK, where 21.4% and 44% respectively of HCWs knew that HBV can be transmitted by needle stick infection. (Moghimi et al., 2007; Stein et al., 2003). In the studies of D'Souza et al.(2004) and van de Mortel et al(2003), most of the participants indicated that blood transfusion was a major mode of transmission. However, some deficits were seen in HCWs knowledge on sexual contact as a mode of transmission for hepatitis C.

In the current study, lower proportions of both nurses and physicians (49.5%vs 31.6%) knew that vaccination could protect against certain BBIs. Both groups knew the ways of preventions mentioned in table 2, with no significant differences except for vaccination, where nurses appeared to have more knowledge than physicians. However, this could be because physicians knew that only HBV can be prevented through vaccinations and this is not applied for HCV or HIV as there were no vaccinations for them, so they answered generally by this lower proportion. Also, nurses in the current study were most likely to have received training, possibly because of their close contact with vaccination sessions, patients and their greater interest in having a correct approach toward them. This finding is similar to a study done in Dublin which showed that nurses had knowledge about the HBV vaccination. (McGrane et al., 2003).

Generally, the knowledge level was acceptable in the current study. Physicians were more knowledgeable than nurses. Richmond et al. (2007) showed a significant relationship between medical groups and level of knowledge whereas doctors were the most knowledgeable group. In his study, Shehab et al.(2002) reported that the higher knowledge level of physicians was likely because of more advanced and professional education on gastrointestinal and liver diseases. On the other hand, nurses may not receive enough practical education or they were under stress, or carelessness because of an increased workload. (Zafar, 2008; Vitale et al., 2005 and Wicker et al., 2008). After adjustment of results using multivariate analysis, only older age, female gender and positive family history of viral hepatitis were proved as associated factors with lower level of participants' knowledge regarding BBIs. This goes with a study conducted by Richmond (2007), as he found that males were more knowledgeable and HCWs who were above 40 were the least knowledgeable. This is because in elders, the efficacy of initial education decreases. D'Souza et al.(2004) and Shehab et al. (2002) indicated that education did not produce any advance in knowledge levels. However, we should not ignore the role of clinical practice as a form of education. Therefore, other factors must influence the knowledge level of HCWs. However, we should not deny the fact that the information presented cannot be effective if it has not been repeated and recorded in the mind. In some studies, it has been suggested that one method for getting better results is active and problem-based learning. (Richmond, 2007). The association between female gender and lower level of knowledge may Reflect the component of the study

population rather than actual association as most of the nurses, who were proved to be less knowledgeable than physicians, were females

In the present study, positive attitudes were encountered in a significant higher proportion of physicians than nurses in certain beliefs regarding the risk of and vaccination against BBIs. Therefore, education had a significant influence on developing positive attitudes, which was also noted by van de Mortel(2003)and Richmond et al(2007). On the other hand, higher proportions of nurses had positive attitude than physicians in practical aspects of BBIs control as readiness to wear protective devices, washing of hands before and after touching patients, and believing that invasive procedures are risk factors. This could be explained by the fact that nurses are the most frequent contact and exposed group. These results were better when compared with another study in which only a little over one third of HCWs studied routinely used all barrier techniques such as gloves, masks, and protective eye-wear (Angelillo et al., 1999). This holds a lot of prospect for the control of BBIs since it was reported that even hand washing alone was sufficient in reducing the incidence of nosocomial infections. In many settings, hand washing may be seen as a trivial issue that is not routinely taken serious, especially in non-surgical and non-invasive sessions. (Suchitra and Lakshmi, 2007). This finding was also reported in the studies of Richmond (2007), Vitale et al (2005) and van de Mortel (2003). They suggest that occupational experience and fear of contracting viral hepatitis can also influence the willingness to treat people with the disease.

We apologize for certain limitations in this study. Firstly, generalization of the study results is limited as the study population is restricted to only two health authorities and unavailability of data about physicians and nurses who refused to participate. Secondly, self-reported responses may not reflect responders' actual attitudes.

## CONCLUSION

Generally, the knowledge level was acceptable in the current study. Physicians were more knowledgeable than nurses. Older age is an important determinant of lower level of knowledge score. Continuing medical education and training programs for PHC physicians and nurses are recommended to keep them up-to-date particularly with advance of age.

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