

Prevalence of Occupational Exposure to Needle-Stick Injuries among Healthcare Workers at a Tertiary Care Hospital: A Retrospective Record Based Study

Sanjana B Jadhav¹, Hemangi D Ingale^{2*}, Nita M Gangurde³

¹SMBT Institute of Medical Sciences and Research Centre, Nashik, Maharashtra, India

^{2,3}Department of Microbiology, SMBT Institute of Medical Sciences and Research Centre, Nashik, Maharashtra, India

ABSTRACT

Introduction: Needle stick injuries (NSIs) are significant occupational hazards among healthcare workers (HCWs), exposing them to blood-borne infections such as HIV, hepatitis B, and hepatitis C. Institution-specific data are essential to design targeted preventive strategies. This study estimated the prevalence of NSIs and identified associated risk factors in a tertiary care teaching hospital.

Materials and Methods: A retrospective record-based study was conducted at an 810-bedded tertiary care hospital in Northwest Maharashtra from January 2023 to September 2025. Data on NSIs were obtained from the Infection Prevention and Control Department. Prevalence was calculated per 100 inpatient days. Descriptive statistics were used for analysis.

Results: A total of 105 NSIs were reported over 33 months, with an overall prevalence of 0.015 per 100 inpatient days. Nursing staff (28.5%) and housekeeping/attendant staff (26.6%) were most affected. Most injuries occurred in wards (47.6%) and among HCWs aged 20-25 years (62.8%). Blood sample collection (40%) was the most common procedure, and needle recapping (36.1%) was the leading cause. Post-exposure prophylaxis for hepatitis B and HIV was administered in 11.4% and 12.3% of cases, respectively.

Conclusion: Although the prevalence of needle stick injuries (NSIs) in our study was low, ongoing efforts are essential to ensure the safe handling of sharps in healthcare settings. Prompt reporting of incidents, coupled with timely initiation of post-exposure prophylaxis, is critical to prevent transmission of blood-borne infections among healthcare workers. Continuous training, adherence to infection control protocols, and the use of safety-engineered devices can further minimize the risk of NSIs and enhance workplace safety.

Key words: Prevalence, Needle Stick Injuries, Healthcare Workers, Occupational exposure, Blood-borne infections

DOI:

10.55489/njmr.160220261275

*Corresponding author:

Dr. Hemangi Dasharath Ingale

Email: ingale.hemangi33@gmail.com

Date of Submission: 27/12/2025

Date of Acceptance: 02/02/2026

Date of Publication: 01/04/2026

Funding Support:

None Declare

Conflict of Interest:

The authors have declared that no conflict of interest exists.

How to cite this article:

Jadhav SB, Ingale HD, Gangurde NM. Prevalence of Occupational Exposure to Needle-Stick Injuries among Healthcare Workers at a Tertiary Care Hospital: A Retrospective Record Based Study. Natl J Med Res 2026;16(02):82-87. DOI: 10.55489/njmr.160220261275

Copy Right: The Authors retain the copyrights of this article, with first publication rights granted to Medsci Publications.

License Term: Creative Commons Attribution-Share Alike (CC BY-SA) 4.0

Publisher: Medsci Publications [www.medscipublications.com]

ISSN: 2249 4995

Official website: www.njmr.in

INTRODUCTION

Needle stick injury (NSI) is defined as any percutaneous injury of skin caused by a needle or any sharp object which was in prior contact with blood or body fluid.[1] These injuries are mostly caused accidentally during giving injections, blood collection, recapping of needles and during handling of biomedical waste due to inappropriate disposal of needles.[2] These are the major occupational hazards in healthcare workers (HCWs) which lead to the spread of various blood borne viruses including human immunodeficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV).[3] The infection transmission risk after needle stick injuries are 0.3% for HIV, 6% to 30% for HBV and 1.8% for HCV.[4] As per World Health Organization (WHO), NSI results in about 200 to 5000 cases of HIV, 66000 cases of HBV, 16,000 cases of HCV annually among healthcare workers.[5]

