

Received: 25 June 2015 • Accepted: 15 August 2015

Short C

doi:10.15412/J.JBTW. 01040403

Knowledge and Attitude of Rafsanjan's Nursing Personnel Regarding Standard Precautions

Mohammad Asadpour^{1*}, Fazlollah Ghofranipour², Hassan Eftekhari ardebili³, Shamsaddin Niknami², Ebrahim Hajizadeh⁴, Gholamhossein Hassanshahi⁵

¹ Department of Health services and Health Promotion, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

² Department of Health Education, Tarbiat Modares University (TMU), Tehran, Iran

³ Department of Health Services management, School of Public Health, Institute of Health research, Tehran University of Medical Sciences, Tehran, Iran

⁴ Department of Biostatistics, Tarbiat Modares University (TMU), Tehran, Iran

⁵ Molecular Medicine Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

*correspondence should be addressed to Mohammad Asadpour, Department of Health services and Health Promotion, Rafsanjan University of Medical Sciences, Rafsanjan, Iran; Tell: +983434339660; Fax: +983434339660; Email: asadpour1@yahoo.com.

ABSTRACT

Health care workers (HCWs) and nursing personnel are at risk for occupational infection and exposure to a wide-ranging of virus-related infection. Standard precautions (SPs) are required for reducing the risk of blood-borne transmission and other pathogens in hospitals. Therefore present study aimed to assess the level of knowledge and attitude of Rafsanjan's nursing personnel about SPs. Current cross-sectional study was conducted on all nursing personnel in the study. A questionnaire was designed to measure the knowledge and attitude of nursing personnel regarding standard precautions. After determine the validity and Reliability of the questionnaire, an anonymous and self-administered questionnaire was distributed among nursing personnel. Afterwards the obtained data was inserted into the SPSS software (version16) then analyzed with t-test, ANOVA, Mann-Whitney, Kruskal-Wallis and Spearman's correlation coefficient test. The significance level for all tests was 0.05. Results of present study showed that 94.1% of samples were vaccinated against HBV, but the majority of them did not follow checking programs for anti-HBs, HBs Ag, Anti HBV, Anti HBC and Anti HIV. Of samples 45.2% reported that had at least one time needle stick injuries in their lifetime, while only 20.10 % (44/219) reported an injury during the last year. The results showed that the mean and standard deviation of the knowledge and attitude score of nursing personnel regarding standard precautions were 22.9±3.21 and 43.88±5.3, respectively. The relationships between knowledge, attitude and demographic variables were not significant. The relationship between knowledge and attitude was a direct correlation. The knowledge score was not desirable whereas attitudes score was better and it could possibly be suggested that educational programs concerning various aspects of Standard precautions should be implemented.

Key words: knowledge, attitude, standard precautions, blood borne pathogens, nursing personnel

Copyright © 2015 Mohammad Asadpour et al. This is an open access article distributed under the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/).

1. INTRODUCTION

Exposure to infectious and transmissible diseases is one of the most frequently identified work-related and occupational hazards in health care workers (HCWs) (1). HCWs and nursing personnel are at risk for occupational or nosocomial infection and exposure to a wide-ranging of virus-related infection such as hepatitis B (HB), hepatitis C (HC), and acquired immunodeficiency syndrome (Aids). More than 50 different pathogens were indicated to be transmitted to blood and body fluids (BBFs) by needle/sharps injury and exposure to patients'

BBFs. Needle stick injuries (NSIs) are one potential way for transmission of such infections (2-4). Results of many studies showed that the rate of NSIs in HCWs in different countries is varying around 20.9 to 76.2 percent (5, 6). Needles stick and sharps injuries represent a considerable hazard in professional nursing staff. Recent approaches are indicative that among all HCWs, nurses are more at risk for burden of NSI (7). The risk of infection, given NSI exposure to the blood of patients infected with the three main blood borne viruses, has been expected to be approximately 30%, 3% and 0.3% for hepatitis B virus

