

Original Research Article

Evaluation of health safety of direct biomedical waste handlers in a Government Medical College, Himachal Pradesh

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ABSTRACT

Background: Hospital waste management is a crucial environmental issue of public health concern due to hazardous and infectious character of the waste. Since the hospital staff is at risk of being infected by the hospital waste, therefore occupational health and safety should be recommended as a component of biomedical management plans with qualified personnel. Health safety of the waste handlers is an issue of prime concern.

Methods: A descriptive study was conducted in Government Medical College, Nahan, Sirmour, Himachal Pradesh to evaluate the health safety of direct waste handlers. The information regarding the biomedical waste management awareness, practices and health safety was recorded from direct waste handlers. Semistructured questionnaire was used for interview.

Results: A total of 26 biomedical waste handlers were interviewed from August 31, 2017 to September 13, 2017. Gender composition showed 18 (69.2%) females and 8 (30.8%) males. Awareness regarding the risk associated with biomedical waste handling like exposure to infections like HIV, HBV, injury with sharp objects and Chemical burns etc. was present in 19 (73.0%) workers. Most 10 (38.4%) demanded the provision of personal protective equipments, training and vaccination.

Conclusions: Regular orientation and training programs should be organized for biomedical waste handlers and strict implementation of biomedical waste management guidelines should be in practice. Risk to the health of direct waste handlers in the form of exposure to infectious diseases needs to be considered by timely provision of vaccination.

Keywords: Biomedical waste, Direct waste handlers, Health Safety

INTRODUCTION

Hospital waste management is a crucial environmental issue of public health concern due to hazardous and infectious character of the waste. Hospital waste is produced when activities pertaining to the care of patients are carried out in the various settings of health care. The waste generated has a leeway to cause harm to the human beings and the environment. The waste generated is called the biomedical waste and includes soiled cotton, bandages, hypodermic needles, syringes and tubings. Such waste constitutes 15-25% of the total waste

generated. The remaining is general waste like wrapper of drugs, waste paper, card board and left over food etc.¹

The generation of biomedical waste is increasing day by day as a result of advances in the scientific knowledge.² There has been an increased felt of hospitals for provision of quality health care to the patients. However, this in turn has led to the increase in the generation of waste posing increased risk to the public, patients, professionals and environment owing to the poor waste management practices.³ The issue of biomedical waste management is of concern globally as tons of wastes is produced in the

hospitals daily. Segregation and labelling of waste at source may help identifying the proper handling and treatment procedure. Improper handling involves some unsafe procedures followed during handling of waste without wearing personal protective equipments, poor storage, transporting manually for longer distances, unpacked or uncovered containers etc.⁴ Combination of improper handling of waste during generation, collection, storage, transport and treatment entails risk because of infectious waste.⁵ Failures in waste segregation and errors in colour coding results in generation of hazardous waste which acts as potential source of infection to the people of the community.

All the staff handling the materials in the health care facilities must be aware of the material safety. Since the hospital staff is at risk of being infected by the hospital waste, therefore occupational health and safety should be recommended as a component of biomedical management plans with qualified personnel. Appropriate safety measures and universal precautions should be adopted in case of spillage/accidents. Personal protective equipments should be worn by the workers concerned with biomedical waste handling to avoid any untoward health problem because of infectious waste. Training of the workers should be priority for proper functioning of biomedical waste management waste system in the hospital. Vaccination against hepatitis B and Tetanus should be provided to the workers on priority basis as an effective preventive measure.

The disposal of waste has historically been an issue of apprehension and one that it provides clear insight into the very essence of the society. In India, where the existence of entire communities of untouchable castes who in their very persons comprised the sum of sanitary systems of any village or towns, political mobilization and cultural assertion have often been centered around the disposal of waste.⁶

Proper waste management practices in the hospital represent the healthy environment in the hospital with subsequent decrease in the health issues because of diseases that spread through improperly disposed biomedical waste. Besides this health safety of the waste handlers is an issue of prime concern as they form the grassroot for the provision of these services. Hence, this study was planned to assess the health safety of direct biomedical waste handlers in a Government Medical College, Himachal Pradesh.

