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KNOWLEDGE AND PRACTICES REGARDING PREVENTION AND POSTEXPOSURE PROPHYLAXIS OF NEEDLE STICK INJURIES AMONG HEALTH CARE WORKERS IN A TERTIARY CARE TEACHING HOSPITAL.

Medical Microbiology

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ABSTRACT

Background & Objectives: Needle Stick Injury (NSI) represents a major occupational hazard for healthcare workers, as they can lead to accidental skin punctures from needles and potential exposure to contaminated blood and body fluids. This study aims to uncover knowledge gaps and pinpoint specific practices that need attention and reinforcement among healthcare workers. **Methods:** The study is a cross sectional survey, using a structured questionnaire aimed towards assessing the knowledge and practices involved in prevention and postexposure management regarding needle stick injuries. Healthcare workers including Post-graduate Residents, MBBS interns, Nurses, and Technical staff were included in the study. **Results:** The incidence of NSIs was 12.40% among healthcare workers (HCWs) and 81.25% were notified immediately after the incident. Recapping was found to be the most common reason (33.33%). Of all the HCWs, 66.12% were fully vaccinated against Hepatitis B with documented protective anti-HBs antibody titers in 69.70%. The knowledge about practice of avoiding the recapping of needles was reported in 26.17% only however, 70.25% knew about recommended first aid components after an accidental NSI. Only 25.34 % of HCWs never recap used needles, and 79.34% use single-hand scoop technique, if recapping is unavoidable. **Interpretation & Conclusions:** An overall satisfactory level of knowledge was observed among healthcare workers regarding NSIs. However, the practice of avoiding the needle recapping needs to be strengthened besides improving the Hepatitis B vaccine coverage. Targeted interventions are essential to improve knowledge and practices, reducing the risk of bloodborne infections.

KEYWORDS

Healthcare workers, Interns, Needle Stick Injury, Nurses, Postexposure management, Post-graduate Residents, Technical staff.

INTRODUCTION

A needle stick injury (NSI) refers to a puncture wound caused by a sharp medical instrument, such as a needle, scalpel, or lancet, which may be contaminated with another person's body fluids (particularly blood).[1] They encompass injuries resulting from sharps such as a hypodermic needle, suturing needle, scalpel, intravenous (IV) cannula, needle used to connect IV delivery systems, or lancet. The needle stick safety and Prevention Act was enacted in November 2000 and came into effect in April 2001.[2] NSI represents a major occupational hazard for healthcare workers (HCWs), including doctors, nurses, and technicians as they can lead to accidental skin punctures from needles and potential exposure to contaminated blood and body fluids, eventually increasing the risk of bloodborne pathogen transmission.[3] Among all sharps', contaminated needles are the leading cause of bloodborne infections, with over 3 million healthcare workers worldwide exposed to Human Immunodeficiency Virus (HIV), Hepatitis C Virus (HCV), and Hepatitis B Virus (HBV) through NSI each year.[4] According to WHO, NSIs contribute to the global incidence of HCV(39%), HBV(36.7%), and HIV(4.4%) among healthcare workers due to factors such as fatigue, negligence, haste, stress, and unexpected patient movements.[5] Evidence also indicates that the actual number may be higher, as many medical professionals may not report sharp injuries.[6] In India, approximately 3-6 billion injections are administered annually, with two-third (62.9%) of them being unsafe.[7] NSIs not only expose healthcare workers to infections but also lead to significant emotional distress, long-term psychological effects, and financial burden associated with treatment and monitoring.[8] Studies on medical students indicate a moderate to high level of knowledge about NSIs. However, nurses and other healthcare workers demonstrate lower awareness. Notably, adherence to standard precautions is closely linked to knowledge levels – lower knowledge results in poorer compliance, increasing the risk of NSI incidence.[9] Healthcare institutions must implement preventive measures to minimize the risk among healthcare workers. Raising awareness through education, training on universal precautions, proper sharps disposal, safe injection practices and providing engineered safety devices have been shown to reduce such incidents by 62%.[10] This study aims to uncover knowledge gaps and pinpoint specific practices that need attention and reinforcement among healthcare workers.

MATERIAL AND METHODS

This Cross sectional study was carried out at tertiary care teaching hospital in North India. The study included health care workers including Post-graduate Residents, MBBS interns, Nurses, and Technical staff. Study period was three months (January to March, 2025) after clearance from the Institutional Research and Ethics committees. Data was collected using a structured questionnaire aimed towards assessing the knowledge and practices involved in prevention and postexposure management regarding needle stick injuries, that was developed by the investigators. Eight academic experts from the various departments assessed content validity, and some minor modifications were made. The study questionnaire was circulated after written informed consent was obtained from each participant. All the healthcare workers (Post-graduate Residents, MBBS interns, Nurses, and Technical staff), who were willing to participate in the study were included. The collected data was put through descriptive analysis as proportions and percentages.

