



An Evaluation of Health Personnel Exposed to Occupational Injuries in Terms of HBV, HCV, and HIV Infections

Mesleki Yaralanmalara Maruz Kalan Sağlık Personellerinin HBV, HCV, HIV Enfeksiyonları Açısından Değerlendirilmesi

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ABSTRACT

Objectives: This study aims to determine the rates, distribution and risk factors of needle-stick and sharps injuries that cause diseases spread through blood and body fluids, to discuss relevant precautions, and to monitor seroconversion conditions of viral hepatitis and human immunodeficiency virus (HIV) in injured health personnel in our hospital.

Materials and Methods: The data recorded by the Infection Control Committee about health personnel who were exposed to blood or body fluids as a result of needle-stick and sharps injuries between January 2018 and May 2020 were analyzed retrospectively. The results were presented as percentages.

Results: A total of 187 health workers were included in the study. The injuries were most common among nurses 48.66%. The most common instrument causing needle-stick and sharps injuries was needle tip 80.8%. In addition, 89.85% of them were vaccinated for hepatitis B. According to the serological status of infected sources, 8.02% were infected with hepatitis B, 10.16% with hepatitis C and 2.67% with HIV. No seroconversion was observed in the injured personnel.

Conclusion: Although health workers are given regular training on occupational hazards during recruitment and employment, they still face risky injuries. Therefore, all health personnel should be informed to raise their awareness of blood-borne infections, undergo medical screening regularly, and have up-to-date vaccines.

Keywords: Health personnel, sharp injuries, viral hepatitis

ÖZ

Amaç: Bu çalışmada hastanemizde kan ve vücut sıvıları ile bulaşan hastalıklara yol açan kesici delici alet yaralanma oranlarını, dağılımlarını, risk faktörlerini tespit etmek, alınacak önlemleri irdelemek, bu kazalardan sonra yaralanan personelin viral hepatitler ve insan immün yetmezlik virüsü (HIV) serokonversiyon durumlarını takip etmeyi amaçladık.

Gereç ve Yöntemler: Ocak 2018-Mayıs 2020 yılları arasında kesici delici alet yaralanması sonucu kan veya vücut sıvısıyla temas eden sağlık personelinin Enfeksiyon Kontrol Komitesi tarafından kayıt altına alınan verileri retrospektif olarak irdelendi. Sonuçlar yüzdeler birim olarak ifade edildi.

Bulgular: Çalışmamıza mesleki yaralanmaya maruz kalan 187 personel dahil edildi. Yaralanmalar en sık hemşire grubundaydı %48,66. Yaralanma aleti en fazla iğne ucuyla %80,8 gerçekleşmekteydi. Personelin %89,85'inin hepatit B aşısı vardı. Kaynağın serolojik durumu incelendiğinde %8,02 hepatit B, %10,16 hepatit C, %2,67 HIV ile enfekte idi. Yaralanan personellerin hiçbirinde serokonversiyon saptanmadı.

Sonuç: Sağlık çalışanlarına işe girişte ve çalışma süreleri boyunca düzenli eğitim verilmesine rağmen halen riskli yaralanmalarla karşı karşıya kalınmaktadır. Tüm personel kanla bulaşan enfeksiyonlar konusunda bilinçlendirilmeli, taramaları yapılmalı, aşıları tamamlanmalıdır.

Anahtar Kelimeler: Sağlık personeli, kesici ve delici alet yaralanmaları, viral hepatit

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Introduction

Health workers are at risk for blood-borne infections due to procedures performed during health care services. This risk varies depending on gender of the agent, viral load of the source, type of the exposure, and prevalence of the disease (1). Studies have reported that more than 20 pathogens can be causative agents for needle-stick and sharps injuries (2,3). The most common of these pathogens are hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV), which can cause mortality and morbidity (4,5).

Infection can occur mainly via percutaneous route due to injector or sharp object injuries or disruption of skin integrity as a result of damage to the skin, or via mucosal route due to splashing/spraying of blood or body fluids into mucosal surfaces (eyes, nose, mouth). HIV, HBV and HCV cannot penetrate intact skin and are not transmitted through air. Since the prevalence of HBV, HCV and HIV infections are high in developing countries, health workers in these countries are at higher risk for blood-borne infections (6).

Risky injuries most commonly occur in medical personnel due to sharp objects (7). The risk of infection in needle-stick and sharps injuries varies between 0.2-0.5% for HIV and increases up to 3-10% for HCV and 40% for HBV (8). Occupational exposures cause anxiety and stress in health workers. Personnel injuries create a huge burden on society in terms of treatment costs and loss of labor (9).

In 1987, the Centers for Disease Control and Prevention published universal measures on awareness, immunization, waste control and post-contact prophylaxis to protect employees, emphasizing that being careful and taking necessary actions would reduce injuries (10). The World Health Organization has published a guidance intended to reduce the risk of infection to health personnel through safe injection (11).

The rate of reporting needle-stick and sharps injuries is low, which may endanger occupational hazard assessments and prophylaxis measures for HIV and HBV (12). This study aimed to evaluate, prevent and reduce the injuries associated with blood and body fluids in our hospital.

