

## Knowledge of Waste Management Among Nursing Students in Moga, Punjab: An Exploratory Study

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**Suman Sudhir Alexander, Phd (N)1\*, Rupinder Kaur Gill, M.Sc. (N)2, Ashu Kesar, Phd (N)3**

1\*Professor, Department Of Community Health Nursing, Dasmesh College Of Nursing, Faridkot, Punjab (India)

2Professor Cum Principal, Department Of Community Health Nursing, Lala Lajpat Rai Institute Of Nursing, Moga, Punjab (India)

3Tutor, Department Of Child Health Nursing, Institute Of Nursing, University Regional Centre, Goindwal Sahib, Tarn-Taran, Punjab (India)

### Keywords:

Biomedical waste management, Nursing students, Knowledge

### Abstract

**Introduction:** Biomedical waste encompasses waste from human/animal diagnosis, treatment, immunization, and related research activities. It also includes waste from biological substance production/testing. It involves waste generation, characterization, minimization, collection, separation, treatment, and disposal.

**Materials and Methods:** The study employed a quantitative approach with an exploratory research design to investigate the knowledge regarding waste management among nursing students. The research was conducted in Lala Lajpat Rai Institute of Nursing, Moga district of Punjab. A total of 60 participants were selected using non-probability purposive sampling technique. Data collection was carried out using a pre-designed demographic proforma and a self-structured knowledge questionnaire focused on bio-medical waste management. The questionnaire included 30 questions, with one mark given for each correct answer and zero marks for incorrect answers. Scores ranged from zero to a maximum of 30. Knowledge levels were categorized as good (23-30), average (16-22), and below average (1-15). Data were coded and imported into Excel for analysis, which was performed using SPSS version 26.

**Results:** Out of 60 nursing students, 40% were aged 15-20 years and 60% were aged 20-25 years. In terms of gender distribution, 28% were males and 72% were females. Regarding their knowledge of biomedical waste management, the majority of students (56%) had below average knowledge. Additionally, 42% of the students had an average level of knowledge, while only 1% demonstrated good knowledge with scores ranging from 23 to 30. **Conclusion:** In conclusion, there is a significant need to enhance students' knowledge of waste management, specifically in the realm of biomedical waste. Implementing comprehensive education and training programs, along with encouraging active participation, will equip future healthcare professionals to effectively manage and contribute to sustainable waste management practices.

### 1. Introduction:

Biomedical waste management (BMW) includes waste from human/animal diagnosis, treatment, immunization, and research. It covers waste generation, characterization, minimization, collection, separation, treatment, and disposal. Hospital waste management is complex due to hazardous materials like chemical, radioactive, and pathogenic waste. Maintaining hospital hygiene is crucial for effective medical waste management. Biomedical waste can be solid or liquid, and examples of infectious waste include discarded blood, sharps (needles, scalpels), microbiological cultures, body parts, tissues, bandages, gloves, and medical supplies contaminated with blood or body fluids. Waste sharps

include used needles, scalpels, lancets, and other contaminated piercing devices.<sup>1</sup> BMW is a significant contributor to the emergence of pollutants resulting from healthcare practices, including medical diagnosis, treatment, immunization, and biological research involving animals.<sup>2</sup>

Inadequate management of hazardous biomedical waste (HBMW) can result in the entry of pathogens into the human body through skin punctures, abrasions, cuts, inhalation, or ingestion. This can lead to the contraction of various viral and bacterial diseases.<sup>3</sup> Around 85% of the total volume of biomedical waste (BMW) is considered non-hazardous, while the remaining volume is classified as infectious hazardous waste. Improper disposal of

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hazardous biomedical waste (HBMW) poses significant risks to public health and the environment due to its potential to harbor various pathogenic microorganisms.<sup>4</sup>

The study revealed significant knowledge gaps among all the respondents, regardless of their professional cadres. Health professionals showed better knowledge regarding Biomedical Waste Management (BMW) and hospital BMW protocols. There was a statistically significant difference in knowledge and practice among different staff cadres.<sup>5</sup> In India, the average generation of biomedical waste is around 2 kg per bed per day. This includes various types of waste such as anatomical waste, cytotoxic waste, and sharps. Improper segregation of these wastes can lead to the transmission of deadly infectious diseases like HIV, hepatitis C, and hepatitis B. Additionally, inadequate management of biomedical waste can result in environmental disruptions and have adverse effects on the ecological balance.<sup>6-8</sup>

The limited knowledge was primarily attributed to new staff rotating in the hospital and the relatively lower educational levels of the housekeeping staff. Providing training to all staff members across different cadres will enable them to conduct analytical evaluations and implement suitable and effective management practices for biomedical waste.<sup>9,10</sup> The study on knowledge of waste management among nursing students is significant in identifying gaps in their understanding and improving waste management practices. It informs curriculum development, policy-making, and enhances patient and public safety in healthcare settings.

