Original Research

EVALUATION OF NEEDLE STICK INJURY AND ASSOCIATED FACTORS AMONG HEALTHCARE WORKERS IN AL NAJAF CITY/ IRAQ

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ABSTRACT

Introduction: In healthcare-related situations, needle sticks represent a substantial work-related health risk. Healthcare professionals face the danger of contracting blood-borne infections as well as the psychological impact of these wounds. The study aimed to evaluate the prevalence of needle stick injuries and the associated socio-demographic determinants among healthcare workers. **Methods**: The research employed a cross-sectional design, with data collection occurring from February 1st, 2023 to February 1st, 2024. 380 participants were conveniently selected from different Al-Najaf City/Iraq healthcare institutions. The study sample included a variety of specialists, including anesthetics, surgeons, dentists, surgeon assistants, anesthetics assistants, nurses, physicians, and laboratory workers. A self-administered questionnaire from previously published articles was used for data collection. It covers socio-demographic information, a history of previous exposure to, and the reasons for needle stick injuries. Quantitative variables were summarized with means and standard deviations; descriptive statistics for categorical variables included frequencies and percentages. $P \leq 0.05$ indicated statistical significance. **Results**: Most healthcare workers (85%) were previously exposed to needle sticks. Job category was significantly associated with a history of needle stick exposure ($p < 0.001$). The anesthetics represent the highest job class exposed to needle sticks (100%). More than one-fifth of participants (21.85%) reported recapping needles followed by bending needles in 16.84% of them as a cause of needle stick injuries. **Conclusion**: Most healthcare workers are exposed to needle stick injuries; job category is an important risk factor.

Keywords: Needle stick injury**,** Healthcare workers, Occupational exposure, Prevalence.

Introduction:

One of the most common workplace accidents and injuries among healthcare workers (HCWs) globally is needle stick injury (NSI) (Bouya et al.,2020). A needle stick is skin tissue damage from needles, broken syringes, and other sharp objects (Suksatan et al.,2022). Risky illnesses such as human immunodeficiency virus (HIV), hepatitis C virus (HCV), and hepatitis B virus (HBV) might spread to individuals if the needle is potentially infected with blood or other bodily fluid from a patient (Hebo et al., 2019).

The majority of needle stick injuries (NSIs) are caused by drug preparation, drug administration, recapping, the handling of syringes without a container, the opening of needle caps, suturing, and the drawing of blood (Abalkhail et al., 2022).

Needle stick injuries pose a major health threat to healthcare workers, potentially exposing them to blood-borne pathogens. The World Health Organization (WHO) reports that NSIs contribute to a substantial portion of global cases of these infections, with HBV (36.7%), HCV (39%), and HIV/AIDS (4.4%) being attributed to this route of transmission (Hosseinipalangi et al., 2022).

Needle stick injuries (NSI) pose a risk for transmission of a wide range of bloodborne pathogens, exceeding 20 different diseases. However, the most significant clinical concern lies with infections like HIV, HBV, and HCV, which can have severe lifelong implications and incur substantial healthcare costs. Notably, HBV infection is the most common consequence of NSI among these three viruses (Abdelmalik et al., 2023).

Every workplace blood-borne pathogen preventive program must include NSI prevention. Concerning prevention, PEP (post-exposure prophylaxis) measures can greatly lower the risk of infection when exposure occurs. Guidelines have been released to manage HCWs who have worked on blood-borne diseases. This entails an immediate assessment of the source and exposed person's health and prompt administration of hepatitis B immune globulin (HBIG), hepatitis B vaccination, and/or HIV PEP might be necessary. Additionally, HCV (Hepatitis C) testing should be performed to identify potential infection (Naggie et al.,2017).

Healthcare settings can spread hepatitis B (HBV) and hepatitis C (HCV) to both healthcare workers and patients. This risk comes mainly from unsafe practices like reusing needles and syringes, and a lack of proper infection control. To protect themselves and others from bloodborne pathogens, healthcare providers should consistently follow recommended standard precautions, safe injection practices, and proper sterile techniques. Furthermore, the CDC and ACIP advise healthcare providers and public safety workers with a potential risk of blood exposure to complete the hepatitis B vaccine series and verify immunity through post-vaccination testing (Singh et al., 2022).

Due to NSI, healthcare personnel may experience emotional discomfort, anxiety, depression, and post-traumatic stress disorder, which can result in more missed workdays and absences from work (Veronesi et al.,2018). Each virus had its own Post-exposure Control. HIV: Post-exposure prophylaxis can aid in lowering the risk of developing HIV. The greatest benefit can be attained by starting therapy as soon as possible after exposure (Chan et al., 2023). HBV: Depending on the patient's HBV status and the exposed person's immunization history, several treatments are available after exposure (Bastian et al.,2022). HCV: For employees who have been exposed to the virus, no therapy has been

proven to stop infection. Suggestions focus on keeping track of injured workers and checking serum for HCV RNA (Cooke et al.,2017).

