

THE VANISHING STRIPES OF BIO-MEDICAL WASTE MANAGEMENT SYSTEM- A STUDY OF SELECT PRIVATE HOSPITALS IN COIMBATORE DISTRICT, TAMIL NADU

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Abstract: *The audit conducted by the Comptroller and Audit General of India (CAG) can be broadly categorized as performance audit, compliance audit and finance audit. Environmental auditing in India is conducted within the broad framework of performance audit and compliance audit. Many environmental auditing have been completed by the Supreme Auditing Authority of India over the last few years. One of the core categories of environmental auditing is waste management, in which we lag. Seventy tonne's of bio medical waste are generated and discharged in India every year. The government has issued several guidelines for the appropriate disposal of the biomedical wastes which many hospitals deny to follow. This study highlights the perception of select private hospitals in Coimbatore District, Tamil Nadu towards bio medical waste management system. The researcher finds negligible degrees of waste management according to the guidelines and suggests recycling of possible medical wastes to reduce their impact on the environment. The researcher suggests proper environmental auditing measures and compliances with the rules can only save future from the ill effects of biomedical wastes.*

Keywords: *Environmental Auditing Protocol, Compliance Audit, Performance Audit, Bio Medical Waste.*

INTRODUCTION

Environmental audit began in industrial India in 1992². The environmental auditing framework envelops both compliance audit and performance audit. Compliance auditing are performed to ensure that the organization have clearly defined internal system monitoring procedure linked to effective action. Performance audit verifies whether the entity is achieving economy, effectiveness and efficiency in the employment of available resources³. Environmental auditing has been conducted by supreme auditing institution of India for the last 25 years. This process was formalized with the introduction of specialized guidelines for the conduct of environmental audits. The environmental audit conducted by CAG can be broadly categorized into (i) Air Issues, (ii) Water Issue, (iii) Waste Management, (iv) Bio Diversity, (v) Environmental Management System⁴. The waste management is concerned with auditing relating to waste reduction, reuse and recycle to have a minimum impact on the environment. Apart from solid waste and plastic waste the threat caused by the bio medical waste in the economy is unquestionable. Despite of the biomedical waste (management and handling) rules 1998, the improper disposal of hazardous biomedical wastes continues. Biomedical wastes are highly infectious generated both in solid and liquid forms which is produced during the diagnosis or treatment of human beings in hospitals. The biomedical wastes can be tissues, organs, body parts, needles, syringes and blades etc. At the global level 18%-64% of health care institutions are reported to have unsatisfactory biomedical waste management with predictors including lack of awareness, insufficient mechanism and poor disposal mechanism⁵. India with its tremendous development in health care and allied areas is still facing a setback in hospital medical waste disposal. This paper studies the perception of major health care entities in Coimbatore district, Tamilnadu towards the biomedical waste management system. The study indicate that RED category health care units which require major plants for biomedical waste disposals should install the same specifically focusing on minimizing their impact on natural environment.

2. Mahware Rs, Verma NK, Chakrabart SP, Biswar DK” Environmental Auditing Programmes in India”, 1997.

3. The International Institution of Supreme Audit Information,” Definition of Performance Audit”, 2014.

4. Environmental Accounting in India- Report of Comptroller and Audit General of India.

5. Dr Narendra K. Arora, Bio-medical waste management: situational analysis & predictors of performances in 25 districts across 20 Indian States”, Indian Journal of Medical Research, P: 141-153, 2014.

REVIEW OF LITERATURE

- **Saurabh Gupta et al (2009)** provided a brief description of biomedical waste management rule of 1998 and biomedical waste management practices existing in one of the premier health care center in Luknow, India. The study analyzed biomedical waste management system including policies, practices and compliances under the standard prescribed under the regulatory framework. The researcher interviews managers, doctors and Paramedical staffs and general survey of facilities in the polytechnic health care unit was undertaken. The analysis proved that even though the hospital abides by the regulatory framework there is a need to build the capacity of the staff members to use state of the art facilities of waste management. The researcher suggested the need to create awareness among all the stakeholders about the essentials of biomedical waste management system.