Globally, surveillance systems such as the Exposure Prevention Information Network (EPINet) have provided valuable data on NSIs. In 2024, EPINet reported 39.14 and 26.83 needlestick and sharp object injuries per 100 occupied beds in teaching and non-teaching hospitals, respectively, in the United States.[6] However, in India, a nationwide surveillance system for reporting NSIs is lacking. Chakravarthy M et al. [7] reported an NSI rate of 0.43 per 1 000 inpatient days using cumulative data from five tertiary care hospitals between 2008 and 2013. Similarly, Sastry A et al. [8] reported 13.1 episodes of needlestick, sharp, and splash injuries (NSSSIs) per 100 occupied beds per year in a tertiary care teaching hospital in Puducherry.

Several risk factors have been identified for the occurrence of NSIs, including lack of training, improper use of personal protective equipment, needle recapping, heavy workload, inattention, younger age, and inappropriate disposal of sharps.[9,10] In addition to the risk of infection, NSIs are associated with significant psychological stress, anxiety, and fear among affected HCWs.[11]

Most NSIs are preventable through measures such as minimizing unnecessary needle use, availability of safety-engineered devices, adherence to safe handling practices, and regular education and training of healthcare personnel. Furthermore, an effective system for prompt reporting of NSIs and timely provision of post-exposure prophylaxis (PEP) is essential in all healthcare settings.

The prevalence of NSIs and associated risk factors varies across institutions depending on work culture, staffing patterns, availability of resources, training programs, and surveillance mechanisms.[9] Therefore, institution-specific data are crucial for planning targeted interventions and evaluating preventive strategies.

With this background, the present study was conducted to estimate the prevalence of needlestick injuries and identify associated risk factors among healthcare workers at our tertiary care hospital.

MATERIALS AND METHODS

This retrospective record-based study was conducted at 810 bedded tertiary care teaching hospital of Northwest Maharashtra. The ethics approval for this study was obtained from the Institutional Ethics Committee (Ref. no: 1401/SMBT/IMSRC/10/IEC/24/218, Dated: 23/07/2024). A total 33 months data (From January 2023 to September 2025) regarding needle stick injuries (NSIs) among healthcare workers which included doctors, interns, nursing staff, house-keeping staff, attendants and laboratory staff was included in this study. This data was obtained from the Infection Control Department of our hospital.

As per the policy in our hospital, after needle stick injury the healthcare workers do first aid management of the affected area and then report the incidence to the Casualty Medical Officer (CMO) for further investigations and management. The CMO also inform the incidence to the designated infection control nurse. The infection control nurse records detailed information about the needle stick injury in a structured proforma. It includes date and time of injury, age, gender and profession of affected healthcare worker, location of incidence, site of injury, type of sharp, procedure during which injury occurred, associated causative factors, use of personal protective equipment by HCW at the time of procedure, the source known or unknown, immediate first aid management after injury, the serological status of the source patient for blood borne infections, baseline serological status of the affected HCW, Hepatitis B vaccination status of affected HCW and post-exposure prophylaxis.

In our study all consecutive cases of needle stick injuries to all types of healthcare workers reported to the infection control Department were included.

Along with the demographic details of the HCW, information regarding procedures during which injuries occurred and factors responsible for it was collected from the record.

Prevalence of Needle stick injury was calculated as number of affected healthcare workers per 100 inpatient days[7]. Data of monthly inpatient days was obtained from Medical Records Department.

Operational definitions [12]:

Needle-stick injuries: Injuries by all types of needles and sharp objects that are contaminated with blood or other body fluids.

Healthcare workers: Any person working in hospital who is potentially at risk of exposure to infectious materials.

Source patient: The patient whose blood or body fluid contaminated needles or sharp objects caused injuries to the HCW.

