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From Editorial desk: "Redefining Boundaries: Recognizing Nurses as Innovators."

"Nurses have been the frontlines of promotion, prevention, care, and rehabilitation of people and patients' health and safety. But beyond this lies a less recognized but equally powerful identity — that of the nurses as innovators, critical analytical people, and leaders of change and visionaries."

Our Nurse Innovators journal was launched to publish the research and conversations by nurses about healthcare innovations. Healthcare departments, governing agencies, and the general public have recognized nurses as agents of change; however, scholarly and research articles and practical literature highlighting nurse-led solutions are lacking. This journal aims to address that. This journal will open the space for interdisciplinary dialogue needed in nursing practice. The launch of the journal comes at a moment of critical transformation in healthcare. The challenges we face — from global health inequities and workforce shortages to digital transformation and environmental crises — demand new ways of thinking. Nurses, with their unparalleled proximity to patients and systems, are uniquely positioned to inform.

What do we mean by "nurse innovator"? We see innovation not just in technology or start-ups, but in every instance where nurses challenge assumptions, redesign systems, and imagine better ways of delivering care. It is the nurse in a rural community who adapts mobile phone technology to improve antenatal care. The ICU nurse leads a quality improvement initiative to reduce infections and medication errors. The psychiatric nurse who develops a culturally grounded mental health toolkit for the community. Innovation, in this context, is not always high-tech — it is high-impact!

In this inaugural issue and future ones, we will feature a diverse range of content: original research on nurse-led interventions, field-tested solutions from practice, reflective essays from nurse leaders, and interdisciplinary perspectives that expand our collective imagination. We welcome contributions from nurses in all sectors — clinical, academic, community-based, and entrepreneurial — as well as collaborations with designers, engineers, and policymakers who collaborate with nurses to co-create change.

We hope that this journal is more than a publication. We envision a vibrant ecosystem — a space of dialogue, mentorship, and shared purpose. Whether you are a student with an idea, a frontline nurse solving problems daily, or a scholar exploring the theory of practice-led innovation, you have a place here.

We invite you to read, contribute, critique, and connect. Let this journal be both a record of what is and a catalyst for what could be.

Because innovation is not the future of nursing — it is already here. And it begins with the nurse.

We invite you to read, contribute, critique, and connect. Let this journal be both a record of what is and a catalyst for what could be.

Dr. Meena Ganapathy
Chief Editor, NIJ

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"A descriptive study to assess the knowledge and practices regarding biomedical waste segregation among nursing students."

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Abstract: Introduction*: Bio-medical waste is any waste generated during the diagnosis, treatment, and immunization of human beings & animal research activities on the health campus. Proper segregation and handling of hazardous waste is essential to minimize these risks in health care settings. The present study aims to assess the knowledge and practices related to biomedical waste segregation among nursing students.* ***Methodology****: A total of 400 nursing students were selected by using a convenient sampling technique. Informed, written as well as online consent was obtained from the participants. The self-structured questionnaire to assess the knowledge and practices regarding bio-medical waste segregation was distributed to the participants.* ***Result****: The result indicates that only 101 (25.25 %) nursing students had good knowledge of biomedical waste segregation. There was a significant positive correlation with the source of information (p = 0.040) with knowledge where 358 (89.5%) students have good practices in biomedical waste segregation and there was a significant positive correlation with the education of the head of the family and practices of biomedical waste segregation (p = 0.030) at the significance level of 0.05****. Conclusion****: There was a critical need to ensure that nursing students fully understand the biomedical waste segregation methods. The research highlighted the necessity of training programs to educate nursing students about the significance of proper waste segregation and to ensure adherence to established protocols which can ultimately have a positive impact on healthcare settings and public health.*

Keywords: knowledge, practices, biomedical waste segregation, nursing students, nursing institute, teaching module

I. INTRODUCTION

According to WHO, bio-medical waste (BMW) means any waste, that is 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. Biomedical waste (BMW) poses significant environmental and health risks if not managed properly. Proper segregation and handling of hazardous waste is essential to minimize these risks and efforts have been or are being made internationally. For safe and scientific management of biomedical waste, handling, segregation, mutilation, disinfection, storage, transportation, and finally disposal are vital steps for any healthcare institution. Proper segregation of biomedical waste is essential to minimize these risks.[1] Nursing students, as future healthcare professionals, must be well-prepared in BMW segregation practices.

