

Incidence and Response to needle stick and sharp injuries in Apollo hospital, Kolkata



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INTRODUCTION

As per CDC, a needle stick injury (NSI) is defined as the penetration of the skin by a needle or other sharp object, which has been in contact with blood, tissue or other body fluids before the exposure.

These injuries can occur while using, disassembling, or disposing of needles. If not disposed of correctly, needles can be found in garbage, bed side and linen and injure workers who encounter them unknowingly.



There are more than 20 blood borne diseases, but those of primary significance to health care workers are hepatitis due to either the hepatitis B virus or hepatitis C virus and acquired immune deficiency syndrome (AIDS) due to human immunodeficiency virus (HIV).

The risk of transmission of blood borne viruses ranges from 0.3% for human immunodeficiency virus (HIV), 2% for Hepatitis C Virus (HCV) and 6-30% for Hepatitis B Virus (HBV).

REVIEW OF LITERATURE

Author	Location	Sample size	Sampling technique	Salient features
Dharmendra Gupta ¹ , Shashi Saxena ¹ , Vijender Kumar Agrawal ² , Meenakshi Singh ¹ , Saurabh Mishra ¹ , 2019	Uttar Pradesh, India	50 nursing staff and 50 nursing students	Purposive sampling	Study was done to assess the knowledge, practice of NSIs, prevalence of NSIs among nurses in a private tertiary care hospital and recommend the preventive measures to reduce the injuries. The incidence of needle stick injuries per year was 69%. Accidental injury was most common among nurses working in wards. Sharps contaminated with infectious fluids were reason for the injuries in the study group of nurses. Prevention is found to be the most effective way to protect them from injuries. Improper handling of sharps and needles after use were most common causes of injuries.

Kifah Habib Alfulayw1, Sultan T. Al-Otaibi and Hatem A. Alqahtani, 2021	Damman city, Saudi Arabia	NA	NA	This was retrospective study done during period from April 2016 to May 2018 with healthcare workers at a governmental hospital. Incidence of NSIs was found to be 8.4% among participants over 26 months. The most affected staff were nurses during disposal of needles. Physicians were injured mostly due to surgical devices. Hepatitis B vaccination was not complete among all participants. Study suggested that preventive measure should be adopted, and all healthcare workers should be completely vaccinated against Hepatitis B.
Abdullah Alsabaani , Norah Saeed S. Alqahtani , Sarah Saeed S. Alqahtani , Jawaher Hussain J. Al-Lugbi , Malak Ali Saleh Asiri , Shyamaa Elsayed Elaraby Salem , Ali Ahmed Alasmari , Syed Esam Mahmood and Mesheil Alalyani , 2022	Abha city, Saudi Arabia	Total 786 Healthcare workers which included 231 physicians and 555 nurses	Stratified multistage cluster sampling technique	Data was collected using a questionnaire. The rate of needle stick injury in healthcare workers in past 12 months was 11.57%. Nurses, females, and Saudis were most injured. About 52% injuries were not reported. Majority of participants were aware of needle stick injury and 81% were aware about the protocol to be followed post injury. 61.2% knew that the recapping of the needle should not be done. 89% of participants were fully vaccinated for hepatitis B. 8.7% bent the needles and 27% recapped the needles before disposal.

Hanny Handiyani , L. Meily Kurniawidjaja , Dewi Irawaty , Rita Damayanti , 2018	NA	NA	NA	Study suggested that needle stick injury was high in low- and middle-income countries (91.85% in India). Main reasons for injury were negligence while opening ampules and IV cannulation. Education, safe needle use, effective communication and training were found to be important strategies to prevent needle stick injuries.
N. Jaggi, P. Nirwan and M. Chakraborty, 2020	India	NA	NA	This was prospective Observational Study done during 2015-2018 in a tertiary Care Hospital. Study included all staff who were injured by needle stick injury. RPI (robust process improvement) toolkit was implemented during 2015-2018 which focused on safety engineered devices, root cause analysis, management after injury and immunization for Hepatitis B. The most risked staff were nurses in hospital. It was seen that there was 21.35% reduction in injuries after implementation of RPI toolkit.

Jayaprada, Rangineni,; Vineela, K.; Ramakrishna, N.; Yamini, S.; Bhargav, K. M., 2022	India	NA	NA	Data was collected from HIPC office in hospital and a retrospective study was done during October 2018 to October 2019. Results showed 47 injuries from October 2018 to October 2019. Main reason was found to be recapping of needles and injuries were high in ICU (intensive care unit). Seroconversion was not seen in any of the cases while follow-up. To reduce incidence, training sessions were held for the staff.
Madhavan, Anitha,; Asokan, Anjana; Vasudevan, Anu2; Maniyappan, Janeesh; Veena, K, 2019	India	100 staff nurses and 100 house surgeons.	Random sampling	Data was collected using a questionnaire and a cross-sectional study was done in hospital. Needle stick injury was high in interns (75.6%) than in nurses (24.4%). Interns were mostly injured while blood withdrawal and recapping of needles. Study showed that nurses had better knowledge regarding NSI than interns.

Research Question

- ▶ What is the incidence rate and most common causes of needle stick injuries in hospital, and who are the most injured staff ?

Objectives

- ▶ To analyse incidence and causes of needle stick and sharp injuries.
- ▶ To analyse department wise occurrence of needle stick injuries.
- ▶ To analyse compliance of post needle stick injury protocol.
- ▶ To assess knowledge of staff most injured for needle stick injury.

METHODOLOGY



Study design: Descriptive cross- sectional study



Setting: The study was conducted in Apollo Multi-speciality Hospitals, Kolkata. It is a tertiary care hospital, established in 2003 having a capacity of 700 beds. It has 50 specialities and 33 centres of excellence.



Study population: It included all healthcare workers injured from January 2022 to March 2023 and, nursing and housekeeping staff selected purposely for knowledge assessment.



Inclusion criteria: All healthcare workers who have reported needle stick injury through hospital incident reporting system. Nursing and housekeeping staff who were willing to participate in the study.



Exclusion criteria: Cases of needle stick injuries which were not reported. Nursing and housekeeping staff who were not interested to participate in the study.

Study tools: Primary data collected through questionnaire, and informal conversation based on the results of secondary data which was collected through hospital incident reporting system. Data analysis was done using Ms Excel.

Duration of study: The study was conducted from April 2023 to May 2023.

Sample size: All healthcare workers injured during January 2022- March 2023 and 50 nursing and housekeeping staff for knowledge assessment.

