



Change in Medical Sharps Injury Characteristics During the COVID-19 Pandemic

Tıbbi Kesici Delici Alet Yaralanma Karakteristiklerinin COVID-19 Pandemisi Sürecindeki Değişimi

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Abstract

Aim: Knowledge about the change in the frequency and characteristics of medical sharps injuries during the Coronavirus Disease-2019 (COVID-19) pandemic is very limited. This study aimed to compare the characteristics of medical sharps injuries experienced by healthcare staff before and during the COVID-19 pandemic.

Material and Method: A total of 304 cases of medical sharps injuries suffered by hospital staff in our hospital between 2014 and 2022 were included in the study. Data regarding these accidents were obtained from workplace accident files in the hospital archive.

Results: The mean age of the staff exposed to the accident was 30.2±10.7 (age range: 15-50) years, and 227 (74.7%) were women. During the pandemic, a 34.6% decrease was detected in the annual mean number of medical sharps injuries compared to before the pandemic. In cases during the pandemic, the annual mean rate of interns who had an accident decreased significantly compared to before the pandemic (43.7% vs. 18.8%) in comparison the mean rate of nurses increased significantly (31.9% vs. 53.2%)(p<0.001), and the annual mean needle tip rate decreased significantly (83.0% vs. 68.0%)(p=0.035).

Conclusion: The findings of the present study showed that there was a significant decrease in the number of medical sharps accidents during the pandemic compared to the pre-pandemic period, that the rate of nurses who were exposed to accidents increased significantly during this period, that there was a significant decrease in the rate of needle stick-related accidents, that there was a significant decrease in the accident rate in surgical wards and a significant increase in intensive care units.

Keywords: Medical sharps injury, needle stick, COVID-19, pandemic

Öz

Amaç: Tıbbi kesici-delici alet yaralanmaları sıklığının ve karakteristik özelliklerinin Coronavirus Disease-2019 (COVID-19) pandemisi sürecindeki değişimi ile ilgili bilgiler çok kısıtlıdır. Bu çalışmada sağlık personelinin yaşadığı tıbbi kesici-delici alet yaralanma kazalarının COVID-19 pandemisi öncesindeki ve pandemi sürecindeki karakteristiklerinin karşılaştırılması amaçlanmıştır.

Gereç ve Yöntem: Çalışmaya 2014-2022 yılları arasında hastanemizde hastane personelinin maruz kaldığı toplam 304 tıbbi kesici-delici alet yaralanma olgusu dahil edildi. Bu iş kazalarına ait veriler hastane arşivindeki iş kazası dosyalarından elde edildi.

Bulgular: Kazaya maruz kalan personelin ortalama yaşı 30,2±10,7 (yaş aralığı: 15-50) idi, 227'si (%74,7) kadındı. Pandemi sürecinde pandemi öncesine göre yıllık ortalama tıbbi kesici-delici alet yaralanma sayısında %34,6'lık düşüş saptandı. Pandemi sırasındaki olgularda kazaya uğrayan yıllık ortalama stajyer oranının pandemi öncesine göre anlamlı düştüğü (%43,7 vs. %18,8), ortalama hemşire oranının anlamlı arttığı (%31,9 vs. %53,2) (p<0,001) ve yıllık ortalama iğne ucu oranının anlamlı düştüğü (%83,0 vs. %68,0)(p=0,035) saptandı.

Sonuç: Çalışmamızdan elde edilen bulgular pandemi sürecinde pandemi öncesine göre tıbbi kesici delici alet yaralanmaları sayılarında belirgin düşüş olduğunu, bu süreçte kazaya maruz kalanlarda hemşire oranının belirgin arttığını, iğne ucuna bağlı kaza oranında belirgin düşüş olduğunu, cerrahi servislerdeki kaza oranında büyük düşüş ve yoğun bakım ünitelerindeki kaza oranlarında büyük artış olduğunu göstermiştir.

