Knowledge and Practice toward Needle Stick Injuries among Health Care Workers at Public Hospitals in Mukalla City–Hadhramout, Yemen

المعرفة والممارسة تجاه إصابات الوخز بالإبر بين العاملين في الرعاية الصحية في المستشفيات العامة في مدينة المكلا – حضرموت، اليمن

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Abstract

Background: Needle Stick Injuries (NSIs) are defined as accidental skin- penetrating stab wounds from a hollow-bore needle containing another person's blood or body fluid. NSIs are one of the most potential hazards for health care workers. They pose a significant risk of occupational transmission of blood-borne pathogens.

Objectives: The aim of the study is to assess knowledge and practice toward needle stick injuries among health care workers (HCWs) at public hospitals in Mukalla city.

Methods: A descriptive cross-sectional study was conducted among health care workers at Ibn Sina General Hospital Authority and Mukalla Maternal and Childhood Hospital. A pre-tested, self-administered questionnaire was used for the data collection. Descriptive statistics were made to analyze the collected data using the Statistical Package for Social Sciences (SPSS) version 26.

Results: Most respondents, 194 (75.8%) aged between (21-31) years, males and females were almost equally distributed. Vast majority of HCWs 234 (91.4%) have a good knowledge regarding NSIs, while only 22 (8.6%) have a poor knowledge. Most of HCWs 237 (92.6%) have a poor practice toward NSIs, while only 19 (7.4%) have a good practice.

Conclusion: Majority of HCWs have a good knowledge, and poor practice toward NSIs. Most of them know that NSIs can be preventable. More than two thirds strongly agree that needles should be discarded immediately after use. Only less than one third use the one-hand method for recapping needles.

Keywords: Needle stick injuries, knowledge, practice, healthcare workers, Mukalla, Yemen

الملخص

الخلفية: تُعرّف إصابات الوخز بالإبر (NSIs) على أنها جروح عابرة للجلد ناتجة عن اختراق إبرة ذات فتحة مملوءة بدم أو سائل جسم شخص آخر. تُعد إصابات الوخز بالإبر من أخطر المخاطر التي يتعرض لها العاملون في مجال الرعاية الصحية، حيث تُشكِّل خطرًا كبيرًا لنقل الأمراض المنقولة بالدم داخل بيئة العمل.

الأهداف: هدفت هذه الدراسة إلى تقييم معرفة وممارسة العاملين في الرعاية الصحية تجاه إصابات الوخز بالإبر في المستشفيات العامة في مدينة المكلا بحضرموت، اليمن.

الطرق: أُجريت دراسة وصفية مستعرضة بين العاملين في الرعاية الصحية في هيئة مستشفى بن سيناء العام ومستشفى المكلا للأمومة والطفولة. تم استخدام استبيان مسبق الاختبار وذاتي التطبيق لجمع البيانات. تم إجراء تحليل إحصائي وصفي للبيانات المجمعة باستخدام حزمة البرمجيات الإحصائية للعلوم الاجتماعية (SPSS) الإصدار 26.

النتائج: وجد أن 194 مشاركًا (75.8%) من العاملين في الرعاية الصحية تتراوح أعمارهم بين 21 و31 عامًا. كان التوزيع بين الذكور والإناث تقريبًا متساويًا. أظهرت النتائج أن 234 من العاملين في الرعاية الصحية (91.4%) يمتلكون معرفة جيدة بشأن إصابات الوخز بالإبر، في حين أن 22 منهم فقط (8.6%) يمتلكون معرفة ضعيفة. بالإضافة إلى ذلك، وجد أن 237 من العاملين في الرعاية الصحية (92.6%) يمتلكون ممارسة ضعيفة تجاه إصابات الوخز بالإبر، في حين أن 19 منهم فقط (7.4%) يمتلكون ممارسة جيدة.

الاستنتاج: يتمتع غالبية العاملين في الرعاية الصحية بمعرفة جيدة وممارسة ضعيفة تجاه إصابات الوخز بالإبر. يعلم معظمهم أنه يمكن الوقاية من إصابات الوخز بالإبر، ويوافق أكثر من ثلثيهم تمامًا على ضرورة التخلص من الإبر فور الاستخدام. أقل من ثلثهم يستخدم طريقة اليد الواحدة لتغطية أطراف الإبر.

