

Needle Stick and Sharp Injuries Among Healthcare Workers

A retrospective six-year study

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إصابات الإبر والأدوات الحادة لدى عمال الرعاية الصحية دراسة إستيعادية لمدة ستة سنوات

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ABSTRACT: Objectives: This study aimed to examine the proportion of needle stick and sharp injuries (NSSIs) among healthcare workers at King Hussein Medical Center (KHMC), Amman, Jordan. **Methods:** All NSSI reports referred from departments at KHMC to the Preventive Medicine Department between 2013–2018 were retrospectively reviewed. Proportion of NSSIs were calculated and stratified according to age, gender, job title, place and site of injury and the procedure/task during which the injury occurred. **Results:** There were a total of 393 NSSIs. A significant association was found between the proportion of NSSIs and all tested variables ($P < 0.001$). The reported proportion of NSSIs was highest among nurses (39.7%) followed by cleaners (36.3%), physicians (10.4%), other workers (7.4%) and lab technicians (5.9%) during the study's six-year period. Hospital wards were the most common locations (46.1%) where injuries took place. Injuries also occurred most frequently during medical waste collection (38.2%). **Conclusion:** The proportion of NSSIs was highest among nurses and cleaners. Safety policies and training among high-risk groups should be reviewed to reduce the risk of NSSIs. Multicentre studies at a national level should be conducted to examine whether this study's findings reflect national trends.

Keywords: Needlestick Injuries; Safety; Self Report; Nurses; Accident Prevention; Jordan.

الملخص: هدفت هذه الدراسة إلى دراسة حالات الإصابة بالإبر والأدوات الحادة بين العاملين في مجال الرعاية الصحية في مركز الملك حسين الطبي، عمان، الأردن. **الطريقة:** تمت مراجعة جميع تقارير الإصابة بالإبر والأدوات الحادة المحالة من أقسام مركز الملك حسين الطبي إلى قسم الطب الوقائي بين 2013–2018 بأثر رجعي. تم حساب معدلات حدوث الإصابة بالإبر والأدوات الحادة وكانت المعدلات مقسمة طبقاً وفقاً للعمر والجنس والمسمى الوظيفي ومكان وموقع الإصابة والإجراء الذي وقع خلال الإصابة. النتائج: كان هناك ما مجموعه 393 حالة من الإصابة بالإبر والأدوات الحادة. تم العثور على ارتباط كبير بين حدوث الإصابة بالإبر والأدوات الحادة وجميع المتغيرات التي تم اختبارها (لكل منها $P < 0.001$). كانت معدلات الإبلاغ عن الإصابة بالإبر والأدوات الحادة أعلى بين الممرضات (39.7%) يليها إصابة عمال النظافة (36.3%) والأطباء (10.4%) والعاملين الآخرين (7.4%) وفنيي المختبرات (5.9%) خلال فترة الدراسة لمدة ستة سنوات. وكانت أجنحة المستشفى هي الأماكن الأكثر شيوعاً لحدوث الإصابات (46.1%). حدثت الإصابات أيضاً بشكل متكرر أثناء جمع النفايات الطبية (38.2%). الخلاصة: كانت نسبة حدوث الإصابة بالإبر والأدوات الحادة أعلى بين الممرضات وعمال النظافة. يجب مراجعة سياسات السلامة والتدريب بين الفئات المعرضة للخطر للحد من مخاطر الإصابة بالإبر والأدوات الحادة. ينبغي إجراء دراسات متعددة المراكز على المستوى الوطني لبحث ما إذا كانت نتائج هذه الدراسة تعكس الاتجاهات الوطنية.

الكلمات المفتاحية: إصابات الإبر؛ السلامة؛ تقرير ذاتي؛ الممرضين؛ الوقاية من الحوادث؛ الأردن.

ADVANCES IN KNOWLEDGE

- The current study highlights work-related factors associated with needle stick and sharp injuries (NSSIs) in settings where a surveillance system does not exist.
- This study highlights the importance of initiating effective surveillance as well as a reporting system that could contribute to reducing the occurrence of NSSIs locally and nationally.