By identifying the prevalence and causes of NSIs worldwide, we can develop strategies to decrease their occurrence. This can lead to safer work environments, foster a culture of safety, reduce staff turnover, save healthcare facilities money, and ultimately allow HCWs to provide better quality care (Santos et al., 2018). Hence, the current study proposes to assess the prevalence and associated risk factors of NSI among healthcare workers in Al-Najaf City, Iraq.

Methods:

A cross-sectional study was conducted over one year starting on February 1st, 2023. The study involved 380 healthcare workers (HCWs) from various healthcare institutions in Al-Najaf City, Iraq.

Study population and sampling technique: The study included healthcare workers in two hospitals and three primary healthcare centers selected by the random sampling technique of health institutions in AL Najaf city. The chosen hospitals and primary health care centers include ALSadr Hospital, Al Najaf Al-Ashraf Hospital, Al-Hassan Al-Mujtaba Center, Khawla Zouein, and Martyr Nasser Center. However, participants were selected conveniently.

Inclusion and exclusion criteria: The study sample included a variety of specialists including anesthetics, surgeons, dentists, assistant surgeons, assistant anesthetics nurses, medical officers, and laboratory workers. Those who refused to participate were excluded.

The sample size was estimated according to the following statistical equation [n = Z2P(1–P)/d2]. The prevalence of NSI among HCWs equals 55% according to a previous Iraqi study in Erbil at Rizgary Teaching Hospital in 2020 (Ali et al.,2020).

Research instruments:

Data collection was conducted using self-administered questionnaires distributed to healthcare workers (HCWs) from various healthcare institutions. A questionnaire adopted from a previous study (Alsabaani et al., 2022) was used for data collection. It was reviewed by expert surgeons and community medicine specialists to ensure alignment with study objectives. It covers socio-demographic information including [age, sex, job category, job duration, job location, health care institution], a history of previous exposure to NSI, and the reasons for NSI.

Ethical approvals: Official agreement was obtained from the Iraqi Board for Medical Specialization and Faculty of Medicine, University of Kufa (Reference#: MEC-33). After obtaining informed verbal consent in a private setting, participants were briefed about the study's purpose, its voluntary nature, guarantees of anonymity, and any technical requirements for participation.

Statistical analysis: Data were analyzed using Statistical Package for Social Sciences (SPSS) version 26. Categorical data (like occupation or marital status) were presented as numbers and percentages. Continuous data (like age or income) are presented as averages and standard deviations. A Chi-Square test was used to find the presence of a relationship between participants' social and demographic characteristics and their experience of NSI. A statistically significant difference was considered at $P \leq 0.05$.

Results:

This study included a sample of 380 healthcare workers from different job categories selected from health institutions in AL-Najaf City.

Concerning sex distribution, more than half of the healthcare workers (55.5%) were females, nearly one-third (32.1%) of the HCWs were working in the outpatient department and 22.4% were working in the emergency room.

The mean ± standard deviation of the participant's age was (4.74 ± 30.88) years. The most common age group was 28-30 years old, representing 31.1% of participants. Nurses were the most prevalent job of participants (21.1%), followed by laboratory technicians (16.8 %) and medical officers (16.3%).

Regarding years of practice, the mean ± standard deviation of job duration was (4.30 ± 5.92) years, and the highest percentage of them (29.5%) had work experience < 3 years (Table 1).

Table 1: Distribution of healthcare workers according to their socio-demographic characteristics.

Variable	**Frequency (No.)**	**Percentage (%)**	**Mean ± SD**
Sex			
Male	169	44.5	
Female	211	55.5	
Age (year)			30. 88± 4.74
<28	112	29.5	
28-30	118	31.1	
31-33	73	19.2	
>33	77	20.3	
Job category			
Surgeon doctor	45	11.8	
Surgeon assistance	19	5.0	
Anesthetic	28	7.4	
Anesthetic assistance	21	5.5	
Nurse	80	21.1	
Laboratory Technician	64	16.8	
dentist	61	11.8	
physician	62	16.3	
Job location			
Ward	63	16.6	
Outpatient department	122	32.1	
Emergency room	85	22.4	
Laboratory	68	17.9	
Operative room	42	11.1	
Job duration (year)			5.92 ± 4.30
<3	112	29.5	

3-5 6-8 >8	101 92 75	26.6 24.2 19.7	
Health care institution			
Primary health care Secondary health care	148 232	38.9 61.1	

Figure (1) Demonstrates that 85 % (n=323) of HCWs were previously exposed to NSI, whereas only 15% (n=57) HCWs were not exposed to NSIs.

