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PRACTICES REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG HEALTH FUNCTIONARIES: A RURAL HARYANA PERSPECTIVE

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ABSTRACT

Introduction: Waste generated from medical activities can be hazardous, toxic and even lethal because of their high potential for diseases transmission. Biomedical Waste (BMW) management is a legal necessity as well as social responsibility.

Aims & Objectives: To assess practices regarding biomedical waste management among healthcare functionaries.

Material and Methods: A list of all health care centres was obtained from CHC Dubaldhan and CHC, Dighal of block Beri. After obtaining informed consent, a pre-tested semi-structured interview schedule was administered to the study subjects and the responses were recorded by the investigator himself.

Results: The segregation of BMW was inadequate in 20 (40.8%) government centers and 59 (96.7%) private centers. Hub-cutter/ needle destroyer was available at 31 (63.3%) of government health centers while only 12 (19.7%) of the private health centers possessed it. Disinfection was adequate in 3 (6.1%) government centers and 1 (1.6%) private center.

Conclusion: The study has shown that appropriate biomedical waste management and safe handling practices were lacking among health functionaries and condition in private centers was significantly poorer than government centers in this regard.

Key words: Biomedical Waste, Management, Health Functionaries, Segregation, Disinfection

INTRODUCTION

Biomedical waste (BMW) is waste generated during the diagnosis, testing, treatment, research or production of biological products for humans or animals. Hospitals, medical clinics and laboratories are main sources of biomedical waste.[1] According to an estimate about 0.33 million tonnes of BMW is generated every year in India and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day. Safe and reliable method for handling of biomedical waste is essential at the point of generation.[2]

The hospital waste, in addition to the risk for patients and personnel who handle these wastes poses a threat to public health and environment. Keeping in view inappropriate BMW management, The Ministry of Environment and Forests notified the "Biomedical Waste (management and handling) Rules, 1998". As per these Rules, it is the duty of every "occupier" i.e. a person who has the control over the institution, to take all steps to ensure that waste generated is handled without any adverse effect to human health and environment.[1]

Each year, the reuse of injection equipment may cause 20 million infections with hepatitis B virus (HBV), 2 million infections with hepatitis C virus (HCV) and 250,000 infections with human immunodeficiency virus (HIV) worldwide.[3] WHO estimates that about 80-85% of the total hospital waste is not hazardous/ infected (provided strict segre-

gation is practiced). The remaining 15-20% is hazardous and can be injurious to humans or animals and deleterious to environment. The hazardous waste can be infectious (10-15%) like sharps or noninfectious (5%) such as chemical and pharmaceutical waste.[4]

Proper technique and methods of handling the BMW waste, and practice of safety measures can go a long way toward the safe disposal of hazardous hospital waste, it can protect not only the health workers and patients from hazards but also community at large from various adverse effects of the hazardous waste. Multiple studies to assess BMW management practices among health functionaries in urban areas of India have been conducted whereas very few studies have been undertaken in rural areas. That's why an attempt was made to assess practices of healthcare functionaries in a predominantly rural block.

MATERIAL AND METHODS

The study was conducted among health functionaries of all health centres whether govt. or private (including veterinary centres) of block Beri, District Jhhajar which is field practice area of Department of Community Medicine, Pt. B. D. Sharma PGIMS, Rohtak. The study was conducted from Jan 2012 to Dec 2012. Approval from Institutional ethics committee was obtained before carrying out the study. A list of all health care centres/units was obtained from CHC Dubaldhan and CHC, Dighal as both these CHCs are administrative units of block, Beri. This block is served by 133 health centres including one General Hospital (Beri), two Community Health Centres (Dighal and Dubaldhan), three Primary Health Centres, 25 Sub Health Centres, 75 general Practitioner's Clinics (Allopathic, AYUSH, Naturopathy, Quacks etc.), 2 dental clinics, 18 veterinary hospitals and 7 laboratories.

All the study subjects were fully informed and consent was obtained before initiating the interview. The confidentiality of the information was assured. Interview with each health functionary was started with general discussion to build up a rapport and to gain their confidence. A pre-tested semi-structured interview schedule was administered to the study subjects and the responses were recorded by the investigator himself.

The questionnaire included information regarding demographic profile, segregation, disinfection, disfigurement, colour coding, transportation, and final disposal of Bio-medical waste. Collected data were entered in the MS Excel spread sheet, coded appropriately and analysis was carried out using SPSS (Statistical Package for Social Studies) for Windows version.18.0 and online. Categorical data were presented as percentage (%) and statistical average (mean) was calculated wherever necessary. Pearson's chi square test was used to evaluate differences between groups for categorized variables. In case, expected cell count less than 5 comprise >20% of a table, fisher's exact test was used. All tests were performed at a 5% level significance; thus an association was significant if the value was less than 0.05 (p value < 0.05).

RESULTS

There were 133 health centres/units in the Beri block, out of which 110 (82.7%) could be studied. All the government centres consented for the study but least response rate (70.7%) was from general practitioners' clinics.