Statistical analysis: All data obtained from the NSI record of Infection Control Department was entered in the Microsoft Excel. All variables like demographic characteristics of HCW, place of injury, causative procedures

etc. were analyzed and presented as descriptive statistics like percentages. Year wise and the overall prevalence was calculated as NSI per 100 inpatient days.

RESULTS

Over a period of 33 Months (January 2023 to September 2025), a total of 105 cases of needle stick injuries were reported to the Infection prevention and control Department. The overall prevalence of needle stick injury in our study was 0.015 which was calculated as the number of exposed healthcare workers per 100 inpatient days. Table No 1 shows year wise prevalence of needle-stick injury among healthcare workers. The month-wise number of NSI cases from year 2023 to 2025 is shown in the Figure 1.

Amongst the total number (n=105) of cases of NSIs, predominant were nursing staff (28.5%) followed by housekeeping and attendant (26.6%) (Table No 2). Majority of the incidences occurred at ward areas (47.6%). The healthcare workers affected were predominantly (62.8%) of 20-25 years age group and of female gender (56.1%).

Most commonly, injuries were occurred at left hand fingers [n=57 (54.2%)] followed by right hand fingers [n=44(41.9%)] and foot [n=4 (3.8%)]. Fifty-three (50.4%) healthcare workers did not wear gloves at the time of injury. All healthcare workers (100%) affected with needle stick injury took immediate first aid management (washed the affected part with soap and water).

Out of the total affected HCWs (N=105), 69 (65.7%) HCWs had taken all three doses of Hepatitis B vaccine, however; seventeen (16.1%) and 19 (18%) HCWs had taken two doses and one dose of Hepatitis B vaccine.

The source patient was known in 95 cases (90.4%) of NSI. In eight cases source was Hepatitis B positive. Amongst these cases (n=8), two HCWs were incompletely vaccinated, so Hepatitis B immunoglobulin dose

was given to them and they were instructed to complete their vaccination as per vaccination schedule. The remaining six HCWs had taken all three doses of Hepatitis B vaccine and their antibody titer for Hepatitis B surface antigen was at protective level. So, post exposure prophylaxis (PEP) was not advised to them.

Table 1: Year wise prevalence of Needle stick injury (NSI) among healthcare workers

Year	Healthcare workers exposed to NSI	Total inpatient days	Prevalence of NSI (Per 100 inpatient days)
2023	41	241139	0.017
2024	37	246570	0.015
Till Sept 2025	27	182703	0.014
Total	105	670412	0.015

Table 2: Demographic parameters of healthcare workers exposed to needle stick injury

Parameter	Healthcare workers (%)
Profession	
Doctor	16 (15.2)
Interns	11 (10.4)
Nursing staff	30 (28.5)
Nursing students	17 (16.1)
Housekeeping and attendant	28 (26.6)
Others	3 (2.8)
Working Place	
Emergency Department	13 (12.3)
Wards	50 (47.6)
Intensive care units	12 (11.4)
Operation theaters	20 (9)
Other	10 (9.5)
Gender	
Male	46 (43.8)
Female	59 (56.1)
Age	
20-25 years	66 (62.8)
26-30 years	26 (24.7)
31-35 years	9 (8.5)
>35 years	4 (3.8)

