ORIGINAL ARTICLE

OCCUPATIONAL SHARPS INJURY AMONG HEALTHCARE WORKERS IN HOSPITAL MELAKA 2013 – 2015: A CROSS SECTIONAL STUDY

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ABSTRACT

Sharps injury imposed a major threat towards safety and health among healthcare workers (HCWs). Many studies in Malaysia concentrated on prevalence of needle stick injury (NSI), however the prevalence of sharps injury among HCWs based on local guideline was still scarce in Malaysia. This information gap leads us to conduct this study. Our study aimed to determine the prevalence of sharps injury among HCWs in Hospital Melaka and to describe the factors among staff with sharps injury. This cross-sectional study was conducted in Hospital Melaka, Malaysia. 165 reported cases from 2013-2015 were reviewed and secondary data extracted. Data was analyzed using IBM SPSS version 20. Among reported sharps injury cases in this study, 65 (39.4%) were male, while 100 (60.6%) were female. The mean age was 27.41 (SD: 6.06). More than half of the reported sharps injury occurred among doctor, 113 (68.5%) specifically House Officer; 89 (53.9%) followed by paramedic, 26 (15.8%) and others, 26 (15.8%). Mostly occurred in ward, 114 (69.1%). The device which accounted for most of sharps injury cases was hypodermic needle, 67 (40.6%). Many of the sharps injury cases occurred while withdrawing needle from patient, 26 (15.9%). Prevalence of sharps injury among HCWs in this study was 0.8% in year 2013, 1.1% in year 2014 and 0.5% in year 2015. Nearly half from the total number of reported sharps injury cases among HCWs in Hospital Melaka were from Medical Department, 71 (43%). Recommended measures include usage of Safety-engineered devices (SEDs) and emphasize on standard precaution.

Keywords: *Sharps Injury, Needlestick Injuries, Healthcare Workers*

INTRODUCTION

Sharps injury is an exposure event occurring when any sharps penetrate the skin[1].The event may impose a major threat towards safety and health among healthcare workers (HCWs). Therefore, it is important to conduct surveillance as part of sharps injury prevention program[2]. On the one hand, Centre for Disease Control and Prevention (CDC) defines sharps as any object that can penetrate the skin including, but not limited to needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires while needle stick defined as penetrating stab wounds caused by needles[1]. On the other hand, National Institute for Occupational Safety and Health (NIOSH) defines needlestick injuries among HCWs as injuries that are caused by needles such as hypodermic needles, blood collection needles, intravenous (IV) stylets, and needles used to connect parts of IV delivery systems[3]. In Malaysia, sharps defined as all sharp's instruments/devices used in healthcare facilities[2] while needlestick injuries (NSI) defined as injuries caused by suture needles or hollow-bore needles[4-5]. Hollow-bore needle is a needle (e.g. hypodermic needle, phlebotomy needle) with a lumen through which material (e.g. medication, blood) can flow[1].

Even though preventable, sharps injury remained as insidious harm or hazard among HCWs. Globally, sharps injury causes morbidity and mortality while seriously affecting health expenditure with costly Post Exposure Prophylaxis medication[6]. Approximately 3 million out of 35 million HCWs worldwide were exposed to blood borne pathogens each year due to sharps injury; two million of those exposed to HBV, 0.9 million to HCV and 170,000 to HIV. These injuries may have resulted in 70,000 HBV, 15,000 HCV and 1,000 HIV infections[7].

In Malaysia, the incidence of NSI in 2005 has been reported by the Occupational Health Unit in Ministry of Health at a rate of 4.7 per 1000 HCWs[8]. Few studies in hospitals in Malaysia have shown prevalence of NSI of 24.6%, 23.5%, 20.9% and 9.8% in year 2003, 2008, 2013 and 2015 respectively[9-12]. Many studies in Malaysia have shown prevalence of NSI among HCWs, however the prevalence of sharps injury among HCWs which includes Ministry of Health staff, Ministry of Health trainees, Medical students and Health facilities support service workers according to Ministry of Health Malaysia Sharps Injury Surveillance Manual were still scarce in Malaysia[2]. This information gap leads us to conduct this study.

