ORIGINAL ARTICLE

Knowledge, Attitude And Practices of Healthcare Workers (HCWs) Regarding Biomedical Waste (BMW) Management: A Multispeciality Hospital Based Cross-Sectional Study In Eastern India

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Abstract

Background: The evolving health care system of India, in its goal of solving health issues and minimizing possible health risks, has unavoidably created waste, which itself may be harmful for health. Inefficient and inadequate knowledge of managing health care waste may have detrimental effects on health and environment. *Aim and Objectives:* To asses level of Knowledge, Attitude, Practices (KAP) about Biomedical Waste (BMW) management among Health Care Workers (HCWs) with an endeavor to improve the standards and protect the health of HCWs and the environment. *Methodology:* A Hospital- based cross-sectional descriptive study was carried out at one of the Multispecialty Hospital in Eastern India. A total of 80 HCWs who were available at the time of study were included and the data were collected by means of 'personal interview technique' by using a pre-designed semi-structured questionnaire in Hindi (local language). The relevant data was collected, compiled and analyzed using SPSS 17.0 version. *Results:* Assessment of KAP with pre-decided scoring system showed, 17.5 % had excellent knowledge, 70% with good to average and 12.5% had poor knowledge with respect to BMW management. Knowledge status was not significantly associated with any of the socio-demographic characteristics. When asked about needle stick injuries, 88% felt that needle stick injury was a concern to them and 86% of them were well aware about the consequences of needle-stick injuries. *Conclusion:* Although the awareness level was high with various aspects of BMW management among HCWs compared to other studies, but still there exists scope for more improvement. Regular awareness capsule with proper BMW committee monitoring is the need of the hour. All measures to sensitize the HCWs against needle stick injuries including both pre and post incident measures need to be taken.

Keywords: Biomedical Waste Management, Knowledge, Attitude, Practices, Health Care Workers

Introduction:

The evolving health care system of India, in its goal of solving health issues and minimizing possible health risks, has unavoidably created waste which itself may be harmful for health. Surprisingly, the waste generated at any stage of health care activity has a higher likelihood for injury and infection than any other type of waste. Biomedical Waste (BMW), as they are rightly called, are waste generated during diagnosis, treatment, immunization or in research activities

concerning human beings or animals and are contaminated with human fluids. It also includes wastes generated from production and testing of biologicals [1].

Inefficient and inadequate knowledge of managing biomedical waste may have detrimental effects on health and environment. As per the annual health reports, about 0.33 million tons of waste are generated by health care establishments in India at a generation rate ranging from 0.5 to 2.0 kg per bed per day [2]. Hence, effective biomedical waste management is an extremely important measure for an active functioning of health care establishments and is an impending social responsibility with legal implications.

To alleviate the influence of hazardous and contaminated hospital waste on the community and mandate the proper management of BMW, the Ministry of Environment and Forests, Government of India, released the Biomedical Waste (management and handling) Rules 1998in concurrence with sections 6, 8 and 25 of Environmental Protection Act 1986 [3]. The rules notify Health Care Establishments (HCEs) to segregate, disinfect and dispose their generated wastes in an eco-friendly manner. However, judicial safeguards for BMW practices in Indian hospitals are still not followed consistently [4].

Needless to say, an improper waste management, inadequate knowledge about the health hazards of BMW, deficiency of financial and human resources and a poor regulation of waste disposal mechanisms are the most critical issues related to efficient BMW management [5]. The BMW management of hospital waste has diverse implications as it not only affects the health of patients, but also of healthcare workers (doctors, nurses, nursing assistants, sanitary staff etc). These ramifications affect the general public as well.

Although, there is an increased international awareness among HCWs about the BMW management principles and the associated hazards, the level of awareness in India is still found to be inadequate [6-9].

This study was conducted with the main aim of assessing knowledge, attitude and practices of nurses, nursing assistants, laboratory technicians, operation room assistants, blood transfusion assistants and other personnel involved in the management of biomedical wastes.