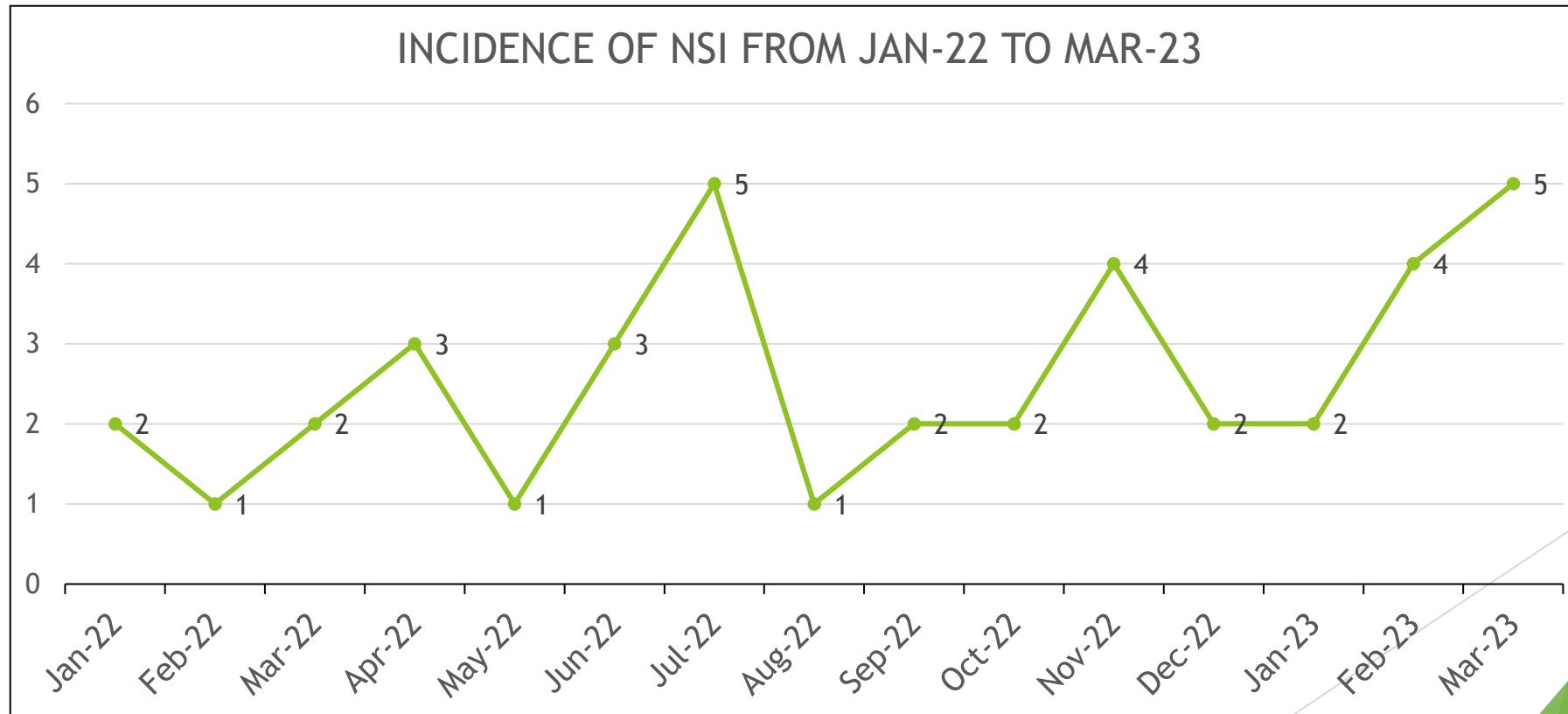
Sampling technique: Purposive sampling for knowledge assessment.

Data collection procedure: Primary data was collected through questionnaires on knowledge regarding needle stick injuries and informal conversation with staff.