Materials and Methods

This study retrospectively analyzed the data recorded by the Infection Control Committee about health personnel who were exposed to blood or body fluids as a result of needle-stick and sharps injuries between January 2018 and May 2020 in İstanbul Medeniyet University, Göztepe Training and Research Hospital. Data on gender, profession, place of injury, tool of injury, immune status, use of protective equipment, cause of injury, infection status of injured organ and source, and prophylaxis and follow-up for injured health workers were recorded.

This study was approved by İstanbul Medeniyet University, Göztepe Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology (approval number: 2020/0149, date: 24.06.2020).

Statistical Analysis

The results were presented as percentages.

Results

A total of 187 health workers exposed to injury were included in the study. Of them, 126 (67.38%) were female and 61 (32.62%) were male; 165 (88.23%) were injured by needle-stick and sharp objects and 22 (11.77%) were injured by mucosal contact. Most of the needle-stick and sharps injuries were superficial (n=106, 64.24%), and the most common sites of injury were the hands/arms (n=161, 97.57%). The most frequent cause for injury was reported as the personnel's own fault (n=136, 72.72%), and the most common sharp instrument causing needle-stick and sharps injuries was needle tip (n=133, 80.8%), followed by suture needle (n=8, 4.8%), and branule (n=6, 3.6%). Mucosal contacts occurred most frequently due to blood splashes (n=19, 86.36%). Most of the health personnel (n=147, 78.61%) were using personal protective equipment during the injury (Table 1). The injuries were most common among nurses (n=91, 48.66%), followed by interns (n=41, 21.92%), doctors (n=23, 12.29%) and cleaning/support staff (n=23, 12.29%) (Figure 1). The injuries were most frequently occurred in internal and surgical clinics (n=83, %44.38), followed by intensive care units (n=33, 17.64%), emergency room (n=27, 14.43%), and operating rooms (n=18, 9.62%). Of those in

Table 1. Distribution of the injured health personnel by gender, type of injury, tool of injury, severity of injury, site of injury, use of protective equipment, and cause of exposure

Features	Number	%
Gender	187	-
Female	126	67.38
Male	61	32.62
Type of injury	187	-
Percutaneous	165	88.23
Mucosal	22	11.77
Tool of injury	165	-
Needle tip	133	80.8
Suture needle	8	4.8
Branule	6	3.6
Bisturi	5	3
Lancet	2	1.2
Other	11	6.6
Severity of injury	165	-
Superficial	106	64.24
Deep	59	35.76
Site of injury	165	-
Hand-arm	161	97.57
Foot-leg	4	2.43
Use of protective equipment	187	-
Yes	147	78.61
No	40	21.39
Cause of exposure	187	-
One's own fault	136	72.72
Someone else's fault	51	27.28

the clinics, 43 (51.81%) were in internal clinics and 40 (48.19%) were in surgical clinics. In addition, 168 (89.85%) of the injured health personnel were vaccinated for HBV, 16 (8.56%) had natural immunity, 2 (1.06%) were unvaccinated, and 1 (0.53%) was a hepatitis B carrier. Moreover, 86 (52.12%) of them were vaccinated, whereas 79 (47.88%) were unvaccinated for tetanus. According to the serological status of infected sources, 15 (8.02%) were infected with hepatitis B, 19 (10.16%) with hepatitis C, and 5 (2.67%) with HIV (Table 2). Both immunization and prophylaxis were applied to the injured personnel. No seroconversion was observed in these personnel during six-month follow-up period.

Job Classifications

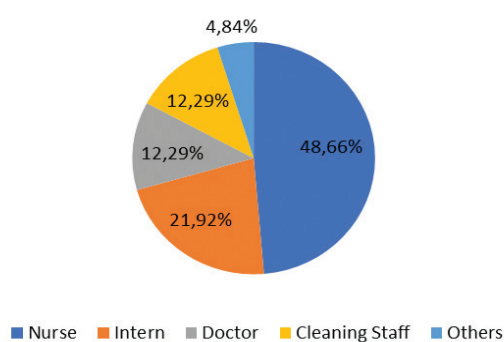


Figure 1. Distribution of health personnel by profession

Features	Number	%
Place of injury	187	-
Clinic	83	44.38
Intensive care unit	33	17.64
Emergency room	27	14.43
Operating room	18	9.62
Blood collection unit	9	4.81
Other	17	9.12
HBV vaccine status	187	-
Vaccinated	168	89.85
Natural immune	16	8.56
Carrier	1	0.53
Unvaccinated	2	1.06
Tetanus vaccine status	165	-
Vaccinated	86	52.12
Unvaccinated	79	47.88
Source	187	-
HBV	15	8.02
HCV	19	10.16
HIV	5	2.67
Unknown	148	79.14

HBV: Hepatitis B virus, HCV: Hepatitis C virus, HIV: Human immunodeficiency virus