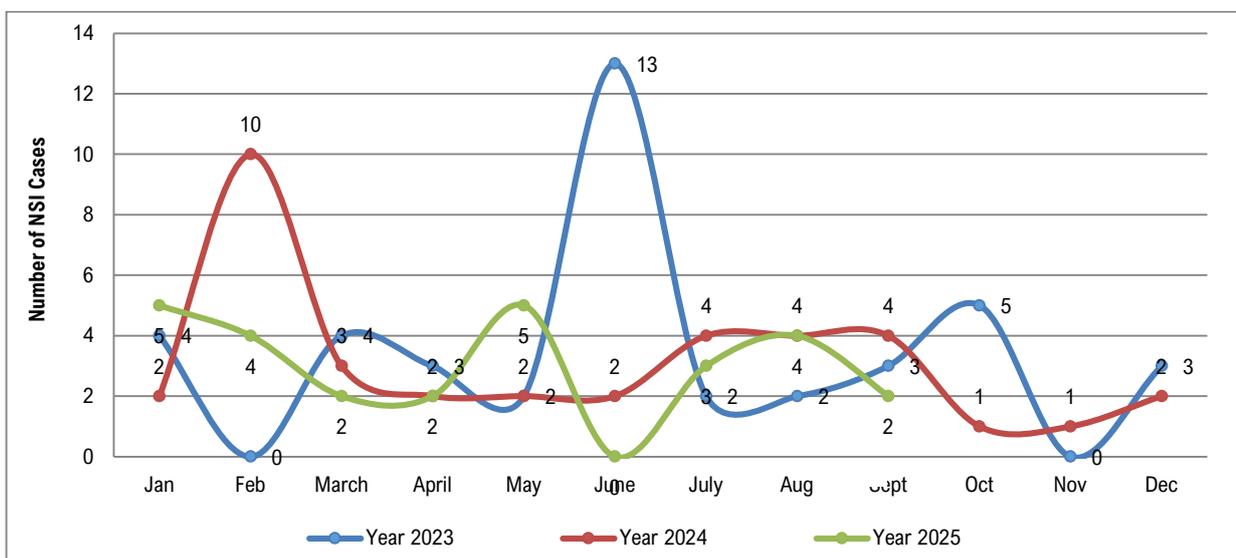


Figure 1: Needle stick injury cases (in numbers) month-wise from Year 2023 to 2025

