

## Prevalence of Needle Stick Injury and Associated Determinants among Healthcare Employees of Tertiary Care Hospital, Bangladesh

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### ABSTRACT

**Objective:** Needle stick injuries (NSIs) are a recurrent issue among healthcare employees. The study aims to evaluate the frequency of needle stick injuries and identify predisposing components at a tertiary care facility in Dhaka.

**Methods:** This descriptive cross-sectional study was organized at six medical and dental hospitals in Dhaka, Bangladesh from January 2023 to August 2023. The study sample consisted of 240 doctors, dentists, and paramedical staff working at the hospital. The data was collected via a structured questionnaire with nine closed-ended questions for the study subjects. The analysis of data was done using SPSS 23.

**Results:** The overall prevalence of NSIs was 60%. The main reason for incurring the injury was drawing blood which accounts for 54% of the total injuries, the second was while performing surgery (27%) and breaking vials (12%). The predominance of the injuries happened during the morning shift (81%). A large majority, i.e., 60%, did not report their injury, and 74% of the study population reported that the vaccination for Hepatitis B was taken prophylactically. A large majority managed a needle stick injury by wound toilet (30.5%), and the same percentage of the study population ignored it.

**Conclusion:** This study observed that healthcare providers had a high prevalence of needle stick injuries. Hospital administration must devise a way to increase the availability of safety equipment, reduce workload, and provide better training to reduce the risk of injury. Moreover, reporting must be made mandatory for all those who incur this kind of injury in the future and immunization must be made available.

**Keywords:** Emergency; Hospital;

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### Introduction

Needle stick injuries (NSIs) are a significant occupational hazard faced by healthcare professionals worldwide. According to the World Health Organization (WHO), sharps injuries contribute to 40% of Hepatitis C Virus (HCV) and Hepatitis B Virus (HBV) infections and 2–3% of

Human Immunodeficiency Virus (HIV) infections among healthcare workers. <sup>1</sup> The National Institute for Occupational Safety and Health (NIOSH), USA, defines needle stick injuries as those caused by devices such as blood collection needles, hypodermic needles, needles used in intravenous (IV) systems, and IV stylets. <sup>2</sup>

Healthcare workers (HCWs) are at an



elevated risk of NSIs, particularly in developing countries, where up to half of injections may be unsafe. According to the Centers for Disease Control and Prevention (CDC), approximately 385,000 needle stick injuries occur annually in US hospitals alone, while globally, over 3 million HCWs experience transcutaneous exposure to blood-borne pathogens each year.<sup>3</sup> In developing nations, these injuries are responsible for an estimated 16,000 HCV infections, 66,000 HBV infections, and 1,000 HIV infections annually.<sup>2,4</sup>

Globally, needle stick injuries remain a pressing concern in the healthcare sector. Among 39.5 million HCWs, approximately 3 million experience percutaneous exposure to infectious diseases annually.<sup>5</sup> Such injuries account for 40% of hepatitis C and B cases and 2.5% of AIDS/HIV cases among healthcare professionals. Unsafe injection practices are implicated in 33% of new hepatitis B cases, 42% of hepatitis C cases, and 2% of new HIV cases. The probability of infection transmission through a needle stick injury is approximately 3–10% for hepatitis B, 3% for hepatitis C, and 0.3% for HIV. On average, healthcare workers face four NSIs each year, with contributing factors including inadequate supplies, excessive reliance on injections, poor access to sharps containers, staffing shortages, needle recapping, and insufficient adoption of safer needle technologies. The prevalence of NSIs in Bangladesh varies widely, with reported frequencies ranging from 30% to 73%.<sup>6</sup>

Bangladesh's healthcare system faces numerous challenges that increase the risk of needle stick injuries. Limited resources, overcrowded facilities, and a lack of comprehensive training on occupational hazards contribute to the prevalence of these injuries.<sup>7</sup> Moreover, inadequate access to safety-engineered devices, weak enforcement of infection control policies, and poor awareness regarding post-exposure prophylaxis (PEP) further exacerbate the issue.<sup>8</sup> Compounding this, the lack of robust reporting mechanisms and improper sharps waste disposal practices expose healthcare workers to additional risks.<sup>9</sup> Addressing these systemic shortcomings is critical to ensuring the safety of healthcare workers and improving patient care outcomes.