Anahtar Kelimeler: Tıbbi kesici delici alet yaralanması, iğne ucu, COVID-19, pandemi



INTRODUCTION

Medical sharps injuries are critical accidents that carry a high risk of transmitting chronic severe viral diseases transmitted through the blood of the patient to whom the material is applied to the healthcare worker. It has been stated that these accidents mostly occur in the form of needle sticking to the patient during or after the application and that trying to attach the syringe caps in a significant number of them increases the risk of accidents.^[1-3] The main reason for the risk of infection is that the material causes an accident after coming into contact with the patient blood. Various precautions are taken in medical centers in this regard. Despite this, there is no decrease in the frequency of these accidents in many centers. Even in the reporting of such accidents, there are some deficiencies and there may be a risk of some health and legal problems.^[1-4]

During the Coronavirus Disease–2019 (COVID-19) pandemic, routine patient admissions have been restricted and non-urgent operations have been postponed all over the world. In addition, serious safety precautions have been taken and strict procedures have been implemented in approaching patients in health centers. During this period, there was a significant decrease in invasive procedures, except for COVID-19 patients.^[5-7]

Information regarding the change in the frequency and characteristics of medical sharps injuries during the COVID-19 pandemic is very limited. This study aimed to compare the characteristics of medical sharps injuries experienced by healthcare staff before and during the COVID-19 pandemic.

MATERIAL AND METHOD

Cases and Data

This retrospective study was approved by the local ethics committee. A total of 304 cases of medical sharps injuries suffered by hospital staff in our hospital between 2014 and 2022 were included in the study. Data regarding these accidents were obtained from accident files in the hospital archive. From the accident reports, the identity of the staff involved in the accident, their duties and the unit they worked in, the medical equipment that caused the accident, and the health status of the patient for whom the medical equipment that caused the accident was used were recorded.

All accidents in the mentioned period were included in the study, but injuries involving non-healthcare workers were not included.

Statistical Analysis

The sample size in the study was calculated by power analysis using G-Power (version 3.1.9.6, Franz Faul, Universitat Kiel, Germany). Effect size 0.3; Type 1 error was taken as 0.05 and test power as 0.95, and the sample size was calculated as 220.

All statistical analyzes in the study were performed using SPSS 25.0 software (IBM SPSS, Chicago, IL, USA). Descriptive

data were given as numbers and percentages. Comparisons between groups in terms of categorical variables were made with Pearson's Chi Square test. The results were evaluated within the 95% confidence interval and p values <0.05 were considered significant. Bonferroni correction was made where necessary.

This study was approved by the institutional ethics committee (no: SÜKAEK 2023- 15/7) and complied with the Declaration of Helsinki and good clinical practice guidelines.

RESULTS

The mean age of the staff exposed to the accident was 30.2±10.7 (age range: 15-50) years, and 227 (74.7%) were women. A total of 113 (37.2%) of the staff were nurses, 114 (37.5%) were nursing intern students, and 43 (14.1%) were cleaning staff. Of the medical supplies that caused the accident, 241 (79.3%) were needle tips and 40 (13.2%) were lancets. In 282 (92.8%) of the cases, information on the patient's health status for whom the material that caused the accident was used could not be obtained. Of the patients whose health information was available, six (2%) were HBsAg positive, nine (3.0%) were AntiHCV positive, and two (0.7%) were positive for AntiHIV (**Table**).

While a total of 229 injuries occurred in the 5-year period covering 2014-2019 before the pandemic, a total of 75 injuries were observed in the 3-year pandemic period covering 2020-2022. The annual mean number of medical sharps injuries decreased from 38.2 to 25 during the pandemic compared to before the pandemic (34.6% decrease). In cases during the pandemic, the annual mean rates of interns (43.7% vs. 18.8%) and cleaning staff (16.2% vs. 8.0%) who had accidents decreased significantly compared to before the pandemic, and the mean number of nurses injured. It was found that the rate increased significantly (31.9% vs. 53.2%) (p<0.001) It was determined that the annual average intern (%43,7 vs. %18,8) and cleaning staff injuries (%16,2 vs. %8,0) during the pandemic decreased significantly compared to before the pandemic, while the average nurse injury rate increased significantly (%31,9 vs. %53,2) (p<0,001) (**Table**).