Discussion

Healthcare-related injuries in health workers can be prevented, but they are a frequently encountered problem in medical field. In this study, the injuries were most common among nurses (48.66%), which is consisted with those of studies previously conducted in both Turkey and across the world. Nurses were reported as the healthcare professional group most exposed to injuries with a percentage of 54.8% by Yılmaz et al. (13), 39.1% by Satılmış and Şahin (14), 60.8% by Karadeniz et al. (15), and 42.2% by Çağlar-Özer et al. (16) Badiiee-aval et al. (17) stated that the most common occupational injuries were observed in nurse groups in their multicentric researches, also Motaarefi et al. (18) reviewed 11 articles and archived same result. This may be because nurses are the main healthcare personnel who most administer intravenous treatments to patients and involve in blood collection and care services, therefore they may not be careful enough and may not wear protective equipment by acting hastily during these procedures due to intense work shifts and heavy workload. In this study, 78.61% of the health personnel exposed to injuries used protective equipment during the injury, and 72.72% of them were injured because of their own fault.

Over 75% of occupational injuries in health workers are considered percutaneous (19). In this study, 88.23% of the injured health personnel had percutaneous injuries and 11.77% were injured by mucosal contact. In particular, 64.24% of the percutaneous injuries were superficial tissue injuries, and 86.36% of the mucosal injuries occurred due to blood splashes. Similar to this study, Tao et al. (20) retrospectively examined a total of 155 occupational exposures in China and found that most of the injuries (89.03%) were percutaneous. Needle tip was found as the most common instrument causing needle-stick and sharps injuries with a percentage of 80.8% by the present study, 86.1% by Karacaer et al. (21), 52.2% by a survey study involving 8645 health workers in Taiwan (22), and 74.2% by Kesmez-Can and Sezen (23). This study found that the most common sites of injury were the hands/arms (97.57%), which is consistent with those reported by previous studies (14,16,23).

In this study, the injuries were most frequently occurred in clinics (44.38%), followed by intensive care units (17.64%) and emergency room (14.43%). In addition, 51.81% and 48.19% of the injuries in clinics occurred in internal and surgical clinics, respectively. The most common injury occurred during blood glucose measurement processes, especially when the needle was reclosed with the cap. Similarly, medical injuries were most observed in internal clinics by Çağlar-Özer et al. (16), in surgical clinics by Özakar-Akça and Aydın (24), and in emergency rooms by Dizili-Yelgin et al. (25).

In Turkey, the positivity rates of hepatitis B surface antigen and anti-HCV antibody for healthy population were reported as 6.8% and 0.5%, respectively; and the rates for health workers as 4.8% and 0.7%, respectively (26). Hepatitis B vaccine, one of the preventive measures, has been available since 1982, and was started to administer on health workers since 1987 (27). In this study, 89.85% of the injured health personnel were vaccinated for hepatitis B, 8.56% had natural immunity, 1.06% were unvaccinated and 0.53% were hepatitis B carriers. When the injuries were examined according to the source, 8.02% were

infected with HBV, 10.16% with HCV and 2.67% with HIV. In injuries caused by instruments contaminated with hepatitis B, the injured personnel whose anti-HBs antibody level is below <10 mIU/mL are administered hepatitis B immunoglobulin and three doses of vaccination. In this study, as the personnel injured by instruments contaminated with hepatitis B had anti-HBs titer above 10mIU/mL, they were not administered hepatitis B prophylaxis. The personnel injured by HIV-infected sources were administered Tenofovir disoproxil fumarate/Emtricitabine (300 mg/200 mg) once a day and Raltegravir (400 mg) twice a day for four weeks. Those injured by instruments infected with hepatitis C were monitored only, because there was no prophylaxis option. During their six-month follow-up, none of them had seroconversion in terms of HBV, HCV and HIV infections, which was pleasing. Tetanus vaccine was administered to 52.12% of the injured health personnel.

Occupational injuries pose a risk of infection, causing anxiety in both health workers and their families during the six-month follow-up period. This can decrease their work efficiency, affecting health system financially in a direct or indirect way. Preventing the spread of infectious diseases costs only one third of the post-exposure expenses to the health system (28). By assuming that all patients are infected, it is extremely important to provide patients with medical intervention, treatment and care services by taking standard protection measures.

Study Limitation

The most important limitation of the study was that it was retrospective. Another was the inadequacy of the notification of the personnel exposed to the injury. Despite these limitations, our study increases awareness about the risks of occupational injury.

Conclusion

Health workers are exposed to occupational injuries and infection risks despite all precautions today. Occupational injuries still continue in our hospital and all of the personnel are not fully vaccinated. Therefore, relevant training activities to prevent infections and personnel screening tests should be performed during recruitment process and then repeated regularly, and health personnel who are not fully vaccinated should complete the vaccine series, whereby especially getting vaccinated for hepatitis B should be set a target for all personnel.

Ethics

Ethics Committee Approval: This study was approved by İstanbul Medeniyet University, Göztepe Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology (approval number: 2020/0149, date: 24.06.2020).

Informed Consent: Since our study was retrospective, informed consent was not used.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: Ö.A., Design: Ö.A., Data Collection or Processing: Ö.A., PE., H.Ç., Analysis or Interpretation: PE., Literature Search: Ö.A., PE., Writing: PE.

Conflict of Interest: The authors declare no conflict of interest.

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