

## **Perception and Practice of Health Personnel Regarding Biomedical Waste Management (BMW) in Selected wards of S.C.B. Medical College Hospital, Cuttack, Odisha**

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### **Abstract**

**Background:** The wastes produced in healthcare especially in hospitals have serious health problems of individuals who directly or indirectly come in contact with this product and it has also hazardous effect on environment if they are not handled properly.

**Objective:** This paper describes the co-relation between perception and practice of health personnel regarding biomedical waste management (BMW) whether the health personnel have some knowledge regarding BMW or not. So to enunciate the perception, a study was therefore undertaken in selected wards of a Medical College Hospital of district Cuttack in the state of Odisha and then we assess the practice of health personnel regarding BMW.

**Methods:** In the study, the researcher adopted 'Purposive Sampling' technique. The study consisted of 90 number of health personnel; doctors, nurses, laboratory technician, waste handler, nursing orderly of 5 major wards like medicine, surgery, obstetrics and gynaecology, operation theatre and regional diagnostic centre at S.C.B. Medical College Hospital, Cuttack, Odisha.

**Results:** The data collected, organized, tabulated and planned to be analyzed using descriptive statistics on the basis of objectives and hypotheses of the study. The analyzed data will be presented in the form of table, diagrams, charts & graphs.

**Conclusions:** We found there is a good proportion of hospital manpower is untrained. Though not poor, the practice of the BMW in the said setting is not good either. The practice of BMW could be enhanced by a training package to different category of personnel considering their level of understanding along with better supervision.

**Keywords:** Biomedical Waste Management, Purposive Sampling technique, Knowledge, Aptitude and Practice

### **1. Introduction**

The recent developments in healthcare units are precisely made for the prevention and protection of community health. Sophisticated instruments have come into existence in various operations for disease treatment. Such improvement and advances in scientific knowledge has resulted in per capita per patient generation of wastes in health care units. Waste generated in the process of health care are composed of variety of wastes including hypodermic needles, scalpels, blades, surgical cottons, gloves, bandages, clothes, discarded medicine and body fluids, human tissues and organs, chemicals etc., Other wastes generated in healthcare settings include radioactive wastes, mercury containing instruments, PVC plastics etc., These are the most environmentally sensitive healthcare

by products and needs a greater attention which has to be monitored. Bio-Medical Waste is generated while reducing the health problems and eliminating potential risks to people's health. Hospitals / health-care services inevitably create waste that may itself be hazardous to health. The waste produced in the course of health-care activities carries a higher potential for infection, injury and pollution due to open burning, than any other type of waste. Wherever it is generated, safe and reliable methods for its handling are therefore essential. Inadequate and inappropriate handling of Bio- Medical waste may have serious public health consequences and a significant impact on the environment. Sound management of Bio-Medical waste is thus a crucial component of

environmental and health protection. Daily operation of medical activities, mass immunization campaigns and in emergency situations, good bio-medical waste management is important to prevent the exposure of health-care workers, patients, waste handlers and the community to infections, toxic effects and injuries. Poor management of bio- medical waste may also damage the environment, in addition to creating opportunities for the collection of disposable medical equipment (particularly syringes), its re-sale and potential re-use without sterilization - a practice causing burden of disease worldwide.

It is essential that everyone concerned of bio-medical waste should understand that its management is an integral part of health care, and that creating harm through inadequate management reduces the overall benefits of health care. Hence selection of safe and environment friendly options for the management of bio medical waste is necessary. With the introduction of Bio-Medical Waste (Management and Handling) Rules, 1998 and emergence of various diseases due to mismanagement of bio-medical waste, it has become important in health care establishments/ hospitals to manage the waste properly. Although we do not often think about it but, health care facilities/ hospitals are potential settings for transmission of diseases. It is to be understood that management of bio-medical waste is an integral part of health care. The absence of proper waste management, lack of awareness about the health hazards from biomedical wastes, insufficient financial and human resources, and poor control of waste disposal are the most critical problems connected with healthcare waste [3].

