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Research Article

Knowledge, attitude and practice of biomedical waste management among health care personnel in a teaching institution in Haryana, India

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ABSTRACT

Background: The amount of biomedical waste being generated in our country is increasing day by day. Biomedical waste if not handled properly can pollute the environment and can spread many harmful diseases. Health care workers in our country are still not fully aware about proper BMW handling and disposal, despite increasing global awareness on it. The objective of the study was to understand the level of awareness regarding BMW handling and disposal among health care professionals in our institution.
Methods: After taking written informed consent doctors, nurses, lab technicians and class IV employees working in our institution were included. A pre designed questionnaire was used for data collection. Data was analysed using SPSS software and results were interpreted into percentages.
Results: 305 participants took part in the study. Doctors, nurses and lab technicians had good knowledge, attitude and practice regarding biomedical waste management but there was scope of improvement in certain areas. Knowledge, attitude and practices regarding biomedical waste management of class IV employees were found to be very low.
Conclusions: There should be a continuous training programme for all health personnel with special focus on sanitary staff. Biomedical waste management rules should be strictly implemented at all levels.

Keywords: Biomedical waste management, Hepatitis B, Universal precautions, Biohazard

INTRODUCTION

As there is a significant expansion of the health care facilities in our country, the amount of biomedical waste being generated is also increasing. Biomedical waste (BMW) is "waste generated during diagnosis, treatment or immunization of human beings or animals, or in research activities pertaining thereto, or in the production or testing of biologicals".[1]

Biomedical waste if not managed properly can spread highly contagious diseases and damage the environment.[2] Of the total waste generated, 80-85% is general waste which is non-infectious and 15% is infectious and hazardous waste. This infectious and hazardous waste can be harmful for health workers, general public and environment.[3,4] On an average about 0.33 million tons of hospital waste is generated in India annually and the waste generation rate ranges from 0.5 to 2.0 kg/bed/day.[5] The growth of BMW is expected at around eight per cent annually.[6] Improper handling of BMW can spread many diseases but the most dangerous ones are Hepatitis B, Hepatitis C and AIDS and also a cause of water , air and soil pollution.[7]

Various studies in the past have shown that health care workers in our country are still not fully aware about proper BMW handling and disposal. This is inspite of the fact that globally there is an increasing awareness about proper BMW handling and disposal.[6] With this background, present study was conducted to understand the level of awareness regarding BMW handling and disposal among health care professionals in our institution and to identify pitfalls in this practice.

METHODS

This was an observational, descriptive, hospital based, cross sectional study which was conducted in our institution in the month of May and June 2016. Ethical clearance was taken from Institute Ethics Committee. The study group comprised of healthcare personnel who included doctors, nurses, laboratory technicians and Class IV employees working in our institution after taking their written informed consent.

Participants who didn't give consent to participate were excluded from the study. A predesigned questionnaire was used for data collection. The study was pretested on a small number of participants comprising of 5 from each group (doctors, nurses, laboratory technicians and class IV employees) who were requested to report any question which they could not understand. Confidentiality of participants was strictly maintained. Data entry was done in Microsoft Excel. Data was analysed using SPSS software version 22 and results were interpreted into percentages.

RESULTS

A total of 305 participants (120 doctors, 110 nurses, 15 lab technicians and 60 class IV employees) took part in the study. Table 1 shows knowledge of various health personnel regarding BMW management. Around 96% doctors, 91% nurses, 80 % lab technicians and only 42 % class IV employees knew about primary source of BMW generation. Knowledge regarding different BMW categories was fairly good among doctors (91.6%) but only 72.7% nurses, 66.6% lab technicians and 25% class IV employees knew about it. Knowledge about BMW rules and regulations was least among class IV employees (16.7%) followed by nurses (45.4%), lab technicians (40%) and doctors (70.8%). Fifty four percent (54.2%) of doctors, 36.4% of nurses, 33.3% of lab technicians and 13.3% of class IV employees knew that BMW cannot be stored beyond 48 hours. Eighty seven percent (87.5%) of doctors correctly identified biohazard symbol while 52.7% of nurses, 66.6% of lab technicians and only 20% of class IV employees could identify it. Only 33% of class IV employees knew about colour coding of containers as compared to 93% doctors, 86% nurses and 80% lab technicians. Doctors, nurses and lab technicians had excellent knowledge about universal precautions (100%) while only 33.3% of class IV employees knew about them. Knowledge about diseases transmitted by BMW was least among class IV employees (41.6%).