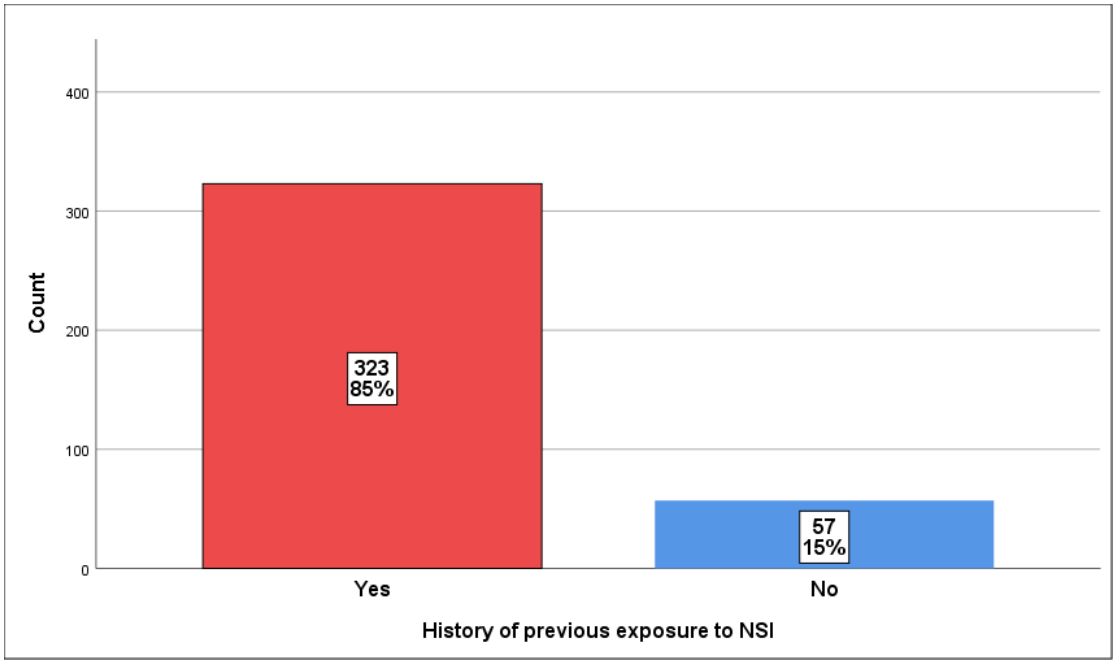

Figure 1: Distribution of healthcare workers according to their history of previous life exposure to needle stick injuries.

The three predominant causes of NSIs were the use of recapping needles (21.6%), the use of bending needles (16.8%), and heavy workload (13.7) as shown in table (2).

Table 2: Reasons for needle stick injuries as reported by participants.

Reason	Frequency (No.)	Percentage (%)
Recapping needles	**82**	**21.6**
Transferring specimen	**25**	**6.6**
Manipulating inpatient	**37**	**9.7**
Collision with a worker or sharp during use others (accessing IV-line restless patient, etc..)	**20**	**5.3**
Heavy work	**52**	**13.7**
Lack protection measure	**49**	**12.9**
Tiredness	**35**	**9.2**
Bending needle	**64**	**16.8**
Others	**16**	**4.2**
Total	**380**	**100.0**

Table (3) demonstrated a highly significant statistical relationship between the job category and a history of exposure to NSI ($p < 0.001$). Among HCWs, those exposed to the anesthetics had the greatest percentage of workers (100%), and there was no significant association between job location and NSIs ($P = 0.499$), however, HCWs who worked in the ward had the highest percentage of exposure to NSI (87.7%). Moreover, there was no significant association between exposure to the NSI and other socio-demographic factors including age, sex, job duration, and healthcare institution ($P > 0.05$).

Table 3: Association of NSI with sociodemographic features of the studied sample.

Characteristics	HCWs exposed to NSIs (n=323) No. (%)	HCWs not exposed to NSIs (n=57) No. (%)	Total (n=380) No (%)	P-Value
Sex				
Male	148(87.6%)	21(12.4%)	169(100%)	0.108
Female	172(81.5%)	39(18.5%)	211(100%)	
Age				
<28	91(81.3%)	21(18.8%)	112(100%)	
28-30	101(85.6%)	17(14.4%)	118(100%)	0.358
31-33	59(80.8%)	14(19.2%)	73(100%)	
>33	69(89.6%)	8 (10.4%)	77(100%)	
Job category				