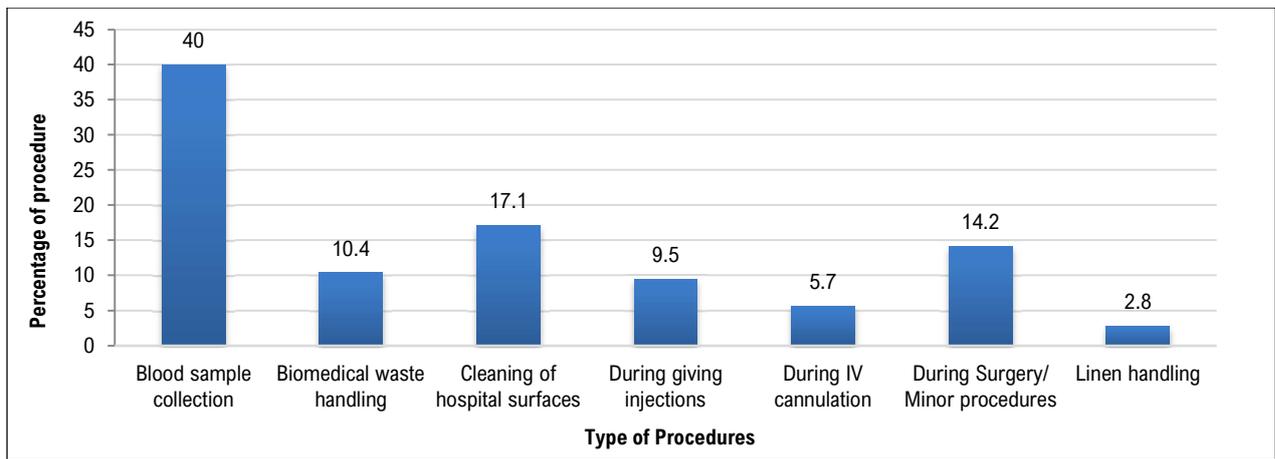


Figure 2: Procedures during which needle stick injuries occurred

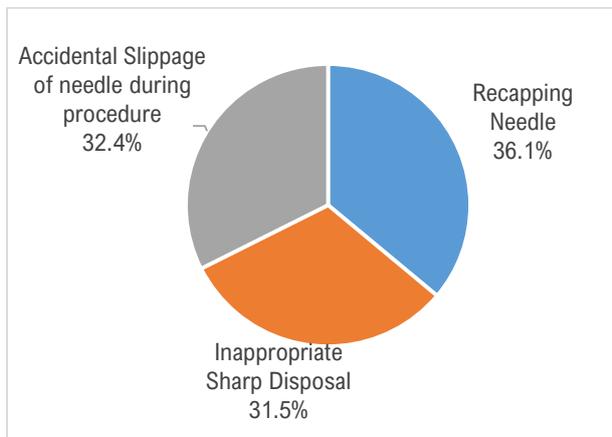


Figure 3: Causes of Needle stick injuries

The source was HIV positive in three cases and all affected HCWs were given first dose of HIV PEP. They were referred to Anti-retroviral therapy (ART) centre for further management.

The source was not identified and thus unknown in 10 cases (9.5%). All these were housekeeping workers handling biomedical waste at end storage area. As all these workers were incompletely vaccinated, PEP for Hepatitis B was also given to them along with HIV.

So, overall, amongst 105 HCWs exposed to NSI, PEP for Hepatitis B and HIV was given to 12 (11.4%) and 13 (12.3%) HCWs respectively.

As shown in Figure No 2.and 3 the most common procedure during which needle stick injury occurred was blood sample collection (40%) and the predominant cause for injury was recapping of needle after use (36.1%)

DISCUSSION

Healthcare workers are at high risk for acquiring blood borne infections through percutaneous exposure to blood and body fluids during patient care activities. The present study was conducted at a tertiary care hospital

of a teaching Institute. In our hospital there is fully functional infection prevention and control team since year 2023, which captures data of needle stick injuries among healthcare workers and conduct regular awareness program for its prevention and management. Being a teaching Institute, many nursing students, interns and post-graduate students are involved in various patient care activities along with the nursing staff, doctors, attendants, housekeeping staff, laboratory and other technicians and thus are vulnerable for exposure to various sharp injuries.

The prevalence of NSIs was estimated in our study retrospectively with a record available with Infection prevention and control Department since January 2023 to September 2025.

The overall prevalence was 0.015 per 100 inpatient days in our study. This corresponds to the study conducted by Shenoy S.et al.[13]in which the annual NSI incidence was reported in a range of 0.007 to 0.02 per 100 inpatient days over 11 years (2012-2022). However; Avnisha et al.[2] and Jayaprada R et al.[14] reported the prevalence as 1.02/100 occupied beds and 0.13 respectively. In a study by Sastry A et al.[8] 10.6 episodes of NSI per 100 occupied beds were reported. The NSI prevalence among different hospitals may vary as per awareness of staff regarding safe use sharps, workload, availability of safety devices and robust protocols for reporting of incidences by healthcare workers. Though the Infection control Department has set system for reporting of needle stick injuries in our hospital, the low prevalence of NSI in our study highlights the possibility of underreporting of incidences by health care workers. So, there is need of in detail assessment of possible factors responsible for this and repeated awareness activities for healthcare workers.

Month-wise number of NSI cases from year 2023 to year 2025 (Figure 1) showed sudden spike of cases in a month of June and February in a year 2023 and 2024 respectively. Being a teaching tertiary care hospital, medical interns and nursing students are posted in the hospital for clinical training. As they have no prior experience to handle the sharps appropriately, they are at

risk of NSIs. There is possibility of joining of new batch of students during those months. As our study was retrospective and record based, we could not gather the detailed information about it.

Nursing staff (28.5%) was the most frequently affected group of healthcare workers for NSI in our study followed by housekeeping and attendant staff (26.6%). Similar findings were reported by Choudhury DD et al.[15] and Raj A et al.[16] As nursing staff is involved in maximum procedures with sharps such as intravenous cannulation, blood sample collection, medication administration etc. they are vulnerable for needle stick injuries.