Bio medical waste consists of solid, liquid, sharps and laboratory waste that are potentially infectious or dangerous. It differs from other types of hazardous waste such as industrial waste. Common producers of bio medical waste are hospitals, health clinics, nursing homes, and medical research laboratories, offices of physicians, dentists and veterinarians. As per Bio- Medical Waste (Management and Handling) Rules, 1998, and as amended "Bio-medical waste" means 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 biological and including categories mentioned in Schedule I. The schedule I includes human anatomical waste, animal waste, microbiology & biotechnology waste, waste sharps, discarded medicines and cytotoxic drugs, soiled waste, solid waste, liquid waste, incineration ash and chemical waste. As per WHO norms the health-care waste includes all the waste generated by health-care establishments, research facilities, and laboratories. In addition, it includes the waste originating from minor or scattered sources such

as that produced in the course of health care undertaken in the home (dialysis, insulin injections, etc.).

In general the bio medical waste / health care waste, (the term bio medical waste is used in India and the health care waste term is used by WHO, both means the same), contains non infectious waste and infectious waste. The infectious waste includes pathological waste, sharps waste, items contaminated with blood and body fluids and chemical, pharmaceutical waste etc. As regards to the category wise percentage of waste generation, non infectious waste is 80% , pathological and infectious waste 15%, sharps waste 1 % , chemical or pharmaceutical waste 3 % and others 1 %. Medical waste incinerators emit toxic air pollutants and toxic ash residues that are the major source of dioxins in the environment [4]. The toxic ash residues sent to landfills for disposal have the potential to leach into groundwater. Medical waste has been identified by US Environmental Agency as the third largest known source of dioxin air emission [5] and contributor of about 10% of mercury emissions to the environment from human activities. [6] Dioxin is one of the most toxic chemicals known to humankind. Dioxins have been linked to cancer, immune system disorders, diabetes, birth defects and disrupted sexual development. [7]

International Agency for Research on Cancer (IARC), an arm of WHO, acknowledged dioxins cancer causing potential and classified it as human carcinogen. To avoid dioxin production, no chlorinated plastic bags (and preferably no other chlorinated compounds) should be introduced into the incinerator. Red bags must not be incinerated as red colour contains cadmium, which causes toxic emissions [8,9]. If mercury-containing items are put into a red bag for infectious waste and sent to an incinerator or other waste treatment technology, mercury will contaminate the environment. Airborne mercury then enters a global distribution cycle in the environment, contaminating fish and wildlife. Mercury is a potent neurotoxin that can cross the blood-brain barrier as well as the placenta.[10]

As stated by Health Care without Harm, an international coalition of 470 organizations in 52 countries, non-incineration treatment technologies are a growing and developing field. Some technologies are still essentially prototypes, while others, such as autoclave technology, have been used for decades [11]. The BMW (Management and Handling) Rules, 2000 recommend autoclaving for disposables, microbiological waste and sharps. Typical operating conditions for an autoclave are a temperature of at least 121<sup>0</sup>C at a pressure of 105 kPa for a period of at least 60 min. The second option for the temperature, etc., is that BMW can be sterilized at 132<sup>0</sup>C for 30-60 min [12].

### 1.1 Categories of Bio-Medical Waste

The categories of bio- medical waste are as follows.

- 1) **Category No. 1** Human Anatomical Waste (body parts, organs, human tissues etc.).
- 2) **Category No. 2** Animal Waste (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses).
- 3) **Category No. 3.** Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures).
- 4) **Category No. 4** Waste Sharps (needles, syringes, scalpels, blade, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps).
- 5) **Category No. 5** Discarded Medicines and Cytotoxic drugs (Waste comprising of outdated, contaminated and discarded medicines).
- 6) **Category No. 6** Soiled Waste (items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, bedding, other material contaminated with blood).
- 7) **Category No. 7** Solid Waste (Waste generated from disposal items other than the sharps such a tubing, catheters, intravenous sets etc.).
- 8) **Category No. 8** Liquid Waste (Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities).
- 9) **Category No. 9** Incineration Ash (Ash from incineration of any bio-medical waste).
- 10) **Category No. 10** Chemical Waste (Chemicals used in production of biological, chemicals used in production of biological, chemicals used in disinfection, as insecticides, etc.).

