

Needle stick and sharp injuries (NSSIs) among housekeepers in a Saudi hospital: An intervention study

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Abstract

Needle stick and sharp injuries (NSSIs) are a risk factor for blood-borne infections in healthcare facilities, yet they are preventable occupational hazards for health care workers. We estimated the frequency of NSSIs among housekeeping workers compared with other healthcare workers and evaluated the effect of preventive measures to reduce these injuries in housekeeping workers. The study was conducted in one Saudi Arabian hospital between 2011 and 2013. NSSIs were analyzed retrospectively and an intervention for housekeepers that included 43 sessions of education and increased resources and supervision was implemented in 2012. Evaluation measures included monitoring sharp disposal compliance, reports of improperly disposed sharps, use of heavy duty gloves, hepatitis B vaccination, and the frequency of NSSIs during 2012 and 2013. Chi square and Fisher's exact tests were used for comparison between groups and pre-post intervention. In 2011 NSSIs rates were 17.8% for housekeeping staff, 3.7% for nurses and 1.3% for doctors, although injury frequency varied by department. Also, 15% of housekeepers were immune to HBV and 21% used heavy duty gloves during waste management. During 2012 and 2013 NSSIs rate dropped significantly to 9.6% and 2.7% respectively, and HBV immunization increased to 78.1% and 100%, respectively. Heavy duty gloves usage improved to 100%. Improper sharp disposal reports decreased from 15.1% in 2012 to 5.5% in 2013. Sharps disposal compliance improved from 35.6% to 78.1% in 2012 and 2013, respectively. Continuous education of housekeepers about all measures for prevention of NSSIs is the responsibility of infection control team. However, continuous monitoring along with continuous training programs and resources adequacy is needed to maintain this improvement.

Keywords: needlestick injuries; sharps injuries; occupational exposure; hospital housekeeping; education; Saudi Arabia.

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Introduction

Needle stick and sharp injuries (NSSIs) are common and preventable occupational hazards and a risk factor for blood-borne infections in health care facilities. Global estimates show that after NSSIs accidents, there is a 3 to 10% risk of transmitting hepatitis B (HBV), 3% risk of transmitting hepatitis C (HCV), and a 0.3% risk of transmitting human immunodeficiency virus (HIV).^{1,2} Approximately three million of 35 million worldwide healthcare workers (HCWs) experience NSSIs every year.¹ Its incidence among hospital housekeepers was estimated to be 24.8% in Saudi Arabia,³ and 28.2% and 34.6% in two Indian studies.^{4,5} Contributing factors for NSSIs include needle type, recapping activities; collisions between HCWs and sharps during clean-up, manipulating needles in patient's areas, passing and handling various devices, and failure to dispose of the needle in puncture proof containers.⁶ Although housekeepers have no direct contact with patients and do not use sharp objects to perform their jobs, they are frequently exposed to NSSIs as they are responsible for closing and disposal of sharps containers. Injuries result from improper sharp object disposal or items protruding from the containers in which they are put. Previous studies indicate that knowledge about of NSSIs health hazards is lacking among the housekeeping staff, compared to other HCWs, re-emphasizing the need for further education about appropriate handling of sharps.^{4,7}

Before this study, it was mandated that Saudi Arabian hospitals report NSSI incidents (and associated blood-borne infections) on a monthly basis to the Ministry of Health. In light of this issue, a national surveillance program called *Exposure Prevention Information Network (EPINet™)* was introduced shortly after completing the study. EPINet™ is a software package created for recording and analyzing occupational exposures to blood-borne viruses. The focus is to monitor sharp injuries, body fluid splashes and the consequences of such exposures.⁸ Also, hospital guidelines mandate that all employees should practice standard precautions when there is potential exposure to blood or body fluids and report any NSSIs to the staff health clinic.

This study aimed to estimate the frequency of NSSIs among housekeeping workers in comparison with other

HCWs in one Saudi healthcare facility. Additionally we implemented and evaluated effect of preventive measures which were taken to reduce these injuries among them. These preventive measures can be used as a template to be implemented in other Saudi hospitals.

