

## An Interventional Study on Knowledge and Practice of Injection Safety and Appropriate Biomedical Waste Disposal among Students of One of the Nursing Colleges, Ahmedabad

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### Abstract

**Background:** Injection is an important drug delivery system especially for severely ill patient, acute emergency condition and immunization. A safe injection is that, does not harm the recipient (patient), does not expose the provider (Health Workers) to any avoidable risk and does not result in waste that is dangerous for the community. Nursing personnel are an important risk group for occupational exposure to needle stick injuries as they are directly involved in the patient care activities like giving injections, starting IV line, taking blood sample etc. **Objectives:** To study the knowledge & impact of educational intervention of injection safety, post exposure prophylaxis following needle stick injury and segregation of bio medical waste among study participants. **Methods:** An Interventional study was carried out among 2<sup>nd</sup>, 3<sup>rd</sup> and final year B.Sc. & 2<sup>nd</sup>, 3<sup>rd</sup> year GNM nursing students of one of the Nursing Colleges in Ahmedabad. **Results:** Out of total, 233 (89.6%) were females and 27(10.4%) were males. Overall comparison between pre-test and post-test score regarding various factor of knowledge and practice of safe injection was statistically significant. Out of total, 36(13.8%) study participants were suffered from needle stick injury due to quickness or not wearing gloves. Only 11.1% study participants were not taking post exposure prophylaxis because of lack of knowledge and dread about long time medication course. **Conclusion:** Practice of injection safety standards was inappropriate except for routine use of hand gloves. The level of knowledge was poor especially in Post-Exposure Prophylaxis and Needle-prick injury accident management (NPIAM) protocol and register for post-exposure prophylaxis. Post-intervention assessment showed significant improvement in Knowledge for injection safety, PEP/NPIAM and category wise segregation of Bio-medical waste. Periodic reinforcement of the Nursing students by MBBS level educator with IEC and hands on training intervention will significantly protect them from NSIs and prevent the spread of blood borne pathogens.

**Keywords:** Bio-medical waste, Knowledge, Practice, Safe injection.

### Introduction:

Injection is an important drug delivery system especially for severely ill patient, acute emergency condition and immunization. <sup>(1)</sup> A safe injection is that, does not harm the recipient (patient), does not expose the provider (Health Workers) to any avoidable risk and does not result in waste that is dangerous for the

community.<sup>(2)</sup> Therefore, safe injection practice involves administration of rational injection by a well-trained, qualified person using sterile syringe, needle, adopting sterile technique, and disposing the used ones in a puncture-proof container. The Global burden of disease, due to unsafe injection use, estimated by the World Health Organization (WHO) was 340,000 Human Immunodeficiency Virus (HIV) infections, 15 million Hepatitis B Virus (HBV) infections, 1 million Hepatitis C Virus (HCV) infections, 3 million bacterial infections and 850,000 injection site infections.<sup>(3)</sup> Proper disposal of waste that generated after injection is another important issue.

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Waste generated from injection practices should be segregated and disposed by proper disinfection methods (chemical treatment/autoclaving /micro-waving and mutilation /shredding) according to “Biomedical Waste Rules” .<sup>(4)</sup>

Unsafe injections can lead to morbidity and even to death. It may lead to avoidable risks to patients, to health care providers and to the community. Each year, thousands of health care workers are estimated to be at risk for infections like Hepatitis B and C and the human immunodeficiency virus (HIV) due to unnecessary and avoidable accidents from needle stick injuries (NSI) and mucosal exposures. Unsafe injection practices are also prevalent in India. Recently, Epidemiology Network in India has estimated that of the total 3-6 billion injections used each year, 2/3<sup>rd</sup> were unsafe and had the potential to transmit blood-borne infections.<sup>(5)</sup> It has been estimated that unsafe injections lead to 40% cases of hepatitis C, 32% of hepatitis B, and 5% of human immunodeficiency virus (HIV) infections each year. The risks of transmission of infection in an unsafe injection from an infected patient to the HCP following an NSI are: Hepatitis B 3-10%; Hepatitis C- 3%; HIV- 0.3 %.<sup>(6)</sup> Complications such as injection abscesses and nerve damage may also occur following unsafe injections. Unsafe injections are also been responsible for outbreaks of viral hepatitis like the outbreak reported of Hepatitis B in 2009 in Gujarat.<sup>(7)</sup> This was investigated and 40% of all positive cases (n=856) gave history of receiving therapeutic injections in the past 1.5 to 6 months. It is estimated that every year around 13 lac deaths are caused by unsafe injection practices among medical practices.<sup>(8)</sup>

Nursing personnel are an important risk group for occupational exposure to needle stick injuries as they are directly involved in the patient care activities like giving injections, starting IV line, taking blood sample etc. So, present study is carried out to assess knowledge and practice of injection safety, post exposure prophylaxis following needle stick injury and related segregation of bio medical waste after educational intervention among nursing students.