#### The specific objectives of the study are:

- 1) To enunciate the perception of health personnel regarding biomedical waste management in selected wards of S.C.B. Medical College Hospital, Cuttack, Odisha.
- 2) To assess the practice of health personnel regarding BMW in selected wards of Hospital.
- 3) To determine the co-relation between perception and practice of health personnel regarding BMW in selected wards of Hospital.

## 2. Materials and Methods

### 2.1 Research Design

The term 'design' refers to the logical & systematic plan, structure and strategy of a scientific investigation to answer the research question & to control

the variance. So the research design thus provides description of the subject, identification & observation of variables as well as their manipulation and control, measures of time, selection of setting, types of statistical analysis to interpret data along with the role of the researcher. Survey design was found appropriate for the study.

### 2.2 Setting of the Study

The setting of the study was selected on the basis of requirements pertaining to the objectives of the study feasibility, availability of the subject and co-operation from the concerned authorities i.e. selected wards of S.C.B. Medical College Hospital, Cuttack, Odisha.

### 2.3 Sample & Sampling Technique

In the present study, the researcher adopted 'Purposive Sampling' technique. The study consisted of 90 number of health personnel; doctors, nurses, laboratory technician, waste handler, nursing orderly of 5 major wards like medicine, surgery, obstetrics and gynaecology, operation theatre and regional diagnostic centre at S.C.B. Medical College Hospital, Cuttack, Odisha.

#### Inclusion criteria:

1. Health personnel in selected wards of Hospital.
2. Health personnel who are willing to participate.
3. Health personnel who can understand English and odia (local language).
4. Health personnel present at the time of data collection.

#### Exclusion criteria:

Health personnel who are not directly involved in the BWM activities.

### 2.4 Tools and Techniques

The study aimed at finding the Perception and Practice of the sample regarding biomedical waste management in selected wards of S.C.B. Medical College Hospital, Cuttack, Odisha. So the most important aspect of investigation in this context is the collection of appropriate information, which will serve as a basis to answer the raised questions.

Based on the objectives of the study the following data collection tools were developed:

- 1) A Perception-Checklist to assess the perception of Perception of the sample regarding biomedical waste management.
- 2) A Practice-Rating Scale to assess the Practice of the sample regarding BMW.

### 2.5 Description of the Questionnaire

The Tool for the present study was developed after extensive review of relevant research & non-research literatures. The tools are complete set of The Tool consisted of three sections viz. part-A, part -B and part- C. **Part-A:** This section consisted of items relevant to the personal information about the sample like age, work area, qualification, training on BMW etc.

**Part-B:** This section is a Perception-Checklist to assess the perception of Perception of the sample regarding biomedical waste management with 15 items.

**Part-C:** This section is a practice-Rating Scale to assess the Practice of the sample regarding BMW with 20 items.

**2.6 Procedure for Data Collection**

Written permission was sought from the concerned authority and then the study was conducted and the purpose of the study was explained to the sample subjects and confidentiality was assured to the sample.

**3. Results**

The data collected, organized, tabulated and planned to be analyzed using descriptive statistics on the basis of objectives and hypotheses of the study. The analyzed data will be presented in the form of table, diagrams, charts & graphs.

**3.1 Frequency and percentage distribution of the personal characteristics of the sample (N=90)**

We are conducting our study on sample size of 90. In that group high proportion of sample subjects (57.7 %) belongs to age group >40years while 40 % belong to 20-40 years of age and only 2.2% are of age <20 years. Nursing personnel formed majority which is 50% of the total sample size. Other untrained health personnel like nursing orderly and waste handlers comprised about 37.9 % of the sample size. A sample of 6.6% was by pharmacy and 4.4% was by MBBS doctors. Out of total sample only one i.e. 1.1% is student and rest all are service persons. Majority of the personnel i.e. 74.4% are trained where as 25.5 % are untrained regarding BMW. Higher number of sample i.e. 81.1% reported that they are being supervised by authorities regarding BMW occasionally where as 18.8% reported that they are being supervised by authorities regarding BMW regularly. Majority of the sample (92.3%) disagreed at that BMW practice in the hospital is satisfactory where as only a minimum proportion i.e. 7.7% agreed that BMW practice in the hospital is satisfactory. This % wise distribution is represented in Table 1 and Figure 1, 2, 3, 4, 5 below.

