

A study of knowledge, attitude, and practices regarding biomedical waste management among the health-care workers in a multispeciality teaching hospital at Delhi

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Abstract

Background: There is an increased global awareness among health professionals about the health hazards owing to biomedical waste (BMW) and appropriate management techniques, but the level of awareness in India is found to be unsatisfactory. Adequate knowledge about the health hazards of hospital waste, proper techniques and methods of handling the waste, and practice of safety measures can go a long way toward the safe disposal of hazardous hospital waste and protect the community from various adverse effects of the hazardous waste

Objective: To find out the knowledge, attitude, and practices regarding BMW management among the health-care workers (HCWs).

Materials and Methods: This hospital-based, cross-sectional, descriptive study was conducted in a 998-bedded multispeciality teaching hospital, in Delhi, from March 2 to April 10, 2013. The study consisted of 120 HCWs as participants, which included 30 doctors, 30 nurses, 30 laboratory staffs, and 30 sanitary staffs. A predesigned structured questionnaire consisting of 24 questions was administered to the participants after obtaining their consent and briefing them about the study. Data collected were analyzed using descriptive statistical methods applying χ^2 -test to the frequency tables as a test of significance.

Result: Correct color coding for waste disposal was known to 84.2% of respondents, and awareness about transmission of important diseases such as HIV infection and hepatitis B through BMW was known to 66.7% of the participants. The practice of recapping of used needles, which is one of the important risk factors for needle-stick injuries was found among 25.8% of respondents and was the highest among the sanitary staffs (83.3%). Awareness about the practice of initiating accident reporting pro forma on contact with blood/body fluids of HIV-infected patients was found to be 77.5% overall and only 10% among the sanitary staffs. Similarly, the awareness about the practice of postexposure prophylaxis for the prevention of HIV infection was found to be 71.7% overall and only 10% among the sanitary staffs, which could be owing to their poor literacy status. However, the attitude of all HCWs including the sanitary staffs toward BMW management was positive and favorable.

Conclusion: Training of the sanitary staff on all aspects of BMW management will lead to a further improvement in BMW disposal in the hospital.

KEY WORDS: Biomedical waste, health-care worker, knowledge, awareness, attitude

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Introduction

Biomedical Wastes are defined as wastes that are 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 biological^[1]. Studies have shown that 85% of the waste generated in health care establishments is non-hazardous, about 10% is infectious

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and hazardous, and the remaining 5% is non-infectious but hazardous waste^[2]. In India, approximately 0.33 million tons of hospital waste is generated yearly and in hospital settings, 0.5-2.0 Kg of Biomedical waste is being generated per bed every-day^[3]. Government of India has promulgated Biomedical Waste (Management and Handling) Rules, 1998 which is a legal binding on all hospitals to ensure proper disposal of BMW. The responsibility of hospital waste disposal was with the municipal or governmental authorities earlier, but with these Rules, it has become the responsibility of the hospitals.^[4] In spite of increased global awareness among health professionals about the health hazards due to BMW and its disposal, the level of awareness, amongst HCWs in India, is found to be unsatisfactory^[5,6]. Proper knowledge about the health hazards of hospital waste and its disposal, and sound practices of safety measures can lead to its safe disposal and protect the community from its adverse effects^[7]. With this background, the present study was conducted to assess the knowledge, attitude and practices of health care workers regarding biomedical waste management. The study was conducted in Army's Base Hospital at Delhi Cantt which is a 998 bedded busy multispecialty hospital with 86% bed occupancy and an average daily OPD attendance of 2497 patients.

Materials and Methods

This cross-sectional study was conducted in Army's Base Hospital at Delhi Cantonment, which is a busy multispecialty hospital from March 2 to April 10, 2013. The study participants included 120 health-care professionals, which included 30 doctors, 30 nurses, 30 laboratory staffs, and 30 sanitary staffs working in the hospital. A structured questionnaire was prepared based on the review of literature from books, journals, World Wide Website, and published research studies; a pilot study was done to test the questionnaire. Section 1 of the questionnaire consisted of 5 items related to selected demographic variables, and section 2 was divided into four parts containing 7 items for assessing knowledge, 10 items for assessing practices, 3 items for assessing employee education, and 4 items for assessing attitude of the participants regarding BMW management. After obtaining their consent and briefing them about the study, the structured questionnaire was administered to the study participants. All the participants were personally interviewed by the researcher. Ethical approval was taken from the research committee of the institution before starting the study.