- **Huang Rongbing (2011)** explored the implementation of carbon emission reduction tools as an important part of environmental accounting and sustainable development. He opined that in the course of environmental auditing the three basic elements such as economic growth, environmental conservation and social progress should be given more importance. He necessitates the implementation of a scientific environmental auditing of carbon emission indexing system. With the enhancement of carbon emission environmental auditing information and by promoting the effectiveness of environmental auditing accountability mechanism can increase the credibility of environmental auditing.
- **A.K.Jindal et al (2013)** conducted a system analysis of biomedical waste management system in service hospitals to ascertain the views of service hospitals towards biomedical waste management. The researcher proposed a qualitative study in which various stakeholders of biomedical waste management was studied using both primary and secondary data. All the stakeholders opined that wherever possible the outsourcing of biomedical waste should be used a viable mean of waste management. Facilities provided by appropriate authority should be used only where outsourcing is not feasible.
- **Dietrich Earnhart, Donna Ramirez Harrington (2014)**, studied the effect of environmental audit on the extend of facilities compliance with waste water discharge limit. By examining the extend of compliance the study's results reflected both beyond and towards the compliance of environmental auditing. The study examines whether the audit influence the control of different pollutants uniformly. The study suggested that water quality protection policies should induce regulated facilities in auditing to improve compliance. The researcher also opined that regulatory agencies should recognize the possibility of environmental auditing to induce the reduced use to water polluting hazardous chemicals.
- **Santhosh Kumar Sharma et al (2017)** explored the health care waste management scenario in Himachal Pradesh, India. Data had been collected through survey questionnaire and analyzed through well acknowledged SPSS software. Results highlighted that private hospitals are generating more wastes than the public hospital based upon the chosen color codes. The researcher used bed, doctors and staff as independent variable and the results indicate that there is an increasing awareness among various stakeholders of India including its citizens about the positive consequences of waste management which are implicitly or explicitly related to human health and environment. The researcher suggested the dire need of human resource management departments in the hospitals that can optimally design the policies and practices relating to biomedical waste management in the hospital.

OBJECTIVES OF THE STUDY

Based on the above reviews and other studies the researcher chose the following objectives.

- 1) To compare health care waste generation across private hospitals in Coimbatore district, Tamil Nadu.
- 2) To ascertain the relationship between health care waste codes and the chosen variable of the study (bed, doctor and staff).
- 3) To study the perception of private hospitals in Coimbatore district towards biomedical waste management system.

RESEARCH METHODOLOGY

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 is termed as biomedical waste ⁶. As per the provision of supreme auditing institution of India (SAI) biomedical waste management system in the institution to comply with the policies and requirements of the environmental auditing provision of the country. This paper presents a descriptive idea about the waste generation and management in select private health care centers in Coimbatore district, Tamilnadu.

Sample

The required data is collected from various stakeholders of private hospitals in Coimbatore district, Tamilnadu. The research is based on the data collected from all the 82 private hospitals that can be categorized into super specialty, multi-specialty, specialty and general hospitals ⁷. Private hospitals alone are chosen for the study on the common parlance that people dependency on them is more because of the advanced facilities and availability of specialist doctors. The more the patients the more the waste generation is.

Table 1- Categorization of Hospitals

category	Number
Super specialty	07
Multi-specialty	23
Specialty	13
General	39

Data collection

The researcher employed primary data for the study. The necessary data for the study is collected through questionnaires and interview schedule and administered on various stake holders of biomedical waste generation in the select private hospitals in Coimbatore district, Tamilnadu.

6. Biomedical Waste Management Rule of India, 1998.

7. Coimbatore District Profile, 2016

Tools used in the study

Analysis of the collected data is done by

- Descriptive statistics
- Correlation
- ANOVA

ANALYSIS AND INTERPRETATION

Before embarking the analysis and interpretation of the data, the color codes of biomedical waste must be known. According to the information disclosed by Indian Medical Association Nursing Home Board, the biomedical wastes can be coded as blue, red and yellow wastes (<http://www.imanhb.org/pdf/color-coding-2016.pdf>)

Blue: broken, discarded and contaminated glass including medicine vials and ampoules.

Red: contaminated but recyclable waste such as tubes, bottles, catheters, urine bags, syringes, gloves etc.

Yellow: anatomical waste produced by human and animals, soiled waste (items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components), expired or discarded medicines, chemical liquid waste (liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, silver X-ray film developing liquid, discarded formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities) etc.

