

# Knowledge and Attitude among Dental and Nursing Students about BMW And NSI of NPDCH and Nootan College of Nursing in Gujrat

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## ABSTRACT

**Aim-** To assess the knowledge and attitude of bio-medical waste management and Needle Stick Injuries (NSIs) among dental and nursing students of Narsinhbhaipatel Dental College and Hospital(NPDCH) and Nootan College of Nursing Visnagar Gujarat. **Methodology-**A closed-ended questionnaire was prepared and distributed to the study participants. Written informed consent was obtained, and study procedure was explained to study participants. Total of 15 minutes time was allotted to fill the questionnaire. The anonymity of subjects was maintained. **Results-** 82.6% of dental and 80.5% of nursing students have sufficient knowledge regarding disease spread by BMW. 72.5% of dental students and 87% of nursing students have sufficient knowledge regarding various methods of disinfection used to treat BMW. 84.1% of dental students and 71.4% of nursing students are vaccinated with Hepatitis vaccine. 87% of dental and nursing students are been vaccinated with TT vaccine every 5 years. The majority of dental (95.1%) and nursing(96.1%) students considers knowledge of BMW as important. 88.4% dental students and 94.8% of nursing students think that training for BMW management should be made compulsory which showed the interest and importance of biomedical waste management training among them. **Conclusion-** The requirement of compulsory training of BMW waste management and prevention NSI injuries should be included in the academic curriculum by all the health institutions.

**KEYWORDS:** Biomedical waste management, NSI, Dental and Nursing students, NPDCH and Nootan college of nursing

## INTRODUCTION

Healthcare activities provide important and often critical healthcare services to individuals and communities. They were considered as the front line of defense against epidemics such as AIDS, malaria, and cholera and a key component of any comprehensive development program. In the goal of treating these diseases, there is also the generation of waste which is also called biomedical waste.

According to Biomedical Waste (Management and Handling) Rules, 1998 of India “Any waste which was generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals.”<sup>1</sup>

The National Surveillance System for Healthcare Workers(NaSH) defines a percutaneous injury, as penetration of skin resulting from a needle or other sharp object, which prior to the exposure was in contact with blood, tissue, or other body fluid.<sup>2</sup> Occupational needle-stick injuries are most prevalent within the healthcare sector.<sup>2</sup>

Two most important hazards associated with the

emerging health care facilities and practice that are becoming well known are the needle and sharp stick injuries and hazards of biomedical waste.

In the fulfilling of the aim of reducing health problems, potential risks, and treating sick people, healthcare services inevitably create waste which itself may be hazardous to health.

The Government of India (notification,1998) specified the Hospital Waste Management as a part of hospital hygiene and maintenance activities that involves management of range of activities.<sup>3</sup>

The waste produced in the course of healthcare activities carries a higher risk for infection and injury than any other type of wastes. Incorrect and inappropriate knowledge of management of healthcare waste may have serious health consequences and a significant impact on the environment as well. It was estimated that annually about 0.33 million tonnes of hospital waste was generated in India and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day.<sup>4</sup> Effective management of biomedical waste is both a legal necessity and a social responsibility.

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Needlestick and sharp injuries (NSIs), which were mostly preventable, are also one of the major occupational injuries experienced by Medical professionals/ dentists/ registered nurses (RNs) in hospitals. Major potential problems reported by NSIs are infectious diseases such as hepatitis B, hepatitis C, and HIV, which are transmitted through blood pathogens from contaminated needles or sharp devices.<sup>5</sup>

According to the World Health Organization (WHO), NSIs accounted for about 40% of hepatitis B and C infections and 2.5% of HIV infections in healthcare workers across the world<sup>6</sup>. NSIs are also responsible for financial loss because direct costs are required for laboratory tests, including tests for HIV antibodies, hepatitis B serology, and a baseline test for anti-hepatitis C, as well as any treatment for these conditions<sup>7</sup>. In addition to the potential risk for infectious diseases<sup>7</sup>. In addition there are also the costs associated with post-exposure prophylaxis for RNs along with the economic loss of hospitals brought on by absences from work<sup>8</sup>.

In an extensive review of studies<sup>9</sup>, the occurrence of NSIs was related to three major factors: engineering factors, organizational factors, and behavioral factors. By reviewing the report, two WHO reports addressed risk factors, including the lack of engineering controls to ensure safer needle devices, inadequate hospital staffing, and recapping of needles after use<sup>10, 11</sup>. According to the International Healthcare Worker Safety Center, in the US injecting drugs and drawing venous blood accounted for 23.6% and 11.5% of NSIs, respectively<sup>12</sup>. The US General Accounting Office estimates requirement of safety-engineered needle devices, which could prevent 29% of NSIs in the US<sup>13</sup>.