## 2. Materials and Methods:

The study employed a quantitative approach with an exploratory research design to investigate the knowledge regarding waste management among nursing students. The research was conducted in a selected nursing college located in the Moga district of Punjab. A total of 60 participants were selected using non-probability purposive sampling technique. Data collection was carried out using a pre-designed demographic proforma and a self-structured

knowledge questionnaire focused on bio-medical waste management. The questionnaire consisted of 30 questions, with each correct answer awarded one mark and each incorrect answer given zero marks. The minimum possible score was zero, while the maximum score achievable was 30. The level of knowledge was further categorized into three groups: good (23-30), average (16-22), and below average (1-15). Data were coded and imported into Excel for analysis.

## 3. Results

Out of 60 subjects; the majority of adults were concentrated in the age groups of 15-20 years (40%) and 20-25 years (60%). Notably, there were no individuals in the sample within the age ranges of 25-30 years and 30-35 years. As per their gender majority 72% were females and 28% were males. In regards to educational status, more than half students were in their second year of B.sc (N) (54%), followed by those in their third year (46%). Religiously, the largest group in the sample identified as Sikhs (46%), followed by Hindus (25%), Muslims (26%), Christians (1%), and no individuals from other religions.

In terms of marital status, a very small percentage of subjects were married (1%), while the vast majority were unmarried (99%). The majority of Students resided in rural areas (73%), while a smaller percentage lived in urban areas (27%). Family income varied within the sample, with 26% reporting a family income of at least 10,000, 45% falling in the 20,000-30,000-income range, 20% falling in the 30,000-50,000 range, and 9% having a family income less than or equal to 50,000.

Regarding dietary patterns, the sample exhibited an almost equal distribution between vegetarian (48%) and non-vegetarian (46%) diets. A small proportion followed an egg vegetarian diet (6%). Finally, the sources of health information varied among the participants, with 25% relying on mass media, 23% seeking information from friends and relatives, 23% obtaining information from hospitals, and 28% seeking guidance from healthcare professionals [Table 1].

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**Table 1:** Socio-demographic Profile of Nursing students. N=60

| Variables                       | f  | %  |
|---------------------------------|----|----|
| <b>Age (years)</b>              |    |    |
| 15-20                           | 24 | 40 |
| 20-25                           | 36 | 60 |
| <b>Gender</b>                   |    |    |
| Male                            | 17 | 28 |
| Female                          | 43 | 72 |
| <b>Educational status</b>       |    |    |
| B.Sc. N. II year                | 32 | 54 |
| B.Sc. N. III year               | 28 | 46 |
| <b>Religion</b>                 |    |    |
| Sikh                            | 28 | 46 |
| Hindu                           | 15 | 25 |
| Muslim                          | 16 | 26 |
| Christian                       | 01 | 1  |
| <b>Marital Status</b>           |    |    |
| Married                         | 01 | 1  |
| Unmarried                       | 59 | 99 |
| <b>Area of residence</b>        |    |    |
| Rural area                      | 44 | 73 |
| Urban area                      | 16 | 27 |
| <b>Family income (Rs/month)</b> |    |    |
| ≥10,000                         | 6  | 26 |
| 10,000 - 30,000                 | 27 | 45 |
| 30,000 - 50,000                 | 12 | 20 |
| ≤50,000                         | 05 | 9  |
| <b>Dietary pattern</b>          |    |    |
| Vegetarian                      | 29 | 48 |
| Non-vegetarian                  | 27 | 46 |
| Eggetarian                      | 04 | 6  |

The knowledge levels based on their scores reveal that the majority of students 53.33% fall into the below-average category, with scores ranging from 1 to 15. Additionally, 33.33% of students demonstrate an

average level of knowledge, scoring between 16 and 22 and 13.33% of students exhibit good knowledge, achieving scores between 23 and 30 [Table 2].