II. BACKGROUND

The amount of BMW being generated in our country is increasing. In 2023, about 743 tons/day of biomedical waste was generated in India, out of which 694 tons/day were treated and disposed of through CBWTFs and Captive Treatment Facilities (CTFs).[2] Inadequate knowledge of handling BMW may have serious health consequences and a significant impact on the environment. Lack of segregation practices will cause environmental pollution, unpleasant smell, growth and multiplication of vectors like insects, and rodents and may lead to the transmission of diseases like typhoid, cholera, hepatitis, and AIDS through injuries from syringes and needles contaminated with humans.[3]

Diwan T, et al. (2021) conducted a cross-sectional observational study to assess BMW management in a tertiary care hospital among 105 healthcare workers, selected by simple random sampling, using a semi-structured questionnaire. According to their findings, 100% of doctors and lab technicians were aware of biomedical waste generation and legislation. They were concerned about needle stick injury but the recapping practice of needles was found to be as 18.7%, 45.5%, 100%, and 27% among doctors, nurses, lab technicians, and sanitary staff respectively. 52.40% had not received in-service training.[4]

Deress T, et al. (2018) conducted an institution-based cross-sectional study to assess knowledge, attitude, and practice about biomedical waste management and associated factors among 296 healthcare professionals. Data were collected using a structured self-administered questionnaire and observational checklist. Researchers found that 168 (56.8%), 196 (66.2%), and 229 (77.4%) had inadequate knowledge, not satisfactory attitude, and practice scores respectively. Regarding associated factors, M.Sc. and MD^{+}, BSc holders, and availability of color-coded bins were identified as more likely to contribute to adequate knowledge, favourable attitude, and adequate practice scores, respectively. The

majority of healthcare professionals did not access BMW management training. So, there is need of regular training should be given to healthcare professionals.[5]

Tiwari K, et al. (2021) conducted a descriptive cross-sectional study on knowledge, attitude, and practices regarding biomedical waste management. The researcher found that the majority of participants had a poor level of knowledge in various domains of biomedical waste management awareness (78.5%), color coding (84.7%), biomedical waste disposal methods (92.6%), and universal precautions (97.5%) except for biomedical waste hazard symbol (15.3%). Overall knowledge of participants was poor for 155 (95.1%), and excellent for 8 (4.9). overall attitude was poor for 124 (76.1), and excellent for 39 (23.9). overall practice was excellent 121 (74.2), poor 42 (25.8).[6]

The studies highlighted the importance of proper biomedical waste handling, its effects on public health, and the need for training or awareness campaigns in nursing institutions. This study aims to assess the knowledge and practices related to biomedical waste segregation among nursing students. This study helps to bridge that gap and develop an educational module based on the findings. By identifying gaps and areas for improvement, the findings can be informed to educational programs and policymakers to enhance waste management practices in clinical settings.

The objectives of the present study were to assess the knowledge regarding biomedical waste segregation among nursing students, to examine the current practices, to associate the findings of knowledge and practices regarding biomedical waste segregation with selected demographic variables, and to develop a teaching tool to educate the students about Biomedical Waste Segregation.

III. METHODOLOGY

A descriptive research design method was adopted to conduct the study in a selected nursing institute in Pune. A total of 400 nursing students were selected by using a convenient sampling technique. Informed, written hard copy as well as online consent was obtained from the participants. The self-structured questionnaire was developed to assess the knowledge and practices regarding bio-medical waste segregation and was distributed to the participants using Google Forms. Difficulties while filling out the questionnaire had been addressed by the researchers. Descriptive statistics (frequency, percentage) were used to analyze the data, and inferential statistics were used to determine the statistical significance –correlation using data analysis in MS Excel). A significance level of less than 0.05 was set for the tests.

IV. RESULT

The section deals with the selected demographic variables such as program undergoing, year of course, age, education of head of family, awareness of biomedical waste segregation, and source of information.

