



Environmental Education for Healthcare Professionals with Reference to Biomedical Waste Management -A Case Study of a Hospital in Lucknow, India

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Abstract

Healthcare is one of the fastest growing sectors in India undergoing rapid transition. While it is a basic requirement of human being, it also acts as a source of life threatening diseases and toxins. The wastes generated from healthcare establishments pose serious threat to the environment and the people associated with it such as healthcare professionals, workers, patients as well as the general community. Environment education of healthcare professionals can help in developing right kind of attitude and behaviour towards healthcare services particularly the management of the Bio Medical Waste (BMW). The present study focuses on BMW management system in a hospital with special reference to environment education. The study was conducted through questionnaire, surveys, and interviews with the hospital administration, doctors, nurses, technicians and other personnel involved in the management of generated wastes. Observation techniques were also used to verify the authenticity of the information given by the respondents. The study results revealed that 58.3% respondents were aware of the legislation applicable to BMW management and had attended training programme on it. Majority of respondents (91.6%) including doctors, paramedical, and auxiliary staff believed that the proper management of BMW was a team work and that safe management efforts by hospital would increase the financial burden while 16.6% of them felt that it was an extra burden on their work. The knowledge, attitude and practice (KAP) regarding BMW was found to be insufficient among all the three categories. Overall, the doctors had better KAP than paramedical and auxiliary staff. Paramedical staff had poor knowledge about the subject. The attitude of paramedical staff was very high among all three categories as 39.2%. Some 31.8% doctors were doing good practices than paramedical and auxiliary staff. It may be concluded that there is an urgent need to train and educate the doctors and the staff to adopt effective waste management practices as well as concerted efforts are needed to evolve a continuing education programme for all healthcare personnel to make them aware about safe and effective management of BMW.

Keywords: Environmental education, environmental health, biomedical waste management, healthcare establishment.

Introduction

Healthcare is one of the fastest growing sectors in India. The healthcare facilities are a basic requirement of human kind but these are also sources of life threatening wastes and toxins¹. According to World Health Organization reports, 85% of hospital wastes are actually non-hazardous, whereas 10% are infectious and 5% are non-infectious².

The waste generated from healthcare facilities referred also as healthcare waste, hospital waste and infectious waste includes all types of waste generated by healthcare establishments, research facilities and laboratories in addition to hospitals and clinics including waste generated by blood banks^{3,4,5,6}. However, biomedical waste (BMW) is more common and broad term defined as "any solid and / or liquid waste including its container, any intermediate product, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research pertaining thereto or in the production or

testing thereof". It includes waste like sharps, human tissue or body parts and other infectious materials^{7,8,9}.

BMW contains pathogenic viruses and bacteria and some of these are very dangerous, because they may be resistant to treatment and possess high pathogenicity. The hazards of BMW can range from gastroenteritis, respiratory, tuberculosis, septicemia, tetanus and skin infections to more deadly diseases such as HIV/AIDS, and Hepatitis^{2,10}. Mismanagement of BMW may also cause growth and multiplication of insects, rodents and worms and may lead to the transmission of diseases like typhoid, cholera, hepatitis and AIDS by air, direct contact, or by a variety of vectors¹¹. Massrouje¹² has reported in his study that disorganized management of medical waste presents an increasingly high risk to doctors, nurses, technicians, drain cleaners, sweepers, and patients and their visitors. WHO¹³ reported that serious injuries are frequently caused by contact with flammable, corrosive or reactive chemicals in medical waste^{14, 15}. A WHO report¹⁶ claimed that in the year 2000, 21

million people were infected with hepatitis B, 2 million people with hepatitis C and at least 260,000 people with HIV in the world due to injections with contaminated syringes. Tamplin et al.¹⁷ and Patwary et al.¹⁸ pointed out in their studies that improper clinical solid waste management practice impacts both directly and/or indirectly to healthcare staffs, patients and hospitals environment.

Therefore, segregation, collection, treatment and disposal of BMW in an appropriate manner is of great importance as it can decrease health risks to people, and damage to flora, fauna, and the environment^{19,20}. Garvin²¹ and Patil and Shekdar²² have stated that there has been significant increase in public awareness on hospital waste disposal.