Table 2 shows attitude of health personnel regarding BMW Management. All the doctors in our study thought that safe disposal of BMW is necessary and it is a team work as compared to 40 % of class IV employees. Forty four percent (44%) of nurses thought that BMW management created extra burden on their work while 58 % of class IV employees shared the same feelings. Forty one percent (41.6%) doctors felt that BMW management creates extra financial burden on hospitals. All doctors and lab technicians wanted to upgrade their knowledge on BMW management while 75% of class IV employees wanted to learn more about BMW management.

Table 1: Knowledge of health personnel regarding BMW management.

Knowledge on BMW management	Doctors (N=120) N (%)	Nurses (N=110) N (%)	Lab technicians (N=15) N (%)	Class IV employees (N=60) N (%)
Primary source of BMW	115 (95.8%)	100 (90.9%)	12 (80%)	25(41.6%)
Knowledge of different BMW categories	110 (91.6%)	80(72.7%)	10 (66.6%)	15(25%)
BMW management rules	85 (70.8%)	50(45.4%)	6(40%)	10(16.7%)
BMW Storage	65(54.2%)	40(36.4%)	5(33.3%)	8 (13.3%)
Biohazard symbol	105(87.5%)	58(52.7%)	10 (66.6%)	12 (20%)
Colour coding of containers	112 (93.3%)	95 (86.3%)	12 (80 %)	20 (33.3%)
BMW disposal	98 (81.6%)	80 (72.7%)	11(73.3%)	18 (30%)
Universal precautions	120 (100%)	110 (100%)	15 (100%)	20 (33.3)
Diseases transmitted by BMW	110 (91.6%)	90(81.8%)	12 (80%)	25 (41.6%)

Table 3 shows various practices of health personnel on BMW Management. All doctors, nurses and lab technicians in our study said they don't recap used needles. More than 80% of doctors and nurses were discarding used needles in needle destroyer in contrast to 50% of class IV employees practicing it. Around 80% of doctors, nurses and lab technicians followed proper disposal of BMW in specific color coded containers while only 42% of class IV employees did so. Eighty eight (88%) of doctors, 68% of nurses, 66% of lab technicians and 33% of class IV employees were found to be vaccinated against hepatitis B in our study. Sixteen percent (16.6%) of class IV employees reported injury due to sharps as compared to 29.2% of doctors, 18.1% of nurses and 15% of lab technicians.

Table 2: Attitude of health personnel regarding BMW management.

Attitude on BMW management	Doctors (N=120) N (%)	Nurses (N=110) N (%)	Lab technicians (N=15) N (%)	Class IV employees (N=60) N (%)
Safe disposal of BMW is necessary	120 (100%)	105(95.4%)	12 (80%)	27 (45%)
BMW management is a team work	120 (100%)	100 (90.9%)	11 (73.3%)	25(41.6%)
BMW management creates extra burden on my work	45(37.5%)	48 (43.6%)	6 (40%)	35(58.3%)
BMW management is a financial burden on hospitals	50(41.6%)	65(59%)	10 (66.6%)	30 (50%)
Upgrade knowledge on BMW management	120 (100%)	106 (96.3%)	15 (100%)	45 (75 %)

Table 3: Practice of health personnel regarding BMW management.

