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Predictors of biomedical waste management practices among staff nurses of a tertiary care teaching hospital in India

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Abstract:

BACKGROUND: Inappropriate handling of biomedical waste (BMW) may pose serious threats to the health of patients and hospital personnel. Among all healthcare workers, staff nurses play a vital role in BMW management (BMWM). Thus, the present study aimed to determine the predictors of BMWM practices among staff nurses of a tertiary care teaching hospital in India.

MATERIALS AND METHODS: A prospective cross-sectional study was conducted among 150 staff nurses, working at a tertiary care teaching hospital in South India, from July to August 2018. Data were collected using a pretested, semi-structured, and self-administered questionnaire after taking their written informed consent. Regression analysis was carried out to identify the predictors of satisfactory BMWM practice status.

RESULTS: Of the total 150 staff nurses, most of them were young females with a work experience of ≤ 5 years. Concerning knowledge scores, most staff nurses (63.3%) belonged to the moderate category, whereas a few (24%) were in the high category. Also, most of them (62.7%) were in the high category of attitude scores. For practice scores, half of the participants were in moderate and high categories, each. Female gender, attended training status, and moderate and high knowledge scores were significantly associated with satisfactory BMWM scores in unadjusted analysis. After adjusting for other independent variables, all these three factors were found significantly associated with satisfactory BMWM practice scores.

CONCLUSION: The present study shows that the female gender, attending training in BMWM, and having a moderate and high knowledge of BMWM were significant predictors of satisfactory BMWM practice among staff nurses. Thus, all hospitals must periodically train their staff nurses to strengthen their BMWM practices. Safe BMWM leads to environmental protection and safeguards the health of patients, hospital personnel, and the public.

Keywords:

Biomedical waste, hospital waste, infectious waste, medical waste, staff nurses

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Introduction

Every day, healthcare facilities generate humongous amounts of waste termed “biomedical waste” (BMW). BMW refers to “any waste, which is generated during the diagnosis, treatment, or immunization of human beings or animals or research

activities pertaining thereto or in the production or testing of biological or in health camps”.^[1]

According to the Central Pollution Control Board (CPCB), India produced 656 tons/day of BMW in 2020. With the emergence of the COVID-19 pandemic, there was an incremental BMW generation of 84.61 tons/

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day from May 2020 to February 2022.^[2] Of the total BMW generated, 15% are infectious and pose a health hazard to those exposed, such as healthcare personnel, patients, visitors, and multipurpose workers involved in collecting, transporting, treating, and disposing of the waste.^[3]

Every year, BMW-related diseases contribute to around 5.2 million deaths, including 4 million deaths among children globally, the condition being further bleak in developing countries.^[4] A single needle stick injury from an infected needle predisposes to contracting hepatitis B, hepatitis C, and HIV in 30%, 1.8%, and 0.3% of the cases, respectively.^[5] Moreover, improper disposal of BMW leads to a risk of environmental damage.^[6] Thus, safe BMW management (BMWM) is of paramount importance to safeguard public health.

The government of India enacted the BMW (management and handling) rules in 1998 (with an amendment in 2016) for strict enforcement of environmentally sound BMWM practices for human health protection.^[1] However, it requires that healthcare personnel involved in BMW handling have adequate knowledge and the right attitude toward safe BMWM practices.

Nurses play a pivotal role in the generation, segregation, and disposal of hospital waste. They are more involved in direct patient care, manage various healthcare activities, and are also one of the main stakeholders responsible for the safe BMWM. Studies have shown that they work under stressful conditions and often fall short of satisfactory BMWM practices.^[7-12] Thus, it is essential to identify the predictors of safe BMWM among staff nurses and strengthen them to curb the menace of inefficient BMW handling.

Materials and Methods

Study area and setting

This study was conducted at the Sri Manakula Vinayagar Medical College and Hospital (SMVMCH), a 900-bedded, private multi-specialty teaching hospital located in Puducherry in the Southern part of India. It provides in-patient, out-patient, and emergency services. Every day, large amounts of biomedical waste are produced in the hospital.

Study design and population

We conducted a hospital-based, cross-sectional study among the staff nurses of our hospital for 2 months (July and August 2018).