**3.2 Percentage of the Perception score regarding BMW of the sample (N=90)**

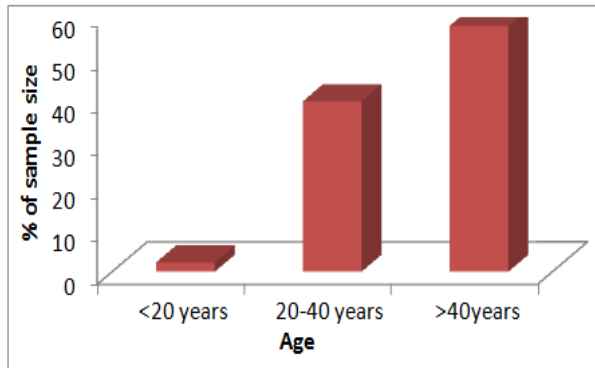
Perception score refers to the responses elicited by the sample subjects on the structured Perception-Checklist. The results are shown in Table 2 which describes majority of the sample subjects’ i.e. 97.7% have Good Perception score and only a minimum proportion i.e. only 2.2% have a fair Perception score.

**3.3 Percentage of the Practice score regarding BMW of the sample (N=90)**

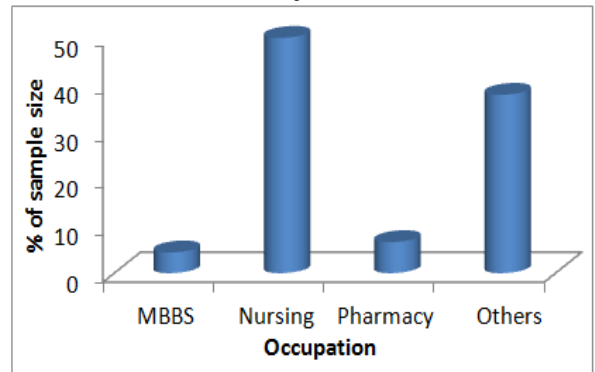
Practice score refers to the responses elicited by the sample subjects on the structured Practice-Rating Scale. The Table 3 describes that all sample subjects have Fair Practice score.

The Perception and Practice of the sample subjects regarding biomedical waste management in selected wards of S.C.B. Medical College Hospital, Cuttack, Odisha is reflected in the form of chart in Figure 6.

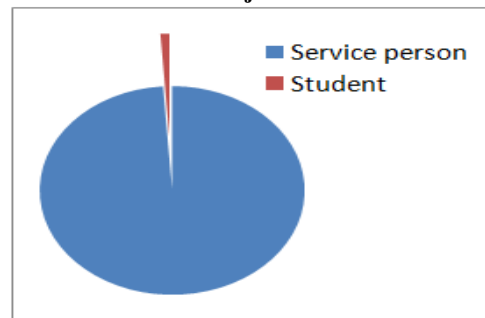
**Figure 1: Age wise distribution of sample subjects**



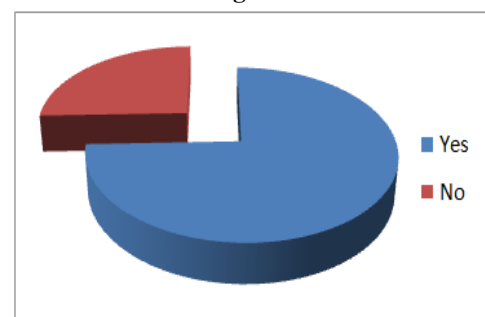
**Figure 2: Qualification wise distribution of sample subjects**