Practice of BMW management	Doctors (n=120) N (%)	Nurses (n=110) N (%)	Lab technicians (n=15), N (%)	Class iv employees (n=60), N (%)
Don't recap used needles	120 (100%)	110(100%)	15 (100%)	40 (66.6%)
Discard used needles in needle destroyer	105(87.5%)	95(86.3%)	12 (80%)	32 (53.3%)
Disposal of BMW waste in specified colour coded containers	100 (83.3%)	85(77.2%)	12 (80%)	25 (41.6%)
Hepatitis b vaccination done	106 (88.3%)	75 (68.1%)	10 (66.6%)	20 (33.3%)
Injury reporting due to sharps	35 (29.2%)	20 (18.1%)	3 (15%)	10 (16.6%)

DISCUSSION

The study was conducted to assess the knowledge, attitude and practice of biomedical waste management of health personnel in our institution. Knowledge regarding BMW management among doctors, nurses and lab technicians was found to be satisfactory as compared to class IV employees in our study. This finding was similar as reported in previous studies.[6,8-12] This low standard of knowledge regarding BMW management among class IV employees may be due to the lack of any formal training to them. Kapoor et al in their systematic review from dental teaching institutions in our country concluded that level of knowledge in study population regarding BMW was low and continuous training programmes were needed to enhance it.[13]

Ninety one percent (91.6%) doctors correctly answered about different BMW categories whereas in a study by Pandit et al none could answer it correctly.[8] Madhukumar et al reported only 3% of participants knew about different healthcare waste categories out of which 62.5% were technicians.[14] Fifty six percent (56%) of the study population in a study by Basu et al knew about different BMW categories.[15] In a study by Shafee at al only 1.6% of the study population had knowledge regarding BMW categories which may be due to the fact that this study included only paramedical staff.[11] In our study 70% doctors, 45% nurses, 40% lab technicians and only 16% of class IV employees knew about BMW rules and regulations as compared to 80%, 60%, 14% and 12% respectively in a study by Saini et al.[10] Mathur et al reported that 90% doctors and nurses, 84% lab technicians and only 25% sanitary staff knew about BMW rules.[6] Basu et al reported 94% of the study population knew about BMW rules.[15] But Sharma identified lack of knowledge among qualified health personnel regarding BMW rules and regulations.[16]

In a study by Bala et al more than 60% of the study population had no knowledge of BMW legislation.[17] Majority of participants in our study didn't know that BMW should not be stored beyond 48 hours which was consistent with the findings by Malini et al.[9] Majority of doctors (87.5%) in our study correctly identified Biohazard symbol. This was consistent with the studies previously done by Madhukumar et al and Basu et al.[14,15] Malini et al reported 100% right identification of Biohazard symbol by both doctors and lab technicians.[9] Only 20% of class IV employees could correctly recognise Biohazard symbol which was similar to Malini et al study (21.6% multipurpose workers).[9] Fifty percent (50%) nurses in our study properly identified Biohazard symbol whereas 64% of nurses did it in a study by Haider et al.[2] In a previous study 76% of study population (junior doctors) knew about different colour coded containers for BMW disposal as compared to 93% of doctors in our study.[15] Ninety six percent (96%) of the study population

in Madhukumar et al study knew about colour coding.[14] Deo et al found that only 20% of health staff knew about colour coding.[18] In a study from Johannesburg hospital 96% of doctors and nurses knew about colour coding.[19] Malini et al reported low knowledge of colour coding of BMW containers among multipurpose workers which was similar to findings in our study with class IV employees.[9]

Present study population except class IV employees was conscious about various methods of BMW disposal which was similar to the study by Yadavannavar et al.[20] Both Basu et al and Deo et al reported a very low knowledge of BMW disposal in their respective studies.[15,18] Knowledge regarding BMW disposal was found to be low (30%) among class IV employees in our study which is pretty worrying as they are the people responsible for BMW disposal. All the qualified health personnel knew about universal precautions in our study which was very satisfying as sufficient knowledge about universal precautions can protect them from injuries and infections related to improper handling of BMW. This was similar to Malini et al study.[9]