**Table 2:** Level of Knowledge regarding Bio-Medical Waste Management of Nursing students. N=60

| Level of Knowledge | f  | %     |
|--------------------|----|-------|
| Good               | 8  | 13.33 |
| Average            | 20 | 33.33 |
| Below average      | 32 | 53.33 |

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Regarding the relationship between mean knowledge scores and various demographic variables; The analysis focused on gender, and the results revealed a significant difference in the mean knowledge scores between males and females. The calculated t-value of 2.484 was greater than the critical value, indicating

statistical significance. Specifically, females exhibited a significantly higher mean knowledge score compared to males. Remain others variables such age, educational status, area of residence, family income and dietary pattern are non-significant at 0.05 level [Table3].

**Table 3 :** Association between knowledge mean score with selected demographic variables. **N=60**

| Variables                       | N  | Mean  | SD   | statistics value       |
|---------------------------------|----|-------|------|------------------------|
| <b>Age (years)</b>              |    |       |      |                        |
| 15-20                           | 24 | 14.6  | 3.54 | t=0.232 <sup>NS</sup>  |
| 20-25                           | 36 | 14.8  | 2.81 |                        |
| <b>Gender</b>                   |    |       |      |                        |
| Male                            | 18 | 13.2  | 3.50 | t=2.484*               |
| Female                          | 42 | 15.3  | 2.77 |                        |
| <b>Educational status</b>       |    |       |      |                        |
| B.Sc. N. II year                | 32 | 14.5  | 3.39 | t=0.494 <sup>NS</sup>  |
| B.Sc. N. III year               | 28 | 14.9  | 2.83 |                        |
| <b>Area of residence</b>        |    |       |      |                        |
| Rural area                      | 44 | 14.9  | 2.67 | t=0.769 <sup>NS</sup>  |
| Urban area                      | 16 | 14.1  | 4.17 |                        |
| <b>Family income (Rs/month)</b> |    |       |      |                        |
| ≥10,000                         | 6  | 14.4  | 2.78 | F=0.0345 <sup>NS</sup> |
| 10,000 - 30,000                 | 27 | 14.6  | 3.64 |                        |
| 30,000 - 50,000                 | 12 | 15.4  | 2.69 |                        |
| ≤50,000                         | 05 | 13.8  | 1.93 |                        |
| <b>Dietary pattern</b>          |    |       |      |                        |
| Vegetarian                      | 29 | 15.4  | 2.86 | t=0.73 <sup>NS</sup>   |
| Non-vegetarian                  | 27 | 14.3  | 2.99 |                        |
| Eggetarian                      | 04 | 12.25 | 4.43 |                        |

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## 4. Discussion

The present study investigated the level of knowledge regarding Bio-Medical Waste Management among nursing students. The findings revealed that a majority of the students, 53.33%, fell into the below-average category, indicating a lack of proficiency in this area with scores ranging from 1 to 15. Additionally, 33.33% of students demonstrated an average level of knowledge, scoring between 16 and 22, while 13.33% exhibited good knowledge, achieving scores between 23 and 30. These results indicate a concerning gap in understanding and awareness of Bio-Medical Waste Management among the surveyed nursing students. A study conducted by Sarkar et al. (2022) reported similar findings among staff nurses, where 50% had good knowledge while 20% had poor knowledge. This highlights the need for educational interventions and training programs to enhance the knowledge base of healthcare professionals across various levels.<sup>11</sup> Tiwari et al. (2021) conducted a supported study that reported a poor level of knowledge among participants in domains such as awareness, color coding, biomedical waste disposal methods, and universal precautions, with only the biomedical waste hazard symbol showing a relatively higher level of understanding at 15.3%. This emphasizes the need for comprehensive training programs to address the gaps in different aspects of biomedical waste management.<sup>12</sup>

Dash et al. (2021) indicated satisfactory knowledge of nursing personnel regarding biomedical waste management, suggesting variations in knowledge levels among different healthcare settings and regions. These differences may be attributed to variations in training programs and educational initiatives.<sup>13</sup> Rama et al. (2019) reported that 23.4% of participants had good knowledge, 60% had average knowledge, and 16.6% had fair knowledge regarding biomedical waste management. This supports the notion that there is room for improvement in enhancing knowledge levels even among practicing healthcare professionals.<sup>14</sup>