In terms of medical materials causing accidents in cases during the pandemic, it was determined that the annual mean needle tip rate decreased significantly compared to before the pandemic (83.0% vs. 68.0%), while the lancet rate increased significantly (11.0% vs. 20.0%) (p=0.035) (**Table**).

In cases during the pandemic, it was determined that the annual mean surgical service rate in terms of units where the accident occurred decreased significantly compared to before the pandemic (16.5% vs. 6.8%), and the rate of intensive care units increased significantly (7.1% vs. 32.0%) (**Table**).

The cases during the pandemic and before the pandemic were found to be similar in terms of the gender distribution of the annual mean healthcare staff involved in the accident and the distribution of the health status of the patients in whom the medical equipment was used (p>0.05 for both) (**Table**).

Table. Distribution and comparisons of the characteristics of medical sharps accidents before and during the pandemic.

	Total		Total (2014-2019)		Total (2020-2022)		The mean annual injuries (2014-2019)		The mean annual injuries (2020-2022)		p
	n	%	n	%	n	%	n	%	n	%	
Total	304		229		75		38.2		25		
Gender											0.359
Female	227	74.7	168	73.4	59	78.7	28	73.3	19.7	78.8	
Male	77	25.3	61	26.6	16	21.3	10.2	26.7	5.3	21.2	
Job											<0.001
Nurse	113	37.2	73	31.9	40	53.3	12.2	31.9	13.3	53.2	
Intern	114	37.5	100	43.7	14	18.7	16.7	43.7	4.7	18.8	
Cleaning staff	43	14.1	37	16.2	6	8	6.2	16.2	2	8	
Other	34	11.2	19	8.3	15	20	3.2	8.4	5	20	
Tool											0.035
Needle tip	241	79.3	190	83	51	68	31.7	83	17	68	
Lancet	40	13.2	25	10.9	15	20	4.2	11	5	20	
Other	23	7.5	14	6.1	9	12	2.2	5.8	3	12	
Source											0.340
Unknown	282	92.8	215	93.9	68	90.7	35.8	93.7	22.7	90.8	
Known	21	6.9	14	6.1	7	9.3	2.3	6	2.3	9.2	
Healthy	4	1.3	3	1.3	1	1.3	0.5	1.3	0.3	1.2	
HBsAg	6	2	4	1.7	2	2.7	0.7	1.8	0.7	2.8	
Anti HCV	9	3	6	2.6	3	4	1	2.6	1	4	
Anti HIV	2	0.7	1	0.4	1	1.3	0.2	0.5	0.3	1.2	
Units											<0.001
Emergency room	69	22.7	52	22.7	17	22.7	8.7	22.8	5.7	22.8	
Operating room	27	8.9	21	9.2	6	8	3.5	9.2	2	8	
Surgical services	43	14.1	38	16.6	5	6.7	6.3	16.5	1.7	6.8	
Internal services	64	21.1	46	20.1	18	24	7.7	20.2	6	24	
ICU	40	13.2	16	7	24	32	2.7	7.1	8	32	
Blood collection unit	10	3.3	10	4.4	0	0	1.7	4.5	0	0	
Waste depots	8	2.6	8	3.5	0	0	1.3	3.4	0	0	
Laundry	6	2	6	2.6	0	0	1	2.6	0	0	
Other units	37	12.2	32	14	5	6.7	5.3	13.9	1.7	6.8	

ICU: Intensive care unit

In the control examinations of the healthcare staff exposed to the accident within weeks after the accident, it was seen that there was no contamination in hepatitis B, hepatitis C and HIV screenings.