The most predominant age group of healthcare workers affected due to NSIs in our study was 20 to 25 years (62.8%). The high prevalence in this young age group may be due to less work experience and maximum patient care activities allotted to them as compared to senior staff who are mainly involved in administration work. Similar results were reported by Naidu RT et al.[17]

Maximum injuries reported at our hospital were occurred at ward areas (47.6%). This is in contrast to study done by Avnisha et al.[2] who reported ICUs and casualty as predominant areas for occurrence of NSIs (47.02%). Though many high-risk invasive procedures are done in ICUs and casualty, the finding in our study, as less number of NSI cases in these areas as compared to ward areas point towards possibly of not reporting of incidences. The heavy workload pressure in these patient care areas may pose difficulty to HCWs to report every incidence. One to one interview with the HCWs working in these Departments needs to be taken to estimate the prevalence of NSI amongst them.

The commonest procedure during which needle stick injuries occurred in our hospital was blood sample collection (40%) and the most common cause was recapping of the needles (36.1%) after the procedure. These findings were in consistence with the study done by Avnisha et al.[2] and Choudhury DD et al.[15] Though recapping of needles is strictly prohibited in our hospital as per infection control policy, existence of such practices indicate gaps in implementation of policy. Recapping practices can be avoided by providing puncture proof containers for disposal of needles at the point of procedure and by engineering control in sharp devices by using safety features.

Gloves are the most important personal protective equipment (PPE) used to prevent blood and body fluid exposure during any invasive procedure. In our study, 50.4% healthcare workers did not use gloves at the time of needle stick injury. Similar results were reported by Khurshed M et al.[18] (50%), while the use of gloves was comparatively better (65%) in a study by Sriram S et al.[19]. We could not identify the reasons of not using gloves in our study as the details were not mentioned in the record but lack of awareness about use of PPE or work in rush or unavailability of gloves could be the possible reasons which need to be assessed further.

All healthcare workers affected with needle stick injury in our study took immediate first aid management by washing the affected part with soap and water. This reflects the better awareness among the HCWs about management of needle stick injuries in our hospital. The source patient was known in 90.4% (95/105) cases of NSI cases in our study. Singh N et al.[1] and Goel V et al.[20] in their study reported the percentage of known source patient as 80.8% and 91.4% respectively. In our hospital as per policy all identified source patients are tested for serological markers like HIV, HBV and HCV immediately after NSI incidences if not tested prior. The high percentage of known source patient suggest better implementation of the policy.

Post exposure prophylaxis for Hepatitis B and HIV was received by 11.4% (12/105) and 12.3 % HCWs respectively. Singh N et al.[1] in their study reported 12.1% (14/115) and 17.3% (20/115) of HCWs exposed to NSI were given immediate PEP for Hepatitis B and HIV respectively. In our study 69 (65.7%) HCWs were completely vaccinated with Hepatitis B at the time of NSI incidences which is in contrast to findings by Sastry A et al.[8] who reported 40.9% HCWs as completely vaccinated for Hepatitis B. In our hospital as per policy all newly joined HCWs are advised to take first dose of Hepatitis B vaccine immediately after joining the duties and rigorous follow up is taken by Infection control nurses for their completion of doses.

LIMITATIONS

This was a retrospective record-based study so there are possibilities of missing of some cases due to under-reporting to the infection control Department.

CONCLUSION

Prevention of needle stick injury is the most effective way for protecting healthcare workers from occupational exposure to blood born infections. Though the prevalence of needle stick injury is less in our study, continued measures must be implemented to prevent the occurrence of incidences and its adequate management. Our study revealed that young health care workers (20-25 years age group) especially nursing staff were predominantly affected by needle stick injuries and the most common procedure and risk factor observed was blood sample collection and recapping of needles respectively. This highlights the need of repeated training and awareness sessions especially for newly recruited staff and students, use of safety devices for blood collection, strict measures for avoidance of recapping of used needles and adequate nurse to patient ratio to minimize work stress.