APPLICATION TO PATIENT CARE

- A safe work environment that minimises injuries among healthcare workers provides a higher level of quality care to patients and lower possibility of infectious disease transmission.

PERCUTANEOUS NEEDLE STICK AND SHARP injuries (NSSIs) could be associated with healthcare workers' (HCWs) exposure to hepatitis B (HBV), hepatitis C (HCV) and HIV. More

than 20 other infections could be transmitted through NSSIs, including syphilis, malaria and herpes.^{1,2} Using devices with safety features, promoting health education and implementing safety protocols and

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training programmes for individuals at risk of NSSIs are part of national public health policies designed to prevent the transmission of blood-borne pathogens among or to HCWs.³ Although most NSSIs occur in developing countries, NSSIs are still reported in developed countries, indicating that NSSIs might be a global problem. Indeed, although developed countries use prevention measures as advanced as real-time injury monitoring systems coupled with standard operating protocols, NSSIs still occur.^{4,5}

The prevalence of NSSIs is higher in developing countries than developed countries.⁶ However, experiences from several developing countries demonstrate that implementing national health policy plans consisting of established safety protocols and offering mandatory training programmes to HCWs can be successful in reducing the prevalence of NSSIs and associated infections.^{7,8} Despite the established safety protocols in some developing countries, compliance with safety protocols is below expectations and NSSIs often go unreported.^{9,10} It has been suggested that to improve compliance with guidelines related to infection control practices, a culturally-oriented approach which aims to improve overall community awareness and focuses on both organisational and individual accountability should be developed. However, for this approach to be successful in achieving its goals, it must be supported by establishing policies and surveillance systems and providing adequate training to HCWs.^{11,12}

Few studies have examined NSSIs in Jordan and most have only included data collected from practicing nurses or nursing students.^{10,13–15} These studies concluded that NSSI rates are high among nurses and nursing students, the level of awareness of universal precaution guidelines is low, reporting occupational exposures to NSSIs is inadequate and young female nurses with fewer years of experience are more vulnerable to NSSIs.^{10,13–15} Studies on the proportion of NSSIs among HCWs, except nurses, have not been conducted in Jordan. Moreover, none of the studies investigated the practices and predisposing factors associated with NSSIs among affected HCWs. Thus, further investigations are needed to understand the causes of the high NSSI rate and the low level of knowledge of safety practices and precautionary guidelines.^{16,17} It is difficult to identify the precise reason for the high proportion of NSSIs; however, by collecting information about the site of injury, the hospital department where the injury took place and the procedure performed by the HCW when the NSSI occurred, it may be possible to infer trends. Identifying

these trends would allow for the development of better preventive measures and programmes.

The lack of similar studies in Jordan and a shortage of addressing HCWs' safety concerns in public hospitals necessitates efficient, useful and accurate research which may yield possible prevention methods. Therefore, this study aimed to measure the proportion of NSSIs among HCWs of the Jordanian Royal Medical Services between 2013–2018, to examine the associations of selected factors, including age, gender, job, place and site of injury and type of procedure/task performed when the NSSI occurred.

Methods

This retrospective study was conducted at the Preventive Medicine Department at King Hussein Medical Center (KHMC), Amman, Jordan, between 2013–2018. The Preventive Medicine Department is the site of referral for all injuries from all other departments at KHMC and is thus expected to house all injury reports regardless of the department in which they took place.

KHMC is a medical compound consisting of five hospitals. This centre is one of the major Jordanian Royal Medical Services hospitals distributed in different governorates across Jordan. Injury report forms are housed within the Department of Preventive Medicine at the Royal Medical Services, which covers all HCWs.

All NSSI report sheets were collected and reviewed by a clinical research coordinator and all data used for analysis were extracted directly from the reports. All reported cases that took place between 2013–2018 were included in the study. Data collected included age, gender, job, place and site of injury and type of procedure/task being performed at the time of injury.

Extracted data were entered in Excel spreadsheets, Version 2010 (Microsoft Corp., Redmond, Washington, USA) and then exported into Statistical Package for the Social Sciences (SPSS), Version 22 (IBM, Corp., Armonk, New York, USA), which was used for all analyses. The proportion of NSSIs was calculated based on age, gender, job, place and site of injury and type of procedure when injury occurred. Chi-squared test was used to examine relationships among the above listed variables. A *P* value <0.05 was considered statistically significant.

