STATUS OF BIO-MEDICAL WASTE MANAGEMENT - A CASE STUDY IN AND AROUND PALAMPUR, HIMACHAL PRADESH

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ABSTRACT

Medical establishments generate sizable amount of hazardous waste. Management of this waste is of major concern due to its potentially high risk to human health and the environment. An anonymous survey was carried out in different healthcare settings in and around Palampur to assess biomedical waste management practices. During the survey it was found that awareness regarding the waste management practices was very low even among the doctors and house surgeons. Burning (51%) was the most widely accepted practice for the disposal of medical waste. Only 18 per cent of respondents used color coding scheme to dispose the bio-medical wastes. Hospitals staff engaged in the collection of medical waste was not found to use complete protective measures. On the other hand, sizeable number (68%) of respondents reported that infectious waste of hospitals was directly disposed into the compost pits located within the hospital vicinity without any treatment. No staff member was given any formal orientation or training regarding medical waste management techniques and hospital administrator pay little attention to appropriate management of medical waste. Thus, it can be concluded that the healthcare settings were severely lacking in collection, segregation, containment, storage, transportation and final disposal of their wastes due to lack of awareness, trainings, education and trained personnel to manage the hospital waste.

KEYWORDS: Bio-medical, Hazardous wastes, Health care settings, Respondent

INTRODUCTION

With the rapid urbanization and ever increasing population growth, there has been a tremendous advancement in the health care system and medical facilities. However it is ironic that a health care setting which restores and maintains health also threatens their well-being. Hospital waste management has been brought into focus recently in India, particularly with the notification of the BMW (Management and Handling) Rules, 1998. The rules make it mandatory for the health care establishments to segregate, disinfect and dispose their waste in an eco friendly manner. But many of health care settings are not doing adequate measures to
the proper treatment and disposal of waste. Poor waste management practices pose a huge risk to the health of the public, patients, professionals, and contribute to environmental degradation (Joseph and Krishnan 2004). Hospital acquired infection, transfusion transmitted diseases, rising incidence of hepatitis B and HIV, increasing land and water pollution lead to increasing possibility of catching many diseases. But all the healthcare waste is not potential to transmit infection. It is estimated that 80-85 per cent is non-infectious waste, 10 per cent is infectious and 5 per cent is hazards waste (Anonymous 2000). But when the hazardous waste is not segregated at the source of generation and mixed with nonhazardous waste, then 100% waste become hazardous.

The unmanaged solid medical waste leads to an adverse impact on the environment hygiene and needs to be integrated with environmental planning and policies. Around the world, the collection, treatment, and disposal of biomedical waste has become a serious problem because of lack in following the rules by healthcare centers. Proper handling, treatment, and disposal of biomedical waste are the elements of healthcare which help to protect the healthcare workers, patients, and the local community. The safe disposal and subsequent destruction of medical waste is a key step in the reduction of illness through contact with potentially hazardous and in the prevention of environment contamination.

Materials and Methods

Study was conducted in different healthcare settings in and around Palampur that included private hospitals, nursing homes, community and primary health centers, laboratories, dental clinics, dispensaries, and other private clinics. A schedule/questionnaire was designed to fulfill the objectives of the present investigation. The questionnaire was designed by following the pattern given by Joseph and Krishnan (2004) to suit four categories of personnel i.e., doctors, house surgeons, paramedical staff, and auxiliary staff associated with healthcare settings. An anonymous survey was carried out by distributing the questionnaire to different personnel of healthcare settings. The data was collected from September 2009 to March 2010. The existing waste management practices with respect to collection, segregation, storage, transportation, and final disposal was evaluated in relation to Bio-Medical Wastes (Management & Handling) Rules, 1998. The brief discussions were held to obtain additional information from respondents and heads of the units and wards. Informal consultations with healthcare personnel were also done. The respondents were asked to indicate their views on waste management practices. An opportunity was also given to the
respondents to give details regarding certain questions asked. A number of face to face formal and informal approaches were adopted to gather data. Data analysis and interpretation were done on the basis of percentage response of the respondents to the particular category of questions.

**Results and Discussion**

**Waste management**

Solid medical waste management has received very little attention although, the Ministry of Environment and Forests has notified the ‘Bio-Medical Waste (Management and Handling) Rules, 1998’. But it is alarming to know by analysing the data on waste management practices, that the main method used in the final disposal of infectious waste was burning. It was most widely accepted practice (51%) followed by burial (37%). Other practices surveyed were deep burial (5%), segregation (3%) and containment (4%) as depicted in Fig. 1. The practice of burning of medical wastes in open pits leads to the production and release of smoke and dangerous gases into the atmosphere which poses serious health risks to the people. Although, Longe and Williams (2006) have reported burning as a common practice among the hospitals of Lagos metropolis, Nigeria. Other than this, many healthcare settings were found disposing waste within their premises. The autoclaving and incinerating provisions were not recorded during the course of present study. The same findings have been observed by Radha et al. (2009).

![Figure 1: Response to the waste management practices](image.png)

Figure 1: Response to the waste management practices
Waste segregation

Results obtained indicated that the sizable number (60%) of respondents said that waste should be segregated but they were not clear as to who should do the segregation and how it is to be segregated. Majority (62%) of the respondents held the view that segregation was the responsibility of auxiliary staff. Only a very small percentage (9%) was of the view that doctors have a role in segregation (Fig. 2). However, it was observed during the present investigation that no plastic bags were being used for lining waste containers/receptacles for other type of wastes and all the type of wastes were being collected in a single container in the majority of government and private healthcare settings. Abdulla et al. (2008) have also found that in Northern Jordan, the segregation of various medical waste types in the hospitals had not been conducted properly. Similar findings were also recorded by Abor (2007) who found that segregation of medical wastes into infectious medical waste and non-infectious medical waste was not conducted according to definite rules and standards in the hospitals of Southern Africa. Sawalem et al. (2009) have reported that the whole mixed waste could be considered as being Infectious and posed threat to the general public health and environment.