Table 1: Distribution of Various Health Functionaries in Government and Private Health Centres (n=208)

Health Functionaries	Government (%)	Private (%)
Allopathic Doctors	15 (10.9)	4 (5.7)
AYUSH Doctors	2 (1.5)	14 (20.0)
Dental Surgeons	4 (2.9)	2 (2.9)
MPHS (Male & Female)	6 (4.3)	0 (0)
Pharmacists	7 (5.1)	0 (0)
MPHW (Male & Female)	70 (50.7)	0 (0)
Staff Nurses	26 (18.8)	4 (5.7)
Radiographers	2 (1.5)	1 (1.4)
Lab technicians	6 (4.3)	7 (10.0)
Quacks	0 (0)	38 (54.3)
Total	138 (100)	70 (100)

Figures in the parentheses are percentages

Table 1 is showing the distribution of 208 various health functionaries in government and private health centres. Out of 208 health functionaries, two third workers were of government health centres and one-third workers were of private health centres. About two third (67.8%) health functionaries in government health centres were multipurpose health worker (male & female), staff nurses and allopathic doctors. In private centres more than half (54.3%) of the health functionaries were quacks and about one fifth (20%) were AYUSH doctors.

Table 2 shows that 12 (80%) doctors and 18 (69.2%) staff nurses disposed of the biomedical waste in specified color coded containers but none of the dentists, AYUSH medical officers or pharmacist and 18.6% MPHWs and 33.3% MPHSs did so ($p<0.001$). Practices regarding disposal of sharps in puncture proof containers were being followed by only 18.6% of Multi-Purpose Health Workers (MPHWs), 33.3% Multi-Purpose Health Supervisors (MPHSs) and 28.7% of pharmacists ($p<0.001$).

Table 2: Practices of Government Health Functionaries for Biomedical Waste Management (n = 138)

Practices regarding BMW management	Doctors (n=15)	Dentists (n=4)	AYUSH MO (n=2)	Pharma-cists (n=7)	Staff Nurses (n=26)	MPHW (M&F) (n=70)	MPHS (M&F) (n=6)	Lab, X-ray technicians (n=8)
Disposal in specified color coded containers*	12 (80.0)	0 (0)	0 (0)	0 (0)	18 (69.2)	13 (18.6)	2 (33.3)	4 (50)
Disposal of sharps in puncture proof containers*	10 (66.7)	0 (0)	0 (0)	2 (28.6)	21 (80.8)	13 (18.6)	2 (33.3)	6 (75)
Wearing of PPEs*:								
Adequate	7(46.7)	3(75.0)	0 (0)	0(0)	11(42.4)	15 (21)	2(33.3)	3(37.5)
Not adequate	8(53.3)	1(25.0)	2(100)	7(100)	15(57.6)	55(79)	4(66.7)	5(62.5)
Reasons for not using PPEs*								
Not provided	2(13.3)	0 (0)	0 (0)	1(14.3)	8(30.8)	53(75.7)	4(66.7)	3(37.5)
Not necessary	0 (0)	0 (0)	0 (0)	1(14.3)	1(3.8)	0 (0)	0 (0)	0 (0)
Lack of awareness	0(0)	0(0)	0 (0)	0 (0)	3(11.5)	2(2.9)	0 (0)	0 (0)
Reluctance	6(40.0)	1(25.0)	2 (100)	5(71.4)	3(11.5)	0 (0)	0 (0)	2(25.0)
Increases cost	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Reporting of injuries due to improperly disposed sharps	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Figures in the parentheses are percentages; *Statistically significant (p<0.05); MO=Medical Officer

Table 3: Practices of Private Health Functionaries Regarding Biomedical Waste Management (n = 70)

Practices regarding Biomedical waste management	Doctors (n=4)	Dentists (n=2)	AYUSH Doctors (n=14)	Staff Nurses (n=4)	Quacks (n=38)	Lab & X-ray technicians (n=8)
Disposal in specified color coded containers*	2 (50)	0(0)	0(0)	0(0)	1 (2.6)	0(0)
Disposal of sharps in puncture proof containers	1 (25.0)	0(0)	0(0)	0(0)	1 (2.6)	0(0)
Wearing of PPEs*						
Adequate	2 (50.0)	0 (0)	0 (0)	3(75.0)	1 (2.6)	0 (0)
Not adequate	2 (50.0)	2(100)	14(100)	1(25.0)	37 (97.4)	8 (100)
Reasons for not using PPEs*						
Not provided	0 (0)	0(0)	0 (0)	0 (0)	0 (0)	1 (12.5)
Not necessary	1 (25.0)	0 (0)	7(50.0)	1(25.0)	13 (34.2)	2 (25.0)
Lack of awareness	0 (0)	0 (0)	3 (21.4)	0 (0)	16(42.1)	2 (25.0)
Reluctance	1 (25.0)	1 (50.0)	2 (14.3)	0 (0)	4 (10.5)	0 (0)
Increases cost	0 (0)	1 (50.0)	2 (14.3)	0 (0)	4 (10.5)	3 (37.5)
Reporting of injuries due to improperly disposed sharps	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Figures in the parentheses are percentages *Statistically Significant (p<0.05).