الكلمات المفتاحية: إصابات الوخز بالإبر، المعرفة، الممارسة، العاملين في الرعاية الصحية، المكلا، اليمن.

Introduction:

Needle Stick Injuries (NSIs) are a serious hazard in any healthcare setting. [1] Centers for Disease Control and Prevention (CDC) define a needle stick injury as an accidental skin penetrating stab wound from a hollow-bore needle (or any sharp object) containing another blood or body fluid.[2,3] NSIs are caused by different types of needles; such as hypodermic needles, blood collection needles, intravenous (IV) cannulas, or needles used to connect part of IV delivery systems.[4]

The main causes of NSIs are two-hand recapping and unsafe collection and disposal of needles.[5] Other factors include lack of knowledge, insufficiency of appropriate resources, work overload, and non-compliance with infection-control standards.[1] NSIs can transfer bacteria, protozoa, viruses, and prions.[6] Therefore, accidental exposure to blood borne diseases through NSIs is very common among health care workers (HCWs). According to the World Health Report (WHR), out of 35 million HCWs, 2 million experience percutaneous exposure to infectious diseases each year. [3]

Data from various studies and researches show that about thirty different diseases can be transmitted by NSIs. Most importantly, it is noticed that 37.6% of hepatitis B, 39% of hepatitis C, and 4.4% Human Immunodeficiency Virus (HIV) among HCWs around the world are due to NSIs. Less frequent infections also have the potential for transmission through NSIs. These include Human T-Lymphotropic Retroviruses (HTLV I and II), hepatitis G virus, Cytomegalovirus (CMV), Epstein Barr virus (EBV), malarial parasites, and others.[7] NSIs also interfere with the psychological wellbeing, mainly due to fear, anxiety, and depression.[1]

Sharp injuries are preventable under the Occupational Safety and Health Act (OSHA).[2] Many of these injuries and blood borne infections can be prevented by applying simple strategies such as immunization of HCWs, replacement of traditional devices with newer safety devices, discouraging unsafe and unhygienic injection practices, improving working environments, and edu-

cating HCWs about the hazards of NSIs.[5]

The Safe Injection Global Network (SIGN) estimates that approximately 16 billion injections are performed annually worldwide. [8] Occurrence of NSIs annually in developing countries is 16 million, while in developed countries it is 6-8 million.[4] Every year in USA, 600,000 to 1,000,000 HCWs receive NSIs from needles and sharps, whereas in the UK, annual prevalence is 100,000.[7] In Pakistan, annual incidence rate of NSIs is approximately 12-27 NSIs per year per 100,000 doctors.[5]

Prevalence of NSIs has been reported to be about 66% in Egypt.[9] Based on a study made on HCWs in a tertiary Sudanese hospital, the prevalence of NSIs was 46%, and most respondents graded themselves "good" regarding their knowledge toward NSIs.[10] According to a study made in Saudi Arabia among primary health care workers in Jazan region, At least 95% of HCWs believed that sharp objects should be kept in a puncture- proof container, kept in a closed container, or disposed by a professional company. More than 80% of HCWs washed their hands by soap and water and cleaned them by alcohol before giving injection, and also got the three doses of hepatitis B vaccine. [11]

Studies regarding NSIs in Yemen are scarce. The reported prevalence rates in the last years were 37.5%, 54.8%, 14.6%. 34.4% of laboratory personnel suffered from NSI during their work in the laboratory respectively. [12-15]

The importance of this study lies in the fact that NSIs are a serious concern for all HCWs and pose a significant risk of occupational transmission of blood borne pathogens.

According to our knowledge, there's a scarcity of data in Yemen regarding occupational exposure to NSIs and there are no previous studies in Mukalla city focused particularly on NSIs. Therefore, an imperative research effort is needed to investigate this topic. Hence, our study aims to assess the knowledge and practice toward needle stick injuries among health care workers at public hospitals in Mukalla city.

Methodology:

A descriptive cross-sectional study was carried out in Mukalla city, the capital city of Hadhramout, Yemen.