Surgeon doctor	53(82.8%)	11(17.2%)	64(100%)	<0.001
Surgeon Assistance	16(84.2%)	3(15.8%)	19(100%)	
Anesthetic	28(100%)	0 (0.0%)	28(100%)	
Anesthetic Assistance	19(90.5%)	2 (9.5%)	21(100%)	
Nurse	71(88.8%)	9(11.3%)	80(100%)	
Laboratory Technician	35(77.8%)	10(22.2%)	45(100%)	
Dentist	57(93.4%)	4 (6.6%)	61(100%)	
Physician	41(66.1%)	21(33.9%)	62(100%)	
Job location				
Ward	55(87.3%)	8(12.7%)	63(100%)	0.499
Outpatient department	107(87.7%)	15(12.3%)	122(100%)	
Emergency room	70(82.4%)	15(17.6%)	85(100%)	
Operative room	33(78.6%)	9(21.4%)	42(100%)	
Laboratory	55(80.9%)	13(19.1%)	68(100%)	
Job duration (year)				
<3	91(81.3%)	21(18.8%)	112(100%)	0.582
3-5	86(85.1%)	15(14.9%)	101(100%)	
6-8	81(88.0%)	11(12.0%)	92(100%)	
>8	62(82.7%)	13(17.3%)	75(100%)	
Health care institution				
Primary health care	128(86.5%)	20(13.5%)	148(100%)	0.331
Secondary health care	192(82.8%)	40(17.2%)	232(100%)	

Discussion:

While the implementation of universal precautions and safer needle technologies have reduced their prevalence, needle stick injuries are still a frequent concern in healthcare settings, posing a risk of serious complications (Alsabaani et al.,2022).

The result of the current cross-sectional research demonstrated that more than three-quarters (85%) of HCWs were exposed to NSI. This finding agrees with the findings of that study (WHO, 2021) which revealed that a relatively high percentage (94%) of HCWs reported this injury and a study in Erbil (81.6%) (Ali et al., 2020), whereas it is greater than that reported in a study done in Baghdad (53.8%) (Khalid et al.,2018); this variation can arise from differences in methodologies, sample size, and the studied population. It is crucial to consider these factors when comparing percentages across studies.

The most common cause of NSI is recapping needles (21.58%), which is lower than the findings of studies done in Erbil (Ali et al., 2020) (42.1%), and Baghdad (Al-kalidi et al., 2022) (41.4%). Recapping was the major cause (55.1%) of NSIs because, during needle recapping, there is a greater chance of losing control of the needle, leading to inadvertent injuries. Safety guidelines advise against recapping to minimize the risk of NSI accidents and promote safer needle-handling practices in healthcare settings (Elisa et al.,2023).

In the current study, there was no significant relationship between sex and NSIs ($P = 0.108$), with a slightly higher prevalence of NSIs among males (87.6%) than females (81,5%), The current finding is similar to that of Saudi study (Alsabaani et al.,2022). NSIs are not necessarily more prominent in male HCWs based on sex alone. The risk of NSI is influenced by various factors such as work practices, experience, and compliance with safety protocols. It's essential to consider the specific tasks, work environment, and adherence to safety measures rather than attributing it solely to gender. Both male and female HCWs can face NSI risks, and promoting universal safety practices is crucial for reducing such incidents.

There was a significant relationship between job category and NSIs ($P <0.001$). Anesthetic was more common in NSIs (100%) than in other categories which was in line with a previous study (Yarahmadi et al.,2024). The NSI can be more prominent in anesthesia-related procedures due to the nature of tasks performed by anesthetists. Anesthetists often handle sharp instruments, administer injections, and manage various medical devices during procedures. The fast-paced and dynamic environment of the operating room, coupled with the need for precise and rapid actions, may increase the risk of accidental NSI.

There was no significant association between job duration and the NSIs ($P > 0.05$), which is similar to the results of a Saudi study (Alsabaani et al.,2022).

In the present study, participants with 6-8 years of experience had the highest prevalence of needlestick injuries (NSIs). This could be due to several factors, such as increased potential fatigue or decreased adherence to safety protocols over time. Long-term exposure to high-risk environments may contribute to a greater likelihood of accidents or lapses in precautionary measures (Wong et al., 2019). Even this association was statistically non-significant ($P>0.05$).

Our research has certain shortcomings. The causation of the link between the variables under comparison cannot be verified by the cross-sectional design. Self-reported answers could overstate or understate the outcome. One of the study's weaknesses is that it was limited to a particular city in the

Najaf Region. In the future, we want to have all the tools needed to conduct multi-centric and country-wide studies. The advantage of our study, nevertheless, is that it uses a large sample of HCWs from various jobs and healthcare levels and a well-designed procedure and well-tested questionnaire for data collection and measurement by algorithm revising for prevalence, as far as we know this research is the first that was conducted in AL-Najaf city.

Conclusion:

Injections have saved many lives but at the same time carry the risk of infection to many HCWs, and the majority of HCWs have been exposed to NSIs which is regarded as a significant occupational hazard, The most commonly reported cause of NSI is recapping needles and bending needles, the Job category is a factor for NSI exposure.

Conflicts of Interest

The authors declare no conflicts of interest.

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