Our main objective is to determine prevalence of sharps injury among HCWs in Hospital Melaka based on the definition of HCWs in local Malaysian guidelines[2] and to describe the factors among staff

with sharps injury. In doing so, we hope to provide a better understanding of the reported sharps injury cases among HCWs in Hospital Melaka so that duly control measure could be taken.

METHODOLOGY

This cross-sectional study was conducted from 1st June 2016 until 31st July 2016 in Hospital Melaka; a full secondary care services provided by the Malaysian public facilities[13].

Population

Registered cases of sharps injury in Melaka State Health Department's Registry of Sharps Injury Surveillance for the period of three years; from 1st January 2013 until 31st December 2015.

Sampling and Sample

We performed purposive sampling on Sharps Injury Surveillance Registry at the state level. From the total of 205 registered cases of sharps injury in Melaka State Health Department's Registry of Sharps Injury Surveillance during the three years study period,167 registered cases from Hospital Melaka were extracted. Out of these, two non-HCWs cases were excluded. Hence, only 165 cases which met the inclusion criteria for this study were selected for further analysis. Our inclusion criteria were reported and registered clinical HCWs in Hospital Melaka, Malaysia. Incomplete OHU/SIS-1 notification forms were excluded from this study.

Data Collection

A secondary source of data from Sharps Injury Surveillance Occupational Health Unit OHU/SIS-1 notification forms were used in this study.

Data Analysis

Data analysis was performed using IBM SPSS version 20. Descriptive analysis was done. Continuous variables were described with mean and standard deviation while categorical variables were described with frequency and percentage.

Definition

Our operational definition for HCWs in this study were Ministry of Health staff, Ministry of Health trainees, Medical students and Health facilities support service workers. On the one hand, clinical HCWs were those whom involved in direct patient care as part of their regular routine. On the other hand, nonclinical HCWs were those whom during their regular work routine were not involved in patient care or contact[14]. In our study, registered clinical HCWs were defined as HCWs involved in direct patient care and services (cleansing, linen, laundry, and healthcare waste management) as part of their regular routine whom registered under Human Resource Unit in Hospital Melaka.

RESULT

Sociodemographic

Among these reported cases, 65 (39.4%) were male and 100 (60.6%) were female. In 131 (79.4%) cases, age were less than 30 years old while 34 (20.6%) were 30 years old and above (Table 1). The mean age was 27.41 (SD: 6.06) and mostly occurred at age of 25 years. Majority 112 (67.9%) had less than 25 months' experience in handling sharps.

In job category, Doctor; 113 (68.5%) shows the highest number of sharps injury followed by Paramedic; 26 (15.8%) and others; 26 (15.8%). These occupations were House Officer; 89 (53.9%) which remarkably shown the highest proportion among sharp-injured HCWs followed by senior doctors, MO; 20 (12.1%) and nursing category (Matron / Sister / Staff Nurse / Assistant Nurse / Midwife / Community Nurse); 18 (10.9%) (Table 1).

Majority 112 (67.9%) had less than 25 months of experience in handling sharps while 53(32.1%) had 25 months and above of experience in handling sharps (Table 1). The mean experience was 31.02 (SD: 52.87) and most of sharps injury cases occurred at 2 months of experience in handling sharps.