DISCUSSION

Medical sharps injuries cause significant health risks for healthcare workers. Various precautions are taken to prevent these accidents.^[2,4] During the COVID-19 pandemic, there have been serious restrictions on routine patient admission and routine procedures. During the pandemic, many additional precautions were taken regarding approach to patients and various new procedures began to be implemented.^[6,7] The present study revealed that these changes during the pandemic caused a decrease in the number of medical sharps injuries.

During the pandemic, restrictions were imposed on routine patient admission and many routine invasive procedures in health centers, and many procedures were postponed

or cancelled. There has been a significant decrease in the total number of invasive procedures in hospitals.^[5-7] Stojic et al.^[8] reported in their study that the monthly mean number of medical sharps accidents before and during the pandemic did not change significantly. In the present study, it was determined that the annual mean number of medical sharps injuries decreased from 38.2 to 25, and this decrease was 35.6%. This may be due to the fact that routine patient admission and routine operations were significantly restricted during the pandemic period. In addition, the measures taken within the scope of COVID-19 measures due to the pandemic may have also contributed to the decrease in this number. The present study detected no chronic viral disease positivity in the staff who had these accidents. Stojic et al.^[8] reported that the hepatitis B, hepatitis C and HIV positivity rates did not change in those who had a medical sharps accident during the pandemic period. This shows that the pandemic process does not significantly affect the risk of viral disease transmission after such an accident.

It has been reported that nurses and healthcare staff in direct contact with patients are most frequently exposed to medical sharps injuries.^[1,2] During the pandemic, there was an increase in the workload of health professionals, and many changes were made in the work distribution in health centers.^[5,6] Some studies have reported that nurses and intern students are most frequently exposed to medical sharps injuries.^[9-13] Diktas et al.^[14] found in their study that those who were exposed to medical sharps injuries at the highest rate in the year before the pandemic were nurses and intern students, respectively, and that there was no significant change in the rate of nurses with the start of the pandemic, but no intern student accidents were observed. In the present study, it was determined that 37.2% of the staff involved in the accident were nurses, 37.5% were nursing intern students, and 14.1% were cleaning staff. This finding shows that most medical sharps injuries occur during or immediately after application to the patient, and a small number occur during the collection of materials. In the present study, we also found that the annual mean rate of interns (43.7% vs. 18.8%) and cleaning staff (16.2% vs. 8.0%) who had accidents during the pandemic decreased significantly compared to before the pandemic, and the mean rate of nurses (31.9% vs. 53.2%) was found to increase significantly. These findings may have resulted from restrictions on the acceptance, employment and scope of work of intern students during the pandemic.

It has been stated that needle tips are the most common cause of medical sharps injuries.^[1-4] Major changes have been made in many practices during the pandemic process, and many strict procedures have begun to be implemented regarding contact with patients. These applications; It has also caused differences in some processes such as the use, collection and disposal of materials.^[7,15] Some studies have reported that the majority of medical sharps accidents occur due to needle stick.^[16-18] Diktas et al.^[14] reported in their study that the needle stick rate, which was 81% the year before the pandemic, increased to 91% in the year the pandemic started. Stojic et al.^[8] found in their study that the needle stick accident rate increased from 89.2% to 93.3% and that the change was not statistically significant. In the present study, it was determined that 79.3% of the medical materials that caused the accident were needle tips and 13.2% were lancets. This finding shows that, as expected, the needle tip most frequently causes medical sharps injuries. In the present study, it was also found that the annual mean needle tip rate in terms of medical materials causing accidents in cases during the pandemic decreased significantly compared to before the pandemic (83.0% vs 68.0%), while the lancet rate increased significantly (11.0% vs 20.0%). This may be due to the significant decrease in injection procedures as a result of the restrictions on routine patient admission during the pandemic period and the resulting change in the patient portfolio.