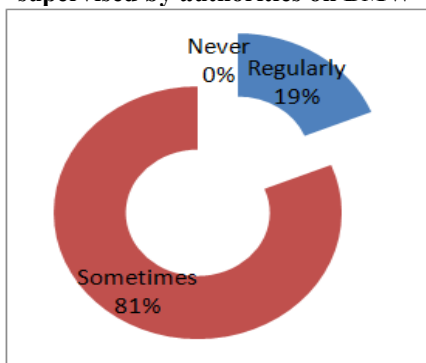
**Figure 3: Occupation wise distribution of sample subjects**



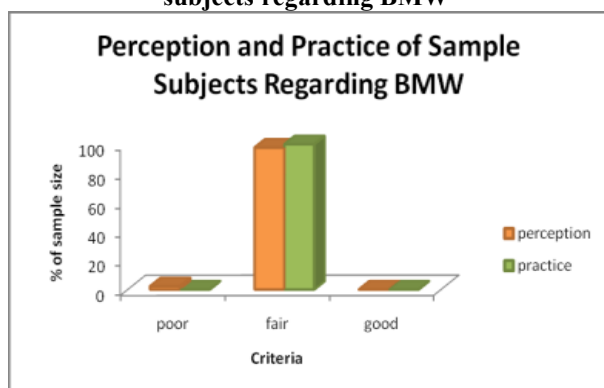
**Figure 4: Distribution of sample subjects based on Training on BMW**



**Figure 5: Distribution of sample subjects based on supervised by authorities on BMW**



**Figure 6: Perception and Practice of the sample subjects regarding BMW**



**Table-1: Frequency and percentage distribution of the personal characteristics of the sample N=90**

Sample characteristics	Sample	
	Frequency	%
Age	<20 years	2 / 2.2
	20-40 years	36 / 40
	>40years	52 / 57.7
Qualification	MBBS	4 / 4.4
	Nursing	46 / 50
	Pharmacy	6 / 6.6
	Others	34 / 37.9
Occupation	Service person	89 / 98.8
	Student	1 / 1.1
Trained on BMW	Yes	67 / 74.4
	No	23 / 25.5
Supervised by authorities on BMW	Regularly	17 / 18.8
	Sometimes	73 / 81.1
	Never	-- / --
BMW practice in the hospital is satisfactory	Agree	7 / 7.7
	Indifferent	-- / --
	Disagree	83 / 92.3

**Table 2: Percentage of the Perception score regarding BMW**

Criteria	Sample	
	Frequency	Percentage
Perception score	Poor	-- / --
	Fair	02 / 2.2
	Good	88 / 97.7

**Table 3: Percentage of the Practice score regarding BMW**

Criteria	Sample	
	Frequency	Percentage
Practice score	Poor	-- / --
	Fair	90 / 100
	Good	-- / --

#### 4. Discussion and Conclusion

In the present topic we conducted study on predesigned and pretested questionnaire by selecting a cross-sectional study design which was similar to other design studies which was adopted in other studies [14-16]. Knowledge about biomedical waste management rules among the technically qualified personnel like the doctors, nurses, and laboratory staff was high but was low among the sanitary staff; this was similar to the findings from other studies [17]. So on that basis the central concept of the study was to find out the Perception and Practice of the sample subjects regarding biomedical waste management in selected wards of S.C.B. Medical College Hospital, Cuttack, Odisha. During our study we have taken different age group people, Occupational persons and after conducting study we found majority of the personnel i.e. about 74.4% of our sample size are trained where as 25.5 % are untrained regarding BMW. Higher number of sample i.e. 81.1% reported that they are being supervised by authorities regarding BMW occasionally where as 18.8% reported that they are being supervised by authorities regarding BMW regularly. Majority of the sample (92.3%) disagreed at that BMW practice in the hospital is satisfactory where as only a minimum proportion i.e. 7.7% agreed that BMW practice in the hospital is satisfactory.

The findings of the study reveal that Majority of the sample subjects i.e. 97.7% have Good Perception score and only a minimum proportion i.e. only 2.2% have a fair Perception score. There is 100% fair practice of BMW among the sample subjects.