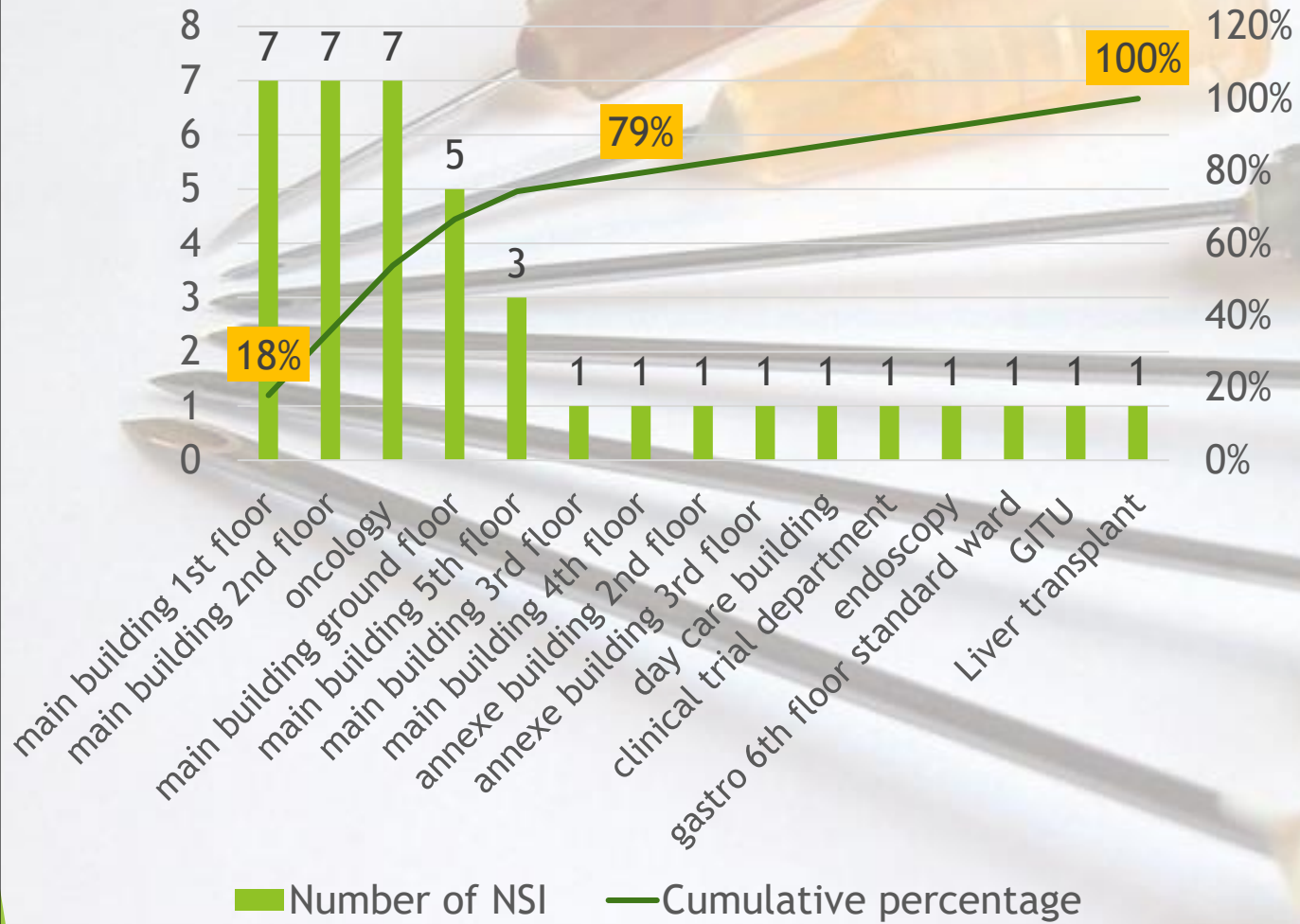
RESULTS

TREND ANALYSIS OF NSI

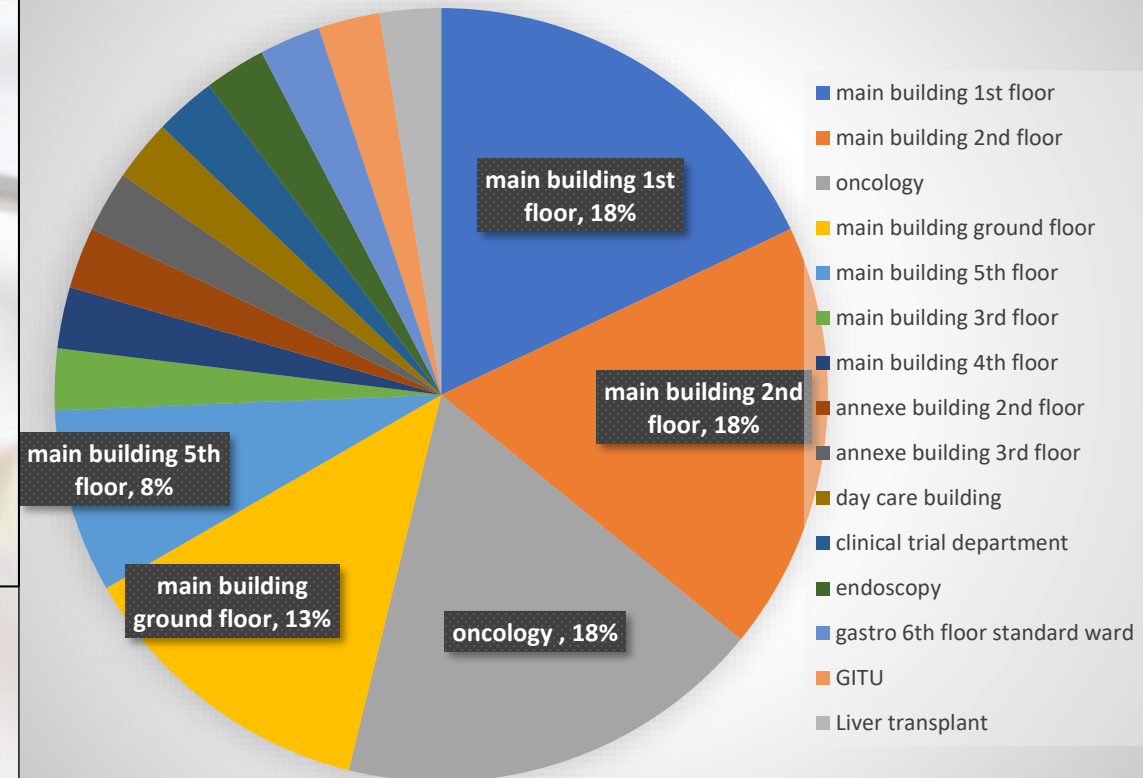
Total number of needle stick injuries from January 2022 till March 2023 were 39. There is an increasing trend in needle stick injuries. In first quarter of 2022, count of NSI was 5 whereas in 2023 count of NSI in first quarter is 11.



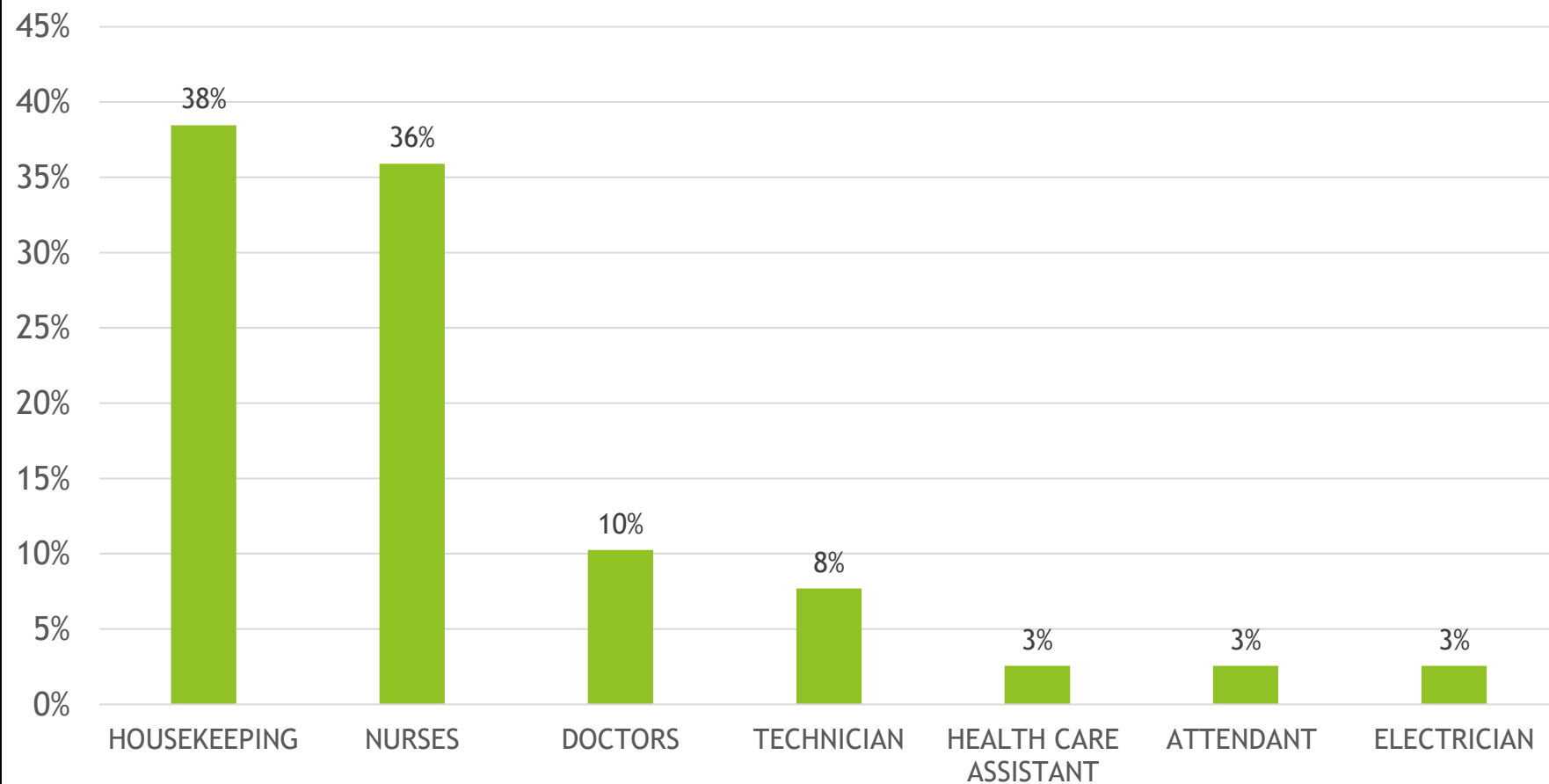
Location wise pareto analysis of NSI



Location wise incidence of NSI



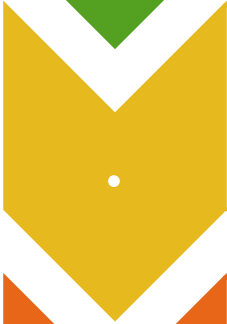
CATEGORY OF STAFF INJURED



Policies to prevent needle stick injuries followed by hospital



- Wear gloves when contamination of hands with body substances anticipated.
- Take precautions during procedures to prevent injuries and when cleaning or during disposal of needles and sharp instruments.