In view of the seriousness of the BMW management in India, the Ministry of Environment and Forests of the Government of India has enacted the Biomedical Waste (Management and Handling) Rules, which came into effect on 20th July, 1998. These rules are applicable to every hospital and nursing home, veterinary institution, animal house or slaughterhouse that generates biomedical waste.

The study carried out by Gupta and Boojh⁸ on BMW practices of Balrampur Hospital in Lucknow, India, revealed that this premier hospital was severely lacking in action to dispose of its waste and uphold its statutory responsibilities. This was due to lack of education, awareness and trained personnel to manage the waste in the hospital. The study concluded that healthcare waste management should go beyond data compilation, enforcement of regulations and acquisition of better equipment. It should be supported through appropriate education, training and the commitment of the healthcare staff, management and healthcare managers within an effective policy and legislative framework.

Another study by Gupta et al.⁹ on Vivekananda Polyclinic in Lucknow, India concluded that there is a need to improve the capability of the staff in terms of providing state-of-the-art facilities and on-job training in order to develop a model BMW system.

The above studies and the survey of other hospitals show that BMW is posing serious threat to the environment and the people associated with it such as healthcare professionals, patients and the general community largely due to the lack of knowledge, attitude and practices (KAP) regarding safe BMW segregation, collection and storage, treatment, transport and disposal both in public and healthcare professionals. Therefore, the present study was carried out to assess the BMW practices special reference to environment education at Shalimar Hospital, a tertiary level hospital, Lucknow, India. Knowledge, Attitude and Practice (KAP) of healthcare personnels towards waste management practices in the hospital were also assessed.

Material and Methods

The Study Area: Lucknow, the capital of the state of Uttar Pradesh state in North India, is situated 123 m above sea level. It is situated on 26.30⁰ to 27.10⁰ North latitude and 80.30⁰ to 81.13⁰ East longitude. It covers an area of 2528 km². It is surrounded on the eastern side by District Barabanki, on the western side by district Unnao, on the southern side by Raebareli and on the northern side by Sitapur and Hardoi districts. River Gomti flows through the city.

The Shalimar Hospital was established in 1995 in the Indira Nagar area of Lucknow city. The hospital has twenty beds with the twelve healthcare personnels. The available medical facilities in the hospital are given below in table 1, and the location map of hospital in India is depicted in Figure-1.

Table-1
Available medical facilities at Shalimar Hospital

S.N.	Facility Available	S.N.	Facility Available
1	Breast and Obesity	11	Pediatric Surgery
2	Eye surgery (IOL Phaco)	12	Physiotherapy
3	Gynics (Cryo)	13	Plastic Surgery
4	I.C.U.	14	Psychiatry
5	Maternity (Fatal Tococardiography)	15	Surgery
6	Medical treatment	16	Ultrasound
7	Neuro Surgery	17	Urology
8	Orthopedics (C-Arm)	18	Vacination
9	Pathology	19	X-ray
10	Paediatric and Lapsroscopy	20	Yog theraaapy