Acknowledgement: Authors are grateful to the infection control nurses of our hospital for providing necessary support for this study

Individual Author's Contribution: **SBJ** contributed to study conception, data collection, data analysis and interpretation, and manuscript preparation. **HDI** contributed to study conception, study design, data analysis and interpretation, and manuscript preparation. **NMG** contributed to study design, data analysis and interpretation, and manuscript preparation.

Availability of data: The data that support the findings of this study are available from the corresponding author on reasonable request.

Declaration of Non-use of generative AI Tools: This article was prepared without the use of generative AI tools for content creation, analysis, or data generation. All findings and interpretations are based solely on the authors' independent work and expertise.

REFERENCES

- Singh N, Mohapatra I, Pattnaik D, Panda SS, Pradhan R, Mund K, et al. Factors Associated With Needle Stick Injuries Among Healthcare Workers: A Retrospective Study in a Tertiary Care Hospital of Eastern India. *Cureus*. 2024 Oct 21;16(10):e72066. DOI: <https://doi.org/10.7759/cureus.72066> PMID: 39569247 PMCID: PMC11578679
- Avnisha, Ilanchezhian, Garg P, Malhotra S, Bhatia N, Kaur A, et al. Prevalence of needle stick injuries among health care workers in a tertiary care hospital in Delhi, India. *Indian J Microbiol Res*. 2025;12(1):125-129. DOI: <https://doi.org/10.18231/j.ijmr.2025.018>
- Sushmitha T, Kumar N, Isaac G, Koteswarammach, Monica G, Kondapaneni S. Study of Occupational Hazards Among Healthcare Workers in A Tertiary Care Hospital, Telangana, India. *Eur J Cardiovasc Med*. 2024;14(1):1185-1193.
- Centers for Disease Control and Prevention. Workbook for Designing, Implementing, and Evaluating a Sharps Injury Prevention Program [Internet]. Atlanta (GA): CDC; 2008 [cited 2026 Jan 12]. Available from: <https://www.cdc.gov/infection-control/media/pdfs/Sharps-Safety-Workbook-2008-P.pdf>
- Prüss-Üstün A, Rapiti E, Hutin Y. Sharps injuries: global burden of disease from sharps injuries to health-care workers [Internet]. Geneva: World Health Organization; 2003 [cited 2026 Jan 26]. Available from: <https://iris.who.int/server/api/core/bitstreams/bd32c4e2-1774-4968-9858-dd8b15a6ea1a/content>
- International Safety Center. EPINet Report for Needlestick and Sharp Object Injuries, Reporting period: January 01, 2024 to December 31, 2024 [Internet]. Washington (DC): Association of Occupational and Environmental Clinics (AOEC); 2025 [cited 2026 Jan 26]. Available from: <https://aoec.org/wp-content/uploads/Official-2024-NeedleSummary-06-25.pdf>
- Chakravarthy M, Singh S, Arora A, Sengupta S, Munshi N, Rangaswamy S, et al. Epidemiology of sharp injuries - Prospective EPINet data from five tertiary care hospitals in India - Data for 144 cumulated months, 1.5 million inpatient days. *Clinical Epidemiology and Global Health*. 2014;2(3):121-126. DOI: <https://doi.org/10.1016/j.cegh.2013.09.002>
- Sastry AS, Rajshekhar D, Bhat P. Needlestick, sharp, and splash injuries in a tertiary care government hospital of South India. *J Curr Res Sci Med*. 2017;3(2):94-101.9.