(HBV), hepatitis C virus (HCV), respectively (8). Nearly 75% of the world's carriers of HBV are reported from Asia and accordingly the prevalence of HBV infection in Iran varies from 1.07% to 5%. However, the global prevalence is lower than 3%. It is estimated that over 35% of Iranian people have a history of exposure to HBV (9). The HCV infection is also considered as a serious health problem and the worldwide prevalence of HCV infection is estimated to be 2-3% of the global population (3). The prevalence of HCV and HIV are remarkably increased in high risk groups such as thalassemic patients, intravenous (IV) drug users and hemodialysis patients in Iran (9, 10). The risk of infection depends on several issues including the number of patients admitted to the hospital and the care and consideration precautions during patient care (11). It has been reported that 64% of Turkish HCWs were exposed to blood and body fluids at least once in their occupational lifetime (2). Standard precautions (SPs) are considered as guidelines for reducing the risk of transmission of blood-borne and other hospital-derived pathogens (12), that were proposed by the United States Centers for Disease Control and Prevention (CDC) in 1996. These SPs include: avoidance of direct contact with patients, hand washing and performing sterilization, use of protective equipment's such as wearing gloves, gowns, face shields, eye protection, safely removal of sharp instruments, and finally handling and disposal of needles, sharp things and etc. According to the SPs principles, patient blood, body fluid, secretions, and excrement have infectivity; have an effect on both patients and health care workers (13, 14). Therefore, there have been increased considerations on in the field SPs for all health care workers, and research programs are currently going on SPs regulations in many countries. Several reports demonstrated that knowledge and attitude of HCWs about nosocomial infections and compliance of SPs are inadequate (13, 15, 16). HCWs have to go through clinical practices and few studies have assessed the knowledge and attitudes of HCWs about SPs. Therefore, the main aim of the present study was to assess knowledge and attitude of Rafsanjan's nursing personnel about standard precautions, as a required assessment. This Provide useful information for professional groups and managers for formulating training programs as well as development of interventions to improve infection control practices and promote the prevention of hospital acquired infections.

2. MATERIALS AND METHODS

In this cross-sectional study, that sampling method was census, we recruited total of 240 nursing staff who wish to participate in the study were included from Rafsanjan University of Medical Sciences hospitals in 2009. Data was collected by the three-part questionnaire (demographic, knowledge and attitude). Item content validity was assessed using the content validity by applying an expert's panel (quantitative and qualitative) and face validity, the content validity ratio (CVR) of each item were calculated

based on the opinions of 11 experts. All of the experts on the panel were asked to judge the rate of necessity of each item, therefore, those items with a CVR score of 0.59 and more were approved and those with a CVR score less than 0.59 were excluded. Finally, the mean of CVR for items was obtained to be between 0.72 to 1. Then Item Analysis was undertaken which means that items with correlation coefficient of less than 0.3 and greater than 0.7 were removed. Then prepared questionnaires were distributed among the 40 nurses to comment on the clarity, simplicity, and legibility of the items on scale. Finally 27 and 9 items to assess the knowledge and attitude survey were prepared, respectively. The reliability coefficient for the knowledge items using Test-Retest was 0.72 and for attitude using Cronbach's alpha internal consistency coefficient that were 0.78. Knowledge assessment questions had three answers (true, false, and I don't know) that 2 points considered for a correct answer, zero for wrong answers and 1 point was considered to not know. Therefore, the score for knowledge ranged between zero (no correct answers) and 54 (all answers correct), Attitude assessment questions had six possible responses (Completely disagree, disagree, disagree a little, agree a little, agree, completely agree), where the answer was completely agree 6 points was given and completely disagree received only one point. Thus, the total score ranged from nine (all questions regarded as completely disagree) to 54 (all questions regarded as completely agree). Subsequently, questionnaires were distributed among nursing personnel who were willing to participate in the study. After being filled out, the questionnaires, were collected, statistical analyses for knowledge and attitude, frequencies together with means and standard deviations were computed. Due to the fact that knowledge scores were not normally distributed (by Kolmogorov-Smirnov Test), nonparametric test (Mann-Whitney test and the Kruskal-Wallis test) were used for evaluating relationship between knowledge and demographic variables such as Gender, Marital status, level of Education, and To assess the relationship between attitudes and demographic variables, independent t-test and ANOVA were used. Spearman's correlation coefficient was applied to compute knowledge-attitude correlations. P value of ≤ 0.05 was considered as statistically significant.