This study was approved by the Institutional Review Board Committee of KHMC.

Table 1: Distribution of needle stick and sharp injuries according to selected variables of healthcare workers in Jordan (N = 393)

| Variable | n (%) |
|--|------------|
| Age in years | |
| <20 | 7 (1.8) |
| 20–30 | 261 (66.4) |
| >30 | 125 (31.8) |
| Gender | |
| Male | 218 (55.5) |
| Female | 175 (44.5) |
| Job title | |
| Physician | 41 (10.4) |
| Nurse | 156 (39.7) |
| Lab technician | 23 (5.9) |
| Cleaner | 144 (36.6) |
| Other | 29 (7.4) |
| Place of injury | |
| OR | 60 (15.3) |
| Laboratory | 27 (6.9) |
| Hospital wards | 181 (46.1) |
| OP clinic | 48 (12.2) |
| Other | 77 (19.6) |
| Site of injury | |
| Right hand | 166 (42.2) |
| Left hand | 192 (48.9) |
| Lower limb | 27 (6.9) |
| Chest & abdomen | 2 (0.5) |
| Head & neck | 6 (1.5) |
| Procedure/task during which injury occurred | |
| Medical waste collection | 150 (38.2) |
| Giving medication | 41 (10.4) |
| Blood sampling | 61 (15.5) |
| Surgical intervention | 59 (15) |
| Blood analysis | 24 (6.1) |
| Unusual occurrence | 58 (14.8) |
| Year injury reported | |
| 2013 | 59 (15.0) |
| 2014 | 64 (16.3) |
| 2015 | 83 (21.1) |
| 2016 | 77 (19.6) |
| 2017 | 57 (14.5) |
| 2018 | 53 (13.5) |

OR = operating room; OP = outpatient.

Results

A total of 393 NSSIs were included in this study. More than half of reported injuries were among males (55.5%) and almost two-thirds were among those aged 20–30 years old (66.4%). Most reported cases were among nurses (39.7%) and cleaners (36.6%). Almost half of reported injuries occurred in hospital wards (46.1%) and more than one-third of reported injuries occurred during medical waste collection (38.2%). Injuries occurred mainly in the left and right hand (48.9% and 42.2%, respectively). Although injury rates increased from 15.0% in 2013 to 21.1% in 2015, they declined to 13.5% in 2018 [Table 1].

All variables were statistically significant according to participants' job titles ($P < 0.001$ each). Most injuries among those 20–30 years old occurred among nurses (59.4%) and cleaners (22.6%). Among those older than 30 years, most injuries (68%) were found among cleaners. The majority of reported injuries among males were from nurses (67.4%) and among females, cleaners had the most injuries (66.9%). Within laboratory settings, all cases were among nurses and in wards the majority (57.5%) was found among nurses. In the outpatient (OP) clinics, almost all injuries were among cleaners (97.9%). Right-hand injuries occurred mostly among nurses (68.7%) while left-hand injuries were most common among cleaners (66.1%). Although the incidence of NSSIs during medical waste collection or while giving medication was mainly among nurses, injuries during other procedures occurred most often among cleaners [Table 2].

The comparison of NSSIs by location of injury to all variables was statistically significant ($P < 0.001$ each). In 20–30 years old, most NSSIs happened in hospital wards (67%) followed by the operating room (OR; 20.3%). Males reported having more in-ward injuries than females (60.1% versus 28.6%, respectively). Most injuries among physicians occurred in the OR (85.4%) while injuries among nurses occurred mainly in wards (66.7%), followed by the laboratory (17.3%) and the OR (16%). Right and left hand injuries were mainly reported in hospital wards (47.6% and 53.1%, respectively) [Table 3]. Following hospital wards (46.1%), the most frequent place for injuries were other locations (19.6%), ORs (15.3%) and OP clinics (12.2%) [Table 1].