It has been stated that medical sharps injuries occur most frequently in units where procedures such as injection and blood collection are performed intensively.^[18,19] Restrictions and changes in patient admission and some procedures during the pandemic period have led to differences in these procedure intensities.^[18-20] Some studies have reported that medical sharps accidents occur most frequently in wards, emergency rooms or intensive care units.^[18-21] Diktas et al.^[14] stated in their study that there was a two-thirds decrease in the total annual number of operations in the year the pandemic started. In the present study, it was determined that the annual mean surgical service rate in terms of the units where the accident occurred in the cases during the pandemic decreased significantly compared to the pre-pandemic (16.5% vs. 6.8%), and the rate of intensive care units increased significantly (7.1% vs. 32.0%). These findings can be attributed to the decrease in the number of operations due to the restriction of routine operations during the pandemic period, therefore the decrease in the number of patients in surgical wards and the significant increase in the number of patients in intensive care units due to COVID-19.

Reporting accidents in medical sharps injuries is of great importance.^[1,3] Despite the strict security measures in applications during the pandemic period, there may have been disruptions in some reporting issues due to the focus on COVID-19.^[14] In the present study, hepatitis B, hepatitis C or HIV positivity was detected in the patient in whom the material was used in 5.7% of the cases, and in 92.8% of the cases, information on the health status of the patient in whom the material was used that caused the accident could not be obtained. In addition, the cases during and before the pandemic were found to be similar in terms of the distribution of health status of the patients for whom medical equipment was used. These findings show that there is probably a significant deficiency in accident reporting procedures for medical sharps injuries by both the injured staff and the relevant units, and this deficiency could not be eliminated during the pandemic period. This situation indicates that in such cases, where healthcare workers are at significant risk of serious viral infections, not knowing and/or not recording the health information of the patient to whom the material is applied risks both the health of the staff and the subsequent legal processes.

Some of the limitations of the present study are that a comparison regarding this process could not be included in the study due to the fact that a long period of time has not passed after the pandemic, and that a real risk analysis could not be made since the health information of the patients to whom the medical equipment was applied was not included in most of the reports. The positive aspect of the present study is that the duration of the study was longer at nine years and better comparisons were made with a higher number of cases.

CONCLUSION

The findings obtained from the present study showed that there was a significant decrease in the number of medical sharps accidents during the pandemic period compared to the pre-pandemic period, the rate of nurses among those exposed to accidents increased significantly during this period, a significant decrease in the rate of needle stick-related accidents, a significant decrease in the accident rate in surgical wards and a significant increase in the accident rates in intensive care units.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the ethics committee of Samsun Training and Research Hospital (no: SÜKAEK 2023- 15/7).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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REFERENCES

