



DOI: 10.5505/anatoljfm.2018.21931

Anatol J Family Med 2019;2(1):13–8

## It Could Have Been Protected But Wasn't

Ahmet Rıza Şahin,<sup>1</sup> Ahmet Melih Şahin,<sup>1</sup> Selçuk Nazik,<sup>1</sup> Nadide Mercan,<sup>2</sup>  
 Hacer Kandilcik,<sup>2</sup> Selma Ateş<sup>1</sup>

<sup>1</sup>Department Infectious Diseases and Clinical Microbiology, Kahramanmaraş Sütçü İmam University, Faculty of Medicine, Kahramanmaraş, Turkey

<sup>2</sup>Department Infectious Diseases and Clinical Microbiology, Giresun University, Faculty of Medicine, Giresun, Turkey

### ABSTRACT

**Objectives:** Percutaneous injuries create an occupational risk shared for all health workers. Our study aimed to identify the epidemiology of incised wounds that have occurred within the past four years and the effectiveness of preventive measures at the Kahramanmaraş Sütçü İmam University Faculty of Medicine Hospital.

**Methods:** This research was carried out retrospectively with the incised wound cases that occurred at the KSU Faculty of Medicine Hospital between January 1<sup>st</sup>, 2013 and December 31<sup>st</sup>, 2016. Health personnel were examined in terms of gender, professional job position groups, forms of injury, locations of injury, compliance with protective barriers used, and precautions taken.

**Results:** The most frequently injured bodily region was the left hand with 122 (51.2%), followed by the right hand with 104 (43.6%). The most frequent injury took place while recapping to cover the tip of a needle with 86 (36.0%). No type of protective equipments was used for 169 (71.0%) of the health personnel who were included in the study.

**Conclusion:** That there was high noncompliance with the use of protective equipment revealed that health workers needed to be subjected to certain, periodic training. In addition to this, the care for injuries and the provision of training in which the infection control committee needed to be referred to in situations of injury was brought to the forefront.

**Keywords:** Healthcare workers, needle stick injuries, sharps injuries



Please cite this article as:  
Şahin AR, Şahin AM, Nazik S, Mercan N, Kandilcik H, Ateş S. It Could Have Been Protected But Wasn't. Anatol J Family Med 2019;2(1):13–8.

**Address for correspondence:**  
Dr. Ahmet Rıza Şahin.  
Kahramanmaraş Sütçü İmam Üniversitesi, Tıp Fakültesi, Enfeksiyon Hastalıkları ve Klinik Mikrobiyoloji Anabilim Dalı, Kahramanmaraş, Turkey  
**Phone:** +90 505 541 37 65  
**E-mail:** drahmet\_riza@hotmail.com

**Received Date:** 03.10.2018  
**Accepted Date:** 13.12.2018  
**Published online:** 30.04.2019

©Copyright 2019 by Turkish Foundation of Family Medicine  
- Available online at  
www.anatoljfm.org

### INTRODUCTION

Infections that pass on through contact with blood, bodily fluids, and blood products by means of droplets and respiration create shared occupational risk for all health workers.<sup>[1]</sup> The direct contact of blood or other bodily fluids or percutaneous contact of sharp-tipped cutting tools incised wounds (IW)-can lead to some viral, bacterial, parasitic, and fungal infections as a result.<sup>[1,2]</sup> More than 50 different infections can be transmitted to health workers, primarily the 26 indicated viruses (Table 1).<sup>[2]</sup> The Hepatitis viruses as a result of occupational exposure in health workers is the most frequently encountered and transmitted virus group.<sup>[3]</sup> The contaminants of hepatitis viruses from incised wounds contaminated with infected blood indicate whether the patient received treatment, the type of cutting-perforating tool with which percutaneous contact occurred, and whether or not precautions were taken during this.<sup>[3,4]</sup>

While the risk of infection contamination for the Hepatitis B virus (HBV) as a result of percutaneous contact is roughly 6-30%, this rate is 1.8% in the infection of the Hepatitis C virus (HCV).<sup>[4]</sup> Viral hepatitis is a significant health issue in many countries that affects some groups more