SD: standard deviations
MO: Medical Officer

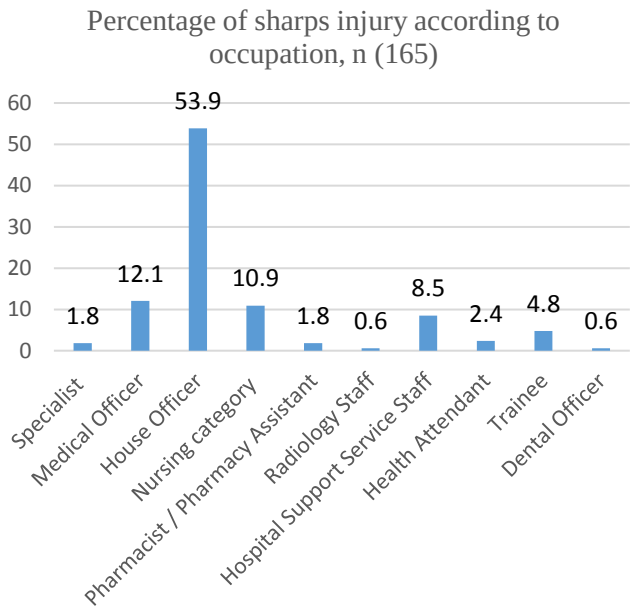

Figure 1: Percentage of sharps injury according to occupation

Workplace

Nearly half of the total number of reported sharps injury cases among HCWs in Hospital Melaka were from Medical Department, 71 (43%) followed by Orthopedics Department, 22 (13.3%) and Emergency & Traumatology Department, 15 (9.1%) (Table 3). In our study, most of sharps injury occurred in the ward, 114 (69.1%). This was followed by operating theatre, 17 (10.3%) and accident & emergency,14 (8.5%) (Table 3). In the ward, sharps injury commonly occurred at patient's bedside 81 (71.1%) while 29 (25.4%) occurred elsewhere in ward and 4 (3.5%) occurred by side room/nurses table (Table 3).

Sharps devices (Hazard)

The needle accounted for most of sharps injury cases, 130 (78.8%) while surgical instruments or other items accounted for 35 (21.2%) of sharps injury cases (Table 3). To be more precise, the top 3 devices which accounted for most of sharps injury cases were hypodermic needle, 67 (40.6%), IV catheter stylet, 42 (25.5%) and suture needle, 15 (9.1%) (Table 3).

Work process / causes

Among the sharp-injured HCWs, many of these events occurred while doing work process of handling patient or needle/sharps, 75 (45.7%) and handling equipment / specimens, 29 (17.7%) or caused by sharps in unusual locations, 22 (13.4%) (Table 3). Specifically, while withdrawing needle from patient, 26 (15.9%) followed by passing / transferring equipment (needle / sharps), 24 (14.6%) and suturing, 12 (7.3%) (Table 4).

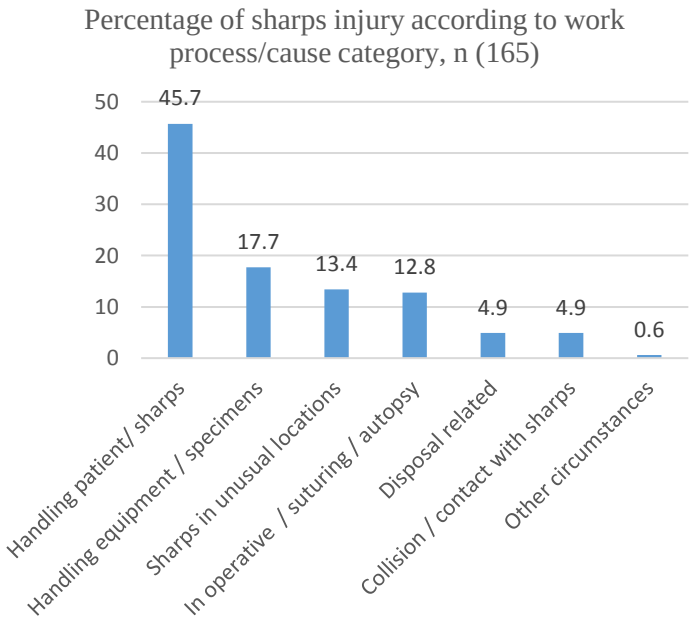

Figure 2: Percentage of sharps injury according to work process/cause category

Procedure

Procedure that can be considered to be at greater risk of sharps injury among reported cases were drawing venous blood sample, 35 (21.2%) and starting IV or setting up Heparin block (IV catheter or butterfly type needle), 28 (17%) (Table 4).

Exposure / contamination

Most of the reported sharps injury cases were contaminated; known exposure to patient or contaminated equipment, 135 (81.8%) while 26 (15.8%) were unknown and 4 (2.4%) were uncontaminated; no known exposure to patient or contaminated equipment (Table 4).

Time category / shift

Sharps injury mostly was reported to occur during the morning shift, 89 (54.3%) as compared to evening shift, 60 (36.6%) and night shift, 15 (9.1%) (Table 3).

Distribution of sharps injury by year

This cross-sectional study was done on 3 years' secondary data of reported cases; 2013-2015. In year 2013, the reported cases of sharps injury were 58 (35.2%) then in 2014, 73 (44.2%) followed by 2015, 34 (20.6%) (Table 1).