Inclusion criteria: Staff nurses employed in various departments of SMVMCH, Puducherry.

Exclusion criteria: Staff nurses who were not available at the time of distribution of the questionnaire by the investigators.

Ethical considerations

Institutional Ethics Committee approval was obtained before the initiation of the study. The study was conducted following the principles of the Helsinki Declaration and Good Clinical Practice guidelines. The purpose of the study had been explained to the staff nurses and only those who were willing to participate in the study were included after obtaining written informed consent. Anonymity and confidentiality of the participant's data were ensured.

Data collection tool and procedure

A self-administered structured questionnaire was developed in English based on previous studies.^[9,10,12,13] Five subject experts checked for the content validity of the questionnaire, and a few questions were modified based on their suggestions. The questionnaire was pilot tested on 10 staff nurses, and the questions were revised to ensure relevance, comprehension, and feasibility. The data collected in the pilot study were not included in the final analysis of the results. The reliability of the questionnaire was assessed by the estimation of Cronbach's alpha. A value of 0.88 suggests that the questionnaire was reliable.

The pretested, structured, and self-administered anonymous questionnaire was given to the participants. They were given an adequate time of 25–30 min to fill out the questionnaire. Once the participants returned the filled questionnaire, they were thanked for their valuable time.

The questionnaire elicited the self-reported practice of BMWM and its possible predictors such as age, gender, educational qualification, years of work experience, attended training in BMWM, knowledge, and attitude toward BMWM. Questions related to knowledge, attitude, and practice of BMWM were 15, 10, and 10, respectively. The questions related to knowledge were multiple-choice questions with one correct response. Those on attitude had pre-coded responses on a 5-point Likert scale (strongly disagree, moderately disagree, neutral, moderately agree, and strongly agree). The questions on practice were mainly closed-ended "yes/no" questions, except for one question (having 13 sub-questions) where a participant had to tick the color of the bag/container, in which a particular BMW/general waste was disposed of. The correct and wrong responses were scored "1" and "0," respectively for knowledge and practice scores. Similarly, favorable responses reflecting positive attitudes such as agree and strongly agree (or disagree and strongly disagree) were scored "1" and the remaining unfavorable

attitude responses were scored “0.” The knowledge, attitude, and practice scores were calculated for each participant. The maximum possible knowledge, attitude, and practice scores were 15, 10, and 22, respectively. Based on the scores obtained, it was possible to categorize them as having low, moderate, and high scores.

Categorization of knowledge scores

Score(s) of 0–5: Low

Scores of 6–10: Moderate

Scores of 11–15: High

Categorization of attitude scores:

Score(s) of 0–3: Low

Scores of 4–7: Moderate

Scores of 8–10: High

Categorization of practice scores:

Score(s) of 0–7: Low

Scores of 8–15: Moderate

Scores of 16–22: High.

Also, the questionnaire had two open-ended questions to assess the facilitating and hindering factors for safe BMWW among staff nurses.

Data analysis

Data were entered in a Microsoft Excel spreadsheet and analyzed using Statistical Package for Social Sciences (SPSS) version 24. Categorical data are summarized as frequency (percentage). For regression analysis, low-to-moderate practice scores were considered “unsatisfactory” and high scores as “satisfactory.” Unadjusted and adjusted binary logistic regression was carried out to identify the predictors of satisfactory BMWW practice status. The independent variables were age, gender, educational qualification, work experience, training in BMWW, and knowledge and attitude of BMWW. All tests were two-tailed, and a *P*-value <0.05 was considered statistically significant.

Results

A total of 150 staff nurses working in a private tertiary care hospital participated in this study. The majority of them were young female participants who had studied B.Sc nursing and with a work experience of 5 years or less. About 70.7% were in the age group of 21–25 years,

90% were females, 84.7% have studied B.Sc nursing, and 94% had work experience of 5 years or less. Among the study participants, 64 (42.7%) have attended training in BMWW [Table 1].

Our study shows that concerning knowledge scores, most staff nurses (63.3%) belong to the moderate category, whereas a few (24%) were in the high category. Also, most of them (62.7%) were in the high category of attitude scores. For practice scores, half of the participants were in each moderate and high category [Figure 1].