**Table 1.** Infections frequently transmitted to health workers<sup>[2]</sup>

Pathogen	Exposure	Exposed worker
CCHF	Percutaneous	Health worker
Hepatitis B virus	Percutaneous	Health worker
Hepatitis C virüs	Percutaneous	Health worker
HIV 1	Percutaneous	Health worker
Hepatitis D virus	Percutaneous	Health worker
Hepatitis G virus	Percutaneous	Health worker
Varicella zoster virus (VZV)	Percutaneous	Health worker
Herpes simplex virus-1	Percutaneous	Health worker
Bolivian VHF (Machupo virus)	Percutaneous	Health worker
Brazilian VHF (Sabia virus)	Percutaneous	Lab. worker
Dengue fever	Percutaneous	Health worker
Kyasanur	Percutaneous	Lab. worker
Marburg	Percutaneous	Health worker
West Nile Virus	Percutaneous	Lab. worker

than others.<sup>[5]</sup> These diseases lead to high rates of death with latent infection along with economic, social, and psychological problems.<sup>[5]</sup>

Another viral infection that occurs as a result of occupational exposure is the Human Immunodeficiency virus (HIV), whose global pandemic has continued since 1984 when it was reported has ceased. The HIV epidemic continues to grow in our country.<sup>[6]</sup> The percutaneous or mucosal infection risk with blood contaminated with HIV is between 0.09% and 0.3%.<sup>[4,7]</sup> Viral hemorrhagic fever infections that can quickly lead to death apart from the infections that lay dormant for a long time, like HIV and hepatitis, can be transmitted most frequently through incised wounds.<sup>[4,8]</sup> The Crimean-Congo Hemorrhagic Fever (CCHF) infection has been well defined in health workers. Following the first cases reported in Pakistan, cases were reported with regard to health services throughout the Middle East.<sup>[9-12]</sup> Our country is endemic in terms of CCHF, but in countries where cases are rarely seen, health personnel face an increased risk.<sup>[8]</sup>

These injuries lead to psychiatric problems as much as physical ones that may occur after trauma.<sup>[13]</sup> Serious problems of struggling with occupational focus, deterioration in family and social relationships, and impacting sexual life after IWs can be seen.<sup>[13]</sup> Because IWs lead to psychological and social problems in health workers, especially in developing countries, they can also lead to a loss of the labor force and a decrease in the quality of health services.<sup>[14]</sup> Our study aimed to identify the epidemiology of incised wounds recorded by the Infection Control Committee (ICC) and Occupational Health Safety (OHS) nurse within the

past four years effectiveness of preventive measures at the Kahramanmaraş Sütçü İmam University (KSU) Application and Research Hospital.

## METHOD

This research was carried out retrospectively with the monitor forms created by EKK and occupational health and safety (OHS) nurses for incised wound cases that occurred at the KSU Application and Research Hospital between January 1<sup>st</sup>, 2013 and December 31<sup>st</sup>, 2016. Health personnel were examined in terms of gender, professional job position groups, forms of injury, locations of injury, compliance with protective barriers used, and precautions taken. Serology tables for the times when employees were administered, were obtained from the hospital information systems computerized records. The serological indicators (HBsAg, anti-HBs, anti-HCV and anti-HIV) of the personnel and patients were studied with the “enzyme-linked immunosorbent assay” (ELISA) method. The times of the training that the injured personnel received were examined from the records held by the training nurse. Ethics committee approval for the study was obtained from the KSU faculty of medicine ethics committee. The acquired data were evaluated using numerical and percentage calculations in the Microsoft Office Excel program.

## RESULTS

A total of 238 health workers exposed to IWs were included in the study as a result of the examination of monitoring forms created by EKK and OHS nurses for incised wounds between the years of 2013 and 2016 at the KSU Application and Research Hospital. Of the health personnel exposed to injury, 146 (61.3%) were women and 92 (38.7%) were men. A large plurality of the injured personnel are nurses with 94 (39.5%), the rest constituting 65 (27.3%) intern nurses, 56 (23.6%) sanitation personnel, 18 (7.5%) doctors, three laboratory technicians, and two data entry personnel. The region of the body injured was seen to be most frequently the left hand at 122 (51.2%) followed by the right hand at 104 (43.6%). Of percutaneous injuries, 86 (36.1%) occurred while covering needle points, 58 (24.4%) occurred because of instantaneous movement of the patient while administering an injection, 43 (18.1%) occurred during medical waste disposal, 15 (6.3%) occurred while placing the needle point in the waste bin, 12 (5.0%) occurred while separating the needle from the syringe, 12 (5.0%) occurred while suturing, 10 (4.2%) occurred during an operation, and 3 (1.3%) occurred while administering medication (Fig. 1).