3. RESULTS AND DISCUSSION

In this study, 240 questionnaires were distributed among the subjects. Of questionnaires, 219 completed ones were returned (Response rate of 91.25). Present results showed that the mean age of subjects was 33.8 ± 8.22 years. Most subjects were female (75.8%), married (78.1%), auxiliary nurse (67.6%), with work experience less 5 years (34.2%), and Most of them worked more than 40 h per week (74.9%). Of subjects, 94.1% had been vaccinated against HBV. Only 14.6% of subjects controlled their blood Anti HBsAb and majority of them did not control their Anti HBV, Anti HBC and Anti HIV. Of HCWs, 45.2% reported

at least one case of NSIs in their lifetime and 20.10 % (44/219) reported an injury during the last year (Table 1).

Table 1 . Distribution of demographic variable, Immunization and infectivity status of HCWs

Variable	Answer	N (%)
Age	< 30 years old	84(38.4%)
	30-45 years old	87(39.7%)
	> 45 years old	48(21.9%)
Gender	male	53(24.2%)
	female	166(75.8%)
Marital Status	single	48(21.9%)
	married	171(78.1%)
Organizational position	Head nurse	12(5.5%)
	auxiliary nurse	148(67.6%)
	auxiliary nurse mate	59(26.9%)
shift work	morning	26(11.9%)
	night	10(4.6%)
hospital	circle	183(83.6%)
	Ali Ebn Abitaleb	163(74.4%)
	Moradi	26(11.9%)
Work experience	Nik Nafs	30(13.7%)
	< 5 years	75(34.2%)
	5-10 years	32(14.6%)
	11- 15 years	31(14.2%)
	16-20 years	32(14.6%)
The number of hours worked per week	>20 years	49(22.4%)
	≤40 h	55(25.1%)
Ward	>40 h	164(74.9%)
	internal medicine	29(13.2%)
	Surgery	40(18.3%)
	pediatric	15(6.8%)
	neonatal	22(10.0%)
	EMS	30(13.7%)
	Dialysis	5(2.3%)
	ICU	17(7.8%)
	psychiatric	5(2.3%)
	neurosurgery and neurology	14(6.4%)
Trained about universal precaution prior to employment	CCU	21(9.6%)
	maternity	21(9.6%)
HBV Vaccination	Yes	79(36.1%)
	No	140(63.9%)
Hbs Antibody control after HBV Vaccination	Yes	206(94.1%)
	No	13(5.9%)
HBs Ag	Yes	32(14.6%)
	No	187(85.4%)
	Don't Control	141(64.4%)
HBs Ag	Positive	1(0.5%)
	Negative	77(35.2%)
	Don't Control	141(64.4%)

The distributions of knowledge and attitudes scores of subjects are demonstrated in Table 2. As it is clear from results presented in the Table 2, the knowledge score was not desirable but attitudes score was better.

Table 2. The indicates the mean and standard deviation of the knowledge and attitude Score about SPs

Variable	Mean ± SD	median	mode	Item	range
Knowledge	22.9±3.21	24	25	27	0-54
Attitude	43.88±5.3	44	45	9	0-54

Statistical tests like Mann-Whitney test, Kruskal-Wallis test, t-test and ANOVA did not show significant differences between knowledge and attitude with demographic variables such as gender, marital status, level of education, the number of hours worked per week, universal(standard) precautions education prior to job, hepatitis B vaccine, shift work and work experience.

Kruskal-Wallis test showed that there were significant differences between knowledge score and ward, also ANOVA test revealed that there were significant differences between attitude score and hospital, ward and organizational position (Table 3, Table 4).