Methods

This is an intervention study with pre-and post-comparison conducted in King Khaled General Hospital (KKGH) in the Eastern Province of Saudi Arabia. KKGH is a 300-bed tertiary care facility with approximately 23,000 admissions per year. The study was done between January 2012 and December 2013. As per hospital policy, NSSIs are documented on an occurrence variance report (OVR), which is written by the injured staff. Since the majority of housekeepers cannot write English it is completed by their supervisor to whom they should report directly after first aid measures (washing hand under running water and sterilize with alcohol put plaster) are performed. After that they are directed to the staff health clinic for proper care, and are registered for follow up in the Infection Control Department. The incident should be reported within 24 hours. Baseline serological tests for HBV, HCV and HIV are done for injured HCWs and source patients (if known) after consent. HCWs who are serologically susceptible to HBV are offered HBV immunoglobulin within 24 hours and the 3 doses series of HBV immunization are initiated. Follow-up HCV serology tests for HCWs are conducted at third and sixth months. Tests for HIV antibody are conducted at sixth week, third and sixth months. The employee is counseled and chemoprophylaxis is given when indicated.

All housekeepers involved in collection of medical waste or likely to be exposed to bloodborne pathogens and who were on duty for at least one year were included in the intervention. All legible housekeepers participated in the study and there are no defaulters.

Data were abstracted from the following: the NSSI OVR, sharps disposal compliance check list, OVR of improper disposal of sharps, personal protective equipment (PPE) compliance checklists, staff health clinic database for HBV immunization, and the Infection Control Department data base for NSSIs.

The NSSI OVR included the demographic data, time and date of incident, location, description of the event

including first aid measures and source patient if known. The sharps disposal compliance check list covered 6 points: sharp disposal containers which were close to point of use; no needles left in place after use; no needles in the yellow biohazard waste bag or black regular waste bag; sharps container replaced when two thirds full; sharps container has an unobstructed visible opening that allows devices to drop in easily; the opening is below eye level, if wall-mounted. Fewer than three points was considered as non-compliant, three to five points partially compliant, and six points fully compliant.

The sharps disposal compliance checklist (twice per week) and OVR of improper disposal of sharps (when there was one) were completed by infection control links (trained nurses who were nominated as infection control links in their respective units). HBV immunization data were collected from the staff health clinic database (work of staff health clinic in some aspects is supervised by infection control). Use of heavy duty gloves was checked daily by infection control nurses as a part of the PPE compliance checklist, which included the following items: appropriate indications for heavy duty gloves, potential hazards identified, and proper donning and doffing of PPE.

Pre-intervention data were obtained by retrospective analysis of the data which were routinely collected in the hospital records for all HCWs (part of the work of the Infection Control Department to record and monitor NSSIs).

The intervention applied included 43 health education/orientation sessions for housekeepers conducted by the infection control team and infection control links, and was implemented throughout the year of 2012. These sessions were prepared and implemented in three languages to cover all housekeepers in homogenous groups of 8 to 10 subjects (Bangladeshi, Sri Lankan, and Indian). Each session lasted for 45 to 60 minutes and included a short lecture, video demonstration, open discussion and distribution of posters and flyers. The topics covered were: standard precautions e.g. hand hygiene, PPE (3 sessions), sharp disposal (seven sessions), post exposure prophylaxis (nine sessions), collection of medical waste (12 sessions), as well as hazards and reporting of NSSIs (12 sessions).

Hepatitis B vaccine was available and obligatory for all housekeepers. All other logistics were made available all the time especially during the night e.g. sharp containers, heavy duty gloves, checklist and OVR forms with adequate supervision.

The study was approved and supported by Hospital Administration. Attendance of training and adherence to the hospital guidelines were considered a prerequisite for contract renewal.

Data were analyzed using SPSS (Statistical Package for Social Sciences) version 16 (IBM, Armonk, NY, USA). The rates of NSSIs were calculated. Variables were presented as numbers and percentages. Chi square or Fisher's exact test was used for comparison between groups and pre-post intervention, as appropriate. A p value of ≤ 0.05 was considered statistically significant.