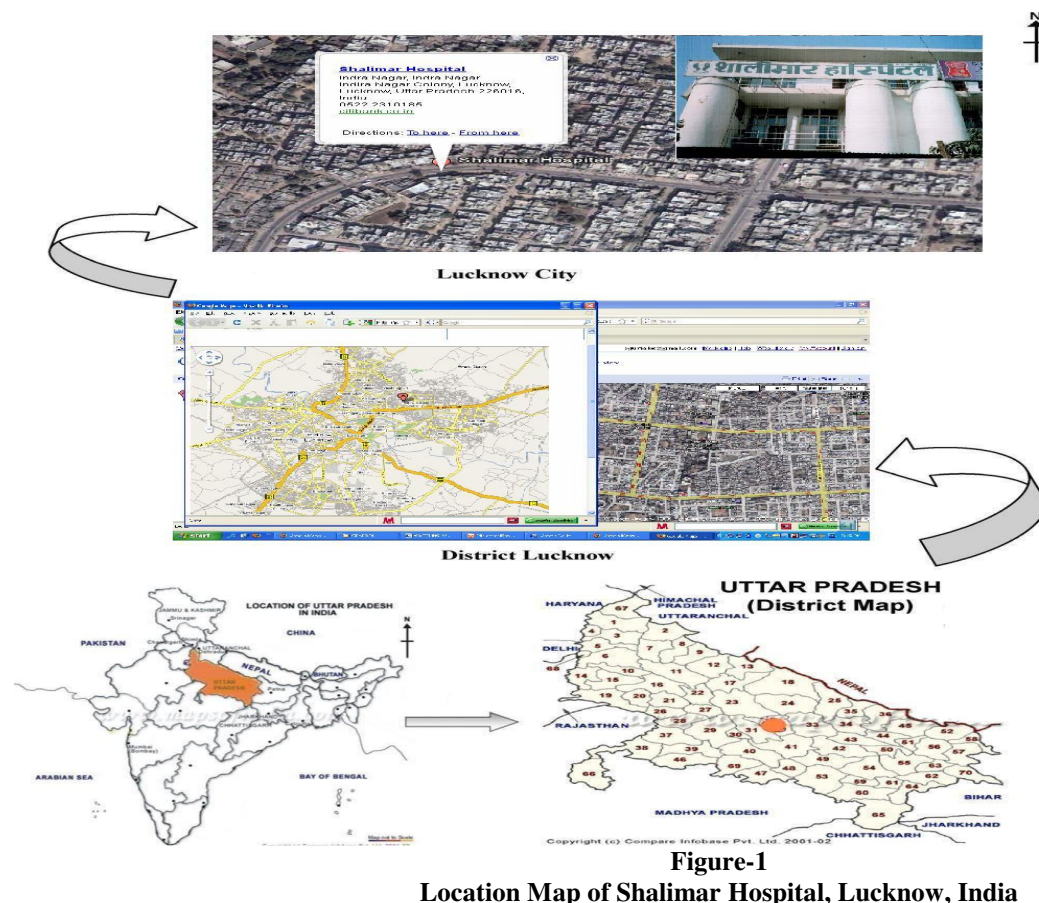


Figure-1
Location Map of Shalimar Hospital, Lucknow, India

Table-2
Details of Questionnaire

S.N.	Question statement	Yes (%)	No. (%)
Knowledge Assessment			
1	Are you aware of any legislation applicable to the hospital waste management?	58.3	41.7
2	Does your health care setting have a waste management plan?	25	75
3	Does your hospital have a waste management team?	25	75
4	Are there any waste management responsibilities included in the job descriptions of hospital supervisory staff?	75	25
5	Do you think biomedical waste generated in the hospital should be segregated?	100	-----
Attitude Assessment			
6	Would you like to attend a programme on Hospital Waste Management?	91.6	8.3
7	Do you think biomedical waste management is not an issue at all?	25	75
8	Do you think proper management of biomedical waste is the sole responsibility of Government?	25	75
9	Do you think waste management is a team work?	91.6	8.3
10	Do you think safe management efforts by hospital increases financial burden on management?	91.6	8.3
11	Do you think safe management of biomedical waste is an extra burden on work?	16.6	83.3
Practices Assessment			
12	Is the infection waste labelled with the Bio-Hazard Symbol?	8.3	91.6
13	Do you color code the waste for disposal?	33.3	66.6
14	Do you maintain a register for waste disposal?	8.3	91.6
15	Have you undergone any training programme on hospital waste management?	58.3	41.7
16	Does your hospital provide annual education on waste management for employee?	16.6	83.3

Results and Discussion

The study consisted of two parts: first, a pilot survey of operating system of BMW management in the hospital; second; face to face interview using the questionnaire with the doctors, nurses, technicians of operation theater (surgical ward) and the personnel involved in the management of generated wastes. Their views on BMW management in terms of knowledge, practices and attitude were also collected through a specially designed questionnaire. The observation techniques were also used to analyze the practices of segregation, collection, treatment and disposal of BMW at hospital as well as to verify the authenticity of the information given by the respondents.