Table 1: Demographic details and year

Variables	Description	Frequency(n)	Percentage(%)
Gender	Female	100	60.6
	Male	65	39.4
Age	Less than 30 years old	131	79.4
	30 years old and above	34	20.6
Job Category	Doctor	113	68.5
	Paramedic	26	15.8
	Others	26	15.8
Occupation	House Officer	89	53.9
	Medical Officer	20	12.1
	Nursing category	18	10.9
	Hospital Support Service Staff	14	8.5
	Trainee	8	4.8
	Medical Assistant	4	2.4
	Health Attendant	4	2.4
	Specialist / Consultant	3	1.8
	Pharmacist / Pharmacy Assistant	3	1.8
	Radiology Staff	1	0.6
	Dental Officer	1	0.6
Experience	Less than 25 months	112	67.9
	25 months and above	53	32.1
Year	2013	58	35.2
	2014	73	44.2
	2015	34	20.6

Table 2: Distribution of top 3 devices among top 5 workplace/department with reported sharps injury

Workplace	Device		
	Hypodermic needle	IV catheter stylet (venofix / branula)	Suture needle
Medical	38 (62.3%)	22 (36.1%)	1 (1.6%)
Orthopedic	6 (50.0%)	1(8.3%)	5 (41.7%)
Emergency & traumatology	6(50.0%)	4 (33.3%)	2 (16.7%)
Obstetrics & gynecology	4 (30.8%)	4 (30.8%)	5 (38.4%)
Pediatric	4 (36.4%)	7 (63.6%)	0 (0.0%)

% within workplace category

Prevalence of sharps injury in year 2013, 2014 and 2015

The number HCWs whom registered under Human Resource Unit in Hospital Melaka were as follows, 2013: 6928 HCWs, 2014: 6351 HCWs and 2015: 6646 HCWs. Based on the number of reported sharps injury cases as mentioned above, we manage to calculate the prevalence of sharps injury among HCWs in Hospital Melaka in year 2013, 2014 and 2015 as 0.8%, 1.1% and 0.5% respectively.

Cross tabulation

Distribution of top 3 devices and top 5 department with reported sharps injury

Among these top 3 devices, hypodermic needles, 38 (62.3%) and IV catheter stylet (venofix/branula), 22 (36.1%) commonly occurred in Medical Department. Suture needle mostly occurred in Orthopedic and Obstetrics & Gynecology Department, 5 (41.7%), 5 (38.5%) respectively (Table 2).

DISCUSSION

Our main objective is to determine prevalence of sharps injury among HCWs in Hospital Melaka based on the definition of HCWs in local Malaysian guideline2 and to describe the factors among staff with sharps injury. In doing so, we hope to provide a better understanding in the occurrence of sharps injury so that duly control measures could be taken. According to Part VIII, Section 32, Occupational Safety and Health Act 1994, an employer shall notify the nearest occupational safety and health office of any accident which has occurred at the place of work15. Therefore, our study which was focusing on reported cases represent the prevalence of sharps injury among HCWs in Hospital Melaka within the study period.

Based on the secondary data that had been collected, the prevalence of sharps injury among HCWs in this study was 0.8% in year 2013, 1.1% in year 2014 and 0.5% in year 2015. These were lower than other studies in Malaysia which have shown prevalence of NSI of 24.6%, 23.5%, 20.9%, and 9.8% in year 2003, 2008, 2013 and 2015 respectively9-12. The most plausible explanation for this is because in this study, we calculate the prevalence based on the definition of HCWs by local Malaysian guideline2 that includes vast variety of occupation serves under the Ministry of Health which were Ministry of Health Staff, Ministry of Health trainees, Medical students and Health facilities support service workers.

Among these reported cases, the mean age was 27.41 years (SD: 6.06) while the mean experience was 31.02 months (SD: 52.87). Most of the HCWs who reported to sustain sharps injury have experience less than 25 months in handling sharps. This is most probably due to the fact that most of the sharps injury cases were contributed by House Officer. On the one hand, another study founds the prevalence of NSI highest among those with less than 1-year work experience16. On the other hand, other study founds that those with work experience of 5 years and longer were significantly less likely to be injured[17].