Table 1: The demographic data of the sample

N=400

Sr. no	Variables	Frequency (n=400)	Percentage %	Association of knowledge with demographic variable	Association of practices with demographic variable
1	**Programme**				
	ANM	42	10.5	0.428	0.403
	GNM	216	54		
	B.Sc. Nursing	140	35		
	P.B.B.Sc. Nursing	0	0		
	MSc Nursing	2	0.5		
2	**Year of Course**				
	1st year	97	24.25	0.054	0.686
	2nd year	202	50.5		
	3rd year	63	15.75		
	4th year	38	9.5		
3	**Age**				
	Below 18 years	11	2.75	0.107	0.254
	18-21 years	281	70.25		
	Above 21 years	108	27		

4	**Education of Head of Family**				
	Illiterate	45	11.25	-0.051	**0.030**
	Undergraduate	233	58.25		
	Graduate	122	30.5		
5	**Are you aware of Biomedical Waste Segregation?**			–	–
	Yes	400	100		
	No	0	0		
6	**If yes, the source of information**				
	Teachers	236	59		
	Social circle	53	13.25	**0.040**	0.114
	Books	88	22		
	Internet	23	5.75		

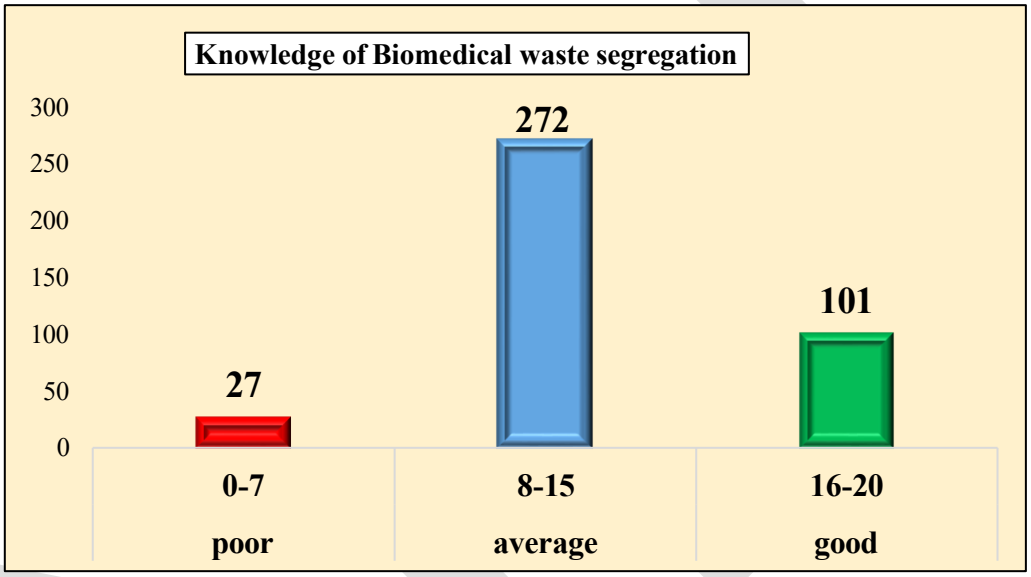

Figure no 1: Knowledge of biomedical waste segregation in nursing students

The above figure no 1 describes the knowledge of biomedical waste segregation in nursing students which indicates 101 (25.25 %) students have good knowledge of biomedical waste segregation 272 (68%) students have average knowledge of biomedical waste segregation, about 27 (6.75%) students have poor knowledge of biomedical waste segregation.