Area and period of the study:

This study was conducted at two public hospitals. Ibn Sina General Hospital Authority (ISGHA) and Mukalla Maternal and Childhood Hospital (MMCH). ISGHA is considered as the main public hospital in Mukalla at which health services are annually provided to around 3 million people from different regions of Hadhramout and nearby governorates as Shabwa, Almahra, and Socotra. MMCH is a specialized hospital in maternal and childhood healthcare and deals with cases of gynecology, obstetrics, and pediatrics.

This study was implemented during the academic year 2021-2022 by medical students of College of Medicine and Health Sciences at Hadhramout University.

Study Tools and Data Collection

Data were gathered using a self-administered questionnaire. To enhance its validity, it was developed in English language from previous literatures with some modifications. [2, 6, 10] In addition to that, it was submitted to three experts for check and review. To strengthen the readability of the questionnaire, a pilot study was conducted by collecting data from 30 subjects not included in the sample.

The study questionnaire was composed of four parts:

Socio-demographic information about the HCWs composed of 4 items; age, gender, specialty, and experience. Knowledge assessment part which is composed of 6 items. The correctly answered item will be scored 1 and the incorrectly answered will be scored zero. Accordingly, if the participant has scored 4 or more correct answers (≥ 4); knowledge will be considered as good, and when he/she has scored 3 or less correct answers (≤ 3); knowledge will be

considered as poor.

Answers indicating the best practice will be scored 2, and the ones indicating the poorest practice will be scored zero. Consequently, if the participant has scored 6-12 points; practice will be considered as good, and if he/she has scored 1-5 points; practice will be considered as poor.

The questionnaire was translated to Arabic language to facilitate its presentation in Arabic/local language.

Data analysis

The collected data will be computerized and summarized numerically and graphically using Statistical Package for the Social Sciences (SPSS) version 26. Quantitative variables will be presented as a mean and standard deviation and qualitative variables will be presented as frequencies and percentages using the descriptive statistical method to answer the research questions.

Ethical Consideration

Ethical approval was obtained from the Research Ethics Review Committee (ERC) at Hadhramout University College of Medicine (HUCOM). Brief information about the study and clarification for its objectives were incorporated at the beginning of the questionnaire and a written consent was delivered to the participants. Confidentiality will be represented by disseminating research findings without disclosing personal information, in addition to storing the records securely with limited access.

Results:

A total number of 256 HCWs have participated in this study. All distributed questionnaires were fully received with 100% response rate.
Table (1) shows that most respondents (75.8%) were aged between (21-31) years. Males and females were almost equally distributed. The majority of participants were nurses (30.9%) and doctors (30.5%), while the minority were

health assistants (0.8%). The majority of study subjects (77%) had an experience of (1-8) years.

Table (1): Socio-demographic information of the study participants (n=256).

Variables	Frequency	Percentage
(**Age** (**Years**		
21-31	194	75.8
32-42	50	19.5
43-53	12	4.7
Gender		
Male	126	49.2
Female	130	50.8
Specialty		
Doctor	78	30.5
Physician assistant	33	12.9
Health assistant	2	0.8
Nurse	79	30.9
Laboratory technician	45	17.6
Midwife	19	7.4
(**Experience** (**Years**		
1-8	197	77
9-16	31	12.1
17-24	14	5.5
25-32	14	5.5

Majority of HCWs 234 (91.4%) have a good knowledge regarding NSIs, while only 22(8.6%) have a poor knowledge. Table (2) Indicates that most of

HCWs (97.7%) knew that diseases can be transmitted via NSIs. The majority of them perceived that hepatitis B virus (93%) and HIV (96.5%) can be transmitted via NSIs. Most of HCWs (88.7%) believed that NSIs are preventable, and 82% were aware of the universal precaution measures against NSIs. More than half of the HCWs (58.2) have already heard about the post-exposure prophylaxis.

Table2)): Knowledge of HCWs toward NSIs.