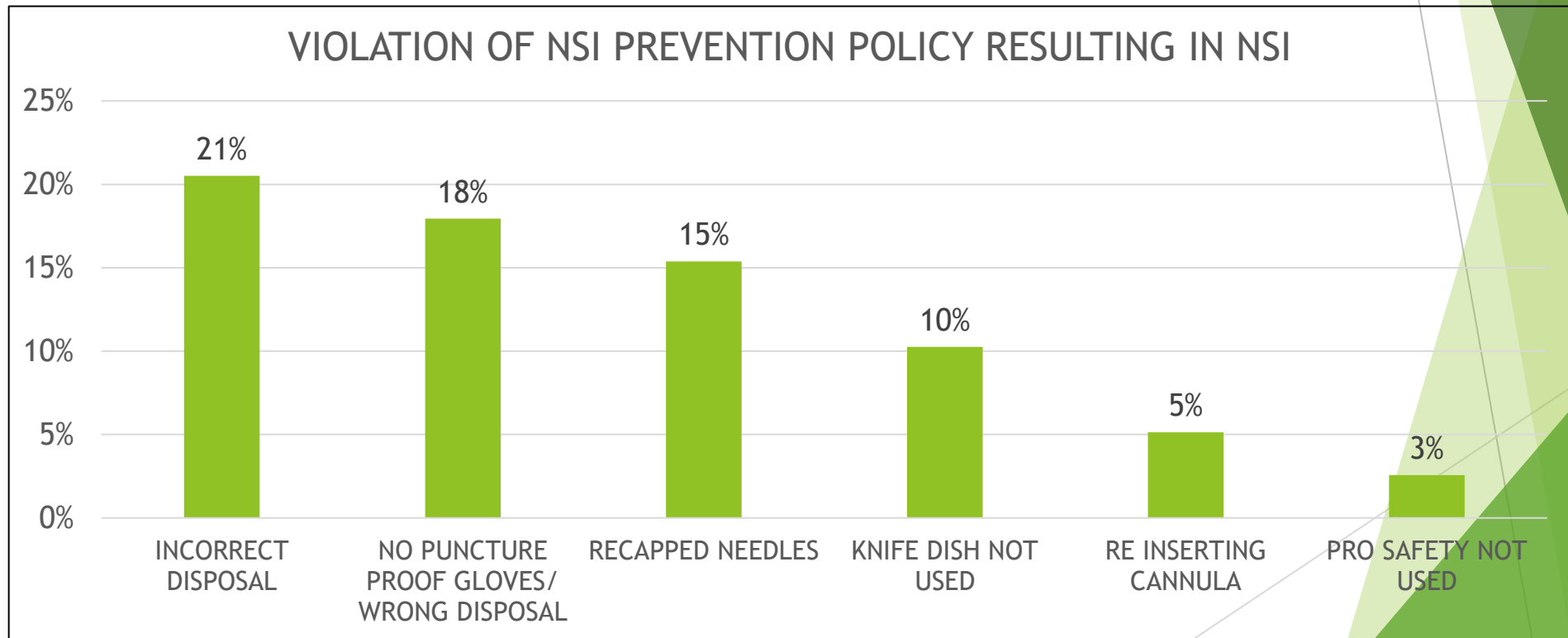


- Needles should not be recapped, bent or broken by hand.
- After use needles and sharps should be disposed in a puncture resistant sharp container.

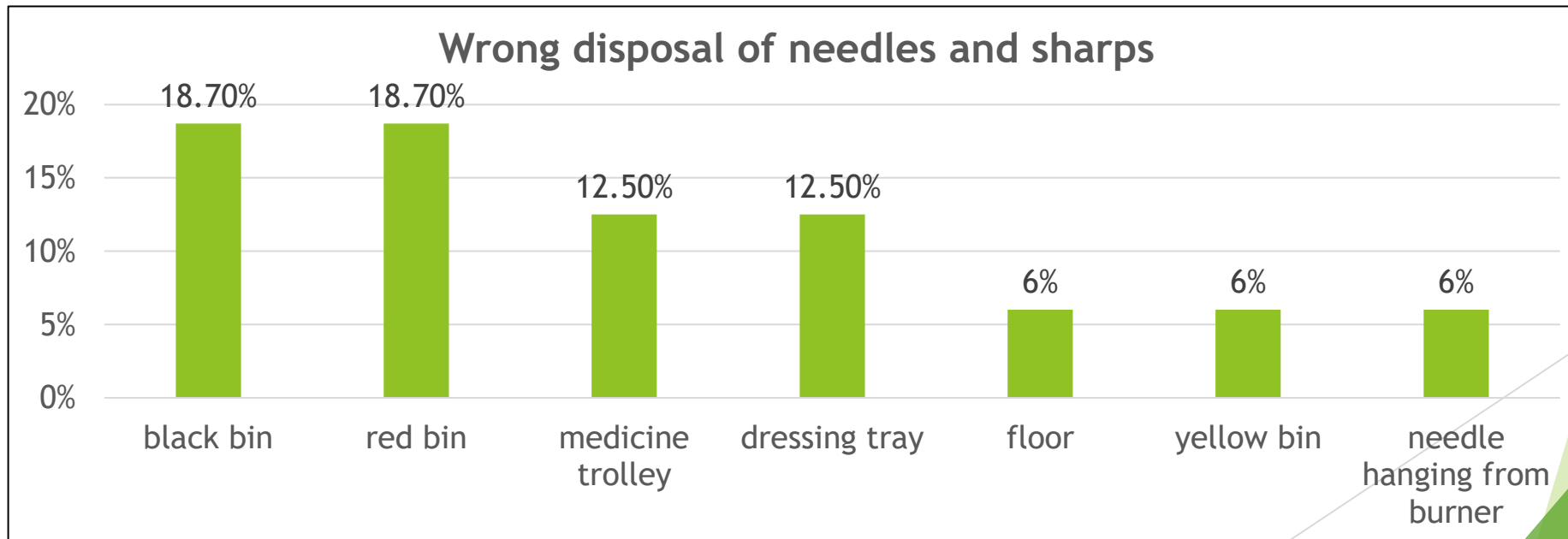
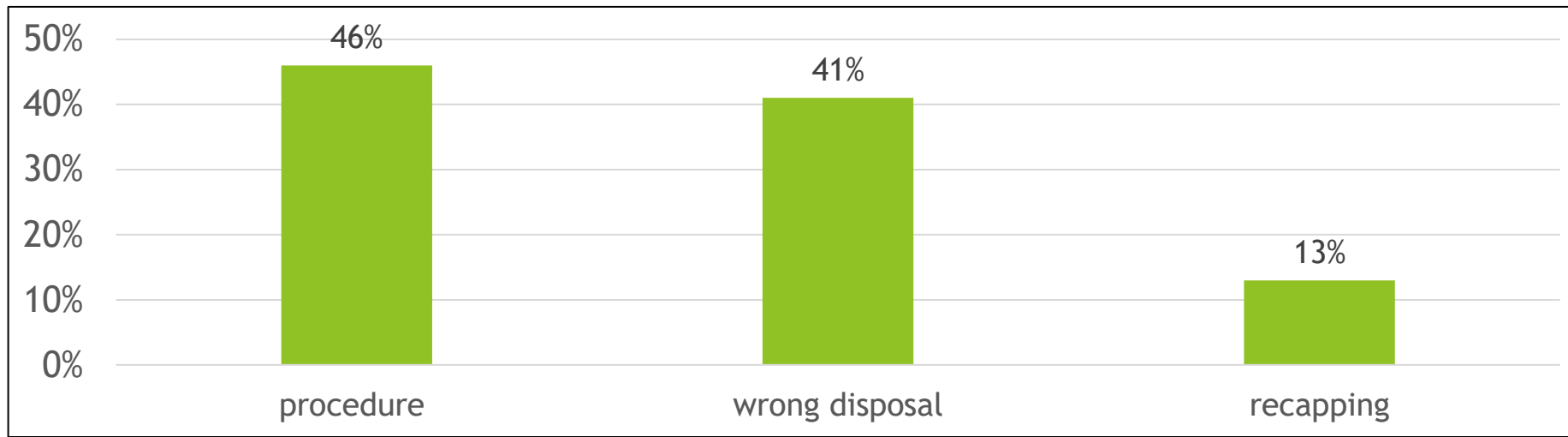


- Heavy duty gloves should be worn when dealing with biomedical waste.
- Vaccinate all healthcare workers against hepatitis B.

