Conditions in which nurses are exposed to the hepatitis viruses and precautions taken for prevention

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KEY WORDS

hepatitis b; hepatitis c viruses; compare; prevention; nurse

ABSTRACT

Objective
The aim of this study is to evaluate the exposure status of nurses to hepatitis B and C, and to determine the precautionary measures taken for protection from these infections.

Design
This descriptive study was performed between February and May 2008 among nurses working in surgery and internal medicine wards.

Setting
A total of 300 nurses working in the Aziziye Research Hospital and Yakutiye Research Hospital.

Subject
The nurses included in the study comprised those who had three different levels of education, namely undergraduate, associate degree and high school. The data were collected via a questionnaire composed of 34 questions. The questionnaire consisted of questions on socio-demographic characteristics, questions for estimating the frequency of exposure to blood and bodily fluids, questions about precautions, and questions for estimating HBV, HCV and the vaccination status of the nurses.

Main outcome measure(s)
A questionnaire developed by the researchers and data collected through a review of literature.

Result
The results of completed questionnaires were collated, and Chi-square test and percentage tests was used for analysis. 94.9% of the nurses participating in the study stated they had contact with blood and bodily fluids, and 75.8% of them had taken precautions during contact. The mostly commonly used preventive methods were hand washing before and after the invasive procedures on the patients (85.6%), hand washing between the invasive procedures on different patients (69%), and use of gloves (67.9%), respectively. The least used method was wearing protective glasses (0.2%). Among the distribution, injuries whilst replacing the cap of the syringe were leading (87.7%), and the least frequent were injuries sustained during the disposal of medical waste (54.6%). It was seen that 20.5% of the nurses in the study had undergone vaccination for hepatitis B. Majority of the nurses who had not had the vaccination (12.6%) stated they had not yet had the opportunity.

Conclusions
As a result of the study, it was found almost all of the nurses had been in contact with blood and bodily fluids. Above all healthcare workers should receive periodic training on universal precautions, with a view on improving the overall safety of patients and healthcare workers.

INTRODUCTION

Healthcare workers (HCWs) are at risk of occupational hazards when performing their clinical activities in the hospital setting. They are exposed to blood-borne infections by pathogens, such as HIV, hepatitis B (HBV) and hepatitis C (HCV), from sharps injuries and contact with bodily fluids (Ramos-Gomez et al 1997; Gerbending 1994; Ruben et al 1983).

Worldwide, more than two billion people are infected with HBV (Centres for Disease Control and Prevention 1989). In Turkey, about four million people, constituting 4.8% of the population, are estimated to be carriers of chronic HBV (Bilgic and Ozacar 2001; Tasyaran 2001). Hepatitis B seroprevalence studies conducted in hospitals in Turkey have shown HBsAg positivity rates of four to 15% (Bilgic and Ozacar 2001; Tasyaran 2001; Akova 1997; Badur 1994; Pamukcu et al 1990; Tekeli et al 1988).

Nearly 170 million of the world's population have been infected with HCV. Between 0 and 2% of the blood donor population in Turkey have been found to be HCV antibodily positive (Bilgic and Ozacar 2001; Tasyaran 2001), while anti-HCV prevalence within the Erzurum, Turkey community has been found to be 0.2% (Deniz 2003).

The World Health Organization (WHO) estimates about 2.5% of HIV cases among HCWs and 40% of hepatitis B and C cases among HCWs worldwide are the result of these exposures (WHO 2002).

According to a European survey of occupational exposure of HCWs to NSSIs, nurses were found to be exposed more commonly (91%) than doctors (6%) and phlebotomists (3%) (Public Health Laboratory Service AIDS and STD Centre 1999). There is a general consensus that nurses are at the greatest risk of an NSSI, with up to 50% of all NSSIs being sustained by this group (May and Brewer 2001; Hanrahan and Reutter 1997).

There is no immunisation for HIV and hepatitis C. It is important to prevent infection by preventing exposure. Since identification of patients infected with blood-borne pathogens cannot be reliably made by medical history and physical examination, universal precautions have been recommended by the Centres for Disease Control (CDC) to be used on all patients (CDC 1986; 1985).

Universal precautions are simple infection prevention control measures that reduce the risk of transmission of blood-borne pathogens through exposure to blood and bodily fluids among patients and HCWs. Compliance with these universal precautions has been shown to reduce the risk of exposure to blood and bodily fluids (Chan et al 2002).