All relationships between NSSIs by procedure and other independent variables were statistically significant ($P < 0.001$ each). The proportion of NSSIs during medical waste collection was highest among those aged 20–30 years (54.8%) compared to other age groups. Females were more commonly injured during an unusual occurrence (33.1%) or surgical intervention

Table 2: Comparison of needle stick and sharp injuries by job title to independent variables of healthcare workers in Jordan (N = 393)

| Variable | n (%) | | | | | | P value |
|--|-----------|------------|----------------|------------|-----------|-----------|---------|
| | Physician | Nurse | Lab technician | Cleaner | Other | Total | |
| Age in years | | | | | | | |
| <20 | 6 (85.7) | 1 (14.3) | 0 (0) | 0 (0) | 0 (0) | 7 (100) | <0.001 |
| 20–30 | 29 (11.1) | 155 (59.4) | 18 (6.9) | 59 (22.6) | 0 (0) | 261 (100) | |
| >30 | 6 (4.8) | 0 (0) | 5 (4) | 85 (68) | 29 (23.2) | 125 (100) | |
| Gender | | | | | | | |
| Male | 35 (16.1) | 147 (67.4) | 9 (4.1) | 27 (12.4) | 0 (0) | 218 (100) | <0.001 |
| Female | 6 (3.4) | 9 (5.1) | 14 (8) | 117 (66.9) | 29 (16.6) | 175 (100) | |
| Place of injury | | | | | | | |
| OR | 35 (58.3) | 25 (41.7) | 0 (0) | 0 (0) | 0 (0) | 60 (100) | <0.001 |
| Lab | 0 (0) | 27 (100) | 0 (0) | 0 (0) | 0 (0) | 27 (100) | |
| Hospital ward | 0 (0) | 104 (57.5) | 18 (9.9) | 59 (32.6) | 0 (0) | 181 (100) | |
| OP clinic | 0 (0) | 0 (0) | 0 (0) | 47 (97.9) | 1 (2.1) | 48 (100) | |
| Other | 6 (7.8) | 0 (0) | 5 (6.5) | 38 (49.4) | 28 (36.4) | 77 (100) | |
| Site of injury | | | | | | | |
| Right hand | 35 (21.1) | 114 (68.7) | 9 (5.4) | 8 (4.8) | 0 (0) | 166 (100) | <0.001 |
| Left hand | 2 (1) | 42 (21.9) | 14 (7.3) | 127 (66.1) | 7 (3.6) | 192 (100) | |
| Lower limb | 4 (14.8) | 0 (0) | 0 (0) | 9 (33.3) | 14 (51.9) | 27 (100) | |
| Chest & abdomen | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 2 (100) | 2 (100) | |
| Head & neck | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 6 (100) | 6 (100) | |
| Procedure/task during which injury occurred | | | | | | | |
| Medical waste collection | 35 (23.3) | 104 (69.3) | 4 (2.7) | 7 (4.7) | 0 (0) | 150 (100) | <0.001 |
| Giving medication | 0 (0) | 27 (65.9) | 0 (0) | 14 (34.1) | 0 (0) | 41 (100) | |
| Blood sampling | 0 (0) | 24 (39.3) | 8 (13.1) | 29 (47.5) | 0 (0) | 61 (100) | |
| Surgical intervention | 0 (0) | 1 (1.7) | 8 (13.6) | 50 (84.7) | 0 (0) | 59 (100) | |
| Blood analysis | 0 (0) | 0 (0) | 3 (12.5) | 18 (75) | 3 (12.5) | 24 (100) | |
| Unusual occurrence | 6 (10.4) | 0 (0) | 0 (0) | 26 (44.8) | 26 (44.8) | 58 (100) | |

OR = operating room; OP = outpatient.

(30.3%) than other procedures. It is noteworthy that NSSIs among physicians occurred mainly during surgical interventions (85.4%). During surgical interventions, the left hand was more commonly injured (30.7%) while the right hand was more commonly injured during medical waste collection (83.1%) [Table 4].

Regarding the comparison of NSSIs by site to other independent variables, the site of injury was statistically significant for all variables ($P < 0.001$ each). In OP clinics, injuries were reported only in the left hand (100%). Moreover, among cleaners (88.2%), females (77.7%) and at hospital wards (56.4%) left hand injuries were the most common. Among the procedures/tasks during which an injury occurred,

the right hand was most often injured during medical waste collection (92%) [Table 5].