Of the health personnel included in the study, 169 (71.0%) did not use any kind of protective equipment. For those in-

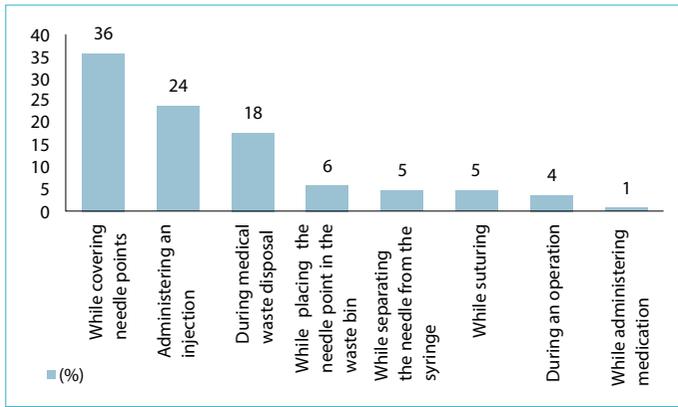


Figure 1. Forms of injury of individuals.

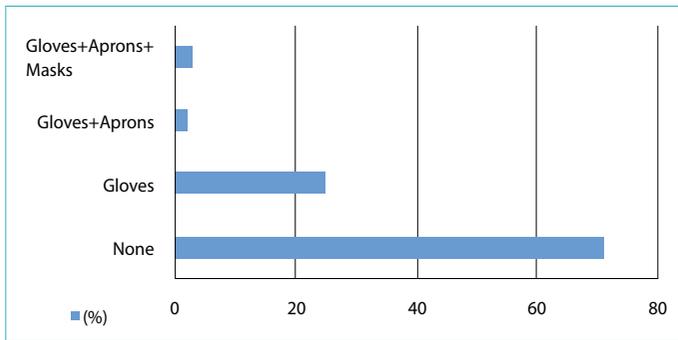


Figure 2. Use of projective barriers.

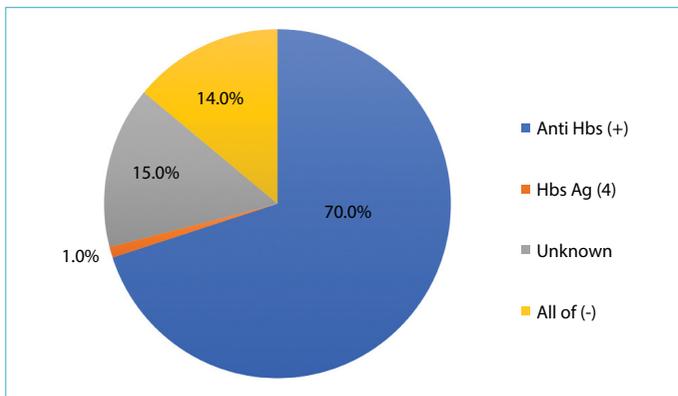


Figure 3. Serology of injured personnel.

jured personnel using barrier precautions, 60 (25.2%) used a single glove, 8 (3.4%) used gloves, aprons, and masks together, and 5 (2.1%) used aprons and gloves. There were no health personnel who used all equipment prior to the operation (Fig. 2). Of the injured personnel, anti-Hbs was positive in 169 (71.0%). Anti-Hbs, HbsAg, anti-HCV and anti-HIV were negative in 34 (14.3%) (Fig. 3). In the serology of the patients who came into contact with blood after the injury, anti-Hbs, HbsAg, anti-HCV, and anti-HIV were negative in 115 (48.3%). Serology was not checked in 84 (35.3%). HBsAg was positive in 22 (9.2%) and Anti-HCV was positive in 20 (8.4%). Anti-HIV was positive in two of the patients (Fig.