Objective

- To evaluate the health safety of direct waste handlers in a government medical college, Himachal Pradesh, India.

METHODS

A descriptive study was conducted in Government Medical College, Nahan, Himachal Pradesh. The study

period was from 31st August, 2017 to 13th September, 2017. Inclusion criteria included the biomedical waste handlers who gave consent to participate in the study. Exclusion criteria included the biomedical waste handlers on leave during the study period. The information regarding biomedical waste management practices and health safety was recorded in a semistructured questionnaire. The questionnaire was pretested prior to use. Detailed information was obtained from direct waste handlers including the background characteristics, awareness regarding the proper collection, segregation, transport and disposal, associated health hazards with biomedical waste and health safety measures adopted by them. Modified Prasad classification was used for the assessment of socioeconomic status.

Analysis

Analysis was done using percentage, range, mean, standard deviation. Chi square test was used for analysis. SPSS package was used for data entry and analysis.

RESULTS

A total of 26 biomedical waste handlers were interviewed. Gender composition showed 18 (69.2%) females and 8(30.8%) males. Majority 21 (80.8%) belonged to middle and lower middle class. However, 3 (11.5%) workers belonged to lower class. Most of the workers 17 (65.4%) were in the age group of 25-45 years, 7 (26.9%) aged more than 45 years and 2 (7.7%) aged between 15-24 years. Average period of work in the hospital was 4.5 years. Majority 12(46.2%) of workers were educated upto primary. 3 (11.5%) workers were educated upto middle standard. Only one worker was matriculate. Overall, 10 (38.5%) workers were illiterate; Half 9 (50%) of female workers were illiterate as compared to 1 (12.5%) male worker. Majority of the male workers 6 (75%) were educated upto primary. All the workers were Hindus and belonged to scheduled caste. Subcategorization of caste showed that 13 (50%) of the workers belonged to Balmiki community and 13 (50.0%) belonged to Harijan community (Table 1).

All the workers responded as waste collection daily with onsite disposal of waste manually in the specified collection bins for infectious and non-infectious waste. All the workers were aware of the types of waste generated in the hospital. Awareness regarding the amount of the waste generated in the hospital everyday was present in only 1 (3.8%) worker. Overall, 22 (84.6%) agreed to the segregation of waste prior to disposal.

Rating of segregation of biomedical waste on Likert scale suggested poor response in 4 (18.1%), Good in 11 (50.0%) and very good in 7 (31.8%) workers. All the workers were aware of the provision of coloured containers for the segregation of biomedical waste. According to 21 (80.7%) workers, storage of biomedical waste was safe. Storage was considered unsafe by 2

(7.6%) and 3 (11.5%) workers had no idea regarding the safety of storage of biomedical waste. Manual handling of waste from colour coded bins to onsite disposal was rated as poor in 5 (19.2%), good in 15 (57.6%) and very good in 4 (15.3%). However 2 (7.6%) workers could not rate the handling of waste in the Likert scale. Personal protective equipments were provided in form of gloves in

11 (42.3%) and gloves and mask in 15 (57.6%). Training regarding safe collection, segregation and disposal of biomedical waste was provided to only 3 (11.5%) workers during their entire period of work in the hospital. None of the workers had attended sensitization workshop on biomedical waste management in last 6 months. (Table 2).

Table 1: Background characteristics of the study population (gender wise).