Discussion

NSSIs are frequent yet preventable occupational hazards among HCWs. According to recent World Health Organization estimates, approximately two million NSSI cases are reported annually, but this number could be an underestimation as many cases of NSSIs are not reported, especially in developing countries.^{1,11,18} Public health sectors are concerned about NSSIs because they comprise a major source of morbidity and mortality worldwide. It is estimated

Table 3: Comparison of needle stick and sharp injuries by location of injury to independent variables of healthcare workers in Jordan (N = 393)

| Variable | n (%) | | | | | | P value |
|--|-----------|-----------|------------|-----------|-----------|-----------|---------|
| | OR | Lab | Wards | OP clinic | Other | Total | |
| Age in years | | | | | | | |
| <20 | 7 (100) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 7 (100) | |
| 20–30 | 53 (20.3) | 27(10.3) | 175 (67) | 6 (2.3) | 0 (0) | 261 (100) | <0.001 |
| >30 | 0 (0) | 0 (0) | 6 (4.8) | 42 (33.6) | 77 (61.6) | 125 (100) | |
| Gender | | | | | | | |
| Male | 60 (27.5) | 27 (12.4) | 131 (60.1) | 0 (0) | 0 (0) | 218 (100) | |
| Female | 0 (0) | 0 (0) | 50 (28.6) | 48 (27.4) | 77 (44) | 175 (100) | <0.001 |
| Job title | | | | | | | |
| Physician | 35 (85.4) | 0 (0) | 0 (0) | 0 (0) | 6 (14.6) | 41 (100) | |
| Nurse | 25 (16) | 27 (17.3) | 104 (66.7) | 0 (0) | 0 (0) | 156 (100) | |
| Lab technician | 0 (0) | 0 (0) | 18 (78.3) | 0 (0) | 5 (21.7) | 23 (100) | <0.001 |
| Cleaner | 0 (0) | 0 (0) | 59 (41) | 47 (32.6) | 38 (26.4) | 144 (100) | |
| Other | 0 (0) | 0 (0) | 0 (0) | 1 (3.4) | 28 (96.6) | 29 (100) | |
| Site of injury | | | | | | | |
| Right hand | 60 (36.1) | 27 (16.3) | 79 (47.6) | 0 (0) | 0 (0) | 166 (100) | |
| Left hand | 0 (0) | 0 (0) | 102 (53.1) | 48 (25) | 42 (21.9) | 192 (100) | |
| Lower limb | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 27(100) | 27 (100) | <0.001 |
| Chest & abdomen | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 2 (100) | 2 (100) | |
| Head & neck | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 6 (100) | 6 (100) | |
| Procedure/task during which injury occurred | | | | | | | |
| Medical waste collection | 60 (40) | 27(18) | 63 (42) | 0 (0) | 0 (0) | 150 (100) | |
| Giving medication | 0 (0) | 0 (0) | 41 (100) | 0 (0) | 0 (0) | 41 (100) | |
| Blood sampling | 0 (0) | 0 (0) | 57 (93.4) | 4 (6.6) | 0 (0) | 61 (100) | |
| Surgical intervention | 0 (0) | 0 (0) | 14 (23.7) | 33 (55.9) | 12 (20.3) | 59 (100) | <0.001 |
| Blood analysis | 0 (0) | 0 (0) | 5 (20.8) | 6 (25) | 13 (54.2) | 24 (100) | |
| Unusual occurrence | 0 (0) | 0 (0) | 1 (1.7) | 5 (8.6) | 52 (89.7) | 58 (100) | |

OR = operating room; Lab = laboratory; OP = outpatient.

that NSSIs account for 16,000, 66,000 and 1,000 annual cases of HCV, HBV and HIV infections, respectively. This may lead to approximately 1,100 deaths or significant disabilities.¹⁸

Despite the global magnitude of NSSI occurrence and the negative impact it has in terms of morbidity and mortality, studies evaluating NSSIs in Jordan are scarce or have not been comprehensive in design or have only focused on the nursing sector.^{14,16,19–21} Although the current study includes only NSSI data from one medical centre, all NSSI reports referred to the Preventive Medicine Department from 2013–2018 were collected, regardless of the referring party. Information related to age, gender and occupation of the NSSI referee were also collected.