Statistical Analysis

The data collected were analyzed using descriptive statistical method. The χ^2 -test was applied to the frequency tables as a test of significance.

Inclusion and Exclusion Criteria

A list of staffs available in the four different categories was obtained from the hospital administration, and all were contacted for their willingness to participate in the study.

Those who were unwilling to participate were excluded from the study. Random sampling was done to select 30 participants from each category from the list of willing people.

Result

The findings on the knowledge of HCWs regarding BMW management are shown in Table 1. It highlights that awareness regarding the correct definition of BMW among HCWs was found to be 54.2% and was found to be the highest among laboratory staff (86.7%) and the lowest among sanitary staff (0%). Awareness regarding the exact legislative act/BMW rules was found to be poor at 8.3% and was the highest among doctors at 20% and the lowest for sanitary staff at 0%. Although majority of the respondents were aware of the existence of some law related to BMW management, the exact rule was not known to most of them. Although almost all the respondents knew that BMW is hazardous, the awareness about transmission of important diseases such as HIV infection and hepatitis B was known to 66.7% of respondents, which included 86.7% of doctors, 80% of nurses and laboratory staffs, but only 20% of sanitary staffs. Only 14.2% of the respondents knew that the waste can be stored for a maximum period of 48 h. Correct color coding for waste disposal was known to 84.2% of respondents. The awareness in this regard was the best among laboratory staffs (100%), followed by nurses and sanitary staffs (80%), and the least among doctors (76.7%).

The findings on the practices of HCWs regarding BMW management are shown in Table 2. It shows that all the respondents (100%) felt that hospital waste should be segregated into different categories. Maintenance of register for waste disposal was being followed by 68.3% of respondents, which included 86.7% doctors, 66.7% nurses, 56.7% laboratory staffs, and 63.3% sanitary staffs. Majority (98.3%) of the respondents had been immunized against hepatitis B. Only two nurses had not been immunized as they had joined service very recently. Regular annual medical examination was being done for all the (100%) respondents. Practice of recapping of used needles, which is viewed as one of the important risk factors for needle-stick injuries, was found to be 25.8% and was the highest among the sanitary staffs (83.3%). Only one (3.3%) doctor was found following this practice. Awareness about the practice of initiating accident reporting pro forma on contact with blood/body fluids of HIV-infected patients was found to be 77.5%, with 100% of doctors, nurses, and laboratory staffs being aware of it. The awareness was found to be poor at 10% among sanitary staffs. Similarly, awareness about the practice of postexposure prophylaxis for the prevention of HIV infection was found to be 71.7%. All the doctors and nurses and 76.7% of laboratory staffs were aware of this practice, but only 10% of sanitary staffs knew about it. Use of protective clothing was found to be 100% among all the categories of HCWs.

The findings of knowledge, practices, and attitude of HCWs about employee education on BMW management

Table 1: Knowledge of HCWs regarding BMW management

Knowledge regarding BMW	Doctors, n (%)	Nurses, n (%)	Laboratory staffs, n (%)	Sanitary staffs, n (%)	Total, n (%)
Awareness regarding correct definition of BMW	19 (63.3)	20 (66.7)	26 (86.7)	0 (0)	65 (54.2)
Awareness regarding the exact legislative act/BMW rules	6 (20)	3 (10)	1 (3.3)	0 (0)	10 (8.3)
Knows the existence of written guidelines on BMW management in the hospital	27 (90)	30 (100)	26 (86.7)	27 (90)	110 (91.7)
Knows about important diseases transmitted through BMW	26 (86.7)	24 (80)	24 (80)	6 (20)	80 (66.7)
Knows that the waste can be stored for a maximum of 48 h	10 (33.3)	6 (20)	1 (3.3)	0 (0)	17 (14.2)
Knows the correct color coding for BMW disposal	23 (76.7)	24 (80)	30 (100)	24 (80)	101 (84.2)
Knows the need for disinfection of infected waste before disposal	30 (100)	30 (100)	30 (100)	30 (100)	120 (100)

$\chi^2 = 52.71$; degrees of freedom = 18; $p < 0.001$. The differences in awareness across the four categories of HCWs were statistically significant.