The questionnaire, based on the WHO guidelines for healthcare waste management¹⁴, was designed to suite three categories of personnel associated with healthcare establishments, i.e. Doctors, Paramedical and Auxiliary Staff. The questionnaire contained 21 core questions. Out of which 16 questions were related to KAP: 5 for knowledge, 6 for attitude and 5 for waste management practices, and the remaining 5 questions were related to demographic details. There were three doctors, seven paramedical staff and two auxiliary staff, working as a full time employed, in the hospital. All doctors had master's degree. Their ages ranged from 33-53 years. With respect to nurses, three had bachelor's degree and four had secondary education. Their ages ranged from 19-45 years. Regarding auxiliary staff, 50% were illiterate. Their ages ranged from 22-30 years. Among all the respondent, 41.6% were male and 58.3 were female. The detail of the questionnaire is given below in the table 2. The response was analyzed as categorical variable (right or wrong answer). The value of the KAP test was obtained in the form of Yes/No. The normalized the KAP results are shown in table 2.

The study revealed that BMW generated in each ward was collected by in-service sanitation staff (auxiliary staff). The collection cycle occurred three times in a day. The BMW was collected with hands and temporarily stored in plastic buckets of colors other than those prescribed by BMW rules, 1998 (figure 2). It was observed that staff was mixing infectious and non-infectious waste and hospital did not segregate BMW properly in accordance with the prescribed rules. Above findings are similar to those reported by Gupta and Boojh⁸; Sabour et al.²³; Arab et al.²⁴; Hassan et al.²⁵; Sreegiri and Babu²⁶; who have also reported no segregation activity as well as mixing of infectious waste with non hazardous medical waste in Lucknow, Jordon, Tehran, Dhaka and Vishakhapatnam, respectively.

The BMW, collected in plastic buckets in each ward, is carried out by the sanitation staff from their wards through the corridors of hospital to the dumping bin placed outside the hospital (Figure 3). From outside the BMW was taken by the Lucknow Municipal Corporation (LMC) staff on daily basis for incineration. The used needles were being kept separate in a plastic bottle and were sent separately to LMC for disposal. The study results also revealed that the collection, segregation,

transportation, treatment and disposal practices of BMW in the hospital were inadequate. Auxiliary staff did not wear any personal protective equipment such as apron, impervious gloves, mask, safety glasses, safety boots and safety hat. Even the hospital did not have any waste management plan as well as waste management team as reported by 75% respondents.



Figure-2
A view of waste: Bins placed inside the hospital



Figure-3
A view of waste: Bins placed outside the hospital

Regarding knowledge, the study results reveal that total 58.3% respondents were aware of the legislation applicable to BMW and had attended training programme on it. The waste management responsibilities were included in the job description of their employees by 75% of the respondents. Regarding the disposal of wastes, majority of respondents (91.6%) including doctors, paramedical and auxiliary staff dumped the wastes in a bin placed outside the hospital. All the respondents reported that authorized waste collection was done by Municipal Corporation of Lucknow. 83.3% respondents reported that the hospital did not have any annual education

programme on waste management. However, majority of respondents (91.6%) were interested in attending a programme on it. 33.3% respondents said that they followed the color coding system for waste disposal, which on physical observation was found contrary to the norms prescribed under the BMW Rules, 1998. There was total (100%) agreement that waste generated in the hospital should be segregated for easy identification. Two third of the respondents (75%) considered safe management of BMW to be an issue concerned with everyone. Only 25% of respondents were with the view that it was the sole responsibility of the government. However, majority of respondents (91.6%) believed that the proper management of BMW was a team work and that safe management efforts by hospital would increase the financial burden. Only 16.6% of them felt that it was an extra burden on their work.

Figure 4 illustrates that 31.8% doctors were doing better practices than paramedical and auxiliary staff. The attitude of paramedical staff was very high (39.2%) among all three categories. It was observed that paramedical staff especially nurses spent more time with patients in the ward than any other healthcare personnel. This increased their exposure to risks associated with BMW. Therefore they must be equipped with the latest information, skills and practices in waste management to reduce the effects of BMW and protect their own health as well as our environment^{27,28}. Mecklem and Neumann²⁹ have emphasized in their study that healthcare workers at all levels need to be trained and informed to be able to practice waste management procedures even in countries like US.