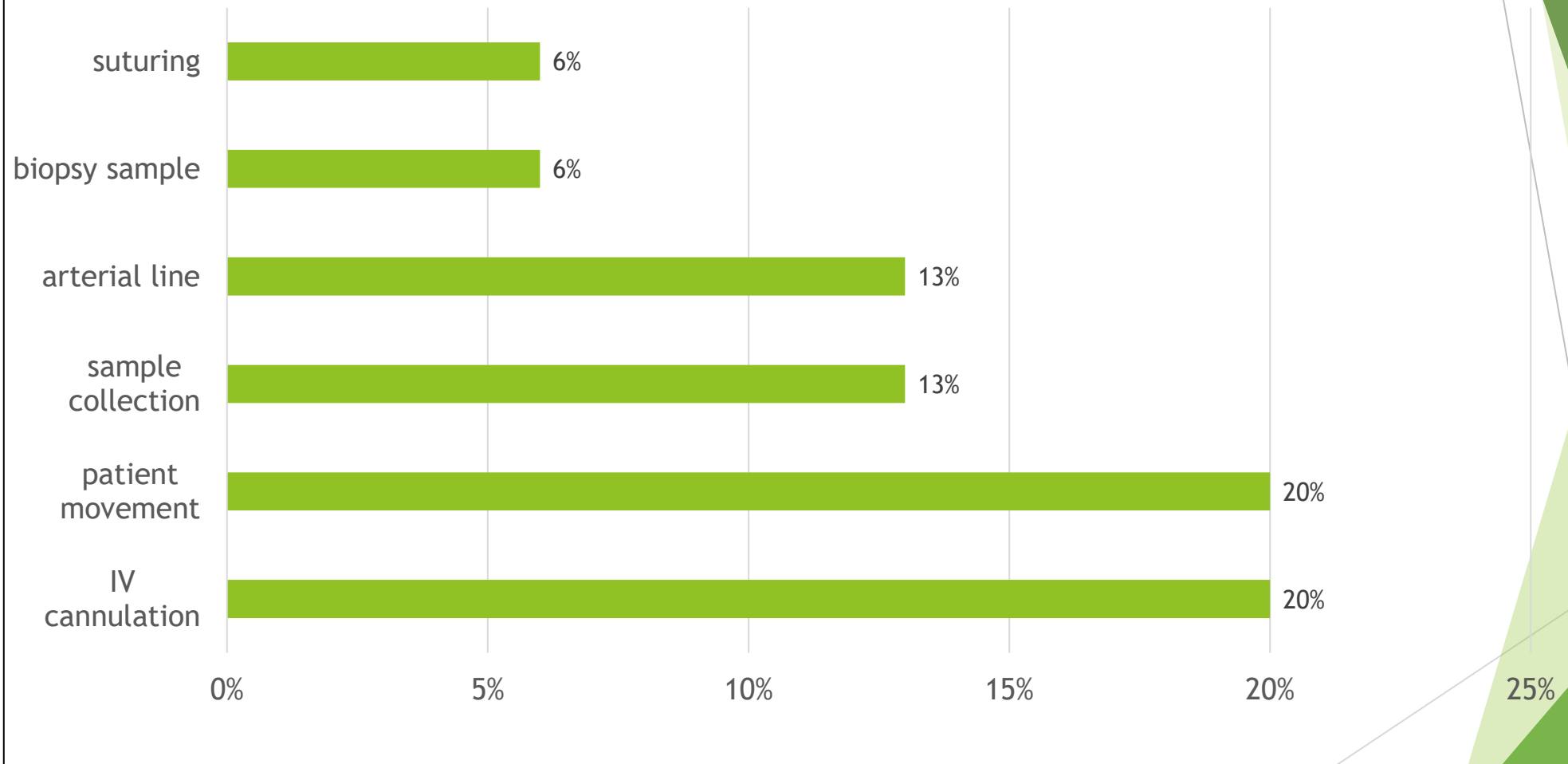
- 72% of NSI occurred due to violation of NSI prevention policy and rest 28% occurred accidentally or because of patient movement.
- Housekeeping staff was mostly injured during cleaning of waste because of wrong disposal of sharps by Doctors and nurses.
- Nurses were mostly injured because of recapping of needles and holding used needles in hand instead of using knife dish.



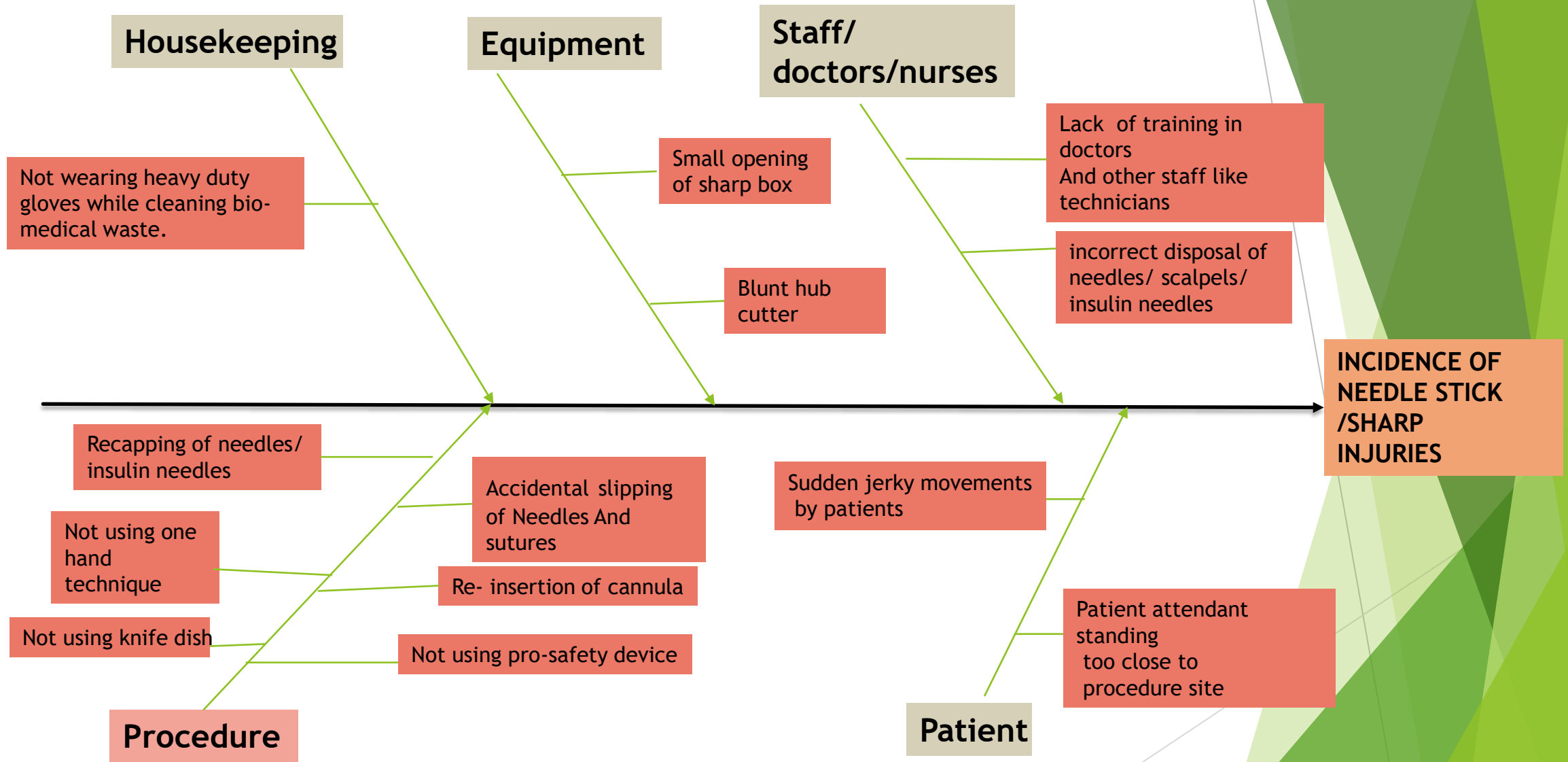
Maximum number of needle stick injuries have occurred during procedure (46%) like sample collection, cannulation etc and because of wrong disposal of needles and sharps (41%).