Material and Methods:

We carried out a cross-sectional study at one of the multi-speciality hospitals. The study population comprised of nurses, nursing assistants, laboratory technicians, operation room assistants, blood transfusion assistants and other personnel involved in the management of BMW in the latter set up. Inclusion criteria being all HCWs with minimum of one month work experience available during the study period and who consented for the study. Exclusion criteria being newly employed HCWs with less than one month work experience and those who did not consent for the study. A total of 96 paramedical staff were working in the hospital, out of which 80 who were present in the hospital at the time of study and who fitted in inclusion and exclusion criteria were included in the study. The data were collected from all the study participants by means of 'personal interview technique' by using a pre-tested, pre-designed semi-structured questionnaire in Hindi (local language). The questionnaire used in our study was based on WHO guidelines and modified to suit our study objectives. The relevant data were collected, compiled and analyzed using SPSS 17.0 version for calculation of percentages. Institutional Ethics Committee clearance was taken and confidentiality was maintained where ever required.

Results:

A total of 80 HCWs consented to participate in the study. 42.6% were below 30 yrs and 57.6% above 30 years. 85% were male and 58% had undergone higher secondary education. The participants included forty seven nursing assistants, twelve nurses; seven OT assistants followed by a minority of other personnel. In the present study, all the HCWs felt the imperative need of BMW generation, associated hazards and legislation. About 98.8% of HCWs already knew about existing BMW management rules while less than 10% were aware of the authority regulating the same. Though more than 80% of the study participants knew the year in which BMW guidelines were proposed, only ¼th were aware of the amendments in the latter. Overall, more than half of HCWs had knowledge about BMW waste management plan, its authorization and guidelines. Table 3 depicts the awareness level of participants pertaining to BMW. More than 90% of awareness levels were observed with respect to classification, colour coding, biohazard symbol and labeling of BMW. Table 4 reflects the attitudes of participants towards BMW.

A total of 20 questions were included in scoring in which each right answer was given one mark and total marks out of 20 was accessed. All those who scored above 15 were labelled as excellent, with 08-15 marks as good and less than 08 marks were assessed as poor in knowledge pertaining to BMW practices. Knowledge score was assessed with age category, educational status, working experience and Job category.

The overall mean and SD score for the knowledge regarding BMW management was 14.48276 and 0.508548 respectively and Knowledge status was not significantly associated with any of the socio-demographic characteristics.

Table 1: Socio-demographic Profile of Study Participants

Age Category	Frequency	Percentage	95% C.I
21-24 years	13	16.3	8.9-26.2
25-30 years	21	26.3	17.0-37.3
30-35 years	23	28.8	19.2-40.0
Above 35 years	23	28.8	19.2 -40.0
Total	**80**	**100**	
Sex			
Female	12	15.0	8.0-24.7
Male	68	85.0	75.3-92.0
Total	**80**	**100**	
Education			
Diploma	9	11.3	5.3- 20.3
Graduate	20	25.0	16.0- 35.9
Higher secondary	47	58.8	47.2-69.6
Matriculation	4	5.0	1.4-12.3
Total	**80**	**100**	
Job profile			
Blood Transfusion Assistant	4	5.0	1.4-12.3
Health Assistant	3	3.8	0.8-10.6
Lab Assistant	3	3.8	0.8-10.6
Nursing Assistant	47	58.8	47.2-69.6
Nurse	12	15.0	8.0-24.7
OT Assistant	7	8.8	3.6-17.2
Physiotherapist	1	1.3	0.0-6.8
Psychiatric Assistant	1	1.3	0.0 -6.8
Radiology Assistant	2	2.5	0.3-8.7
Total	**80**	**100**	