The level of practice of universal precautions by HCWs may differ from one HCW to another. The differences in the level of knowledge of universal precautions by HCWs may be influenced by the varying types of training (Ofili et al 2003; Chan et al 2002). The absence of an enabling environment in the health institution, such as lack of constant running water or a shortage of personal protective equipment (PPE) would lead to poor compliance with universal precautions.

The aim of this study is to evaluate the exposure status of nurses to hepatitis B and C, and to determine the precautionary measures taken for protection from these infections.

METHOD

This descriptive study was performed between February and May 2008 among nurses working in the surgery and internal medicine wards, of two Turkish hospitals. A total of 300 nurses work in the Aziziye Research Hospital (with bed capacity of 384) and the Yakutiye Research Hospital (with a bed capacity of 326), with a total bed capacity of 620 in the two hospitals. Seven nurses could not be reached due to various reasons. The nurses included in the study comprised those who had three different levels of education, namely undergraduate, associate degree and high school. The data were collected by a questionnaire comprising of 34 questions. The questionnaire consisted of questions: on socio-demographic characteristics (age, education level, department

and working hours); for estimating the frequency of exposure to blood and bodily fluids; about precautions; and questions for estimating HBV, HCV and the vaccination statuses of the nurses.

Permission was obtained from the Ethical Committee of the Health Science Institute of the university and informed consent was obtained from each participant.

Before performing the questionnaire, the aim of the study was explained to the nurses; the supervising nurses were contacted and a suitable time in which the workload was low had been arranged. The questionnaire was completed by the nurses under the supervision of investigators. The time for completing the questionnaire was 15-20 minutes.

Statistical analysis

Statistical analyses of the data were performed using the Statistical Package of Social Science (SPSS 11.5) computer program. Data analyses were performed using the chi-square and percentage tests. $P < 0.05$ was considered statistically significant.

FINDINGS

The mean age of the nurses was 28.36±6.22. 33.4% of the nurses had an undergraduate level of education, and 52.6% of the nurses were found to have been working for one to five years.

Table 1: Nurses contact with blood, bodily fluids and precaution status of nurses during contact.

Characteristics	n	%
Contact with blood and bodily fluids		
Yes	278	94.9
No	15	5.1
Precautions taken during contact		
Yes	222	75.8
No	44	15.0
Could not remember	27	9.2

94.9% of the nurses participating in the study stated they had contact with blood and bodily fluids, and 75.8% of them had taken precautions during contact (table 1). Although the difference was not statistically significant, it was found that nurses (34.5%) that had graduated from undergraduate education had more frequent contact with blood and bodily fluids ($p>0.05$). It was estimated that nurses that had graduated from undergraduate education had taken much more precautionary measures (37.8%). The difference was statistically significant ($p<0.05$). Although statistically insignificant, the nurses that had been working for one to five years had much more contact with blood and bodily fluids (51.8%), and took much more precautionary measures during contact (54.1%) ($p>0.05$).

The mostly commonly used preventive methods were hand washing before and after invasive procedures on the patients (85.6%), hand washing between invasive procedures on different patients (69%), and use of gloves (67.9%), respectively. The least used method was wearing protective glasses (0.7%) (table 2).

The study found the use of double-gloves was more prominent among undergraduate nurses (47.6%) and nurses who had been working for one to five years (66.7%). However, there was no statistically significant difference between education levels and working years of nurses.

Majority of nurses (50.5%) that had contact with blood or bodily fluids preferred to have their hepatitis markers checked. There was no statistical significant difference between education levels and working years of nurses and the methods preferred after contact ($p>0.05$). It was seen that most of the nurses (43.5%) who had not

taken any action after the contact were high school graduates. Furthermore, majority of the nurses (52%) who preferred to check their hepatitis markers after the contact were found to have been working for one to five years. Most of the nurses who had searched for the presence of HCV or HBV in the patients they had contact with, were of the undergraduate education level (41.7%) and had been working for one to five years (46%). The difference was statistically significant ($p<0.05$).

Table 2: Distribution of the precautions taken by the nurses and actions taken following contact.