### **Objectives:**

- To assess the knowledge and practice of injection safety among nursing students.
- To estimate the prevalence of needle stick injury and assess the knowledge of post exposure prophylaxis (PEP) among nursing students.
- To assess the knowledge regarding segregation of waste generated during injection practices among study participants.
- To assess the impact of educational intervention on knowledge and practice regarding injection safety, post exposure prophylaxis following needle stick injury and segregation of bio medical waste among study participants.

### **Methods:**

An Interventional study was carried out during February to July 2021. Study participants were 2<sup>nd</sup>,3<sup>rd</sup> and final year BSc & 2<sup>nd</sup>, 3<sup>rd</sup> year GNM nursing students of one of the nursing colleges at Ahmedabad.

Sample size: In selected Nursing College, every year 60 students of B.Sc. and 40 students of GNM course get admission. All students of 2<sup>nd</sup>,3<sup>rd</sup>, final year B.Sc. and 2<sup>nd</sup>, 3<sup>rd</sup> year GNM of selected nursing college were included in the study. Total 260 study participants had participated in the study

Exclusion Criteria:

- Study subjects who were absent on the day of data collection.
- First year students of B.Sc. and GNM nursing course as they are not much exposed to clinical posting so, they were excluded.

### **Data collection and Analysis:**

A written informed consent was taken from all study participants prior to the study. Data were collected by using predesigned, semi structured questionnaires after taking permission from Institutional Ethical Committee and Principle of selected nursing college. Questionnaires were filled up by study participants. It

included questions regarding safe injection practices, needle stick injury, PEP and biomedical waste management. Each of the 260 participants were subjected to test which was considered as a pretest results. Following pre-test, a session was conducted using two methods comprising of power point presentation and videos regarding safe injection practices, needle stick injury, post exposure prophylaxis and appropriate biomedical waste disposal methods. After a training intervention, the same participants were subjected again to the same questionnaire as a part of posttest survey.

Total 5 sessions (one each for 2nd, 3rd and 4th year

BSC and 2<sup>nd</sup> and 3<sup>rd</sup> year GNM)) were conducted. Comparison of pre-test and post-test score of safe injection practices, needle stick injury, post exposure prophylaxis and appropriate biomedical waste disposal methods component to assess the knowledge and practice aspects. Pre and post test data were entered in M S Excel and analyzed using SPSS trial version.

### Results:

Mean age of study participants was 19.7±1.7 completed years. Out of 260, 233(89.6%) were females and 27(10.4%) were males. Total, 69.3%

**Table 1: Comparison between pre-test and post-test score of various factors regarding knowledge of safe injection. (n=260)**

Variable	Pre-test score (Mean ± SD)	Post-test score (Mean ± SD)	Paired t-test (P-value)
<b>Practice</b>			
Safe injection	3.54 ± 2.04	6.78 ± 1.86	19.78 (0.00)
Needle stick injury	1.23 ± 0.52	2.09 ± 0.71	15.74 (0.04)
Post exposure prophylaxis	0.7 ± 0.55	1.58 ± 0.49	19.36 (0.001)
Bio-Medical waste	3.76 ± 2.2	7.85 ± 1.9	23.83 (0.002)

**Table 2: Comparison between pre-test and post-test score of various factors regarding practice of safe injection. (n=260)**

Variable	Pre-test score (Mean ± SD)	Post-test score (Mean ± SD)	Paired t-test (P-value)
<b>Practice</b>			
Safe injection	2.49 ± 1.6	3.25 ± 1.68	5.29 (0.006)
Needle stick injury	1.55 ± 1.04	2.48 ± 1.11	9.61 (0.00)
Post exposure prophylaxis	1.32 ± 0.73	2.38 ± 1.07	13.21 (0.003)
Bio-Medical waste	0.45 ± 0.49	0.95 ± 0.21	15.18 (0.00)

study participants were pursuing B.Sc. Nursing course and rest of other were studying in GNM course. Overall comparison between pre-test and post-test score regarding various components of knowledge was statistically significant. (Table 1)

Among study participants, practice regarding post exposure prophylaxis was statistically found significant than other factors due to intervention through presentation. Most of the participants had improved

their practice after intervention session. (Table 2.)