Table 2- Mean Value of Health Care Wastes across Private Hospitals

Waste color	Hospital category	N	Mean
Yellow	General	39	83.219
	Specialty	13	63.781
	Multi-specialty	23	79.315
	Super specialty	07	32.581
	Total	82	258.895
Red	General	39	55.214
	Specialty	13	90.561
	Multi- specialty	23	83.212
	Super specialty	07	25.681
	Total	82	254.668
Blue	General	39	35.281
	Specialty	13	49.674
	Multi-specialty	23	81.531
	Super specialty	07	76.423
	Total	82	242.909

Source: compiled from primary data

Interpretation:

Table 2 gives the mean value of biomedical waste generated across different category of private hospitals. The mean value shows that of the three color codes of wastages the private hospitals generate more yellow wastes (258.895). There is no authorized research evidence to support this research but with common sense the result means that as the facilities and specialist doctors provided by private hospitals are increasing people depending such hospitals are also in rise irrespective of the cost involved. Out of the yellow wastes general hospital generate more waste with a mean value of 83.219. This is because still super specialty and multi-specialty hospitals continue as last resort to many people for treatment.

Among the three category of wastes blue waste is generated less by the private hospitals in Coimbatore district, Tamilnadu. This cannot be attributed to total reduction in blue waste as the waste generated by the public hospital are not in the purview of the current paper.

The relationship between health care wastes and the selected variables of the study^{7,8} namely number of bed, number of doctors and staff is assessed here. The variables for the study are chosen in line with other studies.

Table 3- Correlation between Health Care Waste and Chosen Variables

Waste color	Bed	Doctor	Staff
Yellow	0.71**	0.69**	0.73
Blue	0.68**	0.56**	0.65
Red	0.70**	0.63**	0.43

Source: compiled from primary data, ** significant at 5% level of significance

Interpretation:

Pearson coefficient of correlation was used to study the relationship between the select variable and various color codes of biomedical wastages in private hospitals of Coimbatore district, Tamilnadu. The results indicate that there is positive and statistically significant relationship between the biomedical waste generation and the select variables particularly bed and doctor. Even though there exist a positive

linear relationship between the number of staff and waste generation the results are not significant at 5% level of significance. The positive linear relationship between number of bed and number of doctors means the more the number of specialist doctors and more the expansion of existing bed more will be the biomedical wastages. As the population increase uncontrollably more medical facilities are needed which marks hike in biomedical wastages. The correlation coefficient between bed and doctor with biomedical wastages are statistically significant at 5% level of significance.

To study the perception of select private hospitals in Coimbatore district, Tamilnadu towards biomedical waste management system Analysis of Variance is used.

7. Santhosh Kumar Sharma, Sparsh Gupta, "Health Care Waste Management Scenario: A Case of Himachal Pradesh(India)", Clinical Epidemiology and Global Health-2017.

8. Odette RH, Masika J, Venance T "Assessment of Waste Generation and its Management System: A Prevalent Study Of Health Care Facilities in Madagascar ", Journal of Environment Science Toxicol Food Technologies,2014

The Analysis of Variance measures whether there exist any significant difference in perception towards biomedical waste management across various categories of private hospitals.

Table 4- ANOVA

	Sum of Squares	Degree of Freedom	Mean Square	F	Sig
Between group	182.932	4	45.733	4.46	0.021
Within group	798.486	78	10.237		
Total	981.418	82			

Source: compiled from primary data

Interpretation

ANOVA was used to analyze whether there exists any significant difference between perceptions across private hospitals of Coimbatore district towards biomedical waste management system. The results depicts that there is statistically significant difference between the perceptions of different category of hospitals. Since the p value is less than 0.05 (0.021), there exists a significant difference in their perception. Hospitals in different categories follow different environmental auditing compliances; hence their perceptions towards the subject matter will also be different. The working environment and quality of equipment between a general hospital and a super specialty hospital will be different in general which lead to variations in the biomedical wastes they generate.

CONCLUSION

India is the first country to make environmental audit compulsory⁹. This mandatory audit requires organizations to details of water, raw materials and energy resources used and the products and wastes generated by them.

9. Aparajitha Gogoi,"Environmental Audits- A Mean to Go Green".

One of the core area for which environmental auditing was made mandatory is biomedical waste management system for which a separate law was passed in the year 1998. The present day scenario marks contemptuous disregard for the compliance measures of environmental auditing. The results of the present study focus on the need for sound biomedical waste management awareness and outsourcing of biomedical wastes to foreign nations for less hazardous disposals. The present study which analyzed the data collected from different categories of private hospital brings to the foreground the quantum of waste generated by private hospitals alone. The waste generated by the public hospitals will add to the plight which is not included in the current study. Safe disposal and reduction of biomedical wastages are need of the hour to protect the environment for future generation. The health care institutions should abide by the policies of central government such as Swach Bharath to ensure safe disposal and minimal waste genesis.

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