Characteristics	n	%
Use of barrier methods*		
Gloves	199	67.9
Double gloves	42	14.3
Uniform	33	11.3
Mask	36	12.3
Protective glasses	2	0.7
All of them	9	3.1
Do not remember	52	17.7
Washing hands before and after the procedure		
Yes	251	85.6
No	42	14.4
Washing hands between care of different patients		
Yes	202	69.0
No	91	31.0
Actions taken in case of contact with blood and bodily fluids*		
Checking the results of hepatitis markers	148	50.5
Checking whether the patient had HBV and HCV	139	47.4
Making the contact/injured area bleed	73	24.9
Washed the contact/injured area with cold water	89	30.4
Washed the contact/injured area with alcohol	35	11.9
Washed the contact/injured area with iodine solution	145	49.5
Did nothing	23	7.8

* Percentages were obtained according to the answers, because more than one answer was given by one nurse

Table 3: Distribution of nurses' contact with blood and bodily fluid.

Characteristics	n	%
Needle injury to hand		
No injury	39	13.3
Injury	254	86.7
Injury whilst replacing the needle cap		
No injury	36	12.3
Injury	257	87.7
Blood and bodily fluid contact with eye/mucosa		
No contact	78	26.6
Contact	215	73.4
Injury with sharp objects like scalpel, needle etc.		
No injury	99	33.8
Injury	194	66.2
Injury during disposal of medical waste		
No injury	133	45.4
Injury	160	54.6

Among the distribution, injuries whilst replacing the cap of the syringe were leading (87.7%), and the least frequent were sustained during the disposal of medical waste (54.6%) (table 3).

It was seen that injuries occurring due to sharp objects like scalpels and suture needles, and contact with blood and bodily fluids were most prominent among nurses who were of undergraduate education level (38.9%). The difference was found to be statistically significant ($p<0.05$).

When the working years of nurses were compared with the method of exposure to blood and bodily fluids, it was seen that 52.3% of nurses working from one to five years expirenced injuries due to needlestick pricks. The difference was statistically significant ($p<0.05$).

Table 4: Distribution of serological tests and vaccination of nurses.

Characteristics	n	%
Tests for presence of HBV		
Yes	278	94.9
No	15	5.1
Results of test		
Carrier	21	7.2
Vaccinated	209	71.3
Never come across the virus	48	16.3
Not known	15	5.2
Vaccination for HB		
Yes	234	79.5
No	59	20.5
Reason for not being vaccinated against hepatitis B (n:59)		
Unable to find opportunity	37	12.6
Thought that they were not at risk	2	0.7
Did not trust the protective role of the vaccine	4	1.4
Fear of side effects of the vaccine	3	1.0
Had hepatitis before	13	4.4
Tests for HCV existence		
Yes	166	56.7
No	127	43.3
Results of test for the presence of HCV		
Present	1	0.4
Absent	292	99.6

The study found 20.5% of the nurses had undergone vaccination for hepatitis B. Majority of the nurses who had not been vaccinated (12.6%) stated they had not had the opportunity to have the vaccination.

As a result of the study, it was found that 47.6% of the nurses, who were of undergraduate education level and had worked for one to five years, were carriers. Among the nurses who had not undergone vaccination, 40.7% were high school graduates and 52.5% had been working for one to five years. The difference between hepatitis B vaccination and education level, and the number of years worked was statistically insignificant ($p>0.05$).

While researching the reasons for not being vaccinated, it was found half of the nurses who did not believe the protective role of vaccination were high school graduates and the other half were undergraduates. The

nurses, who had not been vaccination due to the side effects, were all nurses who had been working for one to five years. The difference between the reasons for non-vaccination, the education level, and the number of working years was statistically insignificant ($p>0.05$).

Among the nurses who had not undergone testing for hepatitis C, it was seen that the majority of them (37%) were high school graduates and 61.4% had been working for one to five years.

There was a statistically significant difference between the working years and having been tested for hepatitis C ($p<0.05$), but no statistically significant difference was found between the educational level and having been tested for hepatitis C ($p>0.05$).

DISCUSSION

As a result of the study, it was found almost all of the nurses (94.9%) had been in contact with blood and bodily fluids. The results were found to be concordant with that of the literature (Erol et al 2005; Çelik 2006).

This may be explained by the insufficient number of nurses at work sites, the insufficient number of medical devices, lack of attention, a desire to finish the work quickly due to the length of some operations, poor organisation, heavy workloads, and multiple or repeated attempts to complete a procedure (Johnson et al 1998; Clarke et al 2002).