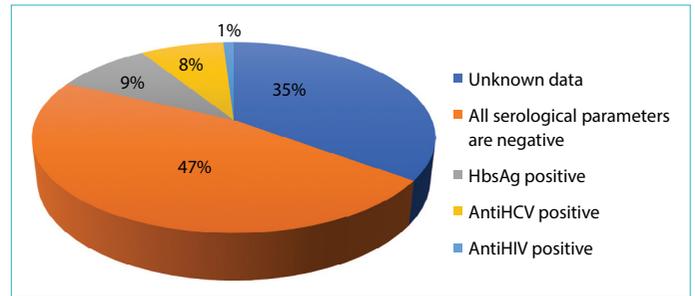


Figure 4. Serology of source patients.

4). In the IW monitor forms examined for the years 2013-2016, the number of personnel referred with IWs for the year 2013 was 30 (%12.6), 56 (%23.5) in 2014, 72 (%30.3) in 2015, and 80 (%33.6) health workers in 2016.

### DISCUSSION

IW monitoring forms have been filled out at our hospital since 2010. The gradually increasing number of injuries within the four-year period our study included was noteworthy. Our hospital moved to its new building four years ago, and we think that the new units put into service in the subsequent years, the growing number of intensive care beds, and the proportionally growing number of workers due to the increasing number of hospital beds are the factors of this increase. Training for infection control measures, standard measures, and protective measures is provided at our hospital to personnel for eight hours at job orientation and then subsequently eight hours a year. It is known that the training provided with regard to infection control measures for health workers is effective in increasing the frequency of notification.<sup>[15]</sup>

There were no referrals originating from contact with completely broken skin, mucosal contact, or splashing in the eye among the 238 injuries that were referred; the entire cases were percutaneous injuries. Any one or few of reasons of health workers not reporting the occupational exposures were that they see it risky, doctors and nurses thinking that they know of the means of protecting against infections transmitted by blood or incidents being seen as unimportant in all occupational groups may be influential.<sup>[15]</sup> Of those exposed to injury in terms of gender, 146 (61%) were women and 92 (39%) were men. When the injuries are grouped according to occupation, the highest proportion was nurses with 94 (39%), followed by intern nurses with 65 (27%), sanitation personnel with 56 (24%), doctors with 18 (8%), laboratory technicians with three, and data entry personnel with two. It emerged in our study that women were injured more often, and women also ended up being injured more in other studies conducted in our country.<sup>[1,15]</sup> The fact that the nurs-

ing profession is more often performed by women is the factor in this. When considering occupational injuries, it was seen in our study that nurses were injured more. Kaya et al. showed in their study that 48% percent of those injured were nurses; Çelik et al. discovered this figure at 44.1% for nurses and 27.1% for intern nurses in the study they conducted; and Özdemir et al. also found that nurses were most often injured with 57.5%.<sup>[1,16,17]</sup> The reason that nurses are the group that most experiences injuries could be related to their high frequency of interventional procedures (establishing vascular access, measuring blood sugar, intramuscular and intravascular injections, etc.) or the work load resulting from a shortage of staff.<sup>[16,18]</sup> Doctors were reported as the group most injured in the study Gücük et al. conducted, and the reason for this was that it was conducted within a general surgical clinic.<sup>[19]</sup> The fact that the study which Merih et al. conducted was done at a branch hospital with 57 individuals may be a factor in sanitation personnel being the group exposed to the most injuries.<sup>[20]</sup> According to International Labor Organization reports, the nursing profession is most exposed to incised wounds, and our study is consistent with this.<sup>[21]</sup>

The region of the body injured was seen to be most frequently the left hand at 122 (51.2%) followed by the right hand at 104 (43.6%). The injuries most frequently seen in studies were during injection administering followed by capping needle tips. It has been shown that disposing of syringes in the yellow-colored perforating and cutting tool bins without closing them greatly reduces these injuries.<sup>[22,23]</sup> In our study, one of the reasons that the most frequent injuries are in nurses emerged as the result of instantaneous movement of the patient while administering insulin injections or intravascular applications. Doctors were injured while suturing and operating. Sanitation officials were frequently injured while disposing of medical waste. In a study published in our country, it was reported that 36% of percutaneous injuries occurred while capping needle tips and as a result of using the left hand.<sup>[1]</sup>

It was reported in the study Kaya et al. conducted, that 50.6% of injuries occurred while closing syringe caps, 18.1% occurred while establishing vascular access, and 15.6% occurred while disposing of medical waste (16). It emerged in our study as well that these incidents took place while capping needles, consistently with the other studies conducted in our country.

