ISSN: 2394-7659
IMPACT FACTOR- 2.789

International Journal of Engineering Researches and Management Studies

A STUDY ON BIO MEDICAL WASTE MANAGEMENT IN CHENNAI NATIONAL HOSPITAL AT CHENNAI

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ABSTRACT
Medical care is vital for our life and health, but the waste generated from medical activities represents a real problem of living nature and human world. Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment Every day, relatively large amount of potentially infectious and hazardous waste are generated in the health care hospitals and facilities around the world. Indiscriminate disposal of BMW or hospital waste and exposure to such waste possess serious threat to environment and to human health that requires specific treatment and management prior to its final disposal. The paper includes various management practices adopted for biomedical waste management. The paper aims to create awareness among staffs, patients and as well as public.The key step in reducing the hazards from Bio medical waste is to segregate the waste at source

Keywords: Bio medical, waste management, environment, policies

1. INTRODUCTION

Waste management is collection, transportation, and disposal of garbage, sewage and other waste products. Waste management is the process of treating solid wastes and offers variety of solutions for recycling items that don't belong to trash. It is about how garbage can be used as a valuable resource. The most important reason for waste collection is the protection of the environment and the health of the population. Rubbish and waste can cause air and water pollution. Rotting garbage is also known to produce harmful gases that mix with the air and can cause breathing problems in people.

Healthcare Waste

The term health-care waste includes all the waste generated within health-care facilities, research centers and laboratories related to medical procedures. In addition, it includes the same types of waste originating from minor and scattered sources, including waste produced in the course of health care undertaken in the home (e.g. home dialysis, self-administration of insulin, recuperative care).Between 75% and 90% of the waste produced by health-care providers is comparable to domestic waste and usually called “non-hazardous” or “general health-care waste”. It comes mostly from the administrative, kitchen and housekeeping functions at health-care facilities and may also include packaging waste and waste generated during maintenance of health-care buildings . The remaining 10–25% of health-care waste is regarded as “hazardous” and may pose a variety of environmental and health risks

Bio Medical Waste

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.

Definition. 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 biological.

Hazardous health-care waste

Sharps waste: Used or unused sharps (e.g. hypodermic, intravenous or other needles; auto-disable syringes; syringes with attached needles; infusion sets; scalpels; pipettes; knives; blades; broken glass)

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Infectious waste: Waste suspected to contain pathogens and that poses a risk of disease transmission (see e.g. waste contaminated with blood and other body fluids; laboratory cultures and microbiological stocks; waste including excreta and other materials that have been in contact with patients infected with highly infectious diseases in isolation wards)

Pathological waste: Human tissues, organs or fluids; body parts; fetuses; unused blood products Pharmaceutical waste, cytotoxic waste : Pharmaceuticals that are expired or no longer needed; items contaminated by or containing pharmaceuticals

Cytotoxic waste containing substances with genotoxic properties (e.g. waste containing cytostatic drugs – often used in cancer therapy; genotoxic chemicals)

Chemical waste containing chemical substances (e.g. laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents; waste with high content of heavy metals, e.g. batteries; broken thermometers and blood-pressure gauges)

Steps For Waste Management

Segregation-Segregation refers to the basic separation of different categories of waste generated at source and thereby reducing the risks as well as cost of handling and disposal

Collection-The collection of biomedical waste involves use of different types of container from various sources of biomedical wastes like Operation Theatre, laboratory, wards, kitchen, corridor etc. The containers/ bins should be placed in such a way that 100 % collection is achieved.

Storage-Once collection occurs then biomedical waste is stored in a proper place. Segregated wastes of different categories need to be collected in identifiable containers. The duration of storage should not exceed for 8-10 hrs in big hospitals.

Transportation-The waste should be transported for treatment either in trolleys or in covered wheelbarrow. Manual loading should be avoided as far as for as possible. The bags / Container containing BMWs should be tied/ lidded before transportation.

Personnel safety devices-The use of protective gears should be made mandatory for all the personnel handling waste. Gloves, Aprons, Masks, Boots.

Effects of biomedical waste

The improper management in bio-medical waste causes stern environmental problems that causes to air, water and land pollution. The pollutants that cause damage can be classified into biological, chemical and radioactive. There are several legislations and guidelines in India concerning environmental problems, which can be addressed.