- Gabr HM, El-Badry AS, Younis FE. Risk factors associated with needlestick injuries among health care workers in Menoufia governorate, Egypt. *Int J Occup Environ Med* 2018;9:63-8.
- Higginson R, Parry A. Needlestick injuries and safety syringes: a review of the literature. *Br J Nurs* 2013;22(8):54.
- Hussain A, Shah Y, Raval P, Deroeck N. Awareness About Sharps Disposal Leads to Significant Improvement in Healthcare Safety: an Audit of Compliance in the National Health Service During the COVID-19 Pandemic. *SN Compr Clin Med* 2020;2(12):2550-3.
- De Carli G, Agresta A, Lecce MG, et al. The Studio Italiano Rischio Occupazionale da Hiv Siroh Group. Prevention from Sharp Injuries in the Hospital Sector: An Italian National Observatory on the Implementation of the Council Directive 2010/32/EU before and during the COVID-19 Pandemic. *Int J Environ Res Public Health* 2022;19(17):11144.
- Shukla P, Lee M, Whitman SA, Pine KH. Delay of routine health care during the COVID-19 pandemic: A theoretical model of individuals' risk assessment and decision making. *Soc Sci Med* 2022;307:115164.
- Reichert M, Sartelli M, Weigand MA et al. WSES COVID-19 emergency surgery survey collaboration group. Two years later: Is the SARS-CoV-2 pandemic still having an impact on emergency surgery? An international cross-sectional survey among WSES members. *World J Emerg Surg* 2022;17(1):34.
- Vermeşan D, Todor A, Andrei D, Niculescu M, Tudorache E, Haragus H. Effect of COVID-19 Pandemic on Orthopedic Surgery in Three Centers from Romania. *Int J Environ Res Public Health* 2021;18(4):2196.
- Stojic J, Grabovac V, Lucijanic M. Needlestick and sharp injuries among healthcare workers prior to and during the coronavirus disease 2019 (COVID-19) pandemic. *Infect Control Hosp Epidemiol* 2022;43(12):1966-8.
- Isara AR, Oguzie KE, Okpogoro OE. Prevalence of needlestick injuries among healthcare workers in the accident and emergency department of a teaching hospital in Nigeria. *Annals of Med Health Sci Res* 2015;5(6):292-6.
- Wang C, Huang L, Li J, Dai J. Relationship between psychosocial working conditions, stress perception, and needle-stick injury among healthcare workers in Shanghai. *BMC Public Health* 2019;19(1):874.
- Bouya S, Balouchi A, Rafiemanesh H, et al. Global Prevalence and Device Related Causes of Needle Stick Injuries among Health Care Workers: A Systematic Review and Meta-Analysis. *Ann Glob Health* 2020;86(1):35.
- Xu X, Yin Y, Wang H, Wang F. Prevalence of needle-stick injury among nursing students: A systematic review and meta-analysis. *Front Public Health* 2022;10:937887.
- Bekele T, Gebremariam A, Kaso M, Ahmed K. Factors Associated with Occupational Needle Stick and Sharps Injuries among Hospital Healthcare Workers in Bale Zone, Southeast Ethiopia. *PLoS One* 2015;10(10):e0140382.
- Diktas H, Oncul A, Tahtasakal CA, et al. What were the changes during the COVID-19 pandemic era concerning occupational risks among health care workers? *J Infect Public Health* 2021;14(10):1334-9.
- Duan X, Sun H, He Y, et al. Personal Protective Equipment in COVID-19: Impacts on Health Performance, Work-Related Injuries, and Measures for Prevention. *J Occup Environ Med* 2021;63(3):221-5.
- Sivić S, Gavran L, Baručija A, Alić A. Epidemiological characteristics of accidental needle-stick injury among health care professionals in primary healthcare in Zenica. *Med Glas (Zenica)* 2020;17(1):182-7.
- Mendelson MH, Lin-Chen BY, Solomon R, Bailey E, Kogan G, Goldbold J. Evaluation of a safety resheathable winged steel needle for prevention of percutaneous injuries associated with intravascular-access procedures among healthcare workers. *Infect Control Hosp Epidemiol* 2003;24(2):105-12.
- Abalkhail A, Kabir R, Elmosaad YM, et al. Needle-Stick and Sharp Injuries among Hospital Healthcare Workers in Saudi Arabia: A Cross-Sectional Survey. *Int J Environ Res Public Health* 2022;19(10):6342.
- Saadeh R, Khairallah K, Abozeid H, Al Rashdan L, Alfaqih M, Alkhatatbeh O. Needle Stick and Sharp Injuries Among Healthcare Workers: A retrospective six-year study. *Sultan Qaboos Univ Med J* 2020;20(1):e54-e62.
- Alfulayw KH, Al-Otaibi ST, Alqahtani HA. Factors associated with needlestick injuries among healthcare workers: implications for prevention. *BMC Health Serv Res* 2021;21(1):1074.
- Ishak AS, Haque MS, Sathra SS. Needlestick injuries among Malaysian healthcare workers. *Occup Med (Lond)* 2019;69(2):99-105.