RESULTS:

Three hundred and sixty three HCWs from different levels of healthcare participated in the study and completed the questionnaire. Out of the total, 120(33.05%) were nurses, 85(22.79%) were MBBS interns, 84(22.52%) were Technicians, and 74(19.84%) were Postgraduate (PG) residents. The reported incidence of NSIs among HCWs was 45(12.40%). Almost three quarter, 71.11% of these injuries were reported by a healthcare worker to the appropriate authorities, with the majority (81.25%) being reported immediately after the incident. The commonest reason for these needle stick injuries was

33.33% while recapping, 31.11% were attributed to working in rush or under stress during a patient emergency, 20% because of improper handling of needle and 4.44% due to inappropriate disposal of used syringes or biomedical waste mixing. Incidence of needle stick injuries was reported maximally among nurses (31.11%), followed by, post-graduate residents (26.67%), MBBS interns (22.22%), and technicians (20%) (Chart 1)

The reported vaccination status amongst HCW against Hepatitis B was, fully vaccinated (with 3 doses completed) in 66.12%, partially vaccinated (one or two doses) in 16.80%, and unimmunized in 6.61%, whereas 10.47% were unaware about their childhood vaccination status. Of these, 77.03% of PG residents were completely vaccinated, followed by 65% nurses, 63.09% Technicians, and 61.18% MBBS interns (Chart 2).

When respondents were asked about barriers to getting Hepatitis B vaccination, 28.70% said limited availability, 28% responded that vaccine is not provided by the institute, 23% found the vaccine to be costly, and 3.88% had concerns with the safety of vaccine.

About the status of Anti-HBs antibody titre among all HCWs, 69.70% were protected with titre more than 10mIU/mL, 22.86% never checked their titres, and only 7.44% HCWs reported their titres to be less than 10mIU/mL and were unprotected. Protective anti-HBs antibody titre was reported in 73.33% nurses, 71.62% PG residents, 67.86% Technicians, and 64.71% MBBS interns (Chart 3).

Table 1 presents the questions related to knowledge based questions for NSI prevention. Each of the following questions had an appropriate answer. Majority of healthcare workers knew about transmission of HIV (81.82%), Hepatitis B virus (74.38%), and Hepatitis C virus (69.42%) through needle stick injury. Wherein 84.85% had knowledge about Hepatitis B virus infection as vaccine preventable. Regarding the knowledge about recapping of used needles, only 26.17% healthcare workers knew that used needles should never be recapped. Of all the HCWs, 70.25% knew about recommended first aid components after an accidental needle stick injury. Knowledge about testing of both source patient and exposed healthcare worker for blood-borne viruses after a needle stick injury was present in most of the healthcare workers (86.50%). Of all the HCWs, 90.35 % knew that follow-up testing of exposed healthcare worker up to 6 months is required, if the source is positive for either HIV, Hepatitis B or Hepatitis C virus infection. Of all the HCWs, 35.53% knew that post-exposure prophylaxis of HIV is to be taken within 72 hours of a needle stick injury. Regarding knowledge about precautions to be taken by a healthcare worker following a needle stick injury, 72.45 % knew about refraining from blood, semen and organ donation, 54.55 % knew about safe sex practices, but only around 20% knew about avoidance of breastfeeding practices.

Table 1: Response Of The Healthcare Workers Regarding Knowledge Based Questions

Knowledge questions	Correct, n (%)	Incorrect, n (%)
Knowledge about HIV transmission through needle stick injury	297 (81.82)	66 (18.18)
Knowledge about Hepatitis B transmission through needle stick injury	270 (74.38)	93 (25.62)
Knowledge about Hepatitis C transmission through needle stick injury	252 (69.42)	111 (30.58)
Knowledge about Hepatitis B virus infection as vaccine preventable	308 (84.85)	55 (15.15)
Knowledge about never to recap used needles	95 (26.17)	268 (73.83)
Knowledge about recommended first aid components after an accidental needle stick injury	255 (70.25)	108 (29.75)
Knowledge about testing of both source patient and exposed healthcare worker for blood borne viruses after a needle stick injury	314 (86.50)	49 (13.50)
Knowledge about post exposure prophylaxis of HIV to be taken within 72 hours	129 (35.53)	234 (64.47)
Knowledge about follow up testing of exposed healthcare worker up to 6 months, if the source is positive for either HIV, Hepatitis B or Hepatitis C	328 (90.35)	35 (9.65)
Knowledge about refraining from blood, semen and organ donation by a healthcare worker following a needle stick injury	263 (72.45)	100 (27.55)
Knowledge about safe sex practices by a healthcare worker following a needle stick injury	198 (54.55)	165 (45.45)
Knowledge about no breastfeeding by a healthcare worker following a needle stick injury	80 (20.04)	283 (77.96)

HIV: Human Immunodeficiency Virus

The reported practice of recapping needles among HCWs was 58.95% always, 6.06% mostly, 9.65% sometimes whereas only 25.34% HCWs never recapped used needles. The method practiced to recap a used needle if unavoidable was 79.34% using single-hand scoop technique, 9.09% followed a non-touch technique like using tongs/ forceps, 1.65% used a needle recapping device, but 9.92% recapped holding the cap in one hand and needle in the other. Of all the HCWs, 90.91% responded that they always wear double gloves during phlebotomy on a patient who is a known HIV/ HCV or HBV positive whereas remaining 9.09% did not.