The Centers for Disease Control and Prevention (CDC) in the United States introduced the first standard precautions in 1982 in order to be able to protect health workers from infection and renewed these recommendations over the years in line with needs.<sup>[23]</sup> In line with these recommen-

dations, all patients will be accepted as infected, and the barrier precautions aimed at this will be observed. The European Union framework agreement directive aimed at occupational injuries at hospitals and in the health sector came into effect in our country in 2013.<sup>[24]</sup> According to the current law in effect, the best application to be protected from infections that may occur as a result of injury is to comply with the standard precautions that include applications of barriers and with the universal methods that aim to prevent contact with blood. Training is provided to employees newly starting work at our hospital by the EKK and training nurse in order to be able to preclude incised wounds. When incised wounds occur, the data of personnel is recorded, and the continuity of monitoring is provided by warning the employees hindering controls. The region of the body most exposed to occupational injury were the hands, and the use of latex gloves is a good barrier for the hands.<sup>[1,23]</sup> It was shown that it decreased the amount of the factors exposed to during injury.<sup>[25,26]</sup> In our study, the compliance with standard measures was at a very low level, and 71% of the injured personnel had taken no precaution. In the study that Sarı et al. conducted, 21% had not used any protective measure, and 60% had used only single-layer gloves.<sup>[15]</sup> In the study that Çelik et al. conducted, 19.9% had used no protective measure, and 63.3% had used only single-layer gloves.<sup>[1]</sup> In the study that Kepenek et al. conducted, 44.9% had used no protective equipment, and 50% had used only single-layer gloves.<sup>[27]</sup> In our study, we were unable to conclude a meaningful result that the compliance with this low of standard measures despite training being provided regularly. The most frequently used barrier precaution in our study was glove use, which was consistent with the literature.

Occupational incised wounds do not end with infection most of the time.<sup>[4]</sup> How contact was made, the type of incising tool that contacted, the amount of blood contacted, and the type and amount of the pathogens found in the blood of the patient during contact determine the infection risk in personnel exposed to injury.<sup>[4]</sup> In the injuries that took place with scalpels and suture needles, the lumen needle was in contact with less inoculum compared with catheters.<sup>[15]</sup> There is a 22-36% chance of transmission for HbeAg positive HBV patients, 1-6% chance for HbeAg negative HBV patients, 1-3% chance for Hepatitis C Virus patients, and 0.3% chance for HIV patients from patients infected as a result of percutaneous contact.<sup>[1]</sup> The CDC recommended the vaccination of all health workers in 1987 for the prevention of HBV infection, which most frequently and currently threatens health workers.<sup>[23,26]</sup> Protection against HBV by means of vaccination is around 90%.<sup>[26]</sup> At our hospital after 2010, employees who will

begin working are scanned serologically for HBsAg, anti-HBs, anti-HCV, and anti-HIV. For those who began working prior to this date, their scans are directed to be conducted by means of providing information during training. Those without immunity are taken into the Hepatitis B vaccination program.

In our study, 22 (6.7%) of the source patients who the injured personnel were in contact with were HbsAg positive (Fig. 4). Vaccinations and immunoglobulin were administered to the workers without immunity and the first- and sixth-month vaccinations were done. Serology checks are conducted at the sixth week, third month, and sixth month for seronegatively injured personnel. Health workers who were in contact with 15 (%) patients who carried HCV were taken in for monitoring because it has no known prophylaxis, and lifestyle changes were recommended (condom use, avoiding blood donations, refraining from pregnancy). No seroconversion was observed at the end of the six-month monitoring for the patients for whom monthly checkups are conducted in terms of ALT, AST, and anti-HCV. Suitable antiretroviral treatment was provided for two personnel who came into contact percutaneously with anti-HIV positive patients. It was observed that psychological stress in health workers receiving antiretroviral treatment was greater compared with other injured personnel, and psychiatric consultations were requested for the purpose of providing the necessary psychiatric support.

