

EMERGING NEED FOR BIO-MEDICAL WASTES MANAGEMENT IN HOSPITALS

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ABSTRACT

Medical care for everyone has become a necessity today. But the waste generated from the care provided in the hospitals and clinics has become a huge challenge for the people. Bio-medical wastes (BMW) represent a real problem for living nature and human world. Lack in proper management of medical wastes serves as a major threat to community, healthcare workers and to everyone. Huge quantities of medical wastes are generated from hospital and healthcare clinics every day around the world, which are considered to be potentially infectious and dangerous. Improper disposal of BMW leads to serious health complications. The present review article deals with the basic issues as definition, categories, problems relating to biomedical waste, procedure of handling, disposal method of Biomedical Waste Management and awareness of staffs on biomedical waste management. It also intends to create awareness amongst the personnel involved in health care unit. A questionnaire was prepared to evaluate the know-how, outlook and practices of employees towards waste management. The information gathered by questionnaires was verified by means of personal observations.

Key Words: BMW, bio-medical waste, hospital waste, waste disposal.

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INTRODUCTION

In the course of curing health problems the health care sector produce huge amount of bio-medical waste which may be hazardous to all those who come in contact with this waste. Hazardous waste management is a concern for every health care organization. Any solid, fluid and liquid or liquid waste, including its container and any intermediate product, which is generated during the diagnosis, treatment or immunization of human being or animals, in research pertaining thereto, or in the production or testing of biological and the animal waste from slaughter houses or any other similar establishment. All biomedical wastes are hazardous. In hospital it comprises of 15% of total hospital waste. This problem has now become a serious threat for the public health and, ultimately, the Central Government had to intervene for enforcing proper handling and disposal of hospital waste and an act was passed in July 1996 and a bio-medical waste (handling and management) rule was introduced in 1998.

REVIEW OF LITERATURE

It has been emphasized by **Summers, J. (1991)**, that for the proper disposal of bio-medical waste, introduction of laws is not sufficient enough. The awareness of these laws among the general public as well as development of these policies and enforcement that respect those laws is essential.

McVeigh, P. (1993), stated that health care workers have an important opportunity to manage the environmental effects of their practice. Their efforts may seem small, but each step builds a base of sound behavior and thinking that are necessary for the success of the whole.

According to **Biomedical Waste (Management and Handling) Rules, (1998)**, of India “Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals. The Government of India (notification,1998) specifies that Hospital Waste Management is a part of hospital hygiene and maintenance activities. This involves management of range of activities, which are mainly engineering functions, such as collection, transportation, operation or treatment of processing systems, and disposal of wastes.

According to **Yadav, (2001)**, bio-medical waste management programme cannot successfully be implemented without the willingness, devotion, self-motivation, cooperation and participation of all sections of employee of any health care establishment

One of India's major achievements has been to change the attitudes of the operators of health care facilities to incorporate good HCW management practices in their daily operations and to purchase on-site waste management services from the private sector, **Bekir Onursal, (2003)**

Rutala WA (2005): "Redefining it scientifically, BMW is defined as "any solid, fluid or liquid waste, including its container and any intermediate product, which is generated during its diagnosis, treatment or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biological and the animal wastes from slaughter houses or any other like establishments".

Carmen Aurora V, (2008), states that 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.

Mandal S. K. and Dutta J (2009): Biomedical waste management has recently emerged as an issue of major concern not only to hospitals, nursing home authorities but also to the environment. the bio-medical wastes generated from health care units depend upon a number of factors such as waste management methods, type of health care units, occupancy of healthcare units, specialization of healthcare units, ratio of reusable items in use, availability of infrastructure and resources etc.