Table 2: Knowledge of BMW Generation and Hazards Legislation	
Questions	**Correctly answered**
Do you know about BMW generation and legislation rules?	98.8% (79)
What agency (-ies) regulate (s) wastage generated at health care facilities?	8.8% (7)
Do you think it is important to know about BMW generation, hazards and legislation?	100.0% (80)
Biomedical Waste (Management & Handling) Rules were first proposed in:	81.3% (65)
Amendments to the Biomedical Waste (Management & Handling) Rules were made in:	25% (20)
Which statement describes one type of BMW:	20% (16)
According to the BMW (Management & Handling) Rule, waste should not be stored beyond:	8.8% (7)
Segregation is essential before disposal? .	91.3% (73)
If yes, then who has to segregate?	95% (76)
Do you consider BMW is a serious health issue?	95% (76)
If yes, BMW Management is whose responsibility?	57.5% (46)
Do you think it is anextra financial burden?	88.8% (71)
Do you think it is an extra work burden?	67.5% (54)
Success of BMW depends upon:-	70% (56)
Do you think BMW management equipment & training sufficient in your hospital?	87.5% (70)
Do you need a separate registration for Biomedical Waste Management	66.3% (53)

Table 3: Level of Awareness on BMW Management Practices

Questions	Correctly answered
Do you know classification of BMW?	96.3% (77)
Do you know about colour-coding segregation of BMW?	97.5% (78)
Do you follow colour-coding for BMW?	95% (76)
Is the waste disposal practice correct in your hospital?	95% (76)
Awareness level for disposal of objects that may be capable of causing punctures or cuts, that may have been exposed to blood or body fluids including scalpels, needles, glass ampoules, test tube and slides as per BMW management rules	6.3% (5)
Documents with confidential patient information are to be disposed of into the paper recycling bins.	22.5% (18)
The colour code for the BMW to be autoclaved, disinfected is:	73.8% (59)
The approximate proportion of infectious waste among total waste generated from a health care facility is:	23.8% (19)
The colour code for disposal general waste from the hospital is:	83.8% (67)
All the following steps should be followed after an exposure with infected blood/body fluid and contaminated sharps EXCEPT	96.2% (77)
All of the following statement about hazardous waste containers are true, except for:	23.7% (19)
Is the infection waste labeled with Bio-hazard symbol?	90.0% (72)
Do you maintain register for waste disposal?	88.8% (71)
Does your hospital provide annual education on waste management for employee?	91.3% (73)

Table 4: Attitude/Behaviour Assessment towards BMW

Questions	Correctly answered
Safe management of BMW is not an issue at all.	73.8% (59)
Waste management is team work/no single class of people is responsible for safe management.	78.8% (63)
Safe management efforts by the hospital increase the financial burden on management.	72.5% (58)
Safe management of BMW is an extra burden on work.	85% (68)
Will you think that the hospital should organize separate classes or a continuing education program to upgrade existing knowledge about biomedical management?	92.5% (74)
Will you like to attend voluntarily programs that enhance and upgrade your knowledge about waste management?	83.8% (67)
Do you think that injection wastes should be sterilized by autoclaving before shredding and disposal?	82.5% (66)
Do you think it is important to report to the Pollution Control Board of India about a particular institution if it is not complying with the guidelines for biomedical waste management?	82.5% (66)
Do you think that labeling the container before filling it with waste is of any clinical significance?	81.3% (65)

Table 5: Distribution of Knowledge Status

Knowledge Scoring	Frequency	Percentage	95% C. I
Excellent	14	17.5	9.9 -27.6
Good	56	70.0	58.7 -79.7
Poor	10	12.5	6.2 -21.8
Total	80	100	

Table 6: Distribution of Knowledge status on Needle-stick Injuries

Knowledge Level on Needle-Stick Injuries			
Is needle stick injury a concern?			
	Frequency	**Percentage**	**95% C. I**
Yes	70	86.3	76.7 - 92.9
No	4	5.0	1.4 - 12.3
Don't know	6	7.5	2.8 - 15.6
Awareness of consequences of needle-stick injury?			
Yes	69	86.3	76.7 - 92.9
No	6	7.5	2.8 - 15.6
Not concerned	5	6.3	2.1 - 14.0
Immunization with tetanus toxoid?			
Yes	64	80.0	69.6 - 88.1
No	1	1.3	0.0 - 6.8
Not sure	15	18.8	10.9 - 29
Immunization with Hepatitis B?			
Yes	69	86.3	76.7 - 92.9
Not sure	10	12.5	6.2 - 21.8
No	1	1.3	0.0 - 6.8

Discussion:

This cross-sectional descriptive study was carried out in a multispecialty hospital setting and has brought out many relevant findings. These are discussed in the succeeding paragraphs.

