

A Study on Biomedical Waste Management of Five Private Hospitals of Imphal City, Manipur, Northeast India

Anjuna Mutum, Susmita Gupta, Thingujam Achouba Singh

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Abstract Biomedical waste (BMW) is associated with risks to health care workers, patients and the environment. Therefore, proper management of segregation, collection, transportation and disposal is very essential. So an attempt is made to assess the knowledge and methods practiced about various aspects of BMW management among the selected health care workers in Imphal, Manipur, India. A cross-sectional study was conducted amongst doctors, nurses, paramedical staffs and auxiliary staffs of five hospitals of Imphal City, India. A total of 556 healthcare personnel consented for interview. Simple random sampling technique was used to select the study unit. A predesigned questionnaire was used for data collection. Data compilation, tabulation and calculation of percentages were done by using SPSS version 20. In the present study it was found that all the five hospitals segregated waste at the source except some new employees were unaware of it. There

was daily collection of waste in the hospitals and was generally maintained in a register. One hospital provided common incinerator for the entire Imphal city for disposing the biomedical waste. The respondents were observed to be quite aware in both theoretical and practical knowledge of BMW. Proper waste management process is needed to improve BMW management as it is an important and necessary component of environmental health protection.

Keywords Biomedical waste management, Segregation, Health care workers.

Introduction

Biomedical Waste Management means the management of waste generated by hospitals. using such techniques that will help to check the spread of diseases through it [1]. In recent years, medical waste disposal has posed even more difficulties with the appearance of disposable needles, syringes, and other similar items. Hospital and public health care units are supposed to safeguard the health of patients, hospital workers and the whole community [2]. However, if the waste produced by the medical care centers, disposed of improperly, it may lead to greater threat than the original diseases themselves. Biomedical waste management has diverse ramifications as it not only affects the health of patients but also of healthcare workers (doctors, nurses, sanitary staff) and the general public. Studies have also investigated the opportunities for waste reduction through better management practices for both infectious and gen-

A. Mutum, S. Gupta*
Department of Ecology and Environmental Science,
Assam University, Silchar 788004, India

T. A. Singh
Department of Community Medicine,
Regional Institute of Medical Sciences, Imphal, India

*Correspondence
Dr. Susmita Gupta
e-mail : susmita.au@gmail.com
Department of Ecology and Environmental Science,
Assam University, Silchar 788004, India

Table 1. Demographic characteristics of the respondents. N=556. *Percentages are calculated based on total number of respondents.

		No. of respondents	Percentages
Sex	Male	208	37.4
	Female	348	62.6
Age	18-27	240	43.2
	28-37	226	40.6
	38-47	54	9.7
	48-57	23	4.1
	58 & above	13	2.3
Occupation	Doctor	77	13.8
	Paramedical staff	39	7.0
	Nurse	249	44.8
	Auxiliary staff	191	34.4
	Total	556	100.0

eral wastes [3]. Within waste management (WM), the health care waste management (HCWM) is a process that helps to ensure proper hospital hygiene and safety of health care workers and communities. HCWM concerns about planning and procurement, staff training and behavior, proper use of tools, machines and pharmaceuticals, proper methods applied for segregation, reduction in volume, treatment and disposal of biomedical waste [4]. The implementation of the Biomedical Waste Management and Han-

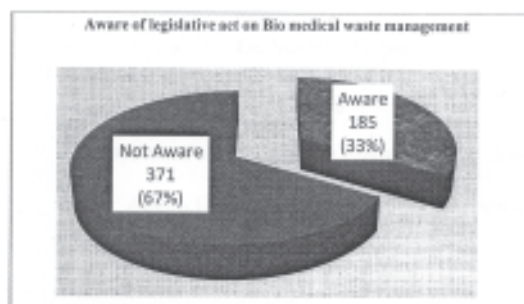


Fig. 1. Waste management policy.

dling Rules 1998 also made it mandatory for hospitals, clinics, other medical institutions and veterinary institutions to dispose of biomedical solid waste according to the Law. However, despite the introduction of the Biomedical Rules [5] the waste generated by government hospitals is still largely being dumped in the open, waiting to be collected along with general waste.

Materials and Methods

Study area

Imphal, the capital city of Manipur is situated in the

Table 2. Bio-waste management.