Studies have also identified organizational characteristics as a risk for NSIs. In magnet hospitals with adequate staffing and an appropriate work environment, the incidence of NSI was apparently lower than that seen in non-magnet hospitals.<sup>14</sup> RNs (registered nurses) who work in hospitals with a poor organizational climate or less adequate resources and nurse leadership<sup>5, 15</sup> had a greater likelihood of needle stick injuries. More recently, RNs in hospitals with the most favorable working environments were found to be about 20–34% less likely to experience NSIs<sup>16</sup>. RNs working on patient care units with less manpower and higher levels of mental exhaustion related to their jobs also had significantly higher likelihoods of NSIs<sup>5, 15</sup>. The association of staffing levels with NSIs among Chinese RNs has also been reported.<sup>17</sup>

Health care facilities to incorporate good HCW management practices in their daily operations and to purchase on-site waste management services from the private sector is one of India's major achievement.<sup>18</sup>

World Health Organization states that 85% of hospital wastes are actually non-hazardous, whereas 10% are infectious, and 5% are noninfectious, but they were included in hazardous wastes. About 15% to 35% of Hospital waste is regulated as infectious waste. This

range was dependent on the total amount of waste generated.<sup>19</sup>

In spite, there is an increased global awareness among health professionals about the hazards and also appropriate management techniques, there is lack of awareness in India is found to be unsatisfactory.

The medical and health services they provide can only involve family planning, nurture child and adult health, prevent disease, cure debilitating illnesses, and alleviate the suffering of the dying. Currently, there is lack in facilities for management of healthcare wastes in small-scale facilities. Training and supplies are minimal. Common practice in urban areas is to dispose of healthcare waste along with the general solid waste or, in peri-urban and rural areas, to bury waste, without treatment, in an unlined pit. There is failure in operating on-site incinerators which is been practiced in some cities small hospitals. Unwanted pharmaceuticals and chemicals may be dumped into the local sanitation outlet, be it a sewage system, septic tank or latrine.

Thus the current study was conducted with an aim to assess the knowledge and attitude of biomedical waste management and NSI injuries among dental as well as nursing students and also to make comparison between the level of knowledge and attitude between dental and nursing students.

## METHODOLOGY

A closed ended questionnaire was prepared and distributed to the study participants. Written informed consent was obtained and study procedure was explained to study participants. Total of 15 minutes time was allotted to fill the questionnaire. Anonymity of subjects was maintained. **Statistical analysis**- chi-square, ANOVA followed by the posthoc test was employed.

## RESULTS

Table 1: Depicts the number of males (28) and females (52) in group A. The mean age in Group A was 21.5. Number of males(11) and females(69) with mean age 19.21 in Group B respectively.

Group	Age(mean/SD)	Male	female	Total
BDS(A)	21.55(1.481)	28	52	80
Nursing (B)	19.21(1.01)	11	69	80

Table 1- Distribution of study subjects based on age and gender

Table-2 shows the details about the awareness pertaining to BMW & colour of the disposal bag used. 68.5% BDS students and 50.11% nursing students have sufficient knowledge about biomedical waste management system. Amongst these knowledge regarding disposing syringes, needles, micro and biotechnological waste and expired and discarded paper exhibits statistical significant relationship.

Table -3 shows Awareness among Dental and Nursing students, towards the spread diseases by BMW. 82.6% of

BDS students and 80.5% of Nursing students have appropriate knowledge regarding disease spread by

Questions	BDS	Nursing	p- value
Human anatomical waste?(Yellow bag)	82.6%	90.6%	0.125
Syringes(Blue bag)	56.5%	44.2%	0.01
Needles(Blue/white)	72.5%	22.1%	>0.001
Dressings(Red/Yellow)	69.6%	64.9%	0.617
Micro and biotechnological waste(Red/yellow)	49.3%	20.8%	0.01
Expired and discard medicines and dental materials(Black)	75.4%	54.5%	0.058
Expired and discard chemical waste(Black)	66.7%	51.9%	0.120
Expired and discarded paper(Black)	75.4%	51.9%	0.020

Table. 2: Awareness about colour of bags used in disposing BMW disposed.