Knowledge of BMWW

Based on a question-wise analysis of knowledge of BMWW [Table 2], more than 75% of the participants were aware of the definition of BMW (94%), the existence of a color coding system for BMWW (93.3%), and the need of following universal precautions while/after handling BMW (80.7%). Also, 50%–75% of the participants were acquainted with who is responsible for proper BMW handling and management (50%), the correct sequence

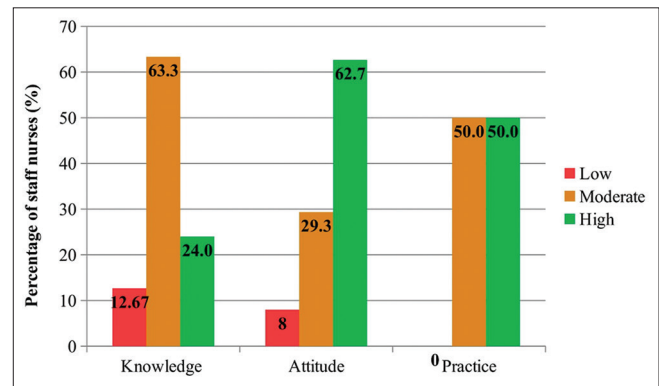


Figure 1: Categorization of knowledge, attitude, and practice scores of biomedical waste management among staff nurses (N=150)

Table 1: Baseline demographic characteristics of the study participants (n=150)

Characteristics	Frequency (percentage)
Age (in years)	
21–25	106 (70.7)
26–30	41 (27.3)
≥31	3 (2)
Gender	
Female	135 (90)
Male	15 (10)
Educational qualification	
B.Sc Nursing	127 (84.7)
Diploma in Nursing	23 (15.3)
Years of work experience	
≤5	141 (94)
6–10	8 (5.3)
>10	1 (0.7)
Attended training in biomedical waste management	64 (42.7)

of steps carried out in the handling and management of BMW (51.3%), color codes not used in the handling and management of BMW (63.3%), the duration of possible storage of BMW (69.3%), risks of improper handling and management of BMW (73.3%), and infection that cannot be spread through accidental needle stick injury (58.7%). However, only less than 50% of the participants provided correct answers for the proportion of infectious hospital-generated BMW (22%), people at risk of improper handling and management of BMW (34.7%), the time point at which segregation of BMW should happen (21.3%), persons designated to separate the wastes at the point of its production (24.7%), legislation found in India that takes care of BMW (35.3%), and logo of bio-hazard (26%).

Attitude toward BMW

On question-wise analysis of attitude toward BMW [Table 3], it was found that the majority of the

staff nurses agreed that BMW needs to be disposed of safely (81.3%), it is their duty (75.3%), and it requires a team effort (80%). Moreover, many of them did not think of BMW as an extra burden on their job (64.7%) or as an unnecessary expenditure for the hospitals (66.7%). In addition, most of them agreed that they need to take personal protective measures while disposal of BMW (84.7%), diseases can be prevented by safe handling of BMW (78%), it improves the quality of patient care (78.6%) and helps in protecting our environment (80%). Further, in this study, 65.3% of the staff nurses wanted to undergo more training sessions in BMW.

Practices of BMW

Figure 2 reveals the safe BMW practices among the staff nurses. The majority of them disposed of BMW in specific color-coded containers (98.7%) and

Table 2: Knowledge about biomedical waste management among staff nurses (n=150)

Questions on knowledge	Frequency (percentage) of correct responses
Definition of bio-medical waste	141 (94)
The proportion of hospital-generated bio-medical wastes, which are infectious	33 (22)
People at risk of improper handling and management of bio-medical wastes	52 (34.7)
Who are all responsible for proper biomedical waste handling and management	75 (50)
The time point at which segregation of biomedical waste should happen	32 (21.3)
The correct sequence of steps carried out in the handling and management of bio-medical wastes	77 (51.3)
Persons designated to separate the wastes at the point of their production	37 (24.7)
Legislation found in India that takes care of biomedical waste management	53 (35.3)
Awareness of the existence of a color coding system for the collection and storage of bio-medical wastes	140 (93.3)
Color code not used in the handling and management of bio-medical wastes	95 (63.3)
Universal precautions (personal protective measures) to be followed while/after handling bio-medical waste	121 (80.7)
The duration of possible storage of biomedical waste at the point of generation in any hospital	104 (69.3)
Risks of improper handling and management of biomedical wastes	110 (73.3)
Infection that cannot be spread through accidental needle stick injury	88 (58.7)
Logo of bio-hazard	39 (26)