Background variables	Females (n=18)	Males (n=8)	P value
Mean age in yrs. (SD)	38.1 (7.92)	35.0 (8.48)	0.366
Age group (years)			
<14	0 (0)	0 (0)	0.492
15-24	1 (5.5)	1 (12.5)	
25-34	5 (27.7)	4 (50.0)	
35-44	7 (38.8)	1 (12.5)	
>45	5 (27.7)	2 (25)	
Education			
None	9 (50.0)	1 (12.5)	0.207
Primary	6 (33.3)	6 (75.0)	
Middle	2 (11.1)	1 (12.5)	
Matric	1 (5.5)	0 (0.0)	
Caste			
Scheduled caste	18 (100.0)	8 (100.0)	
Sub caste			
Balmiki	11 (61.1)	2 (25.0)	0.089
Harijan	7 (38.8)	6 (75.0)	
Socioeconomic status			
Upper middle	0 (0.0)	2 (25.0)	0.117
Middle	7 (38.8)	3 (37.5)	
Lower middle	8 (44.4)	3 (37.5)	
Lower	3 (16.6)	0 (0.0)	
Period of work in days mean (SD)	1683.3 (3208.3)	1629.38 (3208.3)	0.963
Years	4.6	4.4	

*Modified Prasad classification; number (%) are given unless specified otherwise.

Table 2: Training and practices of biomedical waste handlers.

Training and practices	N (%)
Received training on biomedical waste management	3 (11.5)
Attended sensitization workshop on biomedical waste management in one year	0 (0)
Usage of gloves only as personal protective equipment	11 (42.3)
Usage of gloves and mask as personal protective equipment	15 (57.7)
Received Hepatitis B vaccination	1 (3.8)
History of injury* while at work for last 6 months	2 (7.6)
Whether injury reported to higher authorities	0(0)

*Injury with sharp objects, chemical burns, HBV, HIV Infections.

Table 3: Gender wise awareness of risk* associated with biomedical waste handing.

Awareness	Male N (%)	Female N (%)	Total N (%)	P value
Yes	4 (50.0)	15 (83.4)	19 (73.1)	0.07
No	4 (50.0)	3 (16.6)	7 (26.9)	
Total	8 (100.0)	18 (100.0)	26 (100.0)	

*Injury with sharp objects, chemical burns, HBV, HIV Infections.

Table 4: Response by workers for betterment in health safety.

Suggestion	N (%)
Provision of personal protective equipments, training, vaccination, free medical treatment and improved water supply	10 (38.4)
*Provision of all the personal protective equipments	7 (26.9)
Provision of personal protective equipments and soap for hand washing.	5 (19.2)
Provision of personal protective equipments, training, vaccination and free medical treatment	4 (15.3),

*Mask, gloves, eye shield, apron and boots.

Awareness regarding the risk associated with biomedical waste handling like exposure to infections like HIV, HBV, injury with sharp objects and chemical burns etc. was present in 19 (73.0%) workers. Gender wise awareness showed that 15 (83.3%) females were aware as compared to 4 (50.0%) males (Table 3). The level of awareness was statistically insignificant among males and females ($p=0.07$). According to 23 (88.4%) workers, there was no outbreak of diseases related to biomedical waste in the past 6 months. However, 3 (11.5%) workers were unaware.

Only one worker had received vaccination against Hepatitis B. History of injury at work was present in 2 (7.6%) workers, the nature of injury being needle prick. Injury was not reported to the higher authorities as the workers were unaware of the authorities to be contacted in case of any injury. Risk to the health because of biomedical waste handling was interpreted as "exposure to various diseases" in 16 (61.5%), respiratory problems in 2 (7.6%), respiratory problems and gastritis in 1 (3.8%), respiratory problems and diabetes in 1 (3.8%) and exposure to injury by 2 (7.6%). Five (19.2%) workers were unaware of the diseases affecting health because of handling biomedical waste. Risk to the environment was interpreted as "spread of germs" by 23 (88.5%) waste handlers. Lack of knowledge regarding the environmental risk associated with the unsafe practices being followed while collection, segregation and disposal was present in 3 (11.5%) patients.

Most 10 (38.4%) demanded the provision of personal protective equipments, training, vaccination, free medical treatment and improved water supply. 7 (26.9%) of the waste handlers demanded the provision of all the personal protective equipments i.e. gloves, mask, eye shield, apron and boots, 5 (19.2%) demanded the provision of personal protective equipments and soap for hand washing. Personal protective measures, training, vaccination and free medical treatment was demanded by 4 (15.3%) workers (Table 4).