2. STATEMENT OF THE PROBLEM

There is a serious concern regarding hospital waste which has not been adequately managed.There is inadequate training of health care workers on hospital waste management practices. In addition, the waste handling behavior of the people itself is risky. Hospital workers staffs are dispose off their waste as cheaply and as quickly as possible without recourse to the hygienic means of doing it. The importance of this study is to create the necessary awareness among health care workers as well as public to safeguard health and environment

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3. LITERATURE REVIEW

(Mumtaaz hussain et.al) studied that lack of knowledge and awareness regarding hospital waste among patients and more chances are there for infectious disease due to improper handling and disposal of hospital waste at DHQ hospital dera ghazi khan there was a pose risk for the patient's health

(Anitha pandey) Study have a overview on bio medical waste management in a tertiary care hospital it was clear that bio medical waste management was lacking 30-35% health care personal and they suggested to develop the policy to meet the current requirements. The help will be educated about the change in the policy and the same will be implemented after taking permission from the hospital management committee.

(S.V.Manyele) This paper dealt with sharp waste in medical waste management this study assigns the current state of sharp waste management in low level health facilities in Tanzania. Sharp waste management in low level health facilities is not up to the level it leads to risk of exposure to public as well as workers to blood-borue pathogens. Municipality is responsible to open a new waste processing center to collect on a regular basis all sharp waste

(Abdullah al-hadlaq) Purpose of the study is to develop a efficient management system that will increase environmental safety and social responsibility as well as minimize economic cost. According to data collected there is mandatory to provide proper knowledge and create awareness from top to bottom level workers about how to manage with waste.

(Rao) The ministry of environment and forest notified the biomedical waste management rules in july 1998.Rules enacted that every hospital should implement bio medical waste treatment facilities on site. It is very important maintaining and managing bio medical waste workers two types of cost incurred in hospital for bio medical waste management internal segregation, mutilation disinfection external transportation treatment final disposal. After analyzing the results study felt that it is mandatory to standardize the infrastructural needs.

(Thirumala et al) a study was conducted in various hospitals in Mysore city. Data revealed that more modernized and developed hospitals are also not interested in creating proper awareness regarding bio medical waste management. They completely lack in generating and implementing in waste management techniques and policy. It is necessary to provide training and motivation to meet the current needs of bio medical waste management in these hospitals.

(Miyazaki) In Japan the waste management law is under practice the waste disposal law of 1970. After revised for current scenario infections waste management act by ministry of environment in 2004.Minimizing the infectious waste is expected. Study explain a summary of the revised act of infectious waste in this article.

4. OBJECTIVES OF THE STUDY

- To study the present practice related to bio medical waste management
- To create awareness and knowledge of individual in medical waste
- To understand the various handling and disposal procedure in healthcare industry
- To know policies of the hospital about safe disposal of medical waste
- To identify the problem in the management of medical waste

5. COMPANY PROFILE

CHENNAI NATIONAL HOSPITAL , is an exclusive 120 bed Multi-Specialty hospital located in the heart of Chennai City. The hospital has the following specialties, each headed by a team of seasoned and senior clinicians. Here bio medical dept is headed by well trained staffs. They have maintaining separate dust bins for bio medical waste. Each dept following this rules strictly.

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6. RESEARCH METHODOLGY

Sampling Method	Probability sampling-simple random sampling
Sampling area	Chennai National Hospital, Chennai
Sample size	200 respondents
Data collection	Survey-Questionnaire
Data analysis	SPSS version 21
Statistical tools	Chi–square,ANOVA,T-test, Correlation

7. DATA ANALYSIS AND INTERPRETATION

Demographic Details Of The Respondents - Table No: 1

Demographic profile		No. Of respondents	Percentage
Age	**Less than 20**	**13**	**6.5**
	21 to 30	**100**	**50**
	31 to 40	**53**	**26.5**
	Above 40	**34**	**17**
	Total	**200**	**100**
Gender	**Male**	**82**	**41**
	Female	**118**	**59**
	Total	**200**	**100**
Marital status	**Married**	**112**	**56**
	Single	**88**	**44**
	Total	**200**	**100**
Educational qualification	**Hr.sec**	**28**	**14**
	Diploma	**48**	**24**
	U.G courses	**60**	**30**
	P.G courses	**24**	**12**
	Doctorate	**40**	**20**
	Total	**200**	**100**
Designation	**Doctor**	**42**	**21**
	Nurses	**61**	**30.5**
	Administration	**23**	**11.5**
	Pharmacy dept.	**27**	**13.5**
	Ward boy	**12**	**6**
	Laboratory technicians	**19**	**9.5**
	Sanitary staff	**16**	**8**
	Total	**200**	**100**
Income	**Less than 20000**	**117**	**58.5**
	21,000 to 30,000	**28**	**14**
	31,000 to 40,000	**30**	**15**
	Above 40,000	**25**	**12.5**

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	Total	**200**	**100**
Working experience	**Up to 3yrs**	**71**	**35.5**
	4-6yrs	**55**	**27.5**
	7-9yrs	**38**	**19**
	Above 9yrs	**36**	**18**
	Total	**200**	**100**