Table 3. Distribution of Mean Rank of Knowledge & Mean and Std. Deviation of Attitude Score by demographic variable

Variable		Mean Rank of Knowledge Score				Mean and Std. Deviation of Attitude Score				
		N	Mean Rank	P	Test	N	Mean	Std. Deviation	P	Test
Gender	Male	53	117.9	0.29	Mann-Whitney U test	53	43.6	5.87	0.7	T-Test
	female	166	107.5			168	43.9	5.08		
Marital status	Single	48	116.5	0.42		48	43.81	4.98	0.7	
	married	171	108.2			171	43.89	5.36		
Level of Education	Nonacademic	59	114.38	0.53		60	43.28	4.81	0.3	
	Academic	160	108.38			159	44.10	5.42		
The number of hours worked per week	≤40 h	55	104.61	0.46		55	43.72	5.36	0.8	
	>40 h	164	111.81			164	43.92	5.25		
universal(standard) precautions education	Yes	79	109.59	0.94		79	43.67	5.3	0.6	
	No	140	110.23			140	43.99	5.26		
hepatitis B vaccine	Yes	13	132.23	0.19		13	44.84	4.54	0.49	
	No	206	108.60			206	43.81	5.31		

Table 4. Distribution of Mean Rank of Knowledge & Mean and Std. Deviation of Attitude Score by demographic variable

Variable		Mean Rank of Knowledge Score				Mean Rank of Attitude Score				
		N	Mean Rank	P	Test	N	Mean	Std. Deviation	P	Test
Organizational position	Head nurse	12	91.79	0.52	Kruskal-Wallis Test	12	47.66*	4.59	0.02	ANOVA Test
	auxiliary nurse	148	109.73			148	43.87**	5.32		
	auxiliary nurse mate	59	114.38			59	43.11**	5.01		
shift work	morning	26	110.04	0.78		26	45.73	5.48	0.14	
	night	10	96.40			10	44.50	5.68		

	circle	183	110 .74			183	43.57	5.19	
hospital	Ali Ebn Abitaleb	163	104.3 5	0.06		163	43.73	5.32	0.04
	Moradi	26	131.0 6			26	42.50*	4.58	
	Nik Nafs	30	122.4 7			30	45.86*	5.12	
Work experience	< 5 years	75	111.8 1	0.8		75	43.46	4.78	0.1
	5-10 years	32	103.7 2			32	43.00	6.06	
	11- 15 years	31	104.8 2			31	43.12	5.78	
	16-20 years	32	110.1 4			32	46.06	4.64	
	>20 years	49	114.5 2			49	44.12	5.27	
Ward	internal medicine	29	91.78	0.02		29	42.41	4.82	0.001
	Surgery	40	134.4 3			40	44.00	5.95	
	pediatric	15	90.90			15	45.86**	4.54	
	neonatal	22	101.5 5			22	44.86	4.29	
	EMS	30	100.2 8			30	40.36*	5.25	
	Dialysis	5	102.8 0			5	42.20	4.81	
	ICU	17	135.8 2			17	44.88	2.89	
	psychiatric	5	168.5 0			5	40.40	3.20	
	neurosurgery and neurology	14	87.39			14	45.07	5.01	
	CCU	21	102.7 1			21	46.00**	5.10	
	maternity	21	114.2 6			21	45.71**	5.65	

Using Pearson correlation test showed that there was a weak and positive or direct correlation between knowledge and attitude of the SPs ($p=0.03$, $r=0.143$). Our finding revealed that with increased knowledge, attitude was also increased and vice versa. Despite the fact that most of subjects participated in present study were vaccinated against HB, a main proportion of studied staff did not follow up protocols of detecting their immunity levels by testing HBsAg, AntiHBV, AntiHBC and AntiHIV serum concentrations. In a study, Moghimi et al., reported that proximately 76% of vaccinated individuals had completed their vaccination program against HBV whilst only 56.8% had checked anti-HBs levels (9). In other study 68%, 87.2% and 96% of samples vaccinated against HB. With respect to risks nurses and medical staff in the hospital environment, it is necessary to follow up risk of infections in these places (2, 16, 17). In present study, most of the studied staff did not report their HbsAb, HbsAg, Anti HIV and Anti HCV status. Ebrahimi and co-workers showed that 45.6% of Iranian dental practitioners controlled their blood HbsAb (16). Serinken and colleagues reported that 62.9%, 17.7% and 13.7% of the need sticks and sharp injuries in emergency healthcare's of Turkey were HbsAb