Overall, pre-test mean score comparison was found statistically significant between B.Sc. and GNM study participants in both knowledge and practice aspects. After intervention through presentation there is improvement in both knowledge and practice regarding injection safety, PEP following needle stick injury and bio-medical waste segregation (Table 3.)

**Table 3: Comparison of Mean score of knowledge and practice between B.Sc. (n=180) and GNM (n=80) courses**

Variable	Pre test score (Mean ± SD)	Z-test (P-value)	Pre test score (Mean ± SD)	Z-test (P-value)
<b>Knowledge</b>				
BSc	9.55 ± 3.58	8.98 (0.0001)	18.46 ± 2.78	1.22 (0.2217)
GNM	5.72 ± 1.96		17.99 ± 3.02	
<b>Practice</b>				
BSc	8.51 ± 2.31	8.58 (0.030)	9.09 ± 2.28	0.24 (0.8040)
GNM	6.02 ± 1.77		9.01 ± 2.64	

**Table 4: Percentages of various factors regarding needle stick injury among study participants (n=260)**

Variable	Frequency (%)
<b>Suffered from needle stick injury</b>	
Yes	36 (13.8)
No	224 (86.2)
<b>Frequency of needle stick injury (n=36)</b>	
Once only	20 (55.5)
More than one time	16 (44.5)
<b>Appropriate Contact after needle stick injury (n=36)</b>	
Yes	26 (72.3)
No	10 (27.7)
<b>Taken Post-exposure Prophylaxis (n=36)</b>	
Yes	32 (88.9)
No	4 (11.1)

Out of total, 36(13.8%) study participants were suffered from needle stick injury due to haste or not wearing gloves. Among 44.5% participants were suffered more than one time and 72.3% were contacted infection control nurse after needle stick injury. Only 4 out of 36 were not taking post exposure prophylaxis because of lack of knowledge and dread about long time medication course. (Table 4)

### Discussion:

Out of total, 69.3% study participants were studying in B.Sc. course and 30.7% were from GNM course. In Priyanka et al study <sup>(9)</sup> 90.4% participants were from GNM course and only 9.3% study participants were from B.Sc. nursing course. In present study, around one third participants while in Acharya et al <sup>(10)</sup> only 22.8% participants were aware about three criteria for safe injection practices in pretest session. After intervention there was improvement in knowledge regarding safe injection. In this study, 92% study participants were aware about auto-disable syringe after intervention posttest session while in Acharya et al <sup>(10)</sup> study almost similar results were found. Out of total, 80.3% study participants had knowledge about post exposure prophylaxis following needle stick injury and almost similar result found in Acharya et al <sup>(10)</sup> study. In Ganesh et al <sup>(11)</sup> study, 86% participants were aware about PEP. In current study, after intervention 98% study participants while in Dumka et al, <sup>(12)</sup> 81% study participants had correct knowledge about biomedical waste management. Among the study participants 97.7% in present study while in Siwan RM et al study <sup>(13)</sup> 87.6% participants had correct knowledge regarding proper disposal of bio-medical waste generated during injection procedure.

### Conclusion:

The level of knowledge was poor especially in Post-Exposure Prophylaxis and Needle-prick injury accident management (NPIAM) protocol and register for post-exposure prophylaxis. Practice of injection safety standards was inappropriate except for routine use of

hand gloves. Post-intervention assessment showed significant improvement in PEP/NPIAM and category wise segregation of Bio-medical waste. The baseline knowledge of Nursing students was good in certain aspects of injection safety namely, diseases transmitted by unsafe injections and their prevention and common routes of giving injections. Their knowledge was satisfactory regarding PEP while it was poor in some other aspects like WHO criteria for safe injections, don'ts after needle stick injury, and biomedical waste management.

### Recommendation:

There was a significantly change in the level of knowledge and practice aspect as the IEC intervention material was effective in improving the Nursing students knowledge regarding safe injection practices, prevention of NSIs, and injection related bio-medical waste management. Periodic reinforcement of the Nursing students by MBBS level educator with hands on training and IEC intervention will significantly protect them from NSIs and prevent the spread of blood borne pathogens.

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