Despite the importance of accurate data, needle stick injuries in Bangladesh are underreported due to weak reporting systems and

insufficient attention from authorities. A study conducted in Bangladesh found that 60 (31.1%) of healthcare workers reported experiencing such injuries. Ensuring the health and safety of healthcare professionals is essential to improving patient care. By implementing stringent precautionary measures and promoting the responsible use of needles, the risk of occupational exposure to blood-borne pathogens can be significantly reduced. Given the limited research in this area, this study aims to document the frequency of NSIs and identify associated risk factors at a tertiary care facility in Bangladesh.

## Materials and Methods

This study employed a descriptive cross-sectional design to assess the attitudes and knowledge of doctors and paramedical staff in Bangladesh. A period of eight months was spent conducting this study, from January 2023 to August 2023. The study population consisted of 240 doctors and paramedical staff who were registered employees of Dhaka, Bangladesh, and actively involved in providing healthcare services. HCWs were excluded from the study if they were absent during data collection or were unwilling to participate.

A convenient non-probability sampling method was utilized to select the study candidates. To ensure data collection accuracy, a preformed and pretested questionnaire was designed to gather relevant information on the knowledge and attitudes of the study subjects. The selected participants were approached during their working hours and explained the purpose and significance of the study. Written informed consent was procured from every participant. Participation in the study was voluntary,

After the completion of data collection, a rigorous data cleaning process was undertaken. This step involved scrutinizing the collected responses to identify and rectify any errors or inconsistencies. The data was anonymized and coded for confidentiality. Upon data cleaning, it was entered in the Statistical Package for Social Sciences version 23 (SPSS Inc., Chicago, IL, USA) for further analysis. Descriptive statistics were employed to summarize the data, presenting results in frequencies and percentages.

## Results

The sociodemographic characteristics of health professionals are shown in Table 1. When it came to the role of participants in the hospital, this study showed that 110 (45.8 %) were House Officers, 38 (15.8%) were Specialists, 54 (22.5%) were Nursing Staff and 36 (15.0%) were MO/PG.

**Table 1: Sociodemographic properties suited for the study population (N=240)**

Variable	Percentage (%)
<b>Gender</b>	
Male	95 (39.6%)
Female	145 (60.4%)
<b>Marital Status</b>	
Married	106 (44.2%)
Unmarried	134 (55.8%)
<b>Years of Experience</b>	
1-5	147 (61.3%)
5-10	59 (24.6%)
10-15	19 (7.9%)
15-20	9 (3.8%)
>20	6 (2.5%)

Perceptions and Practices regarding needle stick injuries in the study population is shown in Table 2. Out of the 144, those who had an injury only 56 (23.3 %) reported the injury while 87 (36.3%) did not. When asked about the Management 39 (16.3%) resorted to a wound dressing, 45 (18.8%) ignored the injury, 15(6.3%) immunized themselves and 44 (18.3%) did wound toilet. When asked overall from all 240 participants 141 (58.8%) said that they used protection while handling needles and 99 (41.3%) said "No". 179 (74.6%) said that they were vaccinated against Hepatitis B while 61 (25.4%) said "No".