CATEGORIZATION OF BIOMEDICAL WASTES

| Category | Wastes |
|----------------|---|
| Category No. 1 | Human anatomical (human tissues, organs, body wastes parts) |
| Category No. 2 | Animal wastes (animal tissues, organs, body parts carcasses, bleeding parts, fluids) |
| Category No. 3 | Microbiology and biotechnology wastes (wastes from laboratory cultures, stocks or specimens of micro-organisms) |
| Category No. 4 | Wastes sharps (needles, syringes, scalpels, blades, glass, etc, both used and |

| | |
|-----------------|--|
| | unused sharps) |
| Category No. 5 | Discarded medicines (wastes comprising of outdated, contaminated and discarded medicines) |
| Category No. 6 | Solid wastes (items contaminated with blood and body fluids including cotton, dressings, solid linen, other materials contaminated with blood) |
| Category No. 7 | Solid wastes (wastes generated from disposable items other than the waste sharps such as tubing's, catheters, intravenous sets, etc) |
| Category No. 8 | Liquid wastes (wastes generated from laboratory and washing, cleaning, housekeeping and disinfecting activities) |
| Category No. 9 | Incineration ash (ash from incineration of any biomedical wastes) |
| Category No. 10 | Chemical wastes (chemicals used in production of biological, chemicals used in disinfection, as insecticides, etc) |

STEPS IN WASTE MANAGEMENT

Careful handling must be done while managing medical waste since improper handling of biomedical wastes are subject to high infection. For successful waste management effective management should be done from every step of acquisition to disposal of hospital wastes. The following are the steps in waste management.

Waste survey: The survey must quantify the wastes generation as this helps in disposal of wastes.

Waste segregation: placing different kind of wastes in different container or coded bags. Segregation helps in reducing the chances of infection in healthcare workers.

Waste accumulation and storage: it is the point of waste generation to the site of waste treatment and disposal.

Waste transportation: when hospital does not have facility to treat medical wastes in hospitals, it must be transported to waste treatment sites.

Waste treatment: to disinfect or decontaminate the waste right from the source of generation so that it is no longer the source of pathogenic organisms, treatment of wastes is necessary.

Waste disposal: wastes are disposed according to their categories so that it does not infect or pollute humans or environment.

RESEARCH METHODOLOGY

The data collection was done through standard set of questionnaire, which was developed after literature search and review. The questions recorded the degree of awareness and the attitude of the various respondents present towards the bio-waste management. The respondents of the survey comprising of doctors, nurses, para-medical staff and house-keeping staffs provided the complete impression of that hospital.

Research Design: The research design used in this study is descriptive and analytical in nature

Sampling Technique: The sampling technique followed to collect the data is Purposive Simple Random Sampling technique.

Sample Size: The sample size consists of 100 respondents.

Nature of respondents: The nature of the respondents was drawn from hospital staffs including doctors, administrators and nurses.

Data Collection: Primary data were collected from hospital staffs through distributing questionnaire. Secondary data were collected from articles, journals.

Tools and techniques: Percentage analysis and chi square was used.

DATA ANALYSIS AND INTERPRETATION

Table 1: Awareness on Bio-medical waste generation and legislation

| Awareness on BMW generation and legislation | No. of Respondents | Percentage (%) |
|---|--------------------|----------------|
| Strongly disagree | 30 | 30 |
| Disagree | 14 | 14 |
| Neutral | 0 | 0 |
| Agree | 30 | 30 |
| Strongly agree | 26 | 26 |

| | | |
|--------------|------------|------------|
| Total | 100 | 100 |
|--------------|------------|------------|

Inference: The above table shows that 30 percent of the respondents agree that they are aware about biomedical waste generation and legislation, 26 percent strongly agree that they are too aware, while 30 percent strongly disagree and 14 percent disagree that they are aware of the biomedical waste generation.

Table 2: Awareness on the different color code used for disposal of different kind of wastes

| I am aware of the color code used for disposal of different kind of wastes | No. of Respondents | Percentage (%) |
|---|---------------------------|-----------------------|
| Strongly disagree | 25 | 25 |
| Disagree | 14 | 14 |
| Neutral | 0 | 0 |
| Agree | 30 | 30 |
| Strongly agree | 31 | 31 |
| Total | 100 | 100 |

Inference: From the above table it is inferred that 31 percent of the respondents strongly agree that they are aware the color code used for disposal of different kind of wastes, 30 percent agree that they are too aware, while 25 percent strongly disagree and 14 percent disagree that they are aware of the color code used for disposal of different kind of wastes.