Table 3: Attitude toward biomedical waste management among staff nurses (n=150)

Questions on attitude	Frequency (percentage) of responses				
	Strongly disagree	Moderately disagree	Neutral	Moderately agree	Strongly agree
Do you think biomedical waste needs to be disposed of safely?	10 (6.7)	12 (8)	4 (2.7)	2 (1.3)	120 (80)
Do you think you have a duty toward the safe disposal of biomedical waste?	8 (5.3)	6 (2)	23 (15.3)	11 (7.3)	102 (68)
Do you think biomedical waste management is teamwork?	5 (3.3)	8 (5.3)	8 (5.3)	10 (6.7)	110 (73.3)
Do you think biomedical waste management is an extra burden on your job?*	73 (48.7)	24 (16)	11 (7.3)	12 (8)	30 (20)
Do you think the safe management of biomedical waste is an unnecessary expenditure for hospitals?*	81 (54)	19 (12.7)	9 (6)	4 (2.7)	31 (20.7)
Do you think you need to take personal protective measures while disposal of biomedical waste?	10 (6.7)	10 (6.7)	3 (2)	18 (12)	109 (72.7)
Do you think diseases can be prevented by the safe handling of biomedical waste?	11 (7.3)	16 (10.7)	6 (4)	24 (16)	93 (62)
Do you think biomedical waste management improves the quality of patient care?	6 (4)	12 (8)	13 (8.7)	29 (19.3)	89 (59.3)
Do you think the environment can be protected by the safe handling of biomedical waste?	12 (8)	7 (4.7)	10 (6.7)	32 (21.3)	88 (58.7)
Do you think you need to improve your training regarding biomedical waste management?	16 (10.7)	20 (13.3)	16 (10.7)	32 (21.3)	66 (44)

*Negatively phrased statements and reversely scored

discarded used needles using a needle destroyer (90.7%). Moreover, most of them followed universal precautions or personal protective measures while disposing of the BMW. Protective gloves (91.3%), gowns (87.3%), and masks (97.3%) were used by them while disposal of BMW. Also, 98% of them washed their hands after handling BMW.

Figure 3 shows that the majority of the staff nurses disposed of various BMWs in the correct color-coded bag/puncture-proof container. All of them discarded Foleys' catheter in the correct container. Also, more than 75% of the staff nurses disposed of BMW such as needles and blades (93.3%), syringes (95.3%), intravenous sets (95.3%), soiled cotton swabs (94%), placenta (92.7%), and broken ampoules (77.3%) in the appropriate containers. About 50–75% of them disposed of blood samples (57.3%), blood sets (66.7%), and sputum cups (60.7%) correctly. However, only a few of them discarded BMWs such as outdated medicines (36.7%) and culture plates (21.3%) in the correct color-coded bags. In addition, most of them (94.7%) disposed of general waste such as papers and tea cups appropriately in black bags.

Predictors of BMWM practices

In unadjusted binary logistic regression, it was found that females have 4.6 times higher odds (95% confidence interval [CI]:1.2–16.9; $P = 0.02$) to be in the satisfactory BMWM practice group compared to males. Similarly, staff nurses who attended training in BMWM have 3.8 times higher odds (95% CI: 1.9–7.5; $P < 0.001$) of being in the satisfactory BMWM practice group. Also, participants in the moderate and high category of knowledge scores had 4.5 (95% CI: 1.4–14.6; $P = 0.01$) and 4.2 (95% CI: 1.2–15.1; $P = 0.03$) times higher odds of being in satisfactory BMWM practice group [Table 4]. After adjusting for other independent variables, all these three factors were found significantly associated with satisfactory BMWM practice scores [Table 5].