**Table 2: Perceptions and Practices regarding needle stick injuries in the study population (N=240)**

Variable	Percentage
<b>Injury Report</b>	
Yes	56 (23.3%)
No	87(36.3%)
<b>Management</b>	
Ignored it.	45 (31.25%)
Wound toilet	44 (10.5%)
Wound dressing	39 (27.3%)
Immunization	15 (10.4%)
<b>Used any Prevention</b>	
Yes	141 (58.8%)
No	99 (41.3%)
<b>Are you vaccinated against hepatitis?</b>	
Yes	179 (74.6%)
No	61 (25.4%)

As shown in Table 3, this study showed that 144 (60%) participants experienced an NSI in the past 6 months of the questionnaire being administered while 96 (40%) did not have such an experience. Forty-six (19.2%) participants understood NSI as an injury caused by a needle, 16 (6.7%) as an injury caused by sharps, and 178 (74.2 %) as injuries caused by sharp instruments and needles. Of those who incurred an injury when asked about the timing of the NSI, 117 (82%) said it occurred during the daytime while 26 (18%) said night. The reason for incurring NSI, 78 (32.5%) were drawing blood at that time, 39 (16.3%) were scrubbed in



surgery, 17 (7.1%) were breaking vials and 10 (4.2%) were molding needles.

**Table 3: Familiarity and understanding and frequency of Needle Stick of NSI in the study population (N=240)**

Variables	Percentage
<b>Injury in 6 months</b>	
Yes	144 (60%)
No	96(40%)
<b>Understanding</b>	
Caused by Needle	46(19.2%)
Caused by Sharps	16(6.7%)
Caused by Needles and Sharp Instrument	178(74.2%)

## Discussion

Needle stick injuries raise a serious hazard to both healthcare professionals and patients' injuries can result in the spread of HIV/AIDS Hepatitis B and C, the treatment for which is quite expensive.<sup>10</sup> Healthcare professionals put themselves at unnecessary risk every day when they are catering to the needs of the patients while rendering services to them.<sup>11</sup> The study aimed to find out the frequency of needle stick injuries in healthcare providers in a tertiary care facility in Dhaka, Bangladesh. A sample of 240 was taken from medicine, surgery, ENT, and eye wards of different hospitals. This included healthcare providers with clinical experience of as little as 1 year and as great as that of more than 20 years.

About two-thirds of the participants got vaccinated against hepatitis similar to a study done in Sindh, Pakistan.<sup>12</sup> Understanding and familiarity with needle stick injury was high in our study population; a large preponderance knew that these are injuries caused by needles and sharps instruments. This is quite reasonable as the study was conducted in practicing doctors as they are expected to understand exactly what needle stick injuries are. This is in accordance with results from a similar study, where the majority of people i.e., 73.3% (n=220) were aware of the definition of needle stick.<sup>13</sup> However, in other similar studies, not much literature has been found about the understanding of the term "needle stick injuries"

In this analysis, the frequency of needle stick injuries was determined to be notably high at 60%. This figure closely resembles another study supervised in Lahore, which reported a prevalence of 69% among nursing staff. However, in contrast, a study organized in Ethiopia revealed a lower prevalence of 29.5%.<sup>14</sup> The disparities in these

results indicate a potential lack of standardized operating protocols in our country with regard to needle stick injury prevention and management.

In the present study, needle stick injuries mainly occurred during blood drawing (54.1%), surgery (27%), and breaking vials or molding needles (6.9%). Similarly, a study in Lahore, Pakistan, found the highest injuries during surgery (55%), followed by maintaining IV lines (29%) and drawing blood samples (27%).<sup>15</sup>

In this study, 27% (39 out of 144) of the injured healthcare workers managed their needle stick injuries by dressing the wounds, while approximately 30% opted for wound toilet, finding it less time-consuming and convenient. A concerning observation was that the majority, 31%, ignored their injuries, potentially increasing the likelihood of blood-borne diseases among healthcare professionals. A small percentage of subjects in the study chose to get immunized after the injury, possibly because of the high cost of hepatitis B vaccines in Bangladesh.