In our study, as per pre-decided knowledge scoring system, 17.5% (14) had excellent knowledge, 70% (56) with good to average and 12.5% (10) had poor knowledge with respect to BMW management. Knowledge status was not significantly associated with any of the socio-demographic characteristics. Although when accessed through individual questions, majority had given correct answers but when total knowledge score was compared, only 17.5% had excellent scoring with knowledge. 98.8% (79) were aware about BMW generation and legislation rules and everybody thought that it is important to know about BMW generation, hazards and legislation. Most important was that 91.3% (73) of them said segregation is essential before disposal which is the vital step for BMW management and 88.8% felt that it is not an extra financial burden on them to implement BMW management as per rules. Most of the HCWs were fully vaccinated against hepatitis B (80%) and Tetanus toxoid (86%) and when asked about

needle stick injuries, 88% felt that needle stick injury was a concern to them and 86% of them said that they were aware about the consequences of needle-stick injuries. A similar study [10] conducted in dental hospital reported that 29% subjects agreed that safe management of BMW was not an issue at all and 65% agreed that waste management requires team work. Safe management efforts by hospital staff were considered to be an extra work burden and 50% respondents agreed that it increased the financial burden on management. In the same study, it was also seen that only 20% dentists, 14% nurses, 10% laboratory technicians and 10% Class IV employees had an excellent knowledge of needle-stick injuries while 50% of Class IV employees, 5% of dentists and 2% of nursing staff had already experienced a needle-stick injury [10] in the past 12 months but none of them had taken any action following this injury, while in our study no one had experienced needle stick injury.

A study [11] conducted in New Delhi, India, among the 64 personnel who were working in Government institutions reported that the majority of the respondents were not aware of the proper clinical waste management regulations. A study carried out in Agra also showed similar results [12], which indicated a lack of knowledge and awareness towards legislation on BMW and even more in a study carried out at hospital/clinics in Amritsar [13]. The same problem may exist even at more specialized medical institutions because in another study, one third of the staff of a tertiary level hospital in Visakhapatnam were not aware of where the waste from the hospital was ultimately treated and disposed of [14]. A collection and waste disposal survey carried out in Iran in the university hospitals of the Fars province also found insufficient training of personnel, insufficient personal protective equipment and lack of knowledge regarding the

proper use of such equipment [15]. A similar study [16] conducted in a Palestinian hospital showed that there was insufficient separation between hazardous and non-hazardous wastes and there was an absence of necessary rules and regulations for the collection of waste materials from the hospital wards.

In our study hospital, a proper BMW management committee was established which was continuously monitoring the BMW management. Similarly a study out at Dr RML Hospital in North India, a well-established Infection Control Committee was formulated which dealt with the issues related to BMW management so that the healthcare staff was well aware regarding good BMW management practices, hazards caused due to improper handling and spill management [17].

The study had a limitation because the sample size was less and doctors and class IV employees were not involved as most of them were either busy or not available. Keeping in view of sample bias, recall bias, training effect, the study is to be carried out on more subjects involving other HCWs periodically. At the end of this study, intensive Information Education and Communication (IEC) activities were carried out for all the staff and relevant immunization were given to all the staff.

Conclusion

Although the awareness level was high with various aspects of BMW management among HCWs compared to other studies, but still there exists scope for more improvement. Proper training schedule has to be maintained in every hospital and assessment to be done after few months to see the impact with proper BMW committee monitoring which is the need of the hour. All measures to sensitize the HCWs against needle stick injuries including both pre and post incident measures need to be taken.

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