positive, negative and indeterminate, respectively (18). In comparison to other similar studies the vaccination status of our studied group is better than others while control of serological tests is lower than other studies (2, 9, 16, 17). The average score of knowledge and attitude of staff regarding SPs were 22.9 ± 3.21 (out of 54) and 43.88 ± 5.3 (out of 54), respectively. In other words, it may mean that the knowledge score is not desirable whilst the attitude score seems promising. Results of a recent study showed that more than half of samples were unaware of washing their hands before and after patient care even none of them had received training in the field of infection control (19). Kim et al. reported that the average knowledge level of the universal precautions (Ups) was 267.8 ± 21.3 out of 300. The knowledge level of the Ups of the nursing students was higher than medical students as reported (18). In almost similar study, Askarian and Assadian demonstrated that the scores of knowledge and attitude towards standard isolation precautions were 6.71 ± 0.99 and 34.99 ± 4.47 , respectively (20). Once compared, results of our study indicated a knowledge score less than Askarian that of study while attitude score was better that of Askarian study. Consistent with our study, in a recent report, Atif et al.

showed that the knowledge of health care professionals regarding application of appropriate protective barriers and disposal of needles in France is still too limited, to an extent that educational interventions are needed for these professional staff (21). Again, in line with our findings, Bakry et al. demonstrated a poor level of knowledge about universal SPs guidelines in HCWs, this group also reported that HCWs do not fully appreciate their occupational risk regarding hepatitis B infection (22). Sreedharan et al. claimed that 61.2% of the staff who were familiar with the concept of SPs believed that the blood and body fluids of all patients are potentially infectious irrespective of their diagnostic status while 27.6% of them thought that only diagnosed patients and 11.2% said that think only suspected cases are potentially infectious. Less than half agreed that SPs aimed to protect both HCWs as well as patients (45.9%) and accordingly their study highlighted that training programs are required for improving knowledge on SPs (23). In Isara and Ofili's study 82.0% of respondents had heard about SPs. Only 37.7% of them had correct knowledge about SPs. There was fair practice and adherence to the SPs by those who knew of it (24). Sharma et al. reported that only 50.2% of HCWs were aware of disease transmission through needle stick/sharp injury (25). Our study re-emphasized that there is an urgent need for evaluating education on infection control practices and SPs in general, as well as for structured infection control programs among nursing and midwifery staff. Our results are in line with those of Askarian et al., who showed that 231(90.9%) of the participants reported that they required additional infection control education, especially on standard isolation precautions. They observed a linear positive correlation between knowledge, practice, and attitude scores for the group of nursing, auxiliary nursing, and midwifery instructors, as well as their students (26). Similarly, this study and several other studies demonstrated a weak but positive correlation between knowledge and attitudes of the SPs so that with increased knowledge, attitude will also increase and vice versa (18, 20, 27). Overall, according to the findings of present research in parallel with other studies (19, 21, 25, 28). It could possibly be suggested that educational programs with the basis of blood-borne infections, infection control, safety recommendations and various aspects of standard precautions are required. These standard precautions are importantly required for either changing or improving the knowledge and attitude of nursing staff before and following medical services.

4. CONCLUSION

The study highlights were a need for important programs to knowledge improve on SPs. The major limitations of the current study were the issue of filling out the questionnaire since in practice it was not feasible for the researcher to supervise all of the participants in the study and control the options with them one by one. In addition, research investigated some occupational exposure retrospectively;

another limitation is that our study there was a geographical Location.