Interpretation From the above table 1 it is clear that below 20 years of age are 6.5%, most of them are in age group of 21-30 years of age recorded 50%.women between 31-40 of age are 26.5%,17% of respondents are in the age group of above 40years of age. Among the respondents 41% are male and 59% are female. Married respondents are 56% and 44% respondents are single. Respondents who have completed UG and Diploma are 30% and 24% respectively.30% of respondents are belong to Nurses category and 21% respondents are belong to Doctorate. Income of respondents less than Rs 20,000 are 58%,15% of respondents are belong to income level of Rs 30,000 to Rs 40,000.35.5% respondents are in category of up to 3years of experience and 27.5% respondents are 4 to 6 years category.

Table no: 2-Containers identified and distinguished well

Particulars	**No. of Respondents**	**Percentage**
Strongly agree	32	16
Agree	108	54
Neutral	30	15
Disagree	30	15
Strongly disagree	0	0
Total	**200**	**100**

Interpretation From the above table it is clear that majority 54% of respondents are agree that bio medical waste containers identified and distinguished well 16% of respondents are strongly agree and least 15% of respondents are neutral and disagree about bio medical waste containers and distinguished well

Table no : 3-Workers are provided personal protective equipments

Particulars	**No. of Respondents**	**Percentage**
Strongly agree	17	8
Agree	82	41
Neutral	65	32
Disagree	36	19
Strongly disagree	0	0
Total	**200**	**100**

Interpretation From the above table it is clear that majority 41% of respondents are agree that hospital administration provide us personal protective equipments 32.5% of respondents are neutral 19% of respondents are disagree and least 8.5% of respondents are strongly agree that hospital administration provide us personal protective equipment

Table no: 4-Designation and Awareness about waste management

H0-There is no association between respondents designation and aware about bio medical waste management
H1-There is association between respondents designation and aware about bio medical waste management

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Cross Tab

Designation	Are you aware about biomedical waste management					Total
	Extremely aware	Very aware	Moderately aware	Slightly aware	Not at all aware	
Doctor	12	21	6	3	0	42
Nurses	7	31	20	3	0	61
Administration	3	3	10	4	3	23
pharmacy dept	4	14	7	2	0	27
ward boy	1	2	5	3	1	12
laboratory technicians	6	7	4	2	0	19
Sanitary staff	1	2	4	9	0	16
Total	34	80	56	26	4	200

Chi Square Test Is Applied **Table No: 2.1**

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	77.198[a]	24	.000
Likelihood Ratio	64.678	24	.000
Linear-by-Linear Association	12.099	1	.001
N of Valid Cases	200		

Interpretation From the above table it is shows that the Pearson chi square value is 77.198and p value is .001<.05, hence the null hypothesis is rejected and H1 is accepted ,So therefore there is association between respondents designation and aware about bio medical waste management

Table no: 5-Gender and awareness of legislation application

H0- There is no significant difference between gender and awareness about legislation application hospital waste management

H2- There is significant difference between gender and awareness about legislation application hospital waste management

T-Test Applied

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Are you aware of any legislation application to hospital waste management	Male	82	4.0610	.94735	.10462
	Female	118	3.6017	1.16311	.10707

Independent Samples Test **Table no: 3.1**

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper

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Are you aware of any legislation application to hospital waste management	Equal variances assumed	7.800	.006	2.958	198	.003	.45928	.15528	.15306	.76550
	Equal variances not assumed			3.068	192.978	.002	.45928	.14970	.16403	.75453

Interpretation -From the above table we have found out f=7.800 and t-2.958,p=.003,<(0.05)and t=3.068,p=.002,<(0.05),hence null hypothesis rejected alternate accepted, so there is significant difference between gender and awareness about legislation application hospital waste management

Table no: 6-Educational qualification and medical waste is hazardous

H0-There is no significance difference between educational qualification and medical waste is hazardous which threats to environment

H3-There is significance difference between educational qualification and medical waste is hazardous which threats to environment

Descriptive

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Strongly agree	70	3.2714	1.45384	.17377	2.9248	3.6181	1.00	5.00
Agree	126	2.8810	1.21067	.10785	2.6675	3.0944	1.00	5.00
Neutral	4	2.0000	1.15470	.57735	.1626	3.8374	1.00	3.00
Total	200	3.0000	1.31478	.09297	2.8167	3.1833	1.00	5.00

ANOVA **Table no: 4.1**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	10.943	2	5.471	3.236	.041
Within Groups	333.057	197	1.691		
Total	344.000	199			

Interpretation From the above table it is clear that calculated value is .041 it is lesser than table value so null hypothesis rejected, Therefore there is significance difference between educational qualification and medical waste is hazardous which poses serious threats to environment