		Occupation				Total (%)	Chi-square (p-value)
		Doctor (%)	Paramedical staff (%)	Nurse (%)	Auxiliary staff (%)		
Waste labelled with the bio-hazard symbol	Yes	70 (90.91)	28 (71.79)	192 (77.11)	133 (69.63)	423 (76.08)	110.29 (<0.001)
	No	7 (9.09)	11 (28.21)	51 (20.48)	7 (3.66)	76 (13.67)	
	Don't know	-	-	6 (2.41)	51 (26.70)	57 (10.25)	
Sharps/needle waste dissolve in 1% sodium hydrochloride	Yes	77 (100.00)	39 (100.00)	226 (90.76)	190 (99.48)	532 (95.68)	26.482 (<0.001)
	No	-	-	23 (9.24)	1 (0.52)	24 (4.32)	
	Yes	76 (98.70)	24 (61.54)	163 (65.46)	91 (47.64)	354 (63.67)	
Incinerated chemically treated	No	-	13 (33.33)	38 (15.26)	59 (30.89)	110 (19.78)	73.842 (<0.001)
	Don't know	1 (1.30)	2 (5.13)	48 (19.28)	41 (21.47)	92 (16.55)	
	Total	77 (100.00)	39 (100.00)	249 (100.00)	191 (100.00)	556 (100.00)	

Table 3. Personal protective equipment (PPE).

		Occupation				Total (%)	Chi-square (p-value)
		Doctor (%)	Paramedical staff (%)	Nurse (%)	Auxiliary staff (%)		
PPE Gloves	Yes	73 (94.81)	39 (100.00)	247 (99.20)	183 (95.81)	542 (97.48)	8.409 (0.038)
	No	4 (5.19)	0 (0.00)	2 (0.80)	8 (4.19)	14 (2.52)	
PPE Boots	Yes	45 (58.44)	10 (25.64)	155 (62.25)	150 (78.53)	360 (64.75)	44.058 (<0.001)
	No	32 (41.56)	29 (74.36)	94 (37.75)	41 (21.47)	196 (35.25)	
PPE Apron	Yes	58 (75.32)	30 (76.92)	191 (76.71)	155 (81.15)	434 (78.06)	1.698 (0.637)
	No	19 (24.68)	9 (23.08)	58 (23.29)	36 (18.85)	122 (21.94)	
PPE Mask	Yes	77 (100.00)	32 (82.05)	232 (93.17)	181 (94.76)	522 (93.88)	15.005 (0.002)
	No	0 (0.00)	7 (17.95)	17 (6.83)	10 (5.24)	34 (6.12)	
Total		77 (100.00)	39 (100.00)	249 (100.00)	191 (100.00)	556 (100.00)	

extreme north eastern part of India. The state shares common boundary with other north-eastern states such as Assam, Mizoram and Nagaland, it also has an international boundary with Myanmar. Five most popular private hospitals of Imphal city located in Imphal west district, Manipur, India were selected. SHRI having bed capacity of 200, IHRI bedded capacity of 70, LVCCH bedded capacity of 32. ASHRI bedded capacity of 100 and PHRI bedded capacity of 30 were selected for this study.

Methods of study

The present investigation was carried out during October 2013 July 2014. A cross sectional study was conducted in five private hospitals of Imphal. The questionnaire based on modified WHO guidelines for healthcare waste management was designed to suite the different categories of personnel associated with healthcare establishments. The information obtained was confirmed by means of direct observations too.

Results and Discussion

Five hospitals were surveyed and their waste management techniques were assessed. Maximum of the

respondents of all the hospitals were females compared to the male respondents. The maximum respondents were from the nursing category of the hospitals as they form the majority number for taking care of the patients. Table 1 represents the distribution of respondents with respect to sex, age and occupation. Figure 1 reveals that out of 556 employees under study only 185 (33%) employees are aware of the legislative act on biomedical waste management.

Table 2 shows that out of 556 respondents, majority 423 (76.08%) respondents agreed that bio-waste are labelled with bio-hazard symbol in the hospitals. Table 3 represents different types of Personal Protective Equipment (PPE) used by the staff while handling the wastes. Out of 556 respondents under study, majority i.e. 542 (97.48%) agreed that they are using PPE gloves while handling the bio-waste. Table 4 shows that of 556 respondents under study, majority i.e. 523 (94.1%) respondents suggest that biomedical wastes are disposed at the authorized hospital waste collection, 412 (74.1%) respondents suggest that they have maintained a registered for bio-waste management. Majority 416 (74.8%) respondents agreed that their health care setting has done a waste audit in the last three years.

Table 4. Bio-waste disposal management.