Several studies show that nurses have the highest proportion of NSI among HCWs; 27.9%10, 56.7%[16] and 62.3%[17]. However, in our study, House Officer; 89 (53.9%) shows the highest proportion of sharps injury among sharp-injured HCWs followed by senior doctors, MO; 20 (12.1%) and nursing category (Matron / Sister / Staff Nurse / Assistant Nurse / Midwife / Community Nurse); 18 (10.9%). This finding was similar to other study where the highest proportion of NSI was among doctors followed by nurses[9,18].

Doctors especially House Officer were at risk of getting sharps injury in workplace. Most of them have less than 25-month experience in handling sharps. Hence, we assumed that those with less experience also lack in skill in handling sharps, particularly in this group of HCWs. Therefore, orientation regarding standard precaution[19] and training should be emphasized among this group of HCWs.

Nearly half from the total number of reported sharps injury among HCWs in Hospital Melaka were from Medical Department, 71 (43%). This finding was similar with study by Rampal et al in which majority, 51.9% of HCWs experienced needle stick and sharps injury in medical ward10. In our study, most of sharps injury occurred in ward, 114 (69.1%), specifically occurred at patient's bedside 81 (71.1%). Similarly, other study also found that majority of NSI occurred in ward, 36.5%[17].

Since the Medical Department has the highest number of wards/beds in comparison to other departments in Hospital Melaka; 14 wards out of 39 wards (35.9%) while having 376 beds from the total 1074 beds (35%), hence, we assumed that, with the greater number of wards/beds, the higher the likelihood thus the higher risk for HCWs in getting sharps injury20. This was most probably because the

Risk = Likelihood x Severity[20]

Table 3: Distribution of workplace, work unit, workstation, sharps category, work process and work shift
IV: Intravenous

Variables	Description	Frequency(n)	Percentage(%)
Workplace / Department	Medical	71	43.0
	Orthopedic	22	13.3
	Emergency & Traumatology	15	9.1
	Obstetrics & Gynecology	14	8.5
	Pediatric	12	7.3
	Surgery	8	4.8
	Anesthesiology	5	3.0
	Operation Theatre	5	3.0
	Pharmacy	3	1.8
	Dental	3	1.8
	Radiology	2	1.2
	Otorhinolaryngology	2	1.2
	Pathology	2	1.2
	Forensic	1	0.6
Work unit	Ward	114	69.1
	Operating Theatre	17	10.3
	Accident & Emergency	14	8.5
	Others	13	7.9
	Intensive Care Unit	3	1.8
	Specialist Clinic	1	0.6
	Dental Clinic	2	1.2
	Laboratory	1	0.6
Workstation (ward)	At patient's bedside	81	71.1
	Elsewhere in the ward	29	25.4
	Side room /nurses table	4	3.5
Sharps category	Needles	130	78.8
	Surgical Instruments or Other Items	35	21.2
	Glass	0	0
Specific devices	Hypodermic needle	67	40.6
	IV Catheter stylet (Venofix / Branula)	42	25.5
	Suture Needle	15	9.1
	Needle on IV line	10	6.1
	Others (Sharps)	10	6.1
	Others (Needles)	6	3.6
	Scalpel	5	3.0
	Wire (suture / fixation / guide wire)	3	1.8
	Central line catheter introducer needle	2	1.2
	Bone marrow needle	2	1.2
	Razor	2	1.2
	Biopsy needle	1	0.6
Work process / cause (category)	While handling patient or needle / sharps	75	45.7
	Handling equipment / specimens	29	17.7
	Sharps in unusual locations	22	13.4
	While in operative field / suturing / autopsy	21	12.8
	Collision / contact with sharps object	8	4.9
	Disposal related	8	4.9
	Other circumstances	1	0.6
Time category / work shift	Morning Shift	89	54.3
	Evening Shift	60	36.6
	Night Shift	15	9.1

Table 4: Distribution of work process (specific), procedure and exposure
IV: Intravenous