DISCUSSION:

The reported incidence of NSI in our study was maximum among nurses (31.11%), followed by, post-graduate residents (26.67%), MBBS interns (22.22%), and technicians (20%). This is in accordance with reports from various studies conducted globally. [5, 8] This is likely due to their limited experience and a hectic demanding schedule.

In the current study, the highest number of NSI occurred due to recapping of needles (33.33%), followed by working under stress and in rush during a patient emergency (31.11%). This finding is in agreement with a study conducted in Dhaka by Khatun et al. [7] and another study done in Baghdad by Al-Khalidi et al. [8] But different reason of NSI, like phlebotomy, suturing etc. was reported by some other studies. [2, 10] Importantly, recapping of needles is not recommended according to Occupational Safety and Health Administration (OSHA) guidelines. [1] However, our study findings, along with those reported in the literature, indicate that healthcare workers have inadequate awareness of hazards and occupational safety related to sharp disposal methods. With the growing availability of needle devices equipped with safety features, careful selection and evaluation of these devices may be necessary to ensure safe injection practices.

Among bloodborne diseases, Hepatitis B is the most transmissible infection. However, it is also the only one which is vaccine preventable. In our study, out of the 363 HCWs, 66.12% were fully vaccinated against Hepatitis B, 16.80% were partially vaccinated with less than 3 doses of vaccine, 6.61% were unimmunized, and 10.47% were not aware about their vaccination status. This finding aligns with the study conducted in Mumbai by Naidu et al. who also reported a 64.2% of complete vaccination status among HCWs, 12.5% of incomplete vaccination, and 23.2% with unknown vaccination status.[1] Few barriers to getting Hepatitis B vaccination are: Limited availability of vaccine, costly vaccine, safety concerns regarding vaccination, and vaccine not provided by the institution. This highlights the need to initiate Hepatis B vaccination campaigns in hospitals.

When the reporting status was assessed, we found that, 71.11% of NSIs were reported by a healthcare worker to the appropriate authorities, with the majority (81.25%) being reported immediately after the incident. This statistics was much lower in a study done by Madhavan et al.[2] Prompt reporting allows timely post-exposure prophylaxis (PEP), reducing risk of infection, thereby improved workplace safety.

In the current study, majority of healthcare workers knew about transmission of HIV (81.82%), Hepatitis B virus (74.38%), and Hepatitis C virus (69.42%) through needle stick injury, which is consistent with the findings of study done in Saudi Arabia by Alsabaani et al.[10] Understanding risks promotes cautious handling of needles, minimizing accidental exposures, which is crucial to prevent occupational exposure among healthcare workers.

We reported a high level (90.35%) of knowledge regarding follow up

testing of exposed healthcare worker up to 6 months, if the source is positive for either HIV, Hepatitis B or Hepatitis C virus infection. This is consistent with a study conducted by Al-Khalidi et al. in Baghdad.[8] As some infections may not be detectable immediately after exposure; awareness about follow up testing after a needle stick injury is essential for insuring early detection and management of potential bloodborne infections.

Our assessment regarding knowledge about recommended first aid components after an accidental needle stick injury is found to be 70.25%. This goes in parallel with another study by Alsabaani et al. conducted in Saudi Arabia, who reported 76.9% of healthcare workers who had the correct knowledge about recommended first aid components after an accidental needle stick injury. [10] Immediate and correct first aid measures after a needle stick injury, can help reduce the inoculum viral load and lower the risk of transmission.

Our analysis showed only 35.53% of the healthcare workers knew that post-exposure prophylaxis of HIV is to be taken within 72 hours of a needle stick injury, which is in contrast to a study conducted by Al-Khalidi et al. in Bagdhad, who reported 64.2% of the same knowledge.[8] Timely initiation of PEP, especially for HIV, significantly lowers the risk of seroconversion after exposure. Institutions should target interventions on training of healthcare workers regarding NSI prevention, first aid and PEP.

We conclude that overall satisfactory level of knowledge was found among healthcare workers regarding the risk of NSIs however, practices need to be strengthened, especially the avoidance of needle recapping and proper disposal of sharps besides improving the hepatitis B vaccine coverage. Targeted administrative interventions and educational programs are essential to improve knowledge and practices, ensuring a safer workplace and reducing the risk of bloodborne infections.

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