The correlation between the source of information and knowledge of biomedical waste segregation is significant (***p*** = **0.040**) at the significance level of 0.05

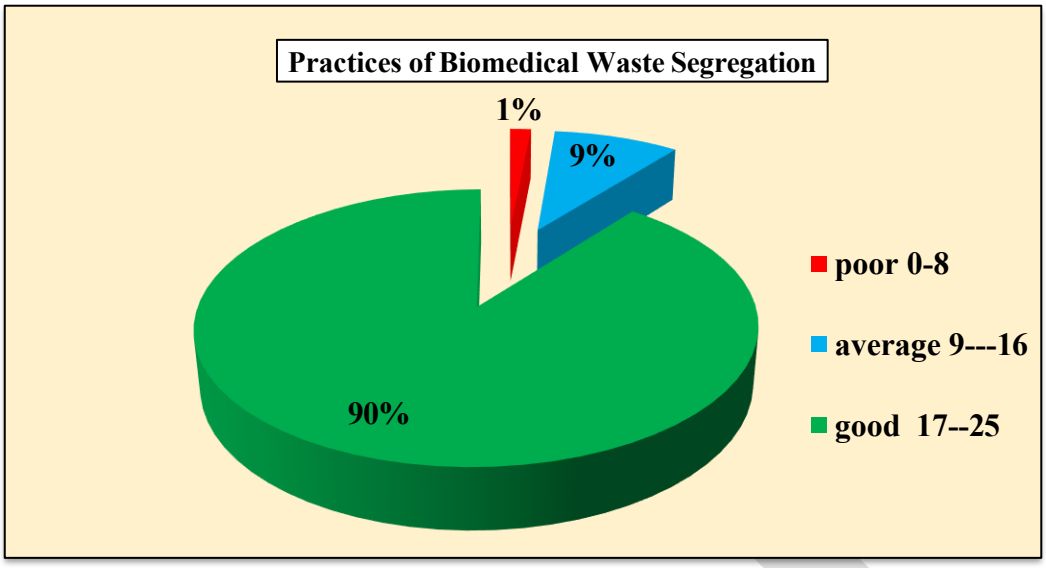

Figure no 2: Practices of Biomedical Waste Segregation

Above figure no 2 describes the practices of biomedical waste segregation in which, 358 (89.5%) students have good practices of biomedical waste segregation. Around 36 (9%) students are following average practices of biomedical waste segregation and 6 (1.5%) students have poor practices of biomedical waste segregation.

The correlation between the education of the head of the family and practices of biomedical waste segregation is significant (**p = 0.030)** at the significance level of 0.05.

Development of a teaching module: Based on the gaps identified, a teaching module will be developed for nursing students, including the importance of biomedical waste segregation, Proper classification and color coding, procedures for safe disposal and handling and case studies or examples to illustrate potential consequences of improper waste management. The module could be integrated into the nursing curriculum and also include practical demonstrations and evaluations.

V. IMPLICATIONS

- **Educational Implications**: Enhancing the nursing curriculum with a focus on biomedical waste management.
- **Healthcare Implications**: Ensuring that nursing students become advocates for proper biomedical waste segregation, thus reducing the risk of contamination and promoting better healthcare practices.

1) Limitations

- Limited to one nursing institute in Pune, so the results may not be generalized to other regions.
- Self-reported data might not always reflect actual practices.

VI. DISCUSSION

A similar cross-sectional hospital-based study was conducted by **Prachi P, et al. (2019)** to assess knowledge, attitude, and practice of biomedical waste management among 100 interns of Dharwad. After obtaining informed consent, a pre-tested, semi-structured questionnaire was used to collect the data. Their result showed that 15% of the interns were not able to name correctly the color codes of bags. Only two-thirds were aware of where and how bio-medical wastes are treated. Hence they concluded that though interns were aware of the seriousness of the biomedical waste to public health, but still exists a knowledge, attitude, and practice gap that needs to be identified and suitably addressed.[7] The present study also identified the gap between knowledge and practices regarding biomedical waste segregation and highlights the necessity of training programs to educate nursing students about the significance of proper waste segregation and to ensure adherence to established protocols.

VII. CONCLUSION

There is a critical need to ensure that nursing students fully understand the biomedical waste segregation method. The study utilized a descriptive research design, employing surveys or questionnaires to collect data from the nursing students. By conducting such a study, you would not only assess the current state of knowledge but also provide concrete recommendations for improving the training of nursing students in biomedical waste management. The findings were

expected to guide the creation of an effective teaching module that would ultimately improve the quality of biomedical waste segregation management by future nursing professionals. This can ultimately have a positive impact on healthcare settings and public health.

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Conflict of interest- No conflict of interest to declare.

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