Gautam et al. (2021) reported that the majority of participants (88.1%) had a moderate level of knowledge regarding biomedical waste management. Additionally, no associations were found between the nurse's level of knowledge and biomedical waste management. These findings suggest the need for standardized training programs and guidelines to

ensure consistent knowledge levels among healthcare professionals.<sup>15</sup> In a similar study by Srivastava (2016), staff nurses were found to have an average level of knowledge regarding biomedical waste management. This further highlights the need for continuous education and training to enhance knowledge and ensure compliance with proper waste management protocols.<sup>16</sup>

## 5. Conclusion

In conclusion, the present study highlights the concerning finding that a majority of nursing students possess below-average knowledge regarding Bio-Medical Waste Management. The findings underscore the importance of targeted educational interventions, training programs, and standardized guidelines to improve knowledge, promote positive attitudes, and ensure safe practice patterns in biomedical waste management. Continuous efforts are necessary to bridge the knowledge gap and promote effective waste management practices among healthcare professionals at all levels.

## Conflict of interest statement

We declare that we have no conflict of interest

## References

- [1] Pratap S, Majumder R, Asokan R. A study to assess the knowledge and practice among bsc nursing 3rd year students, on biomedical waste management in selected nursing colleges, Bhubaneswar, Odisha. *International Journal of Nursing Education and Research*. 2021;9(2):189-94.
- [2] Datta P., Mohi G.K., Chander J. Biomedical waste management in India: critical appraisal. *J. Lab. Physicians*. 2018;10:6–14.
- [3] WHO, Geneva, editors. *Safe Management of Wastes From Health-care Activities*. second ed. WHO; Switzerland: 2014.
- [4] WHO Health-care waste 2018. Available from: <https://www.who.int/news-room/fact-sheets/detail/health-care-waste>
- [5] Rao D, Dhakshaini MR, Kurthukoti A, Doddawad VG. Biomedical waste management: A study on assessment of knowledge, attitude and practices among health care professionals in a tertiary care teaching hospital. *Biomedical and*

# Journal of Coastal Life Medicine

- Pharmacology Journal. 2018 Sep 21;11(3):1737-43.
- [6] Nath P.A, Prashanthini V, Visvanathan C. Healthcare waste management in Asia. *Waste Management*. 2010;30:154-61.
- [7] Lakshmikantha H. Report on waste dump sites near Bangalore. *Waste management*. 2006;26(6):640-50
- [8] Misra V, Pandey S.D. Hazardous waste, impact on health and environment for development of better waste management strategies in future in India. *Environment International*. 2005;31:417-31
- [9] Radha R. Assessment of existing knowledge, attitude, and practices regarding biomedical waste management among the health care workers in a tertiary care rural hospital. *Int J Health Sci Res*. 2012;2(7):14-19.
- [10] Saini S, Nagarajan S.S, Sarma R.K. Knowledge, Attitude and Practices of Bio-Medical Waste Management Amongst Staff of a Tertiary Level Hospital in India. *Journal of the Academy of Hospital Administration*. 2005;17(2).
- [11] Sarkar S, Khati P, Choudhury S, Saha A, Das R, Mandal G, et al. A study to assess the knowledge regarding bio-medical waste management among the staff nurses working in selected hospital, Siliguri. *Int J Res Med Sci* 2022; 10: 2530-5.
- [12] Tiwari SK, Srivastava SP, Chauhan S. Knowledge, attitude and practices regarding biomedical waste management as per 2019 rules among nursing students. *Int J Health Sci Res*. 2021; 11(9): 41-48. DOI: <https://doi.org/10.52403/ijhsr.20210906>
- [13] Dash K, Das M, Satapathy, NK Assessment of Knowledge, Attitude, and Practices about Biomedical Waste Management among Nursing Professionals in a Tertiary Care Hospital, Bhubaneswar, Odisha. *European Journal of Molecular & Clinical Medicine*. 2021;8(3):1127-42
- [14] Rama YS, Reddy K. A study to assess the knowledge regarding biomedical waste management among b.sc(n) students of Sree Balaji college of nursing Chennai. *Journal for advanced research in applied sciences*. 2019;6(7):59-62.
- [15] Gautam S, Mandal PK, Yangden N, Rai M. Knowledge on biomedical waste management among nurses working in a hospital of Biratnagar. *Tribhuvan University Journal*. 2021;36(2):26-38.
- [16] Srivastava J. Knowledge regarding biomedical waste management among the staff nurses. *Int J Sci Res*. 2016;5(7):2319-7064.