The knowledge of auxiliary staff related to waste management practices was generally high; approximate 50% auxiliary respondents had satisfactory knowledge. However, table 2 represents a critical view that only 31.8% doctors have satisfactory knowledge about BMW practices.

The above study clearly demonstrates that there is an urgent need to increase awareness about rules, regulations and procedures regarding safe management of BMW. The BMW management programme cannot be successfully implemented without the willingness, self-motivation, and cooperation from all sections of employees of any healthcare establishments. Sensitization of employees coupled with effective implementation of rules and regular monitoring by authorities are important for successful implementation of the programme.

Conclusion

The BMW management practices in the hospital under the study were found to be inadequate, inefficient and unsafe. The KAP regarding BMW was found to be insufficient among all the three categories. Overall, the doctors had better KAP than paramedical and auxiliary staff. There is a need to evolve a continuing education programme for healthcare personnels to make them aware about the proper management of BMW. Waste management contents should be included in the formal and non-formal education systems in the country. Though, students from medical, dental and nursing courses have BMW as part of their curricula, their practical skills in collection, handling and disposal of waste need to be strengthened for improving the overall performance of all concerned including patients and visitors to the hospital.

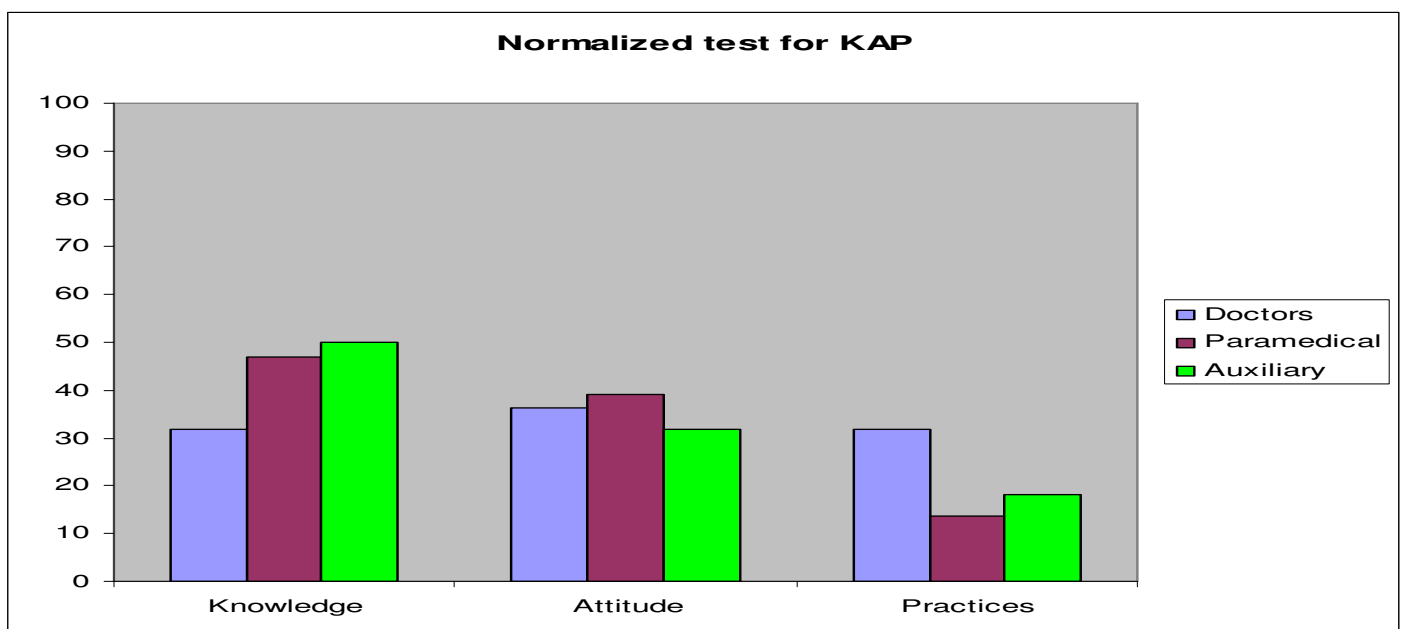


Figure-4
KAP Test

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