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Table no: 7-Working experience and perception about different health problem

H0-There is no association between working experience and perception about different health problems due to bio medical waste

H4-There is association between working experience and perception about different health problems due to bio medical waste

Cross Tabulation

Working experience	**Perception about different health problems due to bio medical waste**					Total
	Extremely aware	Very aware	Moderately aware	Slightly aware	Not aware	
Up to 3yrs	20	10	18	15	8	71
4-6yrs	9	16	17	9	4	55
7-9yrs	11	11	12	1	3	38
above 9yrs	16	11	7	1	1	36
Total	56	48	54	26	16	200

Chi Square Test Is Applied **Table No: 5.1**

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.457[a]	12	.018
Likelihood Ratio	27.467	12	.007
Linear-by-Linear Association	11.782	1	.001
N of Valid Cases	200		

Interpretation From the above table the Pearson chi square value is 24.457and p value is .018> 05, hence the null hypothesis is rejected and H1 is accepted,So therefore there is association between working experience and perception about different health problems due to bio medical waste

Table no : 8 – Practice of waste collection and duration of medical waste storage

H0-There is no significant relationship between practice of waste collection and transporting process and duration of medical waste storage

H5-There is significant relationship between practice of waste collection and transporting process and duration of medical waste storage.

Correlation Test Applied

Respondents opinions		Practice of waste collection and transporting process are done properly	How long the medical waste is being stored
Practice of waste collection and transporting process are done properly	Pearson Correlation	1	.210**
	Sig. (2-tailed)		.003
	N	200	200
How long the medical waste is being stored	Pearson Correlation	.210**	1
	Sig. (2-tailed)	.003	

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	N	200	200

Interpretation From the table Pearson correlation value is .210 and sig value is .003 which is less than .05,so Ho is rejected H1 is accepted, Hence it is concluded that there is a positive relationship between practice of waste collection and transporting them and being medical waste is stored in hospital

Table no : 9-Designation and which should be improved by bio medical team in hospital

H0-There is no significance difference between designation and which should be improved by bio medical team in hospital

H6-There is significance difference between designation and which should be improved by bio medical team in hospital

Descriptive

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Collection	50	3.7600	2.02595	.28651	3.1842	4.3358	1.00	7.00
segregation	47	3.2128	1.95533	.28521	2.6387	3.7869	1.00	7.00
Storage	33	3.1818	1.75810	.30605	2.5584	3.8052	1.00	7.00
Transport	4	2.2500	.50000	.25000	1.4544	3.0456	2.00	3.00
Disposal	66	2.6364	1.80287	.22192	2.1932	3.0796	1.00	7.00
Total	200	3.1350	1.91182	.13519	2.8684	3.4016	1.00	7.00

ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	39.431	4	9.858	2.794	.027
Within Groups	687.924	195	3.528		
Total	727.355	199			

Interpretation From the table it is clear that calculated value is .027 it is lesser than table value so null hypothesis is rejected, Therefore significance difference between designation and collection area to be improve by bio medical team in hospital

8. FINDINGS

- From the chi square test it is found that awareness about bio medical waste management differ based on their designation
- From the t test it is known that there is knowledge about legislation application hospital waste management differ with respect to gender
- From Anova it is clear that those who are aware in medical waste is hazardous which poses serious threats to environment are mostly educated
- From the chi square test it is depicted that based on the working experience perception may vary about different health problems due to bio medical waste management
- From correlation it is depicted that those who are aware about duration of storage of medical waste agree towards delay in transportation

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- From Anova it is clear different designated people are more aware about the segments that has to be improved by bio medical team

9. SUGGESTION

- Present study revealed that although nurses and lab technicians had overall knowledge there were still some scopes of improvement among sanitary staff, and administration dept about Bio Medical Waste management.
- Furthermore there is need for training and capacity building programs of all employees involved in the medical waste management.
- Effective implementation of rules by surprise visits and inspection by appropriate authorities and fixing accountability of each and every person involved in management of Bio medical waste should be made.
- From analysis of the study it is important that management should take steps for giving better equipments to go through bio medical process.

10. CONCLUSION

Bio medical waste management is more of human attitudinal issue than technological.The study revealed that the system of biomedical waste management is still suffering on lack of necessary knowledge and information regarding biomedical waste management system. The efficiency of transportation and storage need improvement. Bio Medical waste management is beyond just compilation of the data on process and enforcement of regulations; it has to be supported by appropriate education, training, commitment of health care staff within an effective policy frame work. Since environmental pollution has become a major concern with respect to the future of life on our planet it is legal duty of the management of the healthcare institution to ensure that bio medical waste are managed properly causing any adverse impacts on human health or environment

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