BMW which was statistically insignificant with P value=0.68.

Disease	BDS	Nursing	p-value
HIV	4.3%	9.1%	0.678
Hepatitis-B	7.2%	6.5%	
Hepatitis- C	5.8%	3.9%	
Tuberculosis	0%	0%	
All of the above	82.6%	80.5%	

Table,3: Awareness about diseases spread by BMW

Table -4 Depicts Awareness about various methods of disinfection used to treat BMW among the BDS and Nursing students. Majority of BDS and Nursing students have sufficient knowledge regarding various methods of disinfection used to treat BMW with statistical insignificant relationship.

Method	BDS(%)	Nursing(%)	p-value
Incineration	17.4%	6.5%	0.072
Chemical disinfection	10.1%	6.5%	
Both of above	72.5%	87%	

Table,4: Awareness about various methods of disinfection used to treat BMW

Table-5 depicts the vaccination status amongst dental and nursing students. Maximum of BDS and nursing students were vaccinated with Hepatitis and TT vaccine.

Vaccine	BDS(%)	Nursing(%)	p-value
Hepatitis	Yes- 84.1% No- 15.9%	Yes- 71.4% No- 28.6%	0.051
TT(tetanus)(every 5 years)	Yes- 87.0% No- 13.0%	Yes- 87.0% No- 13.0%	0.592

Table,5: Vaccination

Table 6 depicts Importance of BMW knowledge and training among BDS and nursing students. Both students of BDS (95.1%) and nursing(96.1%) students considers knowledge of BMW is important and emphasize on training for BMW management should be made compulsory.

Table 7 depicts knowledge regarding needle stick and sharp injuries among dental and nursing students. Nursing students have sufficient knowledge regarding universal precaution guidelines(89.6%), safety devices used to prevent NSI(88.3%) and about PEP

regimen(81.8%) which was statistically significant with p-value of >0.001.

knowledge about BMW management is important	Yes- 95.7% NO-4.3%	Yes- 96.1% NO- 3.9%	0.6 06
Training for BMW management should be made compulsory in your curriculum?	Yes- 88.4% NO- 11.6%	Yes- 94.8% NO- 5.2%	0.1 35

Table,6: Importance of BMW knowledge and training among dental and nursing students

Question	BDS	Nursing	p-value
Diseases that can be transmitted by NSIs			0.122
a. Hepatitis b	a. 0.0%	a. 3.9%	
b. Hepatitis c	b. 2.9%	b. 9.1%	
c. HIV/AIDS	c. 5.8%	c. 7.8%	
d. All of the above	d. 91.3%	d. 79.2%	
Consider needle stick and sharp injury?			0.450
Injury while using hand instruments(explorer, scaler, endodontic instruments)	a. 0.0%	a. 1.3%	
Injury while using rotary instruments(airot or, endodontic instruments)	b. 4.3%	b. 7.8%	
Injury while using surgical instruments (scalpel, scissors, elevators)	c. 11.6%	c. 6.5%	
Injury while using hypodermic needle, suture needles, and lancets	d. 2.9%	d. 6.5%	
All of the above	e. 81.2%	e. 77.9%	
Knowledge about Universal Precaution guidelines			>0.001
Yes	a. 29%	a. 89.6%	
No	b. 71%	b. 10.4%	
knowledge on safety devices to prevent NSIs?			>0.001
Yes	a. 40.6%	a. 88.3%	
No	b. 59.4%	b. 11.7%	
Knowledge on PEP regimen in the management of NSIs?			>0.001
Yes	a. 36.2%	a. 81.8%	
No	b. 63.8%	b. 18.2%	

Table,7: Knowledge about needle stick and sharp injuries among dental and nursing students

Table 8 shows that 49% of BDS students and 39.3% of nursing will first contact Medical surgery room which is statistically significant. A statistically significant result was found regarding not reporting about NSI injuries due to sterile needles (60.9% of dental students and 39% of nursing students).

## DISCUSSION

The current study was conducted with an aim to assess the knowledge and attitude of biomedical waste

first contact person following an NSI's	a. 49.3%	a. 39.0%	>0.001
Medical surgery room	b. 34.8%	b. 23.4%	
Oral surgery department	c. 5.8%	c. 9.1%	
Principal	d. 8.7%	d. 3.9%	
Would not contact anyone.	e. 1.4%	e. 24.7%	
Others			
Reasons for not reporting NSIs in past 12 months?	a. 60.9%	a. 39.0%	0.025
I did not report because injury was due to sterile needle	b. 5.8%	b. 7.8%	
I did know the reporting procedure	c. 23.2%	c. 23.4%	
I thought I might get blamed or get into trouble for having an NSI	d. 8.7%	d. 20.8%	
I did not think it was important to report	e. 1.4%	e. 9.1%	
I was concerned about confidentiality.			