Practice of wearing of personal protective equipments (PPEs) was not being followed by about two third of the government health functionaries except that 75% of the dentists and 46.7% doctors were adequately wearing PPEs (p=0.045). Lack of supply and reluctance were the most commonly stated reasons for not wearing PPEs (p<0.001). The study also found that none of the healthcare functionaries in government centers reported any injury due to improperly disposed sharps.

Table 3 depicts that in private healthcare functionaries, only 50% doctors, 2.6% quacks and none of the dentists, AYUSH (Ayurveda, Yoga, Unani, Siddha & Homeopathy) doctors, staff nurses or lab & X-ray technicians disposed the Biomedical waste in specified color coded containers (p=0.001). Only 2.6% of quacks, 50% of doctors and 75% of staff nurses, used adequate personal protective equipments.

None of the dentists, AYUSH doctors and technicians used adequate PPEs (p<0.001). Lack of awareness, feeling not necessary and cost were the most commonly stated reasons for not wearing PPEs (p<0.001). The study also noted that none of the healthcare staff reported any injury due to improperly disposed sharps.

Findings of the government & private health functionaries revealed that doctors had not percolated their good practices regarding biomedical waste management to their subordinates.

DISCUSSION

Appropriate knowledge, positive attitude and proper practices among health care workers are essential for the adequate management of biomedical waste. The present study assessed the practices of disposal of the BMW. Among the government healthcare functionaries, this study observed that 80% doctors and 69.2% staff nurses were disposing BMW in specified color coded containers but none of the dentists, AYUSH medical officers or pharmacist and 18.6% MPHWs and 33.3% MPHSs did so. Practices regarding disposal of sharps in puncture proof containers were being followed by only 18.6% of MPHWs (male & female), 33.3% MPHSs (male & female) and 28.6% of pharmacists. In study by Bansal et al. conducted on "Biomedical waste management: awareness and practices in a district of Madhya Pradesh" depicted that proper BMW management was observed by all the doctors (100%) followed by Para-medical

workers (95.83%) and least among non-medical workers (43.10%).[6]

The study also assessed the practices regarding BMW management among private healthcare functionaries and found that no dentists, no AYUSH doctors, no staff nurses and no lab and X-ray technicians disposed the waste in specified color coded containers. Also no dentists, no AYUSH doctors, no staff nurses and no lab and X-ray technicians were practicing the disposal of sharps in puncture proof containers. Gupta et al. in Lucknow[7] and Pandit NA et al. in their study in Srinagar[8] also observed that infectious and non-infectious wastes were not being segregated. Pandit NB et al. noticed that none of the hospitals were practicing the disposal of the biomedical waste in specified color coded containers. They also found that all private and Trust/NGO run hospitals were not using needle shredder and they disposed all sharps with other waste.[9]

Shafee et al. in a study regarding BMW practices found that the doctors and nurses practiced BMW management better than the technical and non-technical staff and a significant difference was found (P<0.01). They also recorded that only 95 (19%) of the subjects collected the waste in different colors containers, from which 56 (59.8%) were nurses.[10] Saini et al. reported that only 47% of the technical staff practiced BMW management.[11] However, Patil GV et al. conducted a study at Jhansi, they revealed that the process of segregation, collection, transport, storage and final disposal of infectious waste was done in compliance with the standard procedures. It was also found that the non-infectious waste was collected separately in different containers and treated as general waste.[12] Sood et al. in their study among dentists found that 21% of the dentists were disposing the sharps in, yellow, red, or black bag. Only 32% of dentists were using red bags appropriately while 36% dentist were using yellow bag as per BMWM rules.[13]

Needle stick and puncture wound injuries and resulting infections have been recorded in situations where sharps have been improperly handled and/or disposed. The sharps (needles, scalpel blades) are that category of waste that needs maximum precaution and care. The needles, which comprise of the bulk of "sharps", should be destroyed by needle destroyers or by using syringe melting and disposal system. The mutilated sharps should be placed in puncture proof sharp container containing 1% NaOCl for disinfection. Once the container is three-fourth filled, it should be given to waste handlers and sent for shredding, encapsulation, and disposal in landfills by common treatment facility.[14,15]

These facts require that BMW management must be included & emphasized in curriculum of all healthcare functionaries. The rules apply to all those persons who generate, collect, receive, store, transport, treat, dispose, and handle the BMW waste. It is ideal and desirable that occupational safety be a prime consideration for any system of waste management.

CONCLUSION AND RECOMMENDATIONS

The present study concluded that the appropriate biomedical waste management and safe handling practices were lacking among health functionaries and condition in private centers was significantly poorer than government centers in this regard.

We recommend that all the head of the institutions, health care personnel of health care centres/units must undergo awareness programme to keep abreast with the current knowledge of scientific waste management system and its importance and benefits to the patients, staff and the community as a whole. Supportive supervision and monitoring by immediate incharges and by block & district health authorities can play a big role in improvement of biomedical waste management practices and its status as a whole.

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