Singh et al reported that 83% of doctors in their study were aware of universal precautions which is not very good as all the doctors are taught about universal precautions in their undergraduate curriculum.[12] Malini et al reported around 70% of multipurpose workers were aware about universal precautions as compared to 30% of class IV employees in our study.[9] Awareness about diseases transmitted by BMW was good among majority of doctors, nurses and lab technicians in our study. This finding was compatible with previous studies.[6,8,12,14,15,19,21] Class IV employees had low level of knowledge regarding diseases transmitted by BMW similar to study by Sharma.[16]

Attitude of doctors, nurses and lab technicians towards BMW management was found to be positive in our study as compared to class IV employees. It was consistent with the findings of Tenglikar et al where they found that attitude of an individual towards any health behaviour was directly proportional to knowledge level of that individual.[22]

Similar findings were seen in study by Singh et al.[12] Majority of nursing staff realised that BMW management is a team work and it did not create extra burden on their work as seen in study by Malini et al.[9] This positive attitude of nurses was also seen in study by Madhukumar et al.[14] What is encouraging to see is majority of health personnel in present study wanted to upgrade their knowledge on BMW management seen also in a previous study.[9]

Rational practices regarding BMW management were followed by most of the doctors, lab technicians and nursing staff in our study while class IV employees were ignorant on many accounts. Two previous studies reported that nursing staff practiced BMW management better according to the rules.[10,11] Malini et al similarly established that majority of qualified health professionals followed appropriate BMW management practices.[9] Deo et al in their study found that maximum practical knowledge was present in paramedical staff as compared to medical and non-medical staff.[18]

Maximum number of health staff followed proper disposal of BMW in specific containers similar to a previous study.[6] Only 33.3% of class IV employees were vaccinated against Hepatitis B which is very low and was similar as reported by Kalia et al previously.[23]

Injury reporting due to sharps was low among all groups in our study whereas in Mathur et al study approximately 60% of doctors reported injury due to sharps.[6] Stein et al reported that only 37% of study population ever reported needle stick injury.[24] In a multicentric study in our country it was found that most of the health care facilities fell in RED category which meant lack of a credible BMW management system in place or major improvement is required.[25]

Present study revealed that although doctors, nurses and lab technicians had overall good knowledge there were still some scope of improvement in BMW management. Knowledge, attitude and practices of class IV employees towards BMW management were very low.

Guidelines should be laid down for continuous training programme for all health personnel with special focus on sanitary staff. BMW management rules should be strictly implemented at all levels. A formal injury reporting system due to sharps should be started in all health care facilities so that no injury is missed. Finally all the staff especially the sanitary staff should be very well informed about the various risks associated with BMW.

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REFERENCES

1. Government of India, Ministry of Environment and Forests. Bio-Medical Waste (Management and Handling) Rules. Gazette of India, 1998.
2. Sachan R, Patel ML, Nischal A. Assessment of the knowledge, attitude and practices regarding biomedical waste management amongst the medical and paramedical staff in tertiary health care centre. Intern J Sci Res Pub. 2012;2(7):1-6.
3. Manual on hospital waste management. Central pollution control board, CPCB, Delhi, 2000.
4. Haider S, Kumari S, Kashyap V, Sunderam S, Singh SB. A study on knowledge and practice regarding biomedical waste management among staff nurses and nursing students of Rajendra Institute of