Various facilitating and hindering factors in safe BMWM were mentioned by the staff nurses. They felt

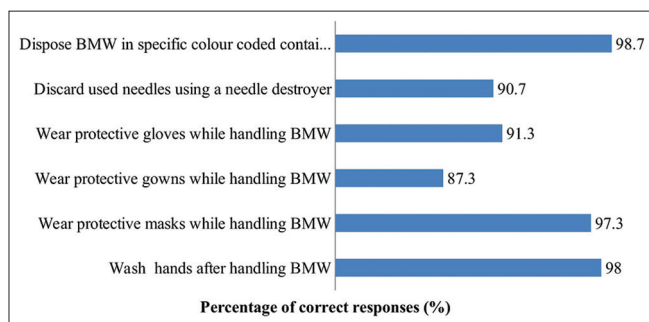


Figure 2: Safe biomedical waste management practices among staff nurses (N=150). BMW: biomedical waste

that the availability of color-coded containers for BMW disposal (34.7%), personal protective equipment (9.3%), needle burner (8.7%), the educational poster on color coding for BMWM (5.3%), and adequacy of disinfecting materials (2.7%) as the facilitating factors in safe BMWM. They also felt fear toward the use of needle burners (4.7%) and shortage of time (2%) as hindering factors.

Discussion

This study investigated the knowledge, attitude, and practice of BMWM among staff nurses. Predictors of the BMWM practices were identified based on the participants' self-reported responses.

It is very inspiring to find that the majority of the staff nurses had a moderate level of knowledge and a few of them had high knowledge of BMWM. Moreover, for attitude, most of them were in the high category. Furthermore, half of the respondents were in each moderate and high category of BMWM practices, respectively. These encouraging findings could be attributed to the fact that 42.7% of the respondents were trained in BMWM.

Knowledge of BMWM

In our study, the knowledge scores on BMWM were moderate and high among 63.3% and 24% of the staff nurses, respectively, which was much better than the findings observed in similar studies. The study conducted by Prashanth *et al.*,^[13] in Maharashtra, showed that 47% of nurses had average to good knowledge and 13% scored excellent regarding BMWM. Congruent findings were observed in another study by Sharma *et al.*,^[14] in Jaipur, which revealed that 48% and 16% of nurses had good to average and excellent scores on knowledge of BMWM, respectively.

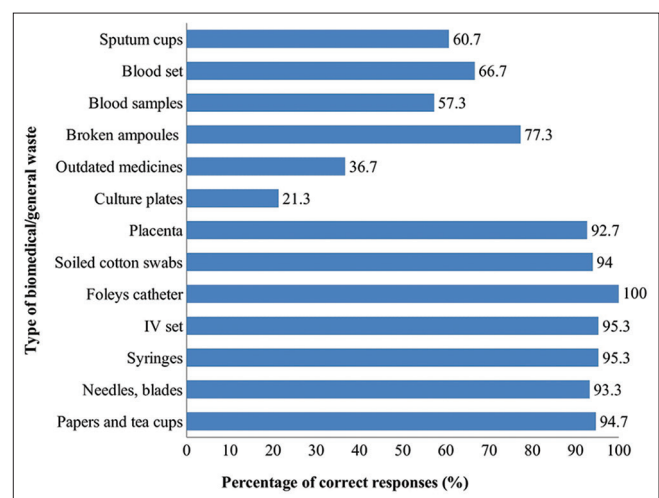


Figure 3: Percentage of correct responses regarding the practice of disposal of biomedical/general waste in specific color-coded bag/puncture-proof container among staff nurses (N=150). IV: intravenous

Table 4: Predictors of biomedical waste management practice by unadjusted binary logistic regression (n=150)