It was determined that the nurses who had been working for one to five years had more contact with blood and bodily fluids. In recent studies, it was found that hepatitis B serum marker positivity was high among nurses in the first five years (Averhofth et al 2002). This emphasised the importance of experience in nursing.

When the education levels of nurses and contact with blood and bodily fluids were compared, it was seen that undergraduate nurses had much more contact with blood and bodily fluids. The reason for this result may be due to the high workload, and place of work in which there was an inadequate number of healthcare providers.

It was found majority of the nurses (75.8%) had taken precautions during contact. These results were found to be similar with those of the recent studies (Çelik 2006).

When the number of working years of nurses and contact with blood and bodily fluids were evaluated, it was determined that nurses working for one to five years had taken more precautionary measures. This result demonstrated that nurses working for one to five years had not forgotten the information provided during their training.

When the relationship between educational levels of nurses and precautions taken during contact were investigated, undergraduate nurses were seen to have taken much more precaution.

It was found that the most frequently used preventive methods were hand washing before and after invasive procedures on patients. Wearing gloves followed.

Sadoh et al (2006), found washing hands before and after invasive procedures on patients and wearing gloves were the two most preferred methods, respectively. Being easier than the other methods and also being important for personal hygiene, washing hands could be effective in obtaining this result. It was found that wearing protective glasses was the least used protective method. In the study by Jeong et al (2008) it was found that the use of protective glasses was also low.

Nurses of undergraduate educational level were found to be those who mostly wore double gloves. It was found in a study by Jeong et al (2008) that healthcare providers were wearing double gloves more and more.

Half of the nurses stated they had checked their hepatitis markers after contact with blood and bodily fluids. Most of the nurses (43.5%) who had taken no action after the contact were high school graduates. Most of the nurses, who had searched for the presence of HBV and HCV in their patients, had been working for one

to five years and were university graduates. A previous study determined a vast majority of nurses knew what to do after contact with hepatitis patients (Ayranci and Köşgeroğlu 2004).

These results showed that nurses need education programs on this subject. It was found that needlestick injuries were the most frequent way of contact with blood and bodily fluids in nurses, and this result is the same as that in previous studies (Ayranci and Köşgeroğlu 2004; Hamory 1983; Dokuzoğlu 1999; Guo et al 1999; Smoot 1998; Shiao et al 2002; Trim and Elliott 2003; McCormick and Maki 1981; Erbay et al 2002).

When the method of contact with blood and bodily fluids was evaluated according to the educational levels, needle and sharps injuries were more frequently seen in inexperienced (one to five years) and undergraduate nurses. The lower degree of experience for nurses who had been working for lesser number of years may affect the results. This finding clearly indicates that nurses need some form of educational program on the prevention of needle and sharps injuries.

Although the vaccination rate against hepatitis in previous studies was found to be 32.4%, the vaccination rate in this study was 20%. The most preverlent reason among the nurses for not having been vaccinated (12.6%) was the inability to find an opportunity to be vaccinated. These results were concordant with that of previous studies (Çelik 2006; Ayranci and Köşgeroğlu 2004; Doğan 2005; Pamukçu 1989). This could be solved by the implementation of a locally funded inoculation program in order to reduce the problems of chronic hepatitis.

Generally the unvaccinated nurses were high school graduates, and had been working for one to five years. While most of the nurses (66.7%) working for one to five years specified the fear of side effects of the vaccine for not having been vaccinated, half of the high school graduate nurses found the vaccine untrustworthy. This showed that the nurses need education on the importance of vaccination against hepatitis B.

It was found that most of the carriers (47.6%) were nurses who had been working for a shorter period of time (one to five years). This result was similar with the results of studies performed previously by Ayranci and Köşgeroğlu (2004).

Needle and sharps injuries were seen more frequently in the first years of nursing. In addition, this result stresses nurses entering the profession should be educated on universal precautions and be immunised. In agreement with Eholie et al (2002) the authors believe the prevention of needle and sharps injuries through education and training of healthcare personnel for universal precautions is of great importance.

CONCLUSION

All healthcare workers should be vaccinated against the hepatitis-B virus to reduce the risk of hepatitis-B blood infection. All medical facilities should establish a post-exposure prophylaxis program for the protection of healthcare workers who experience needlestick injuries. Above all, healthcare workers should receive periodic training on universal precautions, with a view on improving the overall safety of patients and healthcare providers.

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