DISCUSSION

Gender composition showed 18 (69.2%) females and 8 (30.8%) males. Results of our study are similar to study by Kumar et al which showed 133 (60.5%) females and 87 (39.5%) males in the study population.⁷ It represents

that females outnumber males in activities involving handling of biomedical waste. Hospital generates 20 kg of infectious waste/day or 0.08kg/bed/day. Study results are in contrast to study by Baghotia which reported that the average quantum of waste generated in Delhi Government hospitals in Delhi is 260 g per bed per day whereas it is 200g per bed per day in hospitals other than Delhi Government.⁸ It is essential for direct waste handlers to be acquainted with the dangers and hazards that may occur during the course of duty. They need to be trained or oriented on the health and safety measures. Results from the questionnaire revealed that only 3 (11.5%) workers had received training on biomedical waste management study results are in contrast to study by Singh et al which showed that 41 (37.6%) had received training while 68 (62.3%) did not receive any special training on biomedical waste management.⁹ Study by Srivastav et al showed that 8 (14%) had received special training in biomedical waste management.¹⁰ Personal protective equipments were provided in the form of gloves in 11 (42.3%) and gloves and mask in 15 (57.6%). Study results are in accordance with that of Henry which observed less than optimal levels of use of personal protective clothing among health care workers.¹¹ Moreover, all the workers belonged to scheduled caste community. Subcategorization of caste showed that 13 (50%) of the workers belonged to Balmiki community and 13 (50.0%) belonged to Harijan community. Access to cleanliness is in a complete disavowal for these people as they have to handle the biomedical waste with their bare hands and hence have higher risk of occupational illness and health hazards. This emphasises need for adequate personal protective equipments. Hence, waste handlers should always be appropriately clothed and wear personal protective equipment so that harmful agents, whether physical, chemical, or infectious, are prevented from gaining access to open wounds, cuts, or by absorption through the skin.

Hepatitis B vaccination was received by only one worker in our study. Study by Kumar et al showed hepatitis B vaccination in 6 (25.0%) of the sanitary staff.⁷ This imparts vision for the provision of vaccination to the direct waste handlers as it carries an enormous risk to the health of the workers. All the workers gave various suggestions for the challenges faced by them. This means that the workers are aware of the various solutions to the challenges faced by them. History of injury at work was

present in 2 (7.6%) workers, the nature of injury being needle prick. This was dissimilar to the study done by Ismail et al which showed that 67% had history of multiple needle stick injury in the past one year.¹² Study by Sharma showed that history of needle stick was present in 19% of Class IV waste handlers.¹³ Injury was neither reported to the higher authorities nor any treatment was taken. Low reporting of injuries may be attributed to the fact that the workers were unaware of the reporting process. This emphasizes the need for awareness among waste handlers regarding formal system of injury reporting. The workers were aware of the challenges being faced by them in the provision of services. Most 10 (38.4%) demanded the provision of personal protective equipments, training, vaccination, free medical treatment and improved water supply. This highlights the need for transparency and accountability for the betterment of health safety of the direct waste handlers. There is a lack of effective implementation of various provisions and necessary action by the administrative authorities applicable to the health safety of direct biomedical waste handlers.

As majority of the biomedical waste workers are females belonging to the scheduled castes, they need to be aware of the rights conferred upon them and should be competent enough to fight for their rights as far as their health safety issue is concerned

CONCLUSION

The study concluded that regular orientation and re-orientation training programs should be organized for biomedical waste handlers and strict implementation of guidelines of biomedical waste management should be in practice. Risk to the health of direct waste handlers in the form of exposure to infectious diseases needs to be considered by timely provision of vaccination. Provision of adequate and effective personal protective equipments as a safeguard against various health hazards associated with the handling of waste is need of the hour. There is an urgent need for awareness among waste handlers regarding formal system of injury reporting, so that risk of adverse health outcome is averted.

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