Characteristics	BMWM practice score		Unadjusted OR (95% CI)	P
	Satisfactory (n=75)	Unsatisfactory (n=75)		
Age category in years				
21–23 (n=51)	22 (43.1)	29 (56.9)	1 (Reference)	NA
24–26 (n=69)	40 (58)	29 (42)	1.8 (0.9 – 3.8)	0.10
> 26 (n=30)	13 (43.3)	17 (56.7)	1 (0.4 – 2.5)	0.98
Gender				
Male (n=15)	3 (20)	12 (80)	1 (Reference)	NA
Female (135)	72 (53.3)	63 (46.7)	4.6 (1.2 – 16.9)	0.02*
Qualification				
B. Sc nursing (n=127)	61 (48)	66 (52)	1 (Reference)	NA
Diploma in nursing (n=23)	14 (60.9)	9 (39.1)	1.7 (0.7 – 4.2)	0.26
Work experience in years				
<3 (n=74)	35 (47.3)	39 (52.7)	1 (Reference)	NA
3–5 (n=66)	34 (51.5)	32 (48.5)	1.2 (0.6 – 2.3)	0.61
> 5 (n=10)	6 (60)	4 (40)	1.7 (0.4 – 6.4)	0.45
Training status				
Not attended (n=80)	28 (35)	52 (65)	1 (Reference)	NA
Attended (n=70)	47 (67.1)	23 (32.9)	3.8 (1.9 – 7.5)	<0.001*
Knowledge score				
Low	4 (21.1)	15 (78.8)	1 (Reference)	NA
Moderate	52 (54.7)	43 (45.3)	4.5 (1.4 – 14.6)	0.01*
High	19 (52.8)	17 (47.2)	4.2 (1.2 – 15.1)	0.03*
Attitude score				
Low	4 (33.3)	8 (66.7)	1 (Reference)	NA
Moderate	26 (59.1)	18 (40.9)	2.9 (0.7 – 11)	0.12
High	45 (47.9)	49 (52.1)	1.8 (0.5 – 6.5)	0.34

BMWM: biomedical waste management; P-values are based on the unadjusted binary logistic regression model, *Statistically significant (P<0.05), NA- Not applicable

Table 5: Predictors of biomedical waste management practice by adjusted binary logistic regression (n=150)

Characteristics	Adjusted OR (95% CI)	P
Gender		
Male	1 (Reference)	NA
Female	4.8 (1.2–19.2)	0.03*
Training status		
Not attended	1 (Reference)	NA
Attended	3.8 (1.8–7.8)	<0.001*
Knowledge score		
Low	1 (Reference)	NA
Moderate	3.5 (1.0 – 12.2)	0.05*
High	4.3 (1.1 – 16.7)	0.04*

BMWM: biomedical waste management; P-values are based on the adjusted binary logistic regression model, *Statistically significant (P<0.05), NA- Not applicable

It is optimistic to note that more than 50% of the staff nurses were aware of the definition of BMW, the color coding system, universal precautions while/ after its handling, personnel responsible for its proper management, the correct sequence of steps in its management, its maximum duration of storage in hospital, and risks of its improper management. These observations are consistent with those of similar studies conducted in different parts of the country.^[10,15]

On the contrary, a few other studies found a poor level of awareness and knowledge about BMWM among the study participants. A study conducted by Uddin *et al.*^[12] on knowledge of hospital waste management among senior staff nurses working in a medical college hospital in Bangladesh showed that only 7.2% of them answered correctly all the questions regarding knowledge of BMW and only 46.4% of them knew about color-coded bins for BMW disposal.

However, in our study, only less than 50% of the participants responded correctly to a few of the questions in the knowledge domain. They had knowledge gaps in areas such as people at risk of its improper management, persons designated to separate the wastes at the point of its production, BMW (management and handling) rules, the logo of biohazard, proportion of infectious BMW, and the time point at which its segregation should happen. This was in contrast to studies by Haider *et al.*^[16] and Malini *et al.*^[17] in which a greater percentage of nurses were aware of BMWM rules and the logo of biohazard. This could be the impact of better training programs, for their staff nurses with greater emphasis on these aspects, conducted before their knowledge assessment. However, the study by Mane *et al.*^[18] showed that the knowledge of persons responsible for the disposal of biomedical waste

was 18.1%, which was much lesser as compared to the present study (50%). These lacunae in knowledge need to be filled by imparting training to the staff nurses with greater emphasis on these aspects.