Table,8: Attitude on needle stick and sharps injuries among Dental and Nursing students.

management and NSIs among dental students and nursing students. The results of the current study showed that 68.5% BDS students and 50.11% nursing students have sufficient knowledge about disposing of syringes, needles, micro and biotechnological waste. A study conducted by Saini et al<sup>20</sup> in 2013 on Knowledge and awareness of practice regarding BMW management showed that 59.23% had the correct knowledge and 81.55% were aware of the practice of BMW management. 82.6% of dental and 80.5% of nursing students have sufficient knowledge regarding disease spread by BMW, which was in contrast to the study conducted by Kishore et al<sup>21</sup> in 2000 who showed that not all dentists were aware of the risks they were exposed to, and only 50% of them observed infection control practices.

72.5% of dental students and 87% of nursing students have sufficient knowledge regarding various methods of disinfection used to treat BMW. 84.1% of dental students and 71.4% of nursing students are vaccinated with Hepatitis vaccine. 87% of dental and nursing students are been vaccinated with TT vaccine every 5 years. The majority of dental (95.1%) and nursing(96.1%) students thinks that acquiring knowledge of BMW is important. 88.4% dental students and 94.8% of nursing students thinks that training for BMW management should be made compulsory which showed the interest and importance of biomedical waste management training among them which was in line with a A Case Study of Biomedical Waste Management in Hospitals conducted by K.V.Radha, K.Kalaivani and R.Lavanya<sup>35</sup> in April 2009 which showed importance of the development of waste management policies, plans, and protocols are recommended, in addition to establishing training programs on proper waste management for all healthcare workers.

Study on attitude towards BMW management by Rudraswami et al<sup>22</sup> in 2012 showed that 82.6% were in favor of segregating BMW at the source of origin.

Regarding NSSIs injuries the results of the current study showed that 91.3% of dental students and 71.2% of nursing students have sufficient knowledge regarding the

disease that is being transmitted by NSIs . This was in contrast to a study conducted by Alam,<sup>23</sup> which reported that 21% and 30% of HCWs (nurses and paramedical staff) were unaware of the fact of transmission of AIDS and hepatitis C can be transmitted by NSIs, respectively.

81.2% and 77.9% students of dental and nursing are aware of types of NSIs. The majority of dental students(79%) have no knowledge regarding universal precaution guidelines to prevent NSSIs whereas 89.6% of nursing students have sufficient knowledge regarding universal precaution guidelines to prevent NSSIs. Knowledge of the participants regarding Universal Precaution Guidelines is of low level when compared to other studies: Bhardwaj et al.<sup>24</sup>(96.7%), Jaber<sup>25</sup> (92.1%), George et al.<sup>26</sup> (91%), Malik et al.<sup>27</sup> (74%), and Sharma et al.<sup>28</sup>(73.6%). But the knowledge was almost similar to the studies conducted in Hyderabad and Karachi<sup>29</sup> (62.6%). Majority of dental students(59.4%) lack of knowledge about safety devices used to prevent NSIs in comparison with 88.3% of nursing students who had sufficient knowledge regarding the same. This was similar to the studies conducted by Alam<sup>23</sup>(50% of HCWs – nurses and paramedical staff) and Malik et al.<sup>27</sup> (53% of the dental professionals) in which the participants had better knowledge of the new needle devices and their safety features. But when compared to studies by Jaber<sup>25</sup> (93.5% of the dental UG students) and Prabhu et al.<sup>30</sup> (68.62% of the dental nurses), the knowledge of the dental professionals in the current study regarding safety devices to prevent NSIs was found to be poor. Dental students(63.8%) lack knowledge in relation to PEP regimen whereas 81.8% of nursing students have sufficient knowledge regarding it . The participants in the present study had a better knowledge when compared to the studies by Jaber<sup>25</sup> (54.34%) and Salekar et al.<sup>31</sup> (55.5%) and had a poorer knowledge in comparison to the study by Kasat et al.<sup>32</sup> (68.8%).49% of dental students and 39.3% will first contact Medical surgery room whereas 1.4% of dental and 24.4% of nursing students will not contact any medical person. Salekar et al.<sup>31</sup> found that only 32% of HCWs reported the NSIs to the concerned superior. 60.9% of dental students and 39% of nursing students didn't report NSIs during past 12 months because the injury was due to a sterile needle. 8.7% of dental students and 20.8% nursing students felt that it was not important to report NSIs.