#### 5. Conclusion

The following conclusions we can drawn from the findings of the study i.e. there is a good proportion of hospital manpower are untrained. Though not poor, the practice of the BMW in the said setting is not good either. The practice of the BMW could be enhanced by a training package to different category of personnel considering their level of understanding along with better supervision and better supply of materials required like PPE.

The investigator recommends replication of the study with a larger number of sample subjects for better generalization of the findings

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## References

- [1] Bio-medical Waste Rules, Available from: <http://kspcb.kar.nic.in/BMW/hardtechnology.htm> [Last cited on 2000]
- [2] Ministry of Environment and forest notification on the Bio-Medical Waste (Management and Handling) Rules. 1998
- [3] Plianbangchang PH. W.H.O. Publication; "A Report on Alternative Treatment and Non-Burn Disposal Practices"; Safe Management of Bio-medical Sharps Waste in India.
- [4] Pröss A, Giroult E, Rushbrook P. Safe management of wastes from health-care activities. World Health Organization (WHO), Geneva, Switzerland. Available from: [www.who.int/entity/water\\_sanitation\\_health/medicalwaste/wastemanag/en/](http://www.who.int/entity/water_sanitation_health/medicalwaste/wastemanag/en/) [Last cited on 1999]
- [5] Inventory of Sources of Dioxin in the United States (EPA/600/ P-98/002Aa), National Center for Environmental Assessment, USEPA, Apr 1998: 2-13
- [6] Mercury Study Report to Congress, Volume I: Executive Summary, USEPA Office of Air, Dec 1997. p. 3-6
- [7] Emmanuel J, Puccia CJ, Spurgin RA. Non-incineration medical waste treatment technologies. Washington, DC Health Care Without Harm; 2001
- [8] "IARC Evaluates Carcinogenic Risk Associated with Dioxins," International Agency for Research on Cancer press release, February 14, 1997. 8. Estimating Exposure to Dioxin-Like Compounds, Volume I: Executive Summary, USEPA, Office of Research and Development, EPA/600/6-88/005Ca. Jun 1994 review draft, p. 36.
- [9] Arora DR. Sterilization and Disinfection. Textbook of Microbiology. New Delhi: CBS Publishers; 2003. p. 61-4.
- [10] Available from: <http://www.noharm.org>. (What's wrong with incineration? This publication is part of Going Green: A Resource Kit for Pollution Prevention in Health Care)
- [11] Brannen L, Cedar R, Cellarius D, Davis SC, Harvie JP, Christensen JH, *et al.* Medical waste treatment technologies: Evaluating non-incineration alternatives. Washington, DC Health Care without Harm; 2000.
- [12] Forbes BA, Sahm DF, Weissfeld AS. Diagnostic Microbiology. 11<sup>th</sup> ed. St. Louis, Mo. Bailey and Scott's; 2002. p. 19.
- [13] Al-Khatib IA, Al-Qaroot YS, Ali-Shtayeh MS. Management of healthcare waste in circumstances of limited resources: A case study in the hospitals of Nablus city, Palestine. *Waste Manag Res* 2009; 27: 305-12.
- [14] Pandit NB, Mehta HK, Kartha GP, Choudhary SK. Management of bio-medical waste: Awareness and practices in a district of Gujarat. *Indian J Public Health*. 2005; 49: 245-7.
- [15] Kishore J, Goel P, Sagar B, Joshi TK. Awareness about biomedical waste management and infection control among dentists of a teaching hospital in New Delhi, India. *Indian J Dent Res*. 2000; 11:157-61.
- [16] Verma LK, Mani S, Sinha N, Rana S. Biomedical waste management in nursing homes and smaller hospitals in Delhi. *Waste Manage Res*. 2008; 28: 2723-34.
- [17] Saini S, Nagarajan SS, Sarma RK. Knowledge; Attitude and Practices of Bio-Medical Waste Management amongst Staff of a Tertiary Level Hospital in India. *J Acad Hosp Adm*. 2005; 17: 2.