Table 3: Attitude/behavior assessment towards biomedical waste

| Attitude/behavior assessment towards biomedical waste | Strongly Disagree (%) | Disagree (%) | Neutral (%) | Agree (%) | Strongly Agree (%) |
|--|------------------------------|---------------------|--------------------|------------------|---------------------------|
| Safe management of healthcare wastes is not an issue | 73 | 22 | 0 | 5 | 0 |
| Waste management is a team work/no single class of people is responsible for safe management | 0 | 5 | 0 | 50 | 45 |
| Safe management efforts by the hospital increase the financial burden on management | 20 | 34 | 0 | 21 | 25 |
| Safe management of healthcare wastes is an extra burden on work | 40 | 30 | 0 | 30 | 0 |

| | | | | | |
|--|----|----|----|----|----|
| Do you think infectious wastes should be sterilized from infections by autoclaving before shredding and disposal | 5 | 0 | 0 | 20 | 75 |
| The hospital should organize classes/programs to upgrade existing knowledge about biomedical waste management | 0 | 0 | 0 | 36 | 64 |
| I would like to attend voluntarily programs that enhance and upgrade my knowledge about waste management | 16 | 25 | 14 | 20 | 25 |
| It is important to report to the pollution control board of India about a particular hospital if it is not complying with guidelines for BMW | 0 | 0 | 0 | 31 | 69 |
| Do you think that labeling the container before filling it with waste is of any clinical significance | 0 | 0 | 5 | 53 | 42 |

Inference: The above table shows the different level of attitude and behavior of staffs in the hospital towards assessment of biomedical waste management

Table 4: Level of knowledge on BMW among healthcare workers

| Level of knowledge on BMW among healthcare workers | Strongly Disagree (%) | Disagree (%) | Neutral (%) | Agree (%) | Strongly Agree (%) |
|--|-----------------------|--------------|-------------|-----------|--------------------|
| I am aware about biomedical waste generation and legislation | 30 | 14 | 0 | 30 | 26 |
| It is important to know about biomedical waste generation, hazards and legislation | 0 | 0 | 0 | 25 | 75 |
| Needle stick injury is a concern | 0 | 0 | 0 | 30 | 70 |
| I discard used needle immediately | 0 | 0 | 14 | 30 | 56 |
| I fill incident report after an needle stick injury | 0 | 0 | 25 | 47 | 28 |
| Pollution control board regulates the safe transport of medical wastes | 0 | 0 | 0 | 25 | 75 |

Inference: The above table shows the level of knowledge on BMW among healthcare workers.

Table 5: Association between age and attitude/behavior assessment towards biomedical waste

Null hypothesis: There is no association between age and attitude/behavior assessment towards biomedical waste

Alternative hypothesis: There is association between age and attitude/behavior assessment towards biomedical waste

| | Value | df | Asymp. Sig |
|--------------------|-------|----|------------|
| Pearson Chi-Square | 3.000 | 12 | .000 |

Interpretation: Since P value is less than 0.05 the null hypothesis is rejected at 5% level of significance. Hence it is concluded that there is association between age and attitude/behavior assessment towards biomedical waste.

Table 6: Association between designation and attitude/behavior assessment towards biomedical waste

Null hypothesis: There is no association between designation and attitude/behavior assessment towards biomedical waste

Alternative hypothesis: There is association between designation and attitude/behavior assessment towards biomedical waste

| | Value | df | Asymp. Sig |
|--------------------|-------|----|------------|
| Pearson Chi-Square | 2.620 | 16 | .000 |

Interpretation: Since P value is less than 0.05 the null hypothesis is rejected at 5% level of significance. Hence it is conclude that there is association between designation and attitude/behavior assessment towards biomedical waste.