Medical Sciences, Ranchi. Indian J Comm Health. 2015;27(1):135-8.
5. Patil AD, Shekdar AV. Health-care waste management in India. J Environ Manage. 2001;63:211-20.
6. Mathur V, Dwivedi S, Hassan MA, Misra RP. Knowledge, attitude, and practices about biomedical waste management among healthcare personnel: A cross-sectional study. Indian J Comm Med. 2011;36:143-5.
7. Gupta NK, Shukla M, Tyagi S. Knowledge, attitude and practices of biomedical waste management among health care personnel in selected primary health care centres in Lucknow. Int J Comm Med Pub Health. 2016;3(1):309-13.
8. Pandit NB, Mehta HK, Kartha GP, Choudhary SK. Management of bio-medical waste: Awareness and practices in a district of Gujarat. Indian J Pub Health. 2005;49:245-7.
9. Malini A, Eshwar B. Knowledge, attitude and practice of biomedical waste management among health care personnel in a tertiary care hospital in Puducherry. Intern J Biomed Res. 2015;6(3):172-6.
10. Saini S, Nagarajan SS, Sarma RK. Knowledge; attitude and practices of bio-medical waste management amongst staff of a tertiary level hospital in India. J Acad Hosp Adm. 2005;17:2.
11. Shafee M, Kasturwar N, Nirupama N. Study of knowledge, attitude and practices regarding biomedical waste among paramedical workers. Indian J Community Med. 2010;35:369-70.
12. Singh G, Gupta P, Kumari R, Verma S. Knowledge, Attitude and practices regarding biomedical waste management among healthcare personnel in Lucknow, India. Indian J Clin Pract. 2014;24(9):830-3.
13. Kapoor D, Nirola A, Kapoor V, Gambhir R .Knowledge and awareness regarding biomedical waste management in dental teaching institutions in India- A systematic review. J Clin Exp Dent. 2014;6(4):e419-24.
14. Madhukumar S, Ramesh G. Study about awareness and practices about health care wastes management among hospital staff in a medical college hospital, Bangalore. Intern J Basic Med Sci. 2012;3(1):7-11.
15. Basu M, Das P, Pal R. Assessment of future physicians on biomedical waste management in a tertiary care hospital of West Bengal. J Nat Sci Biol Med. 2012;3(1):38-42.
16. Sharma S. Awareness about bio-medical waste management among health care personnel of some important medical centres in Agra. Int J Environ Sci Dev. 2010;1:251-5.
17. Bala S, Narwal A. Awareness of bio-medical waste management among hospital and dental college and hospital employees. A Panoramic View. J Oral Health Comm Dent. 2013;7:1-7.
18. Deo D, Tak SR, Munde SS. A study of knowledge regarding biomedical waste management among employees of a tertiary hospital in rural area. J Indian Soc Hosp Waste Manage. 2006;5:12-6.
19. Ramokate T, Basu D. Health care waste management at an academic hospital: Knowledge and practices of doctors and nurses. S Afr Med J. 2009;99:444-5.
20. Yadavannavar MC, Berad AS, Jagirdar PB. Bio-medical waste management: a study of knowledge, attitude and practices in a tertiary health care institution in Bijapur. Indian J Comm Med. 2010;35:170-1.
21. Saraf Y, Shinde M, Tiwari SC. Study of awareness status about hospital waste management among personnel and quantification. Indian J Comm Med. 2006;31:111-2.
22. Tenglikar PV, Kumar GA, Kapate R, Reddy S, Vijayanath V. Knowledge attitude and practices of health care waste management amongst staff of nursing homes of Gulbarga city. J Pharm Biomed Sci. 2012;19(19):1-3.
23. Kalia M, Virk A, Gupta BP, and Singh J. Biomedical waste management practices in a tertiary-care hospital in Punjab. Int J Med Sci Public Health. 2015;4:179-83.
24. Stein AD, Makarawo TP, Ahmad MF. A survey of doctors' and nurses' knowledge, attitudes and compliance with infection control guidelines in Birmingham teaching hospitals. J Hosp Infect. 2003;54:68-73.
25. INCLEN Program Evaluation Network (IPEN) study group, New Delhi, India. Bio-medical waste management: situational analysis & predictors of performances in 25 districts across 20 Indian States. Indian J Med Res. 2014;139:141-53.

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