Our study revealed that protective equipment doesn't have to be used at high rates and that health personnel must be subjected to training in certain periods. In addition to this, the care for injuries and the provision of training in which the infection control committee needed to be referred to in situations of injury were brought to the forefront. Training is provided at our hospital each year for a total of eight hours to nurses and intern nurses on the topics of percutaneous injuries and the use of protective equipment, according to occupational health and safety data. The fact that the most injuries occurred in the segment of nursing and sanitation personnel in the study produced the result of the provision of the education necessary to minimize contact with hands of cutting and perforating tools and for the propagation of the use of medical waste containers that provide for distancing the waste materials used, because the most frequent form of injury was recapping needle point caps followed by the movements of the patient and the occurrence during the distancing of waste materials. Protective measures also need to be taken after health workers complete donations, after the removal of medical waste in due form, after the cleaning of used tools, and after exposure.

## Disclosures

**Ethics Committee Approval:** Ethics committee approval was received for this study from the Kahramanmaraş Sütçü İmam University Faculty of Medicine Clinical Research Ethics Committee (Decision Number: 203, Decision Date: 29.08.2018).

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Financial Disclosure:** There is no funding in this article.

**Authorship Contributions:** Concept – A.R.Ş., A.M.Ş.; Design – A.R.Ş., S.A., N.M.; Supervision – A.R.Ş., S.A.; Materials – A.R.Ş., A.M.Ş.; Data collection &/or processing – A.R.Ş., S.N.; Analysis and/or interpretation – A.R.Ş., S.A.; Literature search – A.R.Ş., H.K.; Writing – A.R.Ş., N.M.; Critical review – A.R.Ş.

## REFERENCES

1. Çelik N, Ünal O, Çelik O, Soylu A. Hastanemizdeki sağlıkçalışanlarında dört yıllık kesici delicialetyaranmalarının değerlendirilmesi. *Türkiye Klinikleri Journal of Medical Sciences* 2017;37(2): 61-7. [\[CrossRef\]](#)
2. Tarantola A, Dominique A, Anne R. Infection risks following accidental exposure to blood or body fluids in health care workers: a review of pathogens transmitted in published cases. *Am J Infect Control* 2006;34(6):367-75. [\[CrossRef\]](#)
3. Tarantola A. Les risques infectieux après accident exposant au sang ou aux liquides biologiques. *Hygiènes* 2003;11(2):87-95.
4. Karimi-Sari H, Alavian SM. Needlestick injury against viral hepatitis elimination. *Journal of Hospital Infection* 2017;96(4):398.
5. Lavanchy D, Mark K. Global epidemiology of hepatitis B virus infection. *Hepatitis B Virus in Human Diseases*. Springer International Publishing 2016; 187-203. [\[CrossRef\]](#)
6. Global, A.I.D.S. Update UNAIDS Report 2016. (Access Date: 01 Oct 2018).
7. Rice BD, Tomkins SE, Ncube FM. Sharp Truth: healthcare workers remain at risk of blood borne infection. *Occupational Medicine* 2015;65(3):210-4.00. [\[CrossRef\]](#)
8. Leblebicioglu H, Sunbul M, Guner R, Bodur H, Bulut C, Duygu F, et al. Health care-associated Crimean-Congo haemorrhagic fever in Turkey, 2002–2014: a multicentre retrospective cross-sectional study. *Clin Microbiol Infect* 2016;22(4):387. e1-387.e4. [\[CrossRef\]](#)
9. Patel AK, Patel KK, Mehta M, Parikh TM, Toshniwal H, Patel K. First Crimean-Congo hemorrhagic fever outbreak in India. *J Assoc Physicians India* 2011;59:585–9.
10. Burney MI, Ghafoor A, Saleen M, Webb PA, Casals J. Nosocomial outbreak of viral hemorrhagic fever caused by Crimean hemorrhagic fever–Congo virus in Pakistan, January 1976. *Am J Trop Med Hyg* 1980;29:941–7. [\[CrossRef\]](#)
11. Parlak E, Kosan Z, Ertürk A, Parlak M, Özkut Z. A nosocomial outbreak of Crimean-Congo hemorrhagic fever. *J Microbiol Infect Dis* 2015;5:5–9. [\[CrossRef\]](#)