Table 7: Association between experience and attitude/behavior assessment towards biomedical waste

Null hypothesis: There is no association between experience and attitude/behavior assessment towards biomedical waste

Alternative hypothesis: There is association between experience and attitude/behavior assessment towards biomedical waste

| | Value | df | Asymp. Sig |
|--------------------|-------|----|------------|
| Pearson Chi-Square | 3.000 | 12 | .000 |

Interpretation: Since P value is less than 0.05 the null hypothesis is rejected at 5% level of significance. Hence it is conclude that there is association between experience and attitude/behavior assessment towards biomedical waste.

Table 8: Association between age and level of knowledge on BMW among healthcare workers

Null hypothesis: There is no association between age and level of knowledge on BMW among healthcare workers

Alternative hypothesis: There is association between age and level of knowledge on BMW among healthcare workers

| | Value | Df | Asymp. Sig |
|--------------------|-------|----|------------|
| Pearson Chi-Square | 3.000 | 21 | .000 |

Interpretation: Since P value is less than 0.05 the null hypothesis is rejected at 5% level of significance. Hence it is conclude that there is association between age and level of knowledge on BMW among healthcare workers.

Table 9: Association between designation and level of knowledge on BMW among healthcare workers

Null hypothesis: There is no association between designation and level of knowledge on BMW among healthcare workers

Alternative hypothesis: There is association between designation and level of knowledge on BMW among healthcare workers

| | Value | Df | Asymp. Sig |
|--------------------|-------|----|------------|
| Pearson Chi-Square | 3.400 | 21 | .000 |

Interpretation: Since P value is less than 0.05 the null hypothesis is rejected at 5% level of significance. Hence it is conclude that there is association between designation and level of knowledge on BMW among healthcare workers.

Table 10: Association between experience and level of knowledge on BMW among healthcare workers

Null hypothesis: There is no association between experience and level of knowledge on BMW among healthcare workers

Alternative hypothesis: There is association between experience and level of knowledge on BMW among healthcare workers

| | Value | df | Asymp. Sig |
|--------------------|-------|----|------------|
| Pearson Chi-Square | 3.000 | 21 | .000 |

Interpretation: Since P value is less than 0.05 the null hypothesis is rejected at 5% level of significance. Hence it is conclude that there is association between age and level of knowledge on BMW among healthcare workers.

Table 11: Association between gender and level of knowledge on BMW among healthcare workers

Null hypothesis: There is no association between gender and level of knowledge on BMW among healthcare workers

Alternative hypothesis: There is association between gender and level of knowledge on BMW among healthcare workers

| | Value | Df | Asymp. Sig |
|--------------------|-------|----|------------|
| Pearson Chi-Square | 2.000 | 14 | .000 |

Interpretation: Since P value is less than 0.05 the null hypothesis is rejected at 5% level of significance. Hence it is conclude that there is association between gender and level of knowledge on BMW among healthcare workers.

FINDINGS

- The segregation of wastes is only satisfactory, not good or excellent.
- Color coding for various categories of wastes is not followed properly.
- The storage of BMW is not in an isolated area and proper hygiene is not maintained.

- Most of the incinerators are not properly operated and maintained, resulting in poor performance.
- General awareness among the hospital staffs regarding biomedical wastes is lacking.

SUGESSTIONS

- Inspections should be conducted regularly as hospital contributes about 70 percent of the total wastes generated.
- Air and effluent quality analysis in hospitals should be done periodically.
- Professions and housekeeping staffs must be trained more on segregation on wastes depending on its categories.
- Wastes should be stored properly until it is disposed.
- Strategies and appropriate handling techniques for biomedical waste management should be followed.
- Housekeeping staff must wear protective devices such as gloves, face masks, gowned, while handling the waste.
- New technologies can be implemented for safe disposal of biomedical wastes.

CONCLUSION

The need of standard operative procedures (SOP) and defined management techniques like TQM and timely training programs explicitly for BMW handling and disposal is necessary. The information gathered by means of questionnaire was also verified by personal observation of the waste management practices of the staff members and it was concluded staffs of the hospitals are working in accordance with the Bio-medical Waste (Management & Handling) Rules, 1998, but it requires more improvement and dedication.

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