Response to color coding of waste

During the course of study out of the 35 hospitals surveyed, it was recorded that only 18 per cent of respondents used colour coding scheme, 72 per cent did not use the colour coding scheme to dispose the bio-medical wastes and remaining 10 per cent of respondents did not
respond to the question (Fig. 3). Bio-hazard symbol for labeling was used by minority (11%) of them. Nearly 35 per cent of the total maintained a register for waste disposal and a very small percentage (6%) claimed to have done a waste audit in the last three years. The very poor response to the colour coding in the present study indicated poor segregation practices in different healthcare settings. The response to the colour coding was given by only 18 per cent of respondents and it was observed that out of these 54 per cent used yellow, 18 per cent black, 11 per cent blue, 6 per cent red, 5 per cent green and 6 per cent white respectively as a colour for infectious waste containers (Fig. 3). Abor (2007) reported the non-existence of colour coding in the hospitals of South Africa. Majlesi et al. (2007) also recorded that no special bags were used for separating infected solid wastes in Southern African hospital.

Figure 3: Response to colour coding of waste

**Workers Protection**

The present survey revealed that nearly more than half (57%) of the respondents did not use any protective measures. The remaining (43%) were aware of these different precautionary measures, out of these (43%), majority (57%) used only gloves, 5 per cent used masks, and there were no respondents who used the shoes and apron during routine tasks exclusively. The percentage of respondents using gloves and masks, gloves and shoes and gloves and apron was 23 per cent, 7 per cent and 8 per cent respectively (Fig. 4). No other
specific protective measures were used by the personnel. In present study not even in a single hospital, the sanitary ordinal was found to be using complete protective equipments. Still some of them were aware of preliminary safety devices like latex gloves and facemasks. Similar trend of worker’s protection has been observed by Khan et al. (2004) in Srinagar hospitals. Thus, the present survey revealed poor handling of medical wastes by the workers, who are therefore, exposed to high occupational and health hazards.

Figure 4: Percentage of protective measures used

Storage of waste in hospital

The present study revealed that the hazardous waste was stored in the same containers as the general wastes and no control measures were formulated for the management of these wastes. All the hospitals were provided plastic bags and plastic containers for stocking up infectious waste. Out of total respondents, nearly 37 per cent respondents used plastic bags, card board boxes (cartons) were employed by 34 per cent and only 29 per cent utilized plastic buckets for the storage of waste (Fig.5). No separate secondary storage rooms or different coloured storage containers were reported to be used to store the bio-medical waste till its final disposal. The plastic bags, buckets and card board boxes were used for the temporary storage of medical wastes. Khan et al. (2004) also observed the same pattern of storage in Srinagar hospitals.

The bio-medical waste collected each day was stored at a site or in a general waste bin outside the healthcare settings but within the premises. Such practices of storage of medical wastes within the premises of hospitals cause filth, dirt and proliferation of rodents and insects, which might contributed to the spread of diseases.
Figure 5: Containers used for storage of waste

Transportation of healthcare wastes from hospital to disposal sites
Based on the interview among waste handlers, majority (68%) revealed that they directly disposed their wastes into the compost pits constructed within their establishment. Remaining (32%) stated that a periodic collection of the healthcare waste was done by an agency’s garbage truck for which agency’s officials levied fixed monetary charges (Fig. 6). Waste was said to be collected on alternate days in return of a payment of Rs 500 per healthcare setting. This amount was imposed if the waste was less than 1.0 kg/per day but if the wastes weighed more, and then they charged accordingly. It was found that there was no wheeled trolley, container or cart to transport bio-medical waste within healthcare settings. The bio-medical waste stored in buckets was carried out by the respective sanitation staff from their wards through the corridors of hospitals to the dumping sites established within the premises using minimal precautions. During transport some of the waste spilled out. This activity was carried out on daily bases, usually during the morning hours. Similar pattern of bio-medical waste transportation has been reported in Srinagar by Khan et al. (2004).
The dumping of hospital waste within the premises in open pits or municipality bins was invariably practiced by majority of the respondents as revealed in the present study. Similarly, Taghipour and Mosaferi (2009) have found that in Tabriz, infectious-hazardous medical wastes were mixed with general waste, and it was disposed of in a municipal waste landfill. Thirty two per cent respondents claimed that an authorised waste collection was done in their healthcare settings. The same pattern of authorised waste collection has been reported for Pondicherry by Joseph and Krishnan (2004).

**Training of technical staff on healthcare waste management**

Data on employees training status showed that only 8 per cent of the employees of these healthcare settings have undergone introductory orientation/training on bio-medical waste management and 92 per cent were not either given an opportunity or were reluctant to undergo such trainings in order to avoid extra burden. However, 52 per cent of respondents were found interested to attend a training programme on bio-medical waste management (Fig. 7). Bassey et al. (2006), Abor (2007) and Taghipour and Mosaferi (2009b) also reported that no formal training was imparted in medical solid waste management to the staff of healthcare settings.
Conclusion
The present investigation revealed that health care settings in and around Palampur, Distt. Kangra of Himachal Pradesh are severely lacking in solid medical waste collection, segregation, containment, storage, transportation and final disposal due to the lack of infrastructural facilities, concern, motivation, awareness, trainings, and trained personnel. In the study area solid medical waste poses a serious threat to the environment and high risk to doctors, nurses, technicians, sweepers, hospital visitors, patients and poor scavengers.

References