Moreover, site of the NSSI and the procedure/task performed by the individual at the time of injury was acquired. This study helps identify potential risk factors, gaps in the current preventive strategies implemented at KHMC and may serve as a roadmap for future changes in preventive medicine and public health policies at the institution. Although this study was limited in size and only included data collected from one institution, it could serve as a pilot study, and the study design could be easily modified. Implementation on a national scale is a future direction anticipated by the authors.

Analogous to other developing countries, the proportion of NSSIs among HCWs at KHMC was relatively high.^{4,5,7,13,22–26} This finding is in agreement

Table 4: Comparison of needle stick and sharps injuries by procedure/task during which the injury occurred to independent variables of healthcare workers in Jordan (N = 393)

| Variable | n (%) | | | | | | | P value |
|------------------------|--------------------------|-------------------|----------------|-----------------------|----------------|--------------------|-----------|---------|
| | Medical waste collection | Giving medication | Blood sampling | Surgical intervention | Blood analysis | Unusual occurrence | Total | |
| Age in years | | | | | | | | |
| <20 | 7 (100) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 7 (100) | |
| 20–30 | 143 (54.8) | 39 (14.9) | 57 (21.8) | 18 (6.9) | 4 (1.5) | 0 (0) | 261 (100) | <0.001 |
| >30 | 0 (0) | 2 (1.6) | 4 (3.2) | 41 (32.8) | 20 (16) | 58 (46.4) | 125 (100) | |
| Gender | | | | | | | | |
| Male | 150 (68.8) | 37 (17) | 25 (11.5) | 6 (2.8) | 0 (0) | 0 (0) | 218 (100) | <0.001 |
| Female | 0 (0) | 4 (2.3) | 36 (20.6) | 53 (30.3) | 24 (13.7) | 58 (33.1) | 175 (100) | |
| Job title | | | | | | | | |
| Physician | 0 (0) | 0 (0) | 0 (0) | 35 (85.4) | 0 (0) | 6 (14.6) | 41 (100) | <0.001 |
| Nurse | 104 (66.7) | 27 (17.3) | 24 (15.4) | 1 (0.6) | 0 (0) | 0 (0) | 156 (100) | |
| Lab technician | 4 (17.4) | 0 (0) | 8 (34.8) | 8 (34.8) | 3 (13) | 0 (0) | 23 (100) | |
| Cleaner | 7 (4.9) | 14 (9.7) | 29 (20.1) | 50 (34.7) | 18 (12.5) | 26 (18) | 144 (100) | |
| Other | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 3 (10.3) | 26 (89.7) | 29 (100) | |
| | | | | | | | | |
| Place of injury | | | | | | | | |
| OR | 60 (100) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 60 (100) | <0.001 |
| Laboratory | 27 (100) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 27 (100) | |
| Hospital ward | 63 (34.8) | 41 (22.7) | 57 (31.5) | 14 (7.7) | 5 (2.8) | 1 (0.6) | 181 (100) | |
| OP clinic | 0 (0) | 0 (0) | 4 (8.3) | 33 (68.8) | 6 (12.5) | 5 (10.4) | 48 (100) | |
| Other | 0 (0) | 0 (0) | 0 (0) | 12 (15.6) | 13 (16.9) | 52 (67.5) | 77 (100) | |
| | | | | | | | | |
| Site of injury | | | | | | | | |
| Right hand | 138 (83.1) | 18 (10.8) | 10 (6) | 0 (0) | 0 (0) | 0 (0) | 166 (100) | <0.001 |
| Left hand | 12 (6.2) | 23 (12) | 51 (26.6) | 59 (30.7) | 19 (9.9) | 28 (14.6) | 192 (100) | |
| Lower limb | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 5 (18.5) | 22 (81.5) | 27 (100) | |
| Chest & abdomen | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 2 (100) | 2 (100) | |
| Head & neck | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 6 (100) | 6 (100) | |
| | | | | | | | | |