Variables	Description	Frequency(n)	Percentage(%)
Work process / causes (specific)	While withdrawing needle from patient	26	15.9
	Passing / Transferring equipment	24	14.6
	Suturing	12	7.3
	While inserting needle in patient	9	5.5
	During clean-up	8	4.9
	While withdrawing needle from line	7	4.3
	While manipulating needle in patient	6	3.7
	In transit to disposal	6	3.7
	Collided with sharps instrument	6	3.7
	Left on table / tray	6	3.7
	Other unusual locations	5	3.0
	Incising	4	2.4
	Handling equipment on tray / stand	4	2.4
	Transferring blood / body fluids into specimen container	4	2.4
		4	2.4
	Injured by sharps being disposed	4	2.4
	In trash	4	2.4
	On floor	3	1.8
	Passing / receiving equipment	3	1.8
	Disassembling device / equipment	3	1.8
	While transporting the sharps to collection center	3	1.8
	Left in bed / mattress	2	1.2
	While manipulating needle in line	2	1.2
	Palpating / Exploring	2	1.2
	Sharps instrument dropped	1	0.6
	While inserting needle in line	1	0.6
	Manipulating suture needle in holder	1	0.6
	Passing / tranferring equipment	1	0.6
	Decontamination / processing of used equipment	1	0.6
	While manipulating sharps bin	1	0.6
	In linen / laundry	1	0.6
	Other circumstances		
Procedure	Drawing venous blood sample	35	21.2
	Starting IV or setting up Heparin block	28	17.0
	Others	20	12.1
	Injection	19	11.5
	Suturing	16	9.7
	Non medical procedures	14	8.5
	Drawing arterial blood sample	11	6.7
	Obtaining body fluid or tissue samples	7	4.2
	Connecting IV line	6	3.6
	Finger stick / Heel stik	4	2.4
	Heparin or saline flush	1	0.6
	Injections / aspiration at IV injection sites or IV ports	1	0.6
	Placing an arterial / central line	1	0.6
	Dissecting	1	0.6
	Drilling	1	0.6
Exposure/ contamination	Contaminated	135	81.8
	Unknown	26	15.8
	Uncontaminated	4	2.4

Among sharp devices, the device which considered most hazardous; accounted for most of sharps injury cases was hypodermic needle, 67 (40.6%). This was also shown in other study done at hospital in Tehran[16]. Many of these events occurred while doing work process of withdrawing needle from patient, 26 (15.9%) followed by passing / transferring equipment (needle / sharps), 24 (14.6%) and suturing, 12 (7.3%). In contrast with this finding, several studies[9,10,17,21] shown that the work process which attributed most toward sharps injury were needle recapping, although National Institute for Occupational Safety and Health (NIOSH) had emphasized on avoiding needle recapping[3].

However, none of the sharps injury cases in our study were due to recapping of needles. Apart from that, Procedure with highest frequency of sharps injury among reported cases in our study was drawing venous blood sample, 35 (21.2%). Similarly, this was shown by other studies[9,22].

In our study, sharps injury cases mostly were reported to occur during the morning shift, 89 (54.3%). Perhaps, this was due to the fact that most procedures were done after ward round in the morning shift. This finding was similar to study among nurses in hospital in Iran which reported nearly two thirds of NSI happened in the morning[21].

Despites pre-existing control measures (written phlebotomy Standard operating procedures, poster, phlebotomy secretariat and training), the number of reported cases increased from year 2013 (n=58) as compared to year 2014 (n=73), 25.9% increment. However, marked reduction of sharps injury was observed in year 2015 (n=34) as compared to year 2014 (n=73), 53.4% reduction.

This was most probably due to introduction of Safety-engineered devices (SEDs) in the hospital from years 2014 onwards. SEDs are sharp devices with an integrated safety feature designed to shield the needle or non-needle-sharp object after use[23-24]. There was study regarding effectiveness of control measure by which access to devices with safety features was among the factors that decrease the frequency of NSI[17]. Another study pointed out that SEDs can reduce sharps injury rates with much reduction seen with safety cannula and blunt suture needles[25].

LIMITATION

Since we gather mandatory self-reported secondary data, misclassification was possible such as recording error although every form/document had been reviewed by designated person in Public Health Unit in the hospital prior to notification in order to minimize this error.

CONCLUSION

By conducting this study, the prevalence of sharps injury among HCWs and factors among staff with sharps injury could be identified, thus provides a better understanding of the reported sharps injury cases among HCWs in Hospital Melaka so that duly control measure could be taken.

Standard precaution[19] and training should be emphasized among identified job category and department who at high risk of getting sharps injury. Other recommended measure includes usage of SEDs which most probably contributes to the reduction of sharps injury cases in year 2015.

However, we would recommend future study to measure the effectiveness of SEDs in reducing the number of sharps injury among HCWs.

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