12. Conger NG, Paolino KM, Osborn EC, Rusnak JM, Günther S, Pool J, et al. Health care response to CCHF in US soldier and nosocomial transmission to health care. *Emerg Infect Dis* 2015;21:23–31. [\[CrossRef\]](#)
13. Green B, Griffiths EC. Psychiatric consequences of needlestick injury. *Occupational Medicine* 2013;63(3):1883-8. [\[CrossRef\]](#)
14. Sharma R, Rasanias SK, Verma A, Singh S. Study of prevalence and response to needlestick injuries among healthcare workers in a tertiary care hospital in Delhi, India. *Indian J Community Med* 2010;35(1):74-7. [\[CrossRef\]](#)
15. Sarı ND, Fincancı M, Soysal HF, Demirkıran N, Koyuncu S, Özgün Ö. Delici kesici alet yaralanmalarının bildirim sıklığının göstergesi. *Med Bull Haseki* 2014;52:98-102. [\[CrossRef\]](#)
16. Kaya S, Baysal B, Eşkazan AE, Çolak H. Diyarbakır Eğitim Araştırma Hastanesi sağlık çalışanlarında kesici delici alet yaralanmalarının değerlendirilmesi. *Viral Hepatit Dergisi* 2012;18-3. [\[CrossRef\]](#)
17. Özdemir, Güngör E, Şengöz G. 500 yataklı Eğitim ve Araştırma Hastanesinde kesici delici alet yaralanmalarının tutum ve bilgi düzeyi ölçüm anketi sonuçları. *Haseki Tıp Bülteni* 2013;51(1):11-4. [\[CrossRef\]](#)
18. Erol S, Özkurt Z, Ertek M, Kadanal A, Taşyaran MA. Sağlık çalışanlarında kan ve beden sıvılarıyla olan mesleki temaslar. *Hastane Enfeksiyonları Dergisi* 2005;9(2):101-6.
19. Gücük M, Karabey S, Yolsal N, Özden YI. İstanbul Tıp Fakültesi Genel Cerrahi Kliniği çalışanlarında kesici-delici alet yaralanmaları. *Hastane Enfeksiyonları Dergisi* 2002;6(2):72-81.
20. Merih YD, Kocabey MY, Çırpı F, Bolca Z, Celayir AC. Bir devlet hastanesinde 3 yıl içerisinde görülen kesici-delici alet yaralanmalarının epidemiyolojisi ve korunmaya yönelik önlemler. *Zeynep Kamil Tıp Bülteni* 2009;40(1):11-5.
21. Elmiyeh B, Whitaker IS, James MJ. Needle-stick injuries in the National Health Service: a culture of silence. *Journal of the Royal Society of Medicine* 2004;97(7):326-7. [\[CrossRef\]](#)
22. Linnemann CC, Cannon C, DeRonde M, Lanphear B. Effect of educational programs, rigid sharps containers, and universal precautions on reported needle stick injuries in health care workers. *Infection Control & Hospital Epidemiology* 1991;12(4):214-9. [\[CrossRef\]](#)
23. Updated US. Public Health Service guidelines for the management of occupational exposures to HBV, HCV, and HIV and recommendations for post exposure prophylaxis. *MMWR Recomm Rep* 2001;50(1):1-52.
24. T. C. "6331 sayılı iş sağlığı ve güvenliği kanunu." Ankara: Resmi Gazete (28339 sayılı).
25. Heptonstall J, Turnbull S, Henderson D, Morgan D, Harling K, Scott G. Sharps injury! A review of controversial areas in the management of sharps accidents. *Journal of Hospital Infection* 1999;43:219-23. [\[CrossRef\]](#)
26. Centers for Disease Control (CDC). "Guidelines for prevention of transmission of human immunodeficiency virus and hepatitis B virus to health-care and public-safety workers." *MMWR supplements* 1989;38(6):1
27. Kepenek E, Halime B, Eker S. Bir devlet hastanesinde çalışanlarda meydana gelen kesici ve delici alet yaralanmalarının değerlendirilmesi. *Klinik Dergisi* 2017;30(2):78-82. [\[CrossRef\]](#)