Items	Answers	Frequency	Percentage
transmit diseases Can stick inju- needle via ?ries	Yes	250	97.7
	No	4	1.6
	I don't know	2	0.8
virus B hepatitis Can needle via transmit ?stick injuries	Yes	238	93.0
	No	4	1.6
	I don't know	14	5.5
Can human immuno- (deficiency virus (HIV needle via transmit ?injuries stick	Yes	247	96.5
	No	5	2.0
	I don't know	4	1.6
inju- stick needle Are ?preventable ries	Yes	277	88.7
	No	18	7.0
	I don't know	11	4.3
Do you know the universal precaution nee- against measures ?injuries stick dle	Yes	210	82.0
	No	24	9.4
	I don't know	21	8.2
heard ever you Have post expo- the about ?sure prophylaxis	Yes	149	58.2
	No	75	29.3
	I don't know	32	12.5

Majority of HCWs 237 (92.6%) have a poor practice toward NSIs, while only 19 (7.4%) have a good practice. Table (3) indicates that only 35.5% of HCWs always wear gloves before giving injections, and 21.9% always wear new pair of gloves for every injection. Majority (77.3%) always recap needles after use, and only 25.4% use the single-handed method for recapping needles. Majority (85.9%) always discard needles immediately after use. More than half of HCWs (51.2%) never report NSIs.

Table (3): Practice of HCWs toward NSIs.

Items	Answers	Frequency	Percentage
Do you wear gloves before giving injections?	Always	91	35.5
	Sometimes	153	59.8
	Never	12	4.7
Do you wear a new pair of gloves for every injection?	Always	56	21.9
	Sometimes	125	48.8
	Never	75	29.3
Do you recap needles after use?	Always	198	77.3
	Sometimes	30	11.7
	Never	28	10.9
Do you use the one-hand method for recapping needles?	Always	65	25.4
	Sometimes	109	42.6
	Never	82	32

Do you discard needles immedi-?ately after use	Always	220	85.9
	Some-times	23	9
	Never	13	5.1
?stick injuries Do you report needle	Always	52	20.3
	Some-times	73	28.5
	Never	131	51.2

Discussion

Exposure to NSIs is one of the most serious occupational hazards and poses a significant risk upon HCWs by making them vulnerable to blood borne pathogens. It is very important to address such issue in order to prevent it and reduce its occurrence. This study has assessed the knowledge and practice toward NSIs among HCWs at public hospitals in Mukalla city.

The present study shows that high percentage of HCWs knew that diseases (97.7%) including hepatitis B virus (93%) can be transmitted via NSIs. Similarly, reports from studies conducted by Madhavan et al., Patel et al., and Khalid et al., show respectively that almost 86 %, 90% and 98% of the participants were well aware of the diseases being capable to transmit via NSIs. [4,17,7]

In regard to the transmission of hepatitis B virus, similar findings have been reviewed. According to a study conducted in Islamabad by Khalid H et al, it was found that 98% of HCWs are well aware of that.[7] Furthermore, another two studies by Ali et al., and Fareed et al.; have revealed that 94% of HCWs, and100% of nurses respectively were aware of the fact that hepatitis B virus can be transmitted through NSIs.[18,19]

In the present study 58.2% of HCWs have heard about knew about NSIs post exposure prophylaxis. These findings go in tune with those of Patel et al., which show that almost 60% of students had knowledge regarding post

exposure prophylaxis. [17]Also, with that of Ali et al., which find that 62 % of participants were aware of the immediate wound care.[18]

These rates are comparatively low when compared with a study done by Sing et al., which shows that the majority 92.5% of HCWs have heard about NSIs post exposure prophylaxis treatment, and only 7.5% of HCWs were not aware.[3] These moderate findings regarding the post exposure prophylaxis could be due to the insufficient awareness among HCWs. Hence, there is an imperative need to stress its importance and to be initiated by the exposed persons themselves as soon as possible.

High percentage of HCWs (91%) in this study agrees that needles should be discarded immediately after use. Similar findings have been noticed in a study by Bhargava et al., in which 88.3% of doctors and 87.5% of technicians agree with the immediate discard of needles.[2,6]

Contrarily, in a study conducted in Southern Rajasthan, India by Dudi et al., it was found that 76.47% of the laboratory technicians, and 69.01% of the nurses felt that used needles can be discarded later.[20]

Regarding the disposal of needles and sharp objects by a professional company, 57% of HCWs strongly agree with that. Additionally, 32.4% agree too. These findings are incompatible with findings observed in two studies conducted in Saudi Arabia. The first study was conducted in Jazan by Ismail. It was revealed that 95% of physicians, and 98.4% of nurses agree with the professional company disposal. [11] The other study was conducted in Abha by Mahfouz et al., in which 91.8% of HCWs agree too. [21]