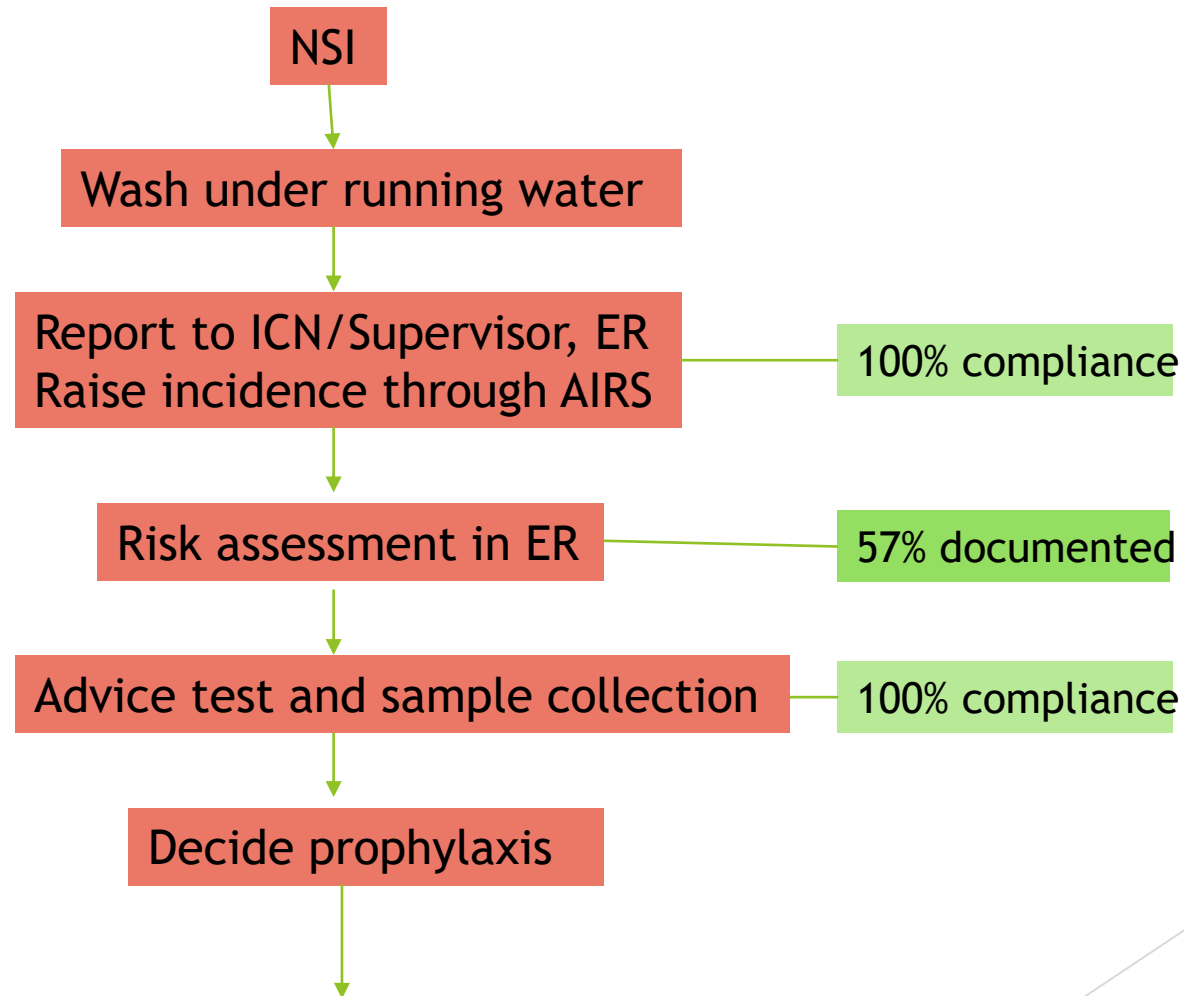
Incidence of NSI during procedure

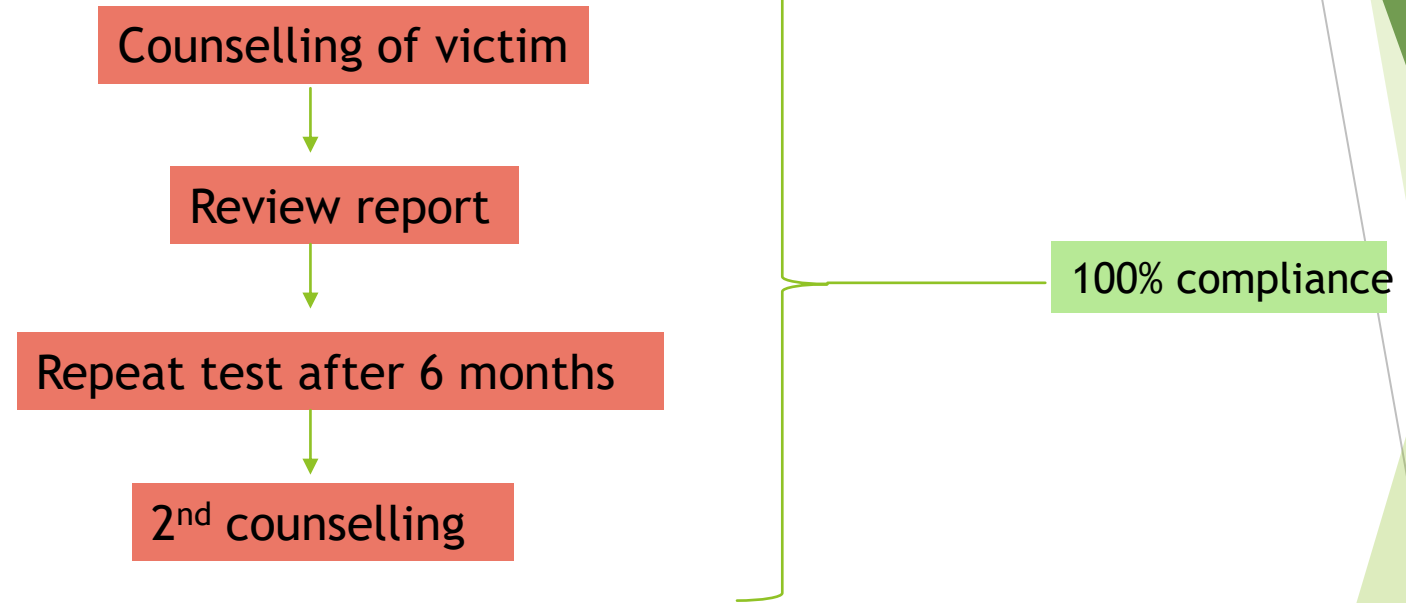


FISH BONE ANALYSIS



Process flow post needle stick injury



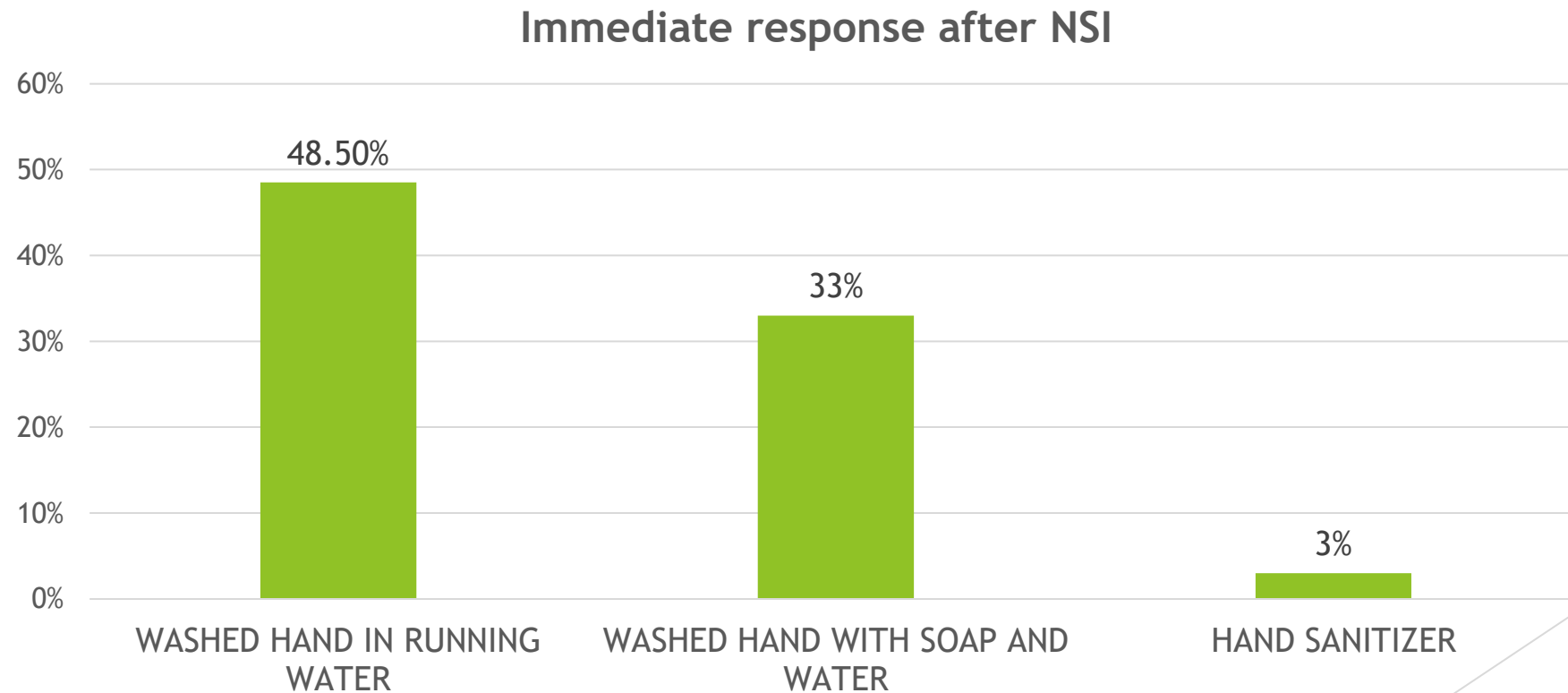




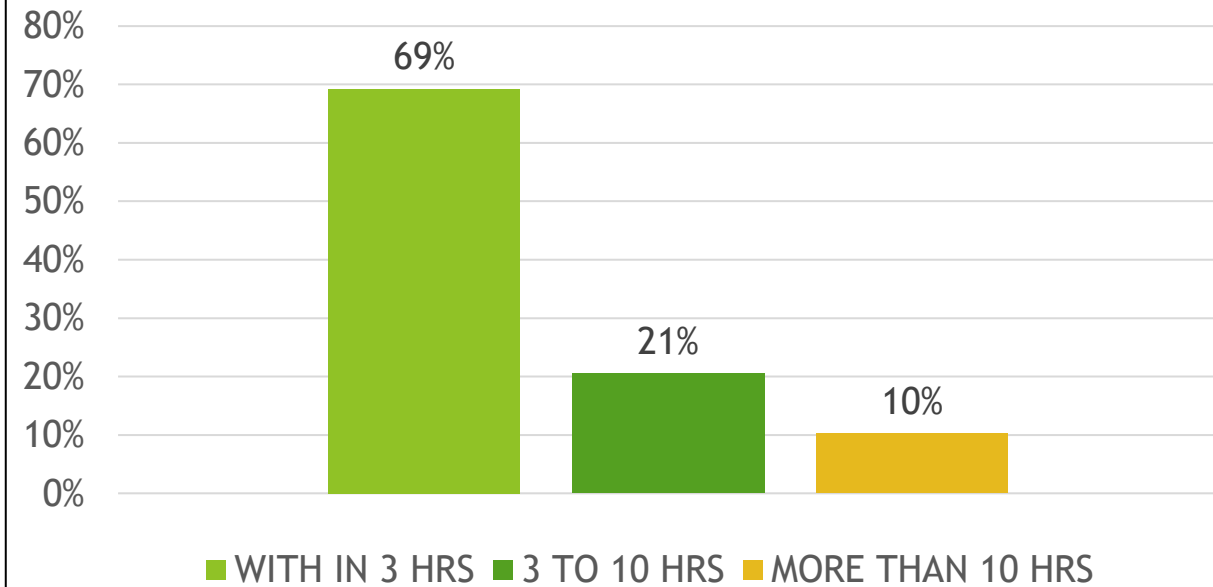
Tests to be done immediately post injury-

- **For HIV** – test is done at day of exposure (base line test), then at 6 weeks, after 3 months and at 6 months. If however, patient was under PEP, test to be done at 1 year too. All tests done are ERS (ELISA rapid simple tests) after proper pre-test and post-test counselling.
- **For Hepatitis B** – base line test is done. The serological test of the source patient is done. The serological test for both hepatitis B surface antigen