Funding/ Support

By research committee of Tarbiat Modares University provided the financial support.

ACKNOWLEDGMENT

We thank all nursing personnel and, the research committee in the Rafsanjan University of Medical Sciences and Tarbiat Modares University who approved & supported our research.

AUTHORS CONTRIBUTION

This work was carried out in collaboration among all authors.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

REFERENCES

- Ojulong J, Mitonga K, lipinge S. Knowledge and attitudes of infection prevention and control among health sciences students at University of Namibia. *African health sciences*. 2014;13(4):1071-8.
- Azap A, Ergönül Ö, Memikoğlu KO, Yeşilkaya A, Altunsoy A, Bozkurt G-Y, et al. Occupational exposure to blood and body fluids among health care workers in Ankara, Turkey. *American journal of infection control*. 2005;33(1):48-52.
- Vossughinia H, Goshayeshi L, Bayegi HR, Sima H, Kazemi A, Erfani S, et al. Prevalence of hepatitis C virus genotypes in Mashhad, Northeast Iran. *Iranian journal of public health*. 2012;41(9):56.
- Shaghaghian S, Pardis S, Mansoori Z. Knowledge, attitude and practice of dentists towards prophylaxis after exposure to blood and body fluids. *The international journal of occupational and environmental medicine*. 2014;5(3 July):379-146-54.
- Askarian M, Shaghaghian S, McLaws M-L. Needlestick injuries among nurses of Fars province, Iran. *Annals of epidemiology*. 2007;17(12):988-92.
- Ayranci U, Kosgeroglu N. Needlestick and sharps injuries among nurses in the healthcare sector in a city of western Turkey. *Journal of Hospital Infection*. 2004;58(3):216-23.
- Smith DR, Choe M-A, Jeong JS, Jeon M-Y, Chae YR, An GJ. Epidemiology of needlestick and sharps injuries among professional Korean nurses. *Journal of professional nursing*. 2006;22(6):359-66.
- Tarantola A, Golliot F, Astagneau P, Fleury L, Brückner G, Bouvet E, et al. Occupational blood and body fluids exposures in health care workers: four-year surveillance from the Northern France network. *American journal of infection control*. 2003;31(6):357-63.
- Moghimi M, Marashi SA, Kabir A, Taghipour HR, Faghihi-Kashani AH, Ghoddoosi I, et al. Knowledge, attitude, and practice of Iranian surgeons about blood-borne diseases. *Journal of Surgical Research*. 2009;151(1):80-4.
- Hassanshahi G, Arababadi MK, Assar S, Hakimi H, Karimabad MN, Abedinzadeh M, et al. Post-transfusion-transmitted hepatitis C virus infection: a study on thalassemia and hemodialysis patients in southeastern Iran. *Archives of virology*. 2011 Jul;156(7):1111-5. PubMed PMID: 21340738. Epub 2011/02/23. eng.
- Alam M. Knowledge, attitude and practices among health care workers on needle-stick injuries. *Ann Saudi Med*. 2002;22(5-6):396-9.
- Godin G, Naccache H, Morel S, Ébacher M-F. Determinants of nurses' adherence to universal precautions for venipunctures. *American journal of infection control*. 2000;28(5):359-64.
- Luo Y, He G-P, Zhou J-W, Luo Y. Factors impacting compliance with standard precautions in nursing, China. *International Journal of Infectious Diseases*. 2010;14(12):e1106-e14.
- Askarian M, Honarvar B, Tabatabaee H-R, Assadian O. Knowledge, practice and attitude towards standard isolation precautions in Iranian medical students. *Journal of Hospital Infection*. 2004;58(4):292-6.
- Kabir A, Tabatabaee SV, Khaleghi S, Agah S, Kashani AHF, Moghimi M, et al. Knowledge, attitudes and practice of Iranian medical specialists regarding hepatitis B and C. *Hepatitis monthly*. 2010;10(3):176.
- Ebrahimi M, Ajami BM, Rezaeian A. Longer years of practice and higher education levels promote infection control in Iranian dental practitioners. *Iranian Red Crescent medical journal*. 2012 Jul;14(7):422-9. PubMed PMID: 22997558. Pubmed Central PMCID: PMC3438435. Epub 2012/09/22. eng.