Table 2: Practices of HCWs regarding BMW management

Practices regarding BMW	Doctors, n (%)	Nurses, n (%)	Laboratory staffs, n (%)	Sanitary staffs, n (%)	Total
Segregation of waste into different categories	30 (100)	30 (100)	30 (100)	30 (100)	120 (100)
Maintenance of a register for waste disposal	26 (86.7)	20 (66.7)	17 (56.7)	19 (63.3)	82 (68.3)
Immunization against hepatitis B infection	30 (100)	28 (93.3)	30 (100)	30 (100)	118 (98.3)
Regular annual medical examination	30 (100)	30 (100)	30 (100)	30 (100)	120 (100)
Recapping of used needles	1 (3.3)	4 (13.3)	1 (3.3)	25 (83.3)	31 (25.8)
Sustaining needle-stick injury during patient care	0 (0)	3 (10) ^a	0 (0)	0 (0)	3 (2.5)
Awareness about practice of initiating accident reporting perform on contact with blood/body fluids of HIV-infected patients	30 (100)	30 (100)	30 (100)	3 (10)	93 (77.5)
Awareness about practice of postexposure prophylaxis for prevention of HIV infection	30 (100)	30 (100)	23 (76.7)	3 (10)	86 (71.7)
Use of protective clothing	30 (100)	30 (100)	30 (100)	30 (100)	120 (100)

$\chi^2 = 115.25$; degrees of freedom = 24; $p < 0.001$. The differences in practices across the four categories of HCWs were significant.

^aAll the affected nurses reported the matter to their senior.

Table 3: Knowledge, practices, and attitude about employee education on BMW management

Employee education	Doctors, n (%)	Nurses, n (%)	Laboratory staffs, n (%)	Sanitary staffs, n (%)	Total, n (%)
Has undergone training program on BMW management	21 (70)	29 (96.7)	27 (90)	28 (93.3)	105 (87.5)
Knows about education about BMW management in the hospital	30 (100)	30 (100)	28 (93.3)	30 (100)	118 (98.3)
Will like to attend a program on BMW management	30 (100)	26 (86.7)	30 (100)	30 (100)	116 (96.7)

$\chi^2 = 1.74$; degrees of freedom = 6; $p > 0.05$.

are given in Table 3. It brings out that majority (87.5%) of the subjects had undergone training program on BMW management, which included 70% doctors, 96.7% nurses, 90% laboratory staffs, and 93.3% sanitary staffs. There is, thus, a need for more emphasis in the training of doctors. Majority (96.7%) of the participants knew about the existence of education program on BMW management in the hospital. Two persons among the laboratory staffs who did not know about it had recently joined the hospital. Majority (96.7%)

of the participants said they would like to attend a training program on BMW management, which included all the doctors, laboratory staffs, sanitary staffs, and 86.7% of nurses.

The findings on attitude of HCWs regarding BMW management are shown in Table 4. It highlights that only 2.5% of participants felt that BMW management is not an issue at all, which included 3.3% of nurses and 6.6% of sanitary staffs. Only 5% of the respondents felt that proper management of BMW is the sole responsibility of the government, which

Table 4: Attitude of HCWs regarding BMW management

S.no.	Attitude regarding BMW	Doctors, n (%)	Nurses, n (%)	Laboratory staffs, n (%)	Sanitary staffs, n (%)	Total, n (%)
1	Feels that BMW management is not an issue at all	0 (0)	1 (3.3)	0 (0)	2 (6.7)	3 (2.5)
2	Feels that proper management of BMW is the sole responsibility of the government	0 (0)	2 (6.7)	2 (6.7)	2 (6.7)	6 (5)
3	Feels that BMW management efforts increase financial burden on management	5 (16.7)	6 (20)	6 (20)	5 (16.7)	22 (18.3)
4	Feels that safe management of BMW is an extra burden on work	0 (0)	3 (10)	0 (0)	6 (20)	9 (7.5)