and anti-Hepatitis B antibody titre are highly recommended on the day of exposure. An adequate antibody level is greater than 10 Mili International Units per ml (10 IU/L). Seroconversion can be detected by testing for Hepatitis B surface antigen at 6 months.
- **For Hepatitis C** – baseline test is done. The seroconversion can be detected by testing at 6 months.

48.5% washed hands under running water whereas 33% washed with soap and water after NSI.

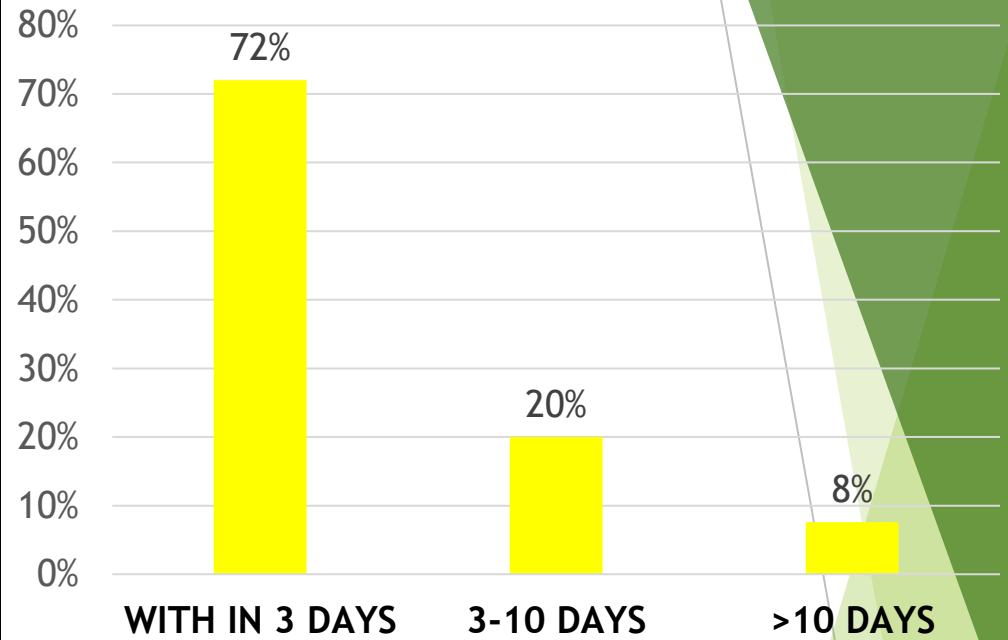


SAMPLE COLLECTION TAT (FROM TIME OF INJURY TO TIME OF COLLECTION)



Out of all the 39 staff who were exposed to NSI, 69% had got sample collection done within 3 hours, 21% Got it done within 3-10 hours and 10% had got it done after more than 10 hours.