Martins et al., (2012)<sup>33</sup> reported a very interesting finding, which is some of the NSIs were actually caused by a HCW colleague; she reported that 4.3% of her sample reported their injury inflicted by another healthcare worker. Martins were the only researcher brought this finding into the surface. Mehrdad et al. (2014)<sup>34</sup> reported another interesting finding, that he did not find any statistically significant association between history of training on NSSI prevention and the exposure to blood-borne pathogens. This finding contradicts with the findings and recommendations of other studies, and it can be explained by the presence of response bias where people tend to present themselves in a favorable way.

**Limitation:** The questionnaire used in the study was closed ended which can hamper the generalized view of students. Also, the sample taken was from single college named Narsinhbhai Patel dental College and Nootan College of Nursing. A large sample size from different colleges would most probably provide the accurate results.

## CONCLUSION

The requirement of compulsory training of BMW waste management and prevention NSI injuries should be included in the academic curriculum by all the health institutions.

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8. In which colored bag do you dispose expired and discard paper?  
a. Blue  
b. Black  
c. White  
d. Red
9. Mention about diseases that spreads by BMW  
a. HIV  
b. Hepatitis B  
c. Hepatitis C  
d. TB  
e. All of the above
10. Mention about various methods used to disinfect BMW  
a. Incineration  
b. Chemical disinfection  
c. Both a and b
11. Are you vaccinated with hepatitis B vaccine?  
a. Yes  
b. No
12. Are you been vaccinated with TT(Every 5 years) vaccine?  
a. Yes  
b. No
13. Do you think having knowledge about BMW management is important?  
a. Yes  
b. No
14. Do you think training for BMW management should be made compulsory in your curriculum?  
a. Yes  
b. No

Source of Support: Nil  
Conflict of Interest: Nil

## Questionnaire

### Awareness about BMW

- Where do you dispose human anatomical waste?  
a. Yellow bag  
b. Black bag  
c. Blue bag  
d. Red bag
- In which colored bag do you dispose syringes?  
a. Blue bag  
b. Yellow bag  
c. Black bag  
d. White bag
- In which colored bag do you dispose needles?  
a. Blue/white  
b. Yellow/black  
c. White/red  
d. Blue/red
- In which colored bag do you dispose dressings?  
a. Blue/white  
b. Red/Yellow  
c. White/red  
d. Blue/red
- In which colored bag do you dispose micro and biotechnological waste?  
a. Blue/white  
b. Yellow/black  
c. Red/yellow  
d. Blue/red
- In which colored bag do you dispose expired and discard medicines and dental materials?  
a. Blue  
b. Black  
c. White  
d. Red
- In which colored bag do you dispose expired and discard chemical waste?  
a. Blue  
b. Black  
c. White  
d. Red

### Needle and Sharp stick Injuries

- Mention about diseases that can be transmitted by NSIs  
a. Hepatitis b  
b. Hepatitis c  
c. HIV/AIDS  
d. All of the above.
- Which amongst the below are considered as needle stick and sharp injury?  
a. Injury while using hand instruments(explorer, scaler, endodontic instruments)  
b. Injury while using rotary instruments(airotor, endodontic instruments)  
c. Injury while using surgical instruments (scalpel, scissors, elevators)  
d. Injury while using hypodermic needle, suture needles, and lancets  
e. All of the above
- Do you have Knowledge about Universal Precaution guidelines?  
a. Yes  
b. No
- Do you have knowledge on safety devices to prevent NSIs?  
a. Yes  
b. No
- Do you have Knowledge on PEP regimen in the management of NSIs?  
a. Yes  
b. No

### Attitude on needle stick and sharps injuries among dental professionals.

- When did the NSIs occurred in past 12 months?  
a. During device use  
b. Just After device use, before disposal  
c. During device recapping  
d. During device disposal
- What are the Reasons for not reporting NSIs in past 12 months?  
a. I did not report because injury was due to sterile needle  
b. I did know the reporting procedure  
c. I thought I might get blamed or get into trouble for having an NSI  
d. I did not think it was important to report. I was concerned about confidentiality.