OR = operating room; OP = outpatient; Lab = laboratory.

with the results of many studies that found a high incidence rate of NSSIs among nurses and nursing students.^{1,15,16,21,23,24,27} The exact cause of the high proportion of NSSIs among HCWs, including nurses, is unknown but could be related to several factors. It is possible that the public in Jordan and many other developing countries prefer injections over other methods for the delivery of drugs and pharmaceuticals.^{11,21} This preference would result in a higher rate of injections in public and private clinics; a higher injection rate could explain the high proportion of injection-related NSSIs observed in this study. Hospitals and other medical centres in Jordan, especially those affiliated with the military, are short-staffed but have a high volume of visitors.¹⁴ This high HCW-to-patient ratio results in a high workload

among hospital staff, including nurses. High workload was previously shown to be associated with increased frequency of occupational injuries among nurses in Jordan.^{14,16,20,21} Indeed, a high incidence of NSSIs appears to be a global problem as studies from many countries around the world have reported similar findings among nurses.^{4,10,16,21,28–30} In this study, a higher proportion of NSSIs was reported among male nurses compared to female nurses. This finding, however, is not in agreement with similar investigations in Jordan, Saudi Arabia, Kenya, Ethiopia and Iran.^{12,20,22,25,31} These studies reported a higher incidence of NSSIs among female nurses compared to male nurses. The difference observed in gender distribution of NSSIs may be attributed to differences in the male-to-female ratio between different hospitals, especially as KHMC has

Table 5: Comparison of needle stick and sharp injuries by site of injury to independent variables of healthcare workers in Jordan (N = 393)

| Variable | n (%) | | | | | | P value |
|--|------------|------------|------------|-----------------|-------------|-----------|---------|
| | Right hand | Left hand | Lower limb | Chest & abdomen | Head & neck | Total | |
| Age in years | | | | | | | |
| <20 | 7 (100) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 7 (100) | |
| 20–30 | 159 (60.9) | 102 (39.1) | 0 (0) | 0 (0) | 0 (0) | 261 (100) | <0.001 |
| >30 | 0 (0) | 90 (72) | 27 (21.6) | 2 (1.6) | 6 (4.8) | 125 (100) | |
| Gender | | | | | | | |
| Male | 162 (74.3) | 56 (25.7) | 0 (0) | 0 (0) | 0 (0) | 218 (100) | <0.001 |
| Female | 4 (2.3) | 136 (77.7) | 27 (15.4) | 2 (1.1) | 6 (3.4) | 175 (100) | |
| Job title | | | | | | | |
| Physician | 35 (85.4) | 2 (4.9) | 4 (9.8) | 0 (0) | 0 (0) | 41 (100) | <0.001 |
| Nurse | 114 (73.1) | 42 (26.9) | 0 (0) | 0 (0) | 0 (0) | 156 (100) | |
| Lab technician | 9 (39) | 14 (60.9) | 0 (0) | 0 (0) | 0 (0) | 23 (100) | |
| Cleaner | 8 (5.6) | 127 (88.2) | 9 (6.3) | 0 (0) | 0 (0) | 144 (100) | |
| Other | 0 (0) | 7 (24.1) | 14 (48.3) | 2 (6.9) | 6 (20.7) | 29 (100) | |
| Place of injury | | | | | | | |
| OR | 60 (100) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 60 (100) | <0.001 |
| Laboratory | 27 (100) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 27 (100) | |
| Hospital ward | 79 (43.6) | 102 (56.4) | 0 (0) | 0 (0) | 0 (0) | 181 (100) | |
| OP clinic | 0 (0) | 48 (100) | 0 (0) | 0 (0) | 0 (0) | 48 (100) | |
| Other | 0 (0) | 42 (54.5) | 27 (35.1) | 2 (2.6) | 6 (7.8) | 77 (100) | |
| Procedure/task during which injury occurred | | | | | | | |
| Medical waste collection | 138 (92) | 12 (8) | 0 (0) | 0 (0) | 0 (0) | 150 (100) | <0.001 |
| Giving medication | 18 (43.9) | 23 (56.1) | 0 (0) | 0 (0) | 0 (0) | 41 (100) | |
| Blood sampling | 10 (16.4) | 51 (83.6) | 0 (0) | 0 (0) | 0 (0) | 61 (100) | |
| Surgical intervention | 0 (0) | 59 (100) | 0 (0) | 0 (0) | 0 (0) | 59 (100) | |
| Blood analysis | 0 (0) | 19 (79.2) | 5 (20.8) | 0 (0) | 0 (0) | 24 (100) | |
| Unusual occurrence | 0 (0) | 28 (48.3) | 22 (37.9) | 2 (3.4) | 6 (10.3) | 58 (100) | |