Attitude toward BMWM

Most participants (62.7%) in our study belonged to the high category in the attitude domain. They felt that BMW needs to be managed safely; it was their duty and requires a team effort. They did not consider it as an extra burden or unnecessary expenditure by the hospital. Further, it was encouraging to find that 65.3% of the staff nurses wanted to undergo more training sessions in BMWM. These findings were similar to the results of studies conducted by Malini *et al.*^[17] in a government tertiary care teaching hospital in Puducherry and Anand *et al.*^[19] in a teaching hospital in Haryana. On the contrary, a study by Mane *et al.*^[18] revealed that more than half of the staff nurses who participated in their study perceived BMWM as an extra burden.

In our study, the staff nurses recognized the need to use personal protective measures while handling BMW and understood that proper BMWM aids in the prevention of hospital-acquired diseases, improves the quality of patient care, and ensures environmental protection. A similar level of positive attitude among staff nurses was observed in various studies.^[20,21]

Practices of BMWM

It is highly encouraging to know that in the present study, 50% of staff nurses were in the moderate and high categories, respectively, and none of them belonged to the low category concerning practices of BMWM. In our study, the majority of the staff nurses (98.7%) segregated the wastes generated in the hospital in specific color-coded bins. This was much higher than that reported in other studies; 60% in Haider *et al.*^[16] study and 73.3% in Mathur *et al.*^[10] study. In our study, more than 75% disposed of wastes such as Foleys catheters, sharps (needles/blades, broken ampoules), syringes, IV sets, soiled cotton swabs, placenta, and paper tea cups in the correct bin. Around 50–70% disposed of blood samples, blood sets, and sputum cups correctly. However, only less than 40% of the staff nurses disposed of outdated medicines and culture plates in the correct color-coded bin. Thus, further training for our staff nurses must emphasize these aspects to strengthen our BMWM practices. Results of similar studies show that more than 75% of nurses disposed of soiled dressings and anatomical waste in the correct bin.^[17,18] Disposal of sharps in the correct bin by nurses varied from 59.6 to 71.6%.^[10,17,18] They were confused regarding the disposal of general plastic items^[18] (34% disposed of in the correct bin) and expired or contaminated drugs^[17] (46.8% discarded in the right bin). The discrepancies between our study

results and those of other studies could be attributed to the differences in the study setting, experiences/training undergone by the study participants, and variations in the data collection instruments.

Our study participants also used needle destroyers and adhered to the use of personal protective measures (gloves, masks, gowns, hand washing) while handling BMW. These findings are congruent with similar studies conducted in various parts of the country.^[16-18]

Predictors of BMWM practices

Our study shows that the female gender, attending training in BMWM, and having a moderate and high knowledge of BMWM were associated with satisfactory BMWM practice scores among staff nurses. However, a similar study conducted among healthcare workers in Saudi Arabia did not find any gender difference in hospital waste management.^[22]

With regard to training, our findings were supported by similar studies conducted among healthcare workers, which showed that those who were trained in BMWM had better BMWM practices.^[23,24] Also, a study conducted in Pakistan has proved that 3 days of structured training sessions among nurses regarding BMWM produced a significant improvement in their knowledge and practice of BMWM.^[25]

Furthermore, our findings were similar to another study conducted in Iran, which showed a strong positive association between knowledge and practice of BMWM among their healthcare staff.^[26]

Limitations

Because the data collection tool was a self-administered questionnaire, there is a possibility of social desirability bias. However, measures were taken to prevent the bias, such as anonymous data collection and informing participants that they need not mention their identifiers in the filled questionnaire. Direct observation of BMWM practices among staff nurses during their duty hours would have yielded more accurate results compared to self-reported practices. Another limitation is that the study was conducted in a single multispecialty hospital and the findings might not be generalizable.

Conclusion

The present study shows that the female gender, attending training in BMWM, and having a moderate and high knowledge of BMWM were significant predictors of satisfactory BMWM practice among staff nurses. Thus, periodic training programs need to be conducted for staff nurses to enrich their knowledge, and further improve their practices on BMWM. Also, future

studies on designing innovative training programs and measuring their impact in large multicentric settings would be warranted.

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Conflicts of interest

There are no conflicts of interest.

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