$\chi^2 = 11.73$; degrees of freedom = 9; $p > 0.05$.

included 6.7% each of nurses, laboratory staffs, sanitary staffs, and none of the doctors. A total of 18.3% of the respondents felt that BMW management efforts increase the financial burden in management, which included 20% each of nurses and laboratory staffs and 16.7% each of doctors and sanitary staffs. Only 7.5% of the participants felt that safe management of BMW is an extra burden on work, which included 20% of sanitary staffs and 10% of nurses, but none of the doctors or laboratory staff felt like that.

Discussion

Awareness regarding the correct definition of BMW and about the diseases spread by it were good among all the other categories of HCWs, except the sanitary staff. The poor knowledge of the sanitary staffs could be owing to their poor literacy status, as majority of them were only educated upto eighth standard. Correct color coding was known to a majority (84.2%) of respondents but was least among the doctors (76.7%) when compared with other categories of HCWs. Similar observations were made by Mathur et al.^[7] in their study.

All respondents except two nurses had been immunized against hepatitis B, and all HCWs of all categories had undergone annual medical examination. This reflects on the implementation of sound preventive medicine practices in the hospital where individuals are not allowed to proceed on promotion/posting/leave unless they get their immunization/medical examinations completed. Practice of recapping of used needles was the highest among the sanitary staffs (83.3%), but only one doctor was found following this practice (3.3%). This was in contrast to the study done by Radha^[8] who found this practice among 70% of the doctors. This could be because of regular training of staffs on precautions to be taken for HIV/AIDS prevention. Awareness about practice of initiating accident reporting pro forma and postexposure prophylaxis on contact with blood/body fluids of HIV-infected patients was good among all the categories of HCWs except sanitary staff, which could again be owing to their poor literacy status and lack of understanding about the practice. The other reason for the low level of awareness among sanitary

staffs is that they are the functionaries who are least related to patient-care directly and are relatively less aware of the procedures. Use of protective clothing was found to be 100% among all the categories of HCWs. This indicates strict implementation of policies and procedures in the hospital.

Although majority (87.5%) of all categories of HCWs had attended training program on BMW management, it was the least among the doctors when compared with other respondents. There is, thus, a need for more emphasis on the training of doctors. Most of the participants knew about the existence of education program on BMW management and were willing to attend such a program in the hospital.

The attitude of all HCWs including sanitary staffs toward BMW management was positive and favorable, as only 2.5% of participants felt that BMW management is not an issue and 7.5% of them felt that safe management of BMW is an extra burden on work. This was in contrast with findings of the study by Radha,^[8] who found that the attitude of majority of the sanitary staffs was less favorable.

The strength of the study was owing to a pilot study carried out before the main study and the fact that each participant was personally interviewed by the study team and not handed over the pro forma to fill and return. The limitation of the study is that, as far as the attitude part is concerned, it is difficult to tell how honest the response was as many people understand what to say in response to a question and the very presence of the researcher can affect their response to the questions related to attitude.

Overall, the knowledge, attitude, and practices about BMW management among HCWs in the hospital were found to be much better than those reported by other workers. This could be attributed to strict instructions by the authorities, better discipline in the armed forces, and Base Hospital, Delhi Cantonment, being a teaching hospital.

Conclusion

The study outlines a significant gap in awareness and practice in the execution of BMW management rules among the sanitary staffs, which could be because of their poorer literacy status. Training of sanitary staffs should, therefore, be

specially emphasized on all aspects of BMW management. Training of doctors on certain theoretical aspects of BMW, such as definition of BMW, BMW rules/legislation, and other such issues, is a must, as it is a teaching institution. Overall, the knowledge, attitude, and practices about BMW management among HCWs in the hospital were found to be much better than those reported by other workers.

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