OR = operating room; OP = outpatient.

more male than female nurses, potentially explaining the higher proportion of injuries among males.

The current findings indicate that hospital wards were the most common location at KHMC where NSSIs took place. This result is in agreement with the findings of several other studies.^{27,32} A possible explanation is that this area of the hospital has high foot-traffic as patients enter or leave the ward. Moreover, the ward experiences a high daily volume of procedures that require the use of needles and sharp objects.^{27,32} Such procedures are mainly done by nurses, which may explain the significant association of medical ward injuries with occupation, young age and left-hand injuries, which are typical characteristics for young nurses working in a busy hospital.

These results also demonstrate that most NSSIs at the hospital wards were significantly more often acquired during medical waste collection, more frequent among males, more likely to occur to either nurses or cleaners and significantly more likely to occur in the left hand. A possible explanation for the higher frequency of NSSIs among nurses and cleaners during medical waste collection is that both are involved in disposing needles/syringes, which often requires recapping of the needle. Right-handed individuals usually use their right hand to hold syringes or needles and the left hand for recapping. Most nurses and cleaners responsible for recapping needles are right-handed.²⁴ This could explain why the majority of NSSIs were to the left hand. Similarly, several studies have

reported that recapping was a significant contributor to NSSIs.^{4,24,33}

This study highlights the high frequency of NSSIs and indicates that there is a need for proper intervention measures to reduce this preventable source of morbidity and mortality. As NSSIs constitute the largest occupational hazard for HCWs, the findings of this study should impact local and national healthcare settings. This study's findings should encourage institutions, with similar occupational settings that have a high proportion of NSSIs, to revisit their surveillance reporting systems and implement proper educational and training programmes. In addition, since exposure to NSSIs is often associated with blood-borne pathogens, prevention strategies should not be limited to the population of this study but also extend to include all HCWs worldwide.

However, this study had some limitations. The data used was self-reported and therefore only included information from individuals familiar with the impact of NSSIs on the quality of health services and may have only captured those who were well-versed in the importance of reporting NSSIs. This data may not be representative of all NSSI cases that took place within the timeframe set for data collection. The study included data collected from only one healthcare institution in Jordan affiliated with the Royal Medical Services. Findings of this study require confirmation by using data collected from a larger sample size across multiple public and private healthcare institutions in Jordan. Nonetheless, the findings of this study will increase knowledge about the factors associated with the occurrence of the NSSIs and support and contribute to the effort of establishing a national reporting system for NSSIs in Jordan's public healthcare sector; such a system can be easily adapted in other countries as well.

Conclusion

Despite the limitations of this study, it confirms the findings of previous reports that highlighted the high proportion of NSSIs among HCWs in Jordan. Proper intervention measures, including well-designed training and awareness programmes, should be mandated in all medical institutions in Jordan. The success of these interventions could be applicable to other developing countries as well. Such a programme should incorporate surveillance techniques that enforce implementation of standard precautions that protect HCWs, regardless of their occupation, job title, place of work or socio-demographic characteristics. Although these precautions should be compulsory for all HCWs, additional measures that target high-risk groups, such as nurses and cleaners, should include additional training or awareness prog-

rammes to ensure their safety. These training or awareness programmes should focus on the importance of reporting NSSIs, explaining the objectives of surveillance systems, outlining available resources, developing skills to decrease the incidence of NSSIs and building leadership capacity for evaluating programmes and training others in the future.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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