Results

The overall incidence of NSSIs among HCWs in KKGH was 4.2% during the year 2011. This incidence was significantly higher among housekeepers compared to nurses and physicians (17.8% vs. 3.7% and 1.3%; respectively) (Table I). The incidence of NSSIs among housekeepers showed non-statistical differences related to age, sex and nationality. However, it was very high among those working in the Department of Obstetrics/Gynecology (66.7%) (Table II).

Table III reveals that the NSSIs rates among housekeepers decreased significantly after the intervention (from 17.8% to 2.7%). All housekeepers used heavy duty gloves and completed the three dose series of hepatitis B vaccine in the post-intervention phase. The full compliance with checklist improved significantly from 35.6% to 78.1% during the intervention and post-intervention years; respectively. The OVR decreased significantly from 15.1% during the intervention year down to 5.5% post-intervention. The overall incidence of NSSIs among all HCWs dropped to 2.6% and 1.6% in 2012 and 2013 respectively.

Discussion

NSSIs are unintentional wounds reported in healthcare settings, triggered by needles and sharps.⁹ They are more common among waste handlers because of the nature of their work.⁴ Studies concerning the epidemiology and

Table I. Needle stick and sharp injuries (NSSIs) among health care workers (HCWs) reported during 2011 in KKGH Hospital

HCW	Total	NSSIs N (%)
Physicians	240	3 (1.3) ^A
Nurses	515	19 (3.7) ^B
Housekeepers	73	13 (17.8) ^{A,B}
Total	838	35 (4.2)

^{A, B} significant difference between the corresponding groups by Fisher's exact test

Table II. Factors associated with NSSIs among housekeepers in 2011

	Total	NSSIs N (%)	Significance test*
Overall	73	13 (17.8)	
Age: <30 years	49	8 (16.3)	FET, P=0.75
30 years & more	24	5 (20.8)	
Sex: Female	51	10 (19.6)	FET, P=0.74
Male	22	3 (13.4)	
Nationality: Bangladeshi	36	7 (19.4)	FET, P=1.0
Sri Lankan	17	3 (17.6)	FET, P=1.0
Indian	20	3 (15.0)	
Ward of injury:			
Obstetrics/Gynecology	12	8 (66.7)	FET, P≤0.001
Artificial kidney unit	8	1 (12.5)	FET, P=0.4
Nursery	10	1 (10.0)	FET, P=0.44
Intensive care unit	12	2 (16.7)	FET, P=0.18
Other wards	30	1 (3.3)	

*Compared to the last category

FET=Fisher's exact test

prevention of NSSIs among housekeeping staff are rare. To our knowledge this is one of the few studies focused on reduction of NSSIs among this job category in Saudi Arabia. This is challenging in the Saudi situation because housekeepers belong to different cultures, have low educational backgrounds and speak other languages with difficult communication with them. In the pre-intervention year, housekeeping staff ranked first with a rate of 17.8% NSSIs, compared to 1.3%

in doctors and 3.7% in nurses. This rate is relatively higher than the rates reported in Saudi Arabia.^{7, 10, 11} A much higher rates of NSSIs up to 34.5% were reported in other studies in Saudi Arabia and India.³⁻⁵

Housekeepers are not the original users of devices. However, they are responsible for the cleaning of wards and the disposal of all sharp containers, so injuries can result during handling these containers

Table III. NSSIs, protective measures and circumstances of injuries among 73 housekeepers before, during and after the intervention years

	NSSIs		
	Before intervention (2011) N (%)	During intervention (2012) N (%)	After intervention (2013) N (%)
NSSIs	13 (17.8) [#]	7 (9.6)	2 (2.7) [#]
Use of heavy duty gloves	15 (20.5)	73 (100)	73 (100)
Hepatitis B vaccination (3 doses)	11 (15.1) [#]	57 (78.1) [#]	73 (100)
Check list compliance			
Full	Not recorded	26 (35.6) [#]	57 (78.1) [#]
Partial		24 (32.9)	9 (12.3)
None		23 (31.5)	7 (9.6)
OVR of improperly disposed sharps	Not recorded	11 (15.1) [#]	4 (5.5) [#]
Circumstances of NSSIs:			
-Device left on table	3 (23.1)	2 (28.6)	2 (100)
-Disposal into plastic bag	9 (69.3)	0	0
-Overfilled, protruding sharps	1 (7.7)	5 (71.4)	0