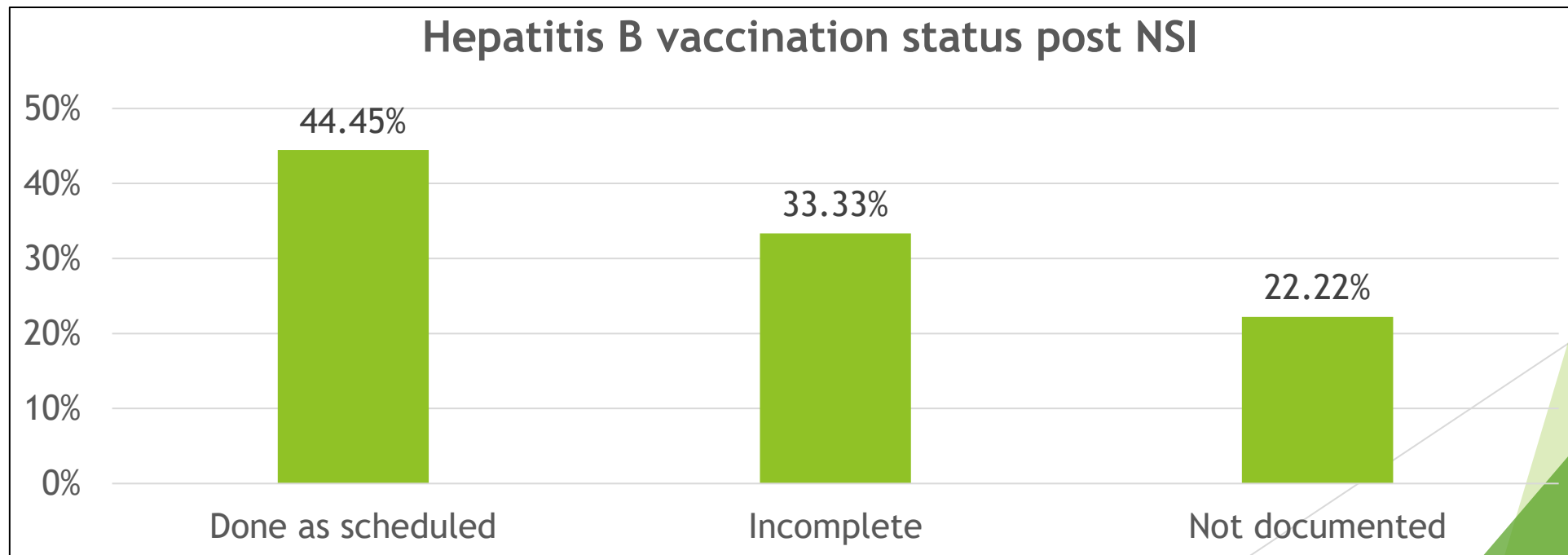
POST NSI COUNSELLING



72% of all who were exposed to NSI had got counselling within 3 days, 20% of them had got counselling between 3-10 days and 8% had got counselling after 10 days of exposure.

Post exposure prophylaxis-

- Approximately 25% of those who were injured were prescribed injection tetanus, which is not required according to the protocol. Patient serology report was not available in 13 cases, out of which only 1 victim started with anti retroviral therapy.
- In all cases where anti HBs titre was below protective level (10mIU/ml), hepatitis B vaccine booster or complete vaccination was advised.
- Hepatitis B vaccination/ booster dose was advised in 18 out of 39 cases.
- Only 8 of all cases (44.5%) took vaccination dose as scheduled.
- In rest of the cases, dose is either incomplete or not documented.



Knowledge assessment of nurses and housekeeping staff regarding NSI

25 nurses and 25 housekeeping staff participated in the study which assessed their knowledge regarding needle stick injuries, Safe handling of needles, waste management and protocols to be followed after needle stick injury. Nurses and Housekeeping staff were also asked about their last training on NSI and Hepatitis B vaccination status.

Hepatitis B vaccination	Complete	Incomplete	Can't recall
Nurses	84%	8%	8%
Housekeeping	46%	-	54%

Nurses

Questions	Yes	No
Ever had needle stick injury	4%	96%
Knowledge about safe handling of needles	100%	-
Knowledge about one hand scoop technique	72%	38%
Awareness regarding diseases which can be transmitted by NSI	80%	20%
Knowledge regarding waste management	100%	-
Knowledge about protocol to be followed after NSI	100%	-

Last training on NSI	Within 3 months	More than 3 months	Can't recall
Nurses	24%	32%	44%
Housekeeping	-	-	100%

Housekeeping

Questions	Yes	No
Knowledge about protective barrier while handling waste	100%	-
Knowledge about waste management	100%	-
Knowledge about protocol to follow after NSI	87%	13%
Awareness about disease (HIV, HCV, HBV) which can be transmitted through NSI	-	100%

DISCUSSION



This study will help hospital identify root causes of needle stick injury and apply interventions which can reduce the incidence of NSI.



Other studies have found that Improper handling of sharps and needles after use were most common causes of injuries. Other reasons for injury were negligence while opening ampules and IV cannulation, recapping of needles, which is same as this study. Nurses are found to be most affected staff. In this study housekeeping is most affected followed by nurses.



Prevention is found to be the most effective way to protect them from injury and Needle stick injuries can be minimized by following prevention strategies like training of health care workers, adopting safety measures while performing procedures and safe disposal of sharp instruments.

CONCLUSION



Needle stick injuries are considered as risk factor for transmission of blood borne pathogens.



Total of 39 cases of needle stick injury were reported from January 2022 to March 2023.



38% of all injuries were reported among housekeeping staff, 36% were reported among nurses and rest 26% were reported among doctors, healthcare assistant and technicians. 72% of all injuries occurred due to violation of NSI prevention policy and rest 28% occurred accidentally and because of sudden movement by patients. . Avoidable practices like recapping and wrong disposal of needles are largely contributing to the injuries

RECOMMENDATIONS

Control impact matrix

This is a prioritization tool that is used after causes are identified for a problem. Here the problem is Needle stick injury. Prioritization is done based on causes that are in our control and the impact it has on the problem. It will be used to prioritize our solutions for prevention of needle stick injury.

Control

H	Wrong disposal of needles/ not wearing puncture proof gloves	Recapping of needles	Not using safety devices
L	Not using safety techniques	Accidental slipping of needles and sutures	Sudden jerky movement by patients

H

M

L

Impact



Ensuring correct disposal of needles



Housekeeping staff should wear PPE



Encouraging use of safety engineered devices



Periodic training of doctors/ nurses / housekeeping.



Correct location of sharp containers.



Patient education



Root cause analysis of each case.



Risk assessment and post exposure prophylaxis



Posters for awareness on NSI in every department.



Thank you