		No. of respondents	Percent
Where do dispose biomedical waste	Dumping in corporation bin	33	5.9
	Authorized hospita waste collection	523	94.1
	Yes	412	74.1
Maintain a registered for waste	No	125	22.5
	Don't know	19	3.4
	Yes	416	74.8
Health care setting done a waste audit	No	97	17.4
	Don't know	43	7.7
	Total	556	100.0

Table 5 reveals that out of 556 respondents under study majority i.e. 498 (89.6%) respondents suggested that their hospital has undergone training program on hospital waste management. Also 400 (71.9%) respondents agreed that their hospital provide annual waste care in responsibility of government. Similarly, 415 (74.6%) respondents agreed that they have attained program on hospital waste management.

Most of the respondents disagree to the statement that safe management of health care waste is not an issue at all (Table 6). Whereas all the respondents gave neutral response to the statement that safe management of health care waste is the responsibility of govt. and safe management of health care waste is an extra burden on work. But all the respondents agreed to the statement that safe management is team work. From the *F*-test result, no statistical variation is found in the opinion of the respondents to the statements as discussed above. Also, statistically significant result was observed as revealed by the *F*-test : $F = 20.115$, p -value = <0.001 .

The paramedical staffs especially the nurses

spent more time with patients which increases 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 environment [6]. In a recent study in Jaipur city it was found that there was a poor level of knowledge and awareness about waste generation hazards, legislation and management among dentists, nurses, technicians and Class IV employees [7]. A study in a Tertiary hospital in Rajkot revealed that majority of respondents heard about BMW and its management rules, but less than half of the participants have actually received BMV training [8]. Lack of awareness, appropriate policy, laws and willingness has been responsible for the improper management of BMW in Dhaka City [9]. In the present study majority of the respondents were not aware of the legal issues involved. They followed only the plan or rules given by the authority of the BMW management. Safe management of health care waste has become very important and necessary and spreading its awareness rather than just providing technology or facilities. It is the right time that people involved in medical paramedi-

Table 5. Training program on hospital management.

		No. of respondents	Percent
Undergone training program on hospital waste management	Yes	498	89.6
	No	58	10.4
	Yes	400	71.9
Hospital provide annual care waste in responsibility of govt.	No	150	27.0
	Don't know	6	1.1
	Total	556	100.0
Attend program on hospital waste management	Yes	415	74.6
	No	141	25.4

Table 6. Attitude assessment. $\bar{x}$ = Mean, SD = standard deviation.

	N	Doctor 77	Paramedical staff 39	Nurse 249	Auxiliary staff 191	Total 556	F-value (p - value)
Safe management of health care waste is not an issue at all	$\bar{x} \pm SD$	1 $\pm$ 0.00	1 $\pm$ 0.00	1 $\pm$ 0.11	1 $\pm$ 0.0	1 $\pm$ 0.7	1.239 (<0.295)
Safe management of health care waste is the responsibility of govt.	$\bar{x} \pm SD$	2.1 $\pm$ 0.97	2.0 $\pm$ 0.89	2.3 $\pm$ 0.94	2.3 $\pm$ 0.86	2.3 $\pm$ 0.92	1.662 (0.174)
Safe management is team work.	$\bar{x} \pm SD$	2.5 $\pm$ 0.87	2.5 $\pm$ 0.89	2.6 $\pm$ 0.78	2.7 $\pm$ 0.74	2.6 $\pm$ 0.79	0.953 (0.415)
Safe management efforts by hospital increases financial burden on management	$\bar{x} \pm SD$	1.4 $\pm$ 0.52	1.8 $\pm$ 0.87	1.9 $\pm$ 0.9	2.3 $\pm$ 0.94	1.9 $\pm$ 0.91	20.115 (<0.001)
Safe management of health care waste is an extra burden on work	Mean $\pm$ SD	1.3 $\pm$ 0.64	1.1 $\pm$ 0.41	1.5 $\pm$ 0.89	1.1 $\pm$ 0.49	1.3 $\pm$ 0.68	9.742 (<0.001)

cal and nursing give due importance to this vital issue. So that academic institutions and non-governmental organizations could play a vital role in disseminating information.

This study revealed that all the five hospitals followed to some extent the rules and regulations regarding BMW management. By following the standard rules of BMW treatment, inappropriately disposed BMW could be substantially reduced. This study has created awareness regarding the magnitude of the problem of BMW management among the employees of the five private hospitals of Imphal, Manipur, India and has generated interest for systematic control efforts for the BMW disposal.

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