Significant difference between the corresponding years

OVR= occurrence variance report

and from devices left inappropriately. Safe handling and disposal of sharps in puncture proof containers immediately after use is important to minimize these injuries.³ It was reported that housekeepers have low knowledge and awareness about NSSIs,⁴ and they have to be educated on appropriate handling of biomedical wastes and sharps.

A previous study revealed that excess work load, carelessness and fatigue were the main factors associated with NSSIs.¹² Some studies have reported that increased number of patients per nurse is significantly associated with NSSIs.¹³ Also the placement of sharps containers proximal to the point of use has been shown to reduce the number of NSSIs.⁷

In the present study, two-thirds of NSSIs among housekeepers in 2011 took place in the obstetrics and gynecology ward. This may be attributed to under staffing especially during night shifts, work overload

with a high admission rate, and lack of sharp containers at the point of use. Previous studies reported that NSSIs were most frequent in emergency wards, operating theatres and intensive care units.^{4,7,14}

In our study, a quality improvement program gradually decreased the overall rate of NSSIs among housekeepers to 9.6% in 2012 and 2.7% in 2013. This gradual decrease in the rate was associated with a similar decrease in the improper sharp disposal OVR which reflects an increase in the awareness. From previous studies it is evident that education, ongoing quality improvement projects and preventive programs play a major role in improving knowledge and safe behavior of HCWs.^{3,15-17}

Environmental services personnel should adhere to standard precautions when performing cleaning tasks.¹⁸ Though glove usage cannot prevent NSSIs, it considerably reduces the risk of acquiring a blood-borne infection due to an injury. The WHO recommends the

use of non-sterile gloves during procedures in which contact with blood is probable and while handling waste.¹⁹ In our study the number of housekeepers using heavy duty gloves has increased from 20.5% in 2011 to 100% in 2012 and 2013, during and post-intervention.

In our study the majority of incidents among housekeepers in 2011 were caused by sharps disposal in plastic bags; this was not reported during 2012 and 2013. Previous studies reported that a considerable proportion of NSSIs occurred due to improper disposal by sharps protruding from trash bags or disposal containers.^{5,7}

The incidence of HBV infection following NSSIs is high among unvaccinated medical staff. Therefore, vaccination against HBV should be given to any person who performs tasks involving contact with blood, blood contaminated body fluids and sharps.²⁰ In our subjects only 15.1% of housekeeping staff were immunized against hepatitis B in 2011 (pre-intervention); however, 78.1% of them were immunized during 2012 and all of them during 2013 (during and post-intervention; respectively). Compliance of HBV vaccine among HCWs was 74.1% and 71.6% in tertiary care centers in Lahore and Saudi Arabia respectively.^{21,22} On the other hand, in a five year surveillance study in Riyadh, 9.1% of injured housekeepers were immune.³

The strength of this study is that it is the first report from Saudi Arabia showing reduction in NSSIs among housekeepers through a quality improvement project. The study limitations are that it does not take into consideration the under-reporting of NSSIs, and the lack of direct communication with housekeepers due to language and cultural barriers which may have influenced the accuracy of the data.

Conclusions

Our study showed that housekeeping staff suffer from high rates of NSSIs associated with inappropriately disposed sharps. Ongoing surveillance, education, close supervision and placement of sharp containers close to the point of use reduced the incidents amongst them. However continuous monitoring, periodic training on safe practices, adequate staffing levels, maintaining experienced staff in busy areas

and resource adequacy are required to maintain such improvement. Sharps disposal-related practices should be given high priority in any intervention program. All HCWs should be educated and trained on the proper use of sharps. There is a need for national guidelines that meet the Saudi scenario of hospital housekeepers.

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