This study differs from others in a few respects, 60.9% cleaned the location of injury with soap and water, and 14.8% did not do anything following their latest needle stick injury. Only 20 (7.8%) of the health care providers took prophylaxis after exposure to HIV/AIDS. In another study conducted in Yemen, 7.9% of the candidates had contacted a medical emergency room, 7.9% had notified the infection control principal, 10.1% had spoken to their professional collaborators and 74% of the participants reported taking no action for the injury.<sup>16</sup>

Underreporting is a major concern when it comes to needle stick injuries as it is a barrier to understanding fully the scope of this occupational hazard. In the present study only, 38.9% reported



the injury which, is somewhat better, yet still a matter of concern, than other research where in India only 27.5% of the total needle stick injuries get reported to the healthcare system. And a German study where 28.7% of injured respondents reported a needle stick injury, 20.9% reported only sporadically, and 50.4% of the needle stick injuries went unreported.<sup>17</sup>

An observational study in Pakistan which took place for 6 years showed junior doctors (interns and residents), who are usually subjected to long working hours and more patient load experienced the greatest amount of injuries (n 394; 28.5%) succeeded by enrolled nurses (n 283; 20.4%), which showed that increase in the number of work hours lead to more injuries, these results, too, are in correspondence with our results.<sup>18</sup>

In this study long working hours (>44hrs/week) predisposed to needle stick injuries. Doctors who had worked 25-32 hours per week showed the least number of needle stick injuries, which suggests that there is a connection between the occurrence of needle stick injuries and working hours, this is supported by another study conducted in Iran which concluded workload as an important risk factor.

In this study only 58.3% of people used protective equipment while handling needles which is not a satisfactory outcome as over 40% of professionals are already at increased risk of incurring an injury, this situation deserves instantaneous attention by health-related policymakers and administrators of hospitals that can certainly decrease the chance of spread of blood-borne pathogens from patients to health care professionals or the contrariwise. Knowledge is not enough; it must be complemented by practice. These healthcare workers expose themselves to the superfluous danger of not reporting, thus stripping themselves of the virtue of intervention.<sup>19</sup>

A study conducted in Saudia Arabia indicates that 75.7% of healthcare professionals had put on gloves at the time of prick. Our findings also vary from another study in Saudia Arabia, where 84.1% used single gloves 86.2% had training in NSIs, 98.6% knew about hospital policies regarding NSIs, and 99.1% had knowledge of disease transmission by NSIs.<sup>20</sup>

This study has several limitations. First, it was conducted at a single tertiary care facility, limiting the generalizability of the findings to other healthcare settings in Bangladesh. Second, the reliance on self-reported data may have introduced

recall bias and underreporting, as NSIs are often inadequately reported in similar settings. Finally, the study did not evaluate the effectiveness of existing infection control policies or the availability of protective equipment, which are crucial in preventing NSIs.

To address these challenges, future studies should include multiple healthcare facilities across diverse regions to provide a more comprehensive understanding of NSIs in Bangladesh. It is also imperative to develop and enforce strict hospital policies for injury prevention, including the provision of safer needle devices, adequate sharps disposal systems, and accessible PEP services. Regular training programs for healthcare workers on infection control practices, NSI management, and the importance of reporting injuries should be instituted. Additionally, promoting vaccination coverage for hepatitis B among all healthcare workers and subsidizing the cost of vaccines could significantly mitigate the risk of blood-borne infections.

By addressing these limitations and implementing evidence-based interventions, the healthcare system in Bangladesh can create a safer working environment for healthcare professionals and reduce the burden of NSIs.

## Conclusion

In this hospital, 60% of healthcare professionals experienced needle stick injuries, indicating a significant problem in their understanding of such injuries and the proper utilization of precautionary equipment. Shockingly, only 38% of those who suffered needle stick injuries reported the incidents. It is crucial to address this issue and make sure that these insults are promptly notified to the relevant authorities. This reporting is essential to facilitate appropriate counseling, prophylaxis, or early treatment. Furthermore, strict adherence to safety-engineered devices is necessary to effectively reduce needle stick injuries and the associated danger of blood-borne infections.

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## Author Contribution



FK and MMR conceived the idea, collected data, and wrote the initial manuscript. FK and MMR collected data, analyzed the data, validated the results, and proofread the finalized manuscript.

### Ethical Considerations

The study was conducted in accordance with the declaration of Helsinki and was approved by the institutional ethical board (Ref: ERB/MARKS/2023:0587)

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### Conflict of Interest

None

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