17. Serinken M, Karcioglu O, Kutlu SS, Sener S, Keysan MK. A survey of needlesticks and sharp instrument injuries in emergency health care in Turkey. *Journal of emergency nursing: JEN : official publication of the Emergency Department Nurses Association*. 2009 Jun;35(3):205-10. PubMed PMID: 19446124. Epub 2009/05/19. eng.
18. Kim KM, Kim MA, Chung YS, Kim NC. Knowledge and performance of the universal precautions by nursing and medical students in Korea. *Am J Infect Control*. 2001 Oct;29(5):295-300. PubMed PMID: 11584254. Epub 2001/10/05. eng.
19. Abou El-Enein NY, El Mahdy HM. Standard precautions: a KAP study among nurses in the dialysis unit in a University Hospital in Alexandria, Egypt. *The Journal of the Egyptian Public Health Association*. 2011;86(1-2):3-10. PubMed PMID: 21527834. Epub 2011/04/30. eng.
20. Askarian M, Assadian O. Infection control practices among dental professionals in Shiraz Dentistry School, Iran. *Archives of Iranian medicine*. 2009 Jan;12(1):48-51. PubMed PMID: 19111029. Epub 2008/12/30. eng.
21. Atif ML, Brenet A, Hageaux S, Fave MH, Cochet C, Baticle E, et al. Awareness of standard precautions for 4439 healthcare professionals in 34 institutions in France. *Medecine et maladies infectieuses*. 2013 Jan;43(1):10-6. PubMed PMID: 23290383. Epub 2013/01/08. eng.
22. Bakry SH, Mustafa AF, Eldalo AS, Yousif MA. Knowledge, attitude and practice of health care workers toward Hepatitis B virus infection, Sudan. *The International journal of risk & safety in medicine*. 2012;24(2):95-102. PubMed PMID: 22751191. Epub 2012/07/04. eng.
23. Sreedharan J, Muttappillymalil J, Venkatramana M. Knowledge about standard precautions among university hospital nurses in the United Arab Emirates. *Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit*. 2011 Apr;17(4):331-4. PubMed PMID: 22259892. Epub 2012/01/21. eng.
24. Isara AR, Ofili AN. Knowledge and practice of standard precautions among health care workers in the Federal Medical Centre, Asaba, Delta State, Nigeria. *The Nigerian postgraduate medical journal*. 2010 Sep;17(3):204-9. PubMed PMID: 20852660. Epub 2010/09/21. eng.
25. Sharma S, Gupta A, Arora A. Knowledge, attitude and practices on needle-stick and sharps injuries in tertiary care cardiac hospital: a survey. *Indian journal of medical sciences*. 2010 Sep;64(9):396-401. PubMed PMID: 23006418. Epub 2010/09/01. eng.
26. Askarian M, Memish ZA, Khan AA. Knowledge, practice, and attitude among Iranian nurses, midwives, and students regarding standard isolation precautions. *Infection control and hospital epidemiology*. 2007 Feb;28(2):241-4. PubMed PMID: 17265414. Epub 2007/02/01. eng.
27. Sax H, Perneger T, Hugonnet S, Herrault P, Chraitit MN, Pittet D. Knowledge of standard and isolation precautions in a large teaching hospital. *Infection control and hospital epidemiology*. 2005 Mar;26(3):298-304. PubMed PMID: 15796284. Epub 2005/03/31. eng.
28. Paiva MH, de Oliveira AC. [Knowledge and attitudes of workers from a public emergency service about the adoption of standard precautions]. *Revista brasileira de enfermagem*. 2011 Jul-Aug;64(4):704-10. PubMed PMID: 22378517. Epub 2012/03/02. Conhecimento e atitudes de trabalhadores de um servico publico de emergencia sobre adocao de precaucoes padrao. por.