- Motaarefi H, Mahmoudi H, Mohammadi E, Hasanpour-Dehkordi A. Factors Associated with Needlestick Injuries in Health Care Occupations: A Systematic Review. *J Clin Diagn Res*. 2016 Aug;10(8):IE01-IE04. DOI: <https://doi.org/10.7860/JCDR/2016/17973.8221> PMid:27656466 PMCID:PMC5028444
- Gholami A, Borji A, Lotfabadi P, Asghari A. Risk factors of needle stick and sharps injuries among healthcare workers. *Int J Hospital Res*. 2013;2(1):31-38.
- Matsubara C, Sakisaka K, Sychareun V, Phensavanh A, Ali M. Anxiety and perceived psychological impact associated with needle stick and sharp device injury among tertiary hospital workers, Vientiane, Lao PDR. *Ind Health*. 2020 Aug 7;58(4):388-396. DOI: <https://doi.org/10.2486/indhealth.2019-0088> PMid:32074514 PMCID:PMC7417503
- Centers for Disease Control and Prevention (CDC). The National Surveillance System for Healthcare Workers (NaSH): Summary Report for Blood and Body Fluid Exposure Data Collected from Participating Healthcare Facilities (June 1995 through December 2007) [Internet]. Atlanta (GA): U.S. Department of Health and Human Services, CDC; 2011 [cited 2026 Jan 26]. Available from: <https://www.cdc.gov/nhsn/pdfs/datastat/nash-report-6-2011.pdf>
- Shenoy S, Vangara H, Rego JE, Saldanha I, Lobo G, Kassim S, et al. Trends of needle stick injuries among health care workers in a tertiary care center in South India. *Clinical Epidemiology and Global Health*. 2025;31:101903. DOI: <https://doi.org/10.1016/j.cegh.2024.101903>
- Jayaprada R, Vineela K, Ramakrishna N, Yamini S, Bhargav KM. A study of needle -stick injury incidences amongst healthcare workers and its root cause analysis in a tertiary careteaching hospital. *J Clin Sci Res*.2022;11(2):72-76. DOI: https://doi.org/10.4103/jcsr.jcsr_40_21
- Choudhury DD, Sonawane JP, Chowdhary A. The study of prevalence of needle stick and sharp injuries among healthcare workers in tertiary care hospital, Navi Mumbai. *IP Int J Med Microbiol Trop Dis* 2021;7(4):227-231. DOI: <https://doi.org/10.18231/j.ijmmt.2021.047>
- Raj A, Haider A, Agraja J, Anjali A, Andrew A, Aparama S, et al. Prevalence of Needle Stick Injuries Among Healthcare Workers at a Tertiary Care Centre in Kochi, India. *Cureus*. 2024;16(10):e72077. DOI: <https://doi.org/10.7759/cureus.72077> PMID: 39575048; PMCID: PMC11579213
- Naidu RT, Toal P, Mishra SC, Nair B, Shejul YK. Incidence of needlestick injury among healthcare workers in western India. *Indian J Med Res*. 2023;158(5-6):552-558. DOI: https://doi.org/10.4103/ijmr.ijmr_892_23 PMid:38265947 PMCID:PMC10878481
- Khursheed M, Khan F, Hashmi ZA, Khan HM, Sultan A. A study on the prevalence of needle stick injuries among health care workers of a tertiary care hospital in Aligarh. *J Patient Saf Infect Control*. 2021;9(3):87-90. DOI: https://doi.org/10.4103/jpsic.jpsic_14_22
- Sriram S. Study of needle stick injuries among healthcare providers: Evidence from a teaching hospital in India. *J Family Med Prim Care*. 2019;8(2):599-603. DOI: https://doi.org/10.4103/jfmpc.jfmpc_454_18 PMid:30984680 PMCID:PMC6436289
- Goel V, Kumar D, Lingaiah R, Singh S. Occurrence of Needlestick and Injuries among Health-care Workers of a Tertiary Care Teaching Hospital in North India. *J Lab Physicians*. 2017 Jan-Mar;9(1):20-25. DOI: <https://doi.org/10.4103/0974-2727.187917> PMid:28042212 PMCID:PMC5015493