The incomplete agreement with the disposal of needles and sharp objects by a professional company could be due to the unavailability and uncommonness of such system in Mukalla city. The present study showed that only 35.5% of the participants always wear gloves before giving injections. This is in accordance with a study conducted in Nursing School, Sheikh Zayed Medical College/Hospital by Fareed et al., which showed that only 10 students out of

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100 were in the habit of using gloves regularly.[19] Another study by Madhavan et al., showed that only 46.2% of interns and 53.8% of nurses wear gloves during phlebotomy and injections.[4]

In a comparison with a study by Azman et al., it is noted that the majority (90.1%) use gloves while doing phlebotomy procedure. [2] Also, in a study by Bhargava et al., it is seen that 83.5% of doctors and 77.3% of nurses do use gloves for phlebotomy procedures.[6]Reasons of not wearing gloves could be due to the unavailability of gloves and safety equipment, inappropriate environment such as overcrowding, neglect, and forgetting.

In regard to recapping of used needles, the highest number of NSIs occurred by recapping of needles, which is one of the most common unsafe injection practices- injection providers in healthcare facilities do commonly recap used needles which is an age-long tradition that has contributed to be a significant hazard to HCWs in developing countries. [1] This is in agreement with Alsabaani et al. [21]

The most important measure to prevent NSIs is never to recap. Although, the Occupation Safety and Health Administration (OSHA) has set up recent guidelines restricting the act of recapping, this study has showed that 77.3% of HCWs always recap needles after use.[2] Similarly, reports from studies conducted by Madhavan et al., and Abkar et al., showed respectively that 73.8% and 61.1% of HCWs do recap needles after use.[4,8] On the other hand, a study conducted by Singh et al., has reported that nearly more than half (57%) of subjects were not recapping needles after use. [3] Another contradictory study by Azman et al., indicated that 85.4% follow the correct practice in this regard. [2]

The act of recapping needles could be due to the impact of the habitual age- long tradition of recapping, in addition to the HCWs being unaware of the modern guidelines -as OSHA- that restrict and discourage the act of recapping. One of the most important issues regarding NSIs is when they go underreported or unreported. Despite the majority of HCWs agree that NSIs

need to be reported. Only 20.3% do so. These findings go in tune with those of Dudi et al., and Ali et al., in which only 27.5% and 10.58% of HCWs report NSIs respectively.[17,15] However, this is incompatible with results from some previous studies. According to a study by Azman et al., it was found that 88.7% report NSIs.[2] Also, in a study by Bhargava et al., it was revealed that 72.7% of nurses and 93.8% of technicians do report NSIs.[6]

Alfulayw et al. reported that the Incidence of NSIs over 26 months was 8.4% among all participants. The most affected staff were nurses (52.5%) followed by physicians (24.9%).[20] Alsabaani1 et al. in their study in Saudi Arabia showed that the incidence of needle stick injury among healthcare workers during the previous 12 months was 11.57%, and the study from Owaidat et al. showed that registered nurses had high level of awareness of incident reporting. [24, 25]

The heavy workload, long and busy duty hours, unavailability of seniors on the spot at the time of injury, especially injuries sustained in emergency hours, perceiving the injury as trivial or noninfectious, lack of reporting system, lack of knowledge on how and where to repot are the possible reasons beyond NSIs being unreported.

Conclusion

The vast majority of HCWs had a good knowledge regarding NSIs. Almost all of them were aware that diseases including HIV/AIDS can be transmitted through NSIs. High percentage of them strongly agree with the keep of needles in puncture-proof containers, while just about one third of them disagree with the un-necessity of post exposure prophylaxis. The majority of HCWs had a poor practice toward NSIs. Almost one third of them never wears a new pair of gloves for every injection, and more than two thirds of them were in the habit of recapping needles after use.

Recommendations

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Conduction of comprehensive preventive programs including training of HCWs, activation of the surveillance protocols, and developing effective disposal systems.

More consideration of NSIs with in educational curricula in medical and health sciences colleges and institutions.

For the HCWs to raise their own awareness and knowledge regarding NSIs and post exposure prophylaxis.

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