

# A Study on Bio-Medical Waste Management in McGANN Hospital with Special Reference to Shimoga

**H. Manjula Bai**

Faculty Member, Department of Post Graduate Studies and Research in Commerce  
Sahyadri College of Commerce and Management, Shimoga, Karnataka, India

 <https://orcid.org/0000-0002-2178-1446>

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## Abstract

*This paper is designed to study the Bio-Medical waste Management in McGANN Hospital in Shimoga. This study is done to assess the types and components of Bio-Medical Waste generated in the McGANN Hospital, to examine the means of waste disposal by McGANN Hospital, and to analyse the mode and frequency of Bio-Medical waste collection, to make recommendations for effective management of Bio-Medical waste in the McGANN Hospital and to know the medical waste segregation practices prevailing in the hospital. This helps to identify the issues and problems faced by the hospital with the waste management. And how the waste management is useful to the society. The study focus on the degree of management skills that the hospital utilise in effective waste management. For the purpose of the study, the researcher has selected 50 respondents who are the employees of the hospital and take part in the waste management process. Exploratory research methodology is used to conduct the study. It includes survey and fact finding enquiries of different kind. It focused on the problems or the benefits availed from waste management. All employees of various department in the Hospital were surveyed by using questionnaire and the level of satisfaction or dissatisfaction from waste management was studied. Finally the detailed information about the benefits about the waste management were considered. Finally, it makes an attempts to offer suggestions to the employees of the hospital, regarding how better they can do to improve the management of Bio-Medical Waste.*

**Keywords:** Waste management, Bio-medical wastes, McGANN hospital, Healthcare, General medical waste, Infectious medical waste, Hazardous medical waste, Radioactive medical waste

## Introduction

Biomedical waste is any complete waste containing infectious (or potentially infectious) materials that is often about to include waste related to the generation of biomedical waste that tends to be of visual medical or laboratory origin (e.g. packaging, discarded bandages, infusion kits, etc.), as well as biomolecules or species containing laboratory waste that is also restricted from environmental release. Due to the risk of being infected with blood and their potential to cause harm when not properly contained and disposed of, discarded sharps are considered biomedical waste, whether or not they are contaminated or not, as detailed below. Biomedical waste can be a form of bio waste. Biomedical waste, just like the diagnosis, prevention or treatment of diseases, is created from biological and medical sources and activities. Popular biomedical waste generators (or producers) include hospitals, health clinics, nursing homes, emergency medical services, laboratories for medical testing, doctors' offices, dentists, and veterinarians.

## Review of Literature

In her study on medical waste management in selected hospitals in Chennai City, Sutha Irin A (2018) aims to review the Medical Waste Management Assessment, the tactic of medical waste management: medical waste management, segregation, storage and disposal of medical waste publicly and privately in Chennai City. With recomme, the analysis was concluded

V. N. Kalpana, D etc in any respect (2016) in their article about - Biomedical waste and its management stated that The Biomedical and Health Care waste management is incredibly different from other house waste or industries waste management. Biomedical waste management is one in all the foremost important challenges of at the present time because it's an instantaneous impact on the health of citizenry. Since it's hazardous in nature its safe and proper disposal is extremely important. for correct disposal management of biomedical waste the Ministry of Environment and Forests has published the Bio-Medical Waste Rules, 1998. This review explains the hospital waste management and so the environmental problem in India. This study also focused on the problems associated with biomedical waste within the past, medical waste was often mixed with municipal solid waste and disposed in nearby landfills. In recent years, many efforts are made by environmental regulatory agencies to higher manage the biomedical waste.

At the very least, Zekieni R. Yelebe, et al, in their article on "Biomedical Waste Treatment: A Case Study of some Selected Hospitals in Bayelsa State, South-South, Nigeria" (2015), they reported that in recent times the treatment and disposal of solid medical waste from hospitals in Nigeria has been of increasing concern. This is often due to the toxic nature of these wastes and hence the possible threat to human beings and other living species to transmit deadly diseases. A study was conducted to examine the generation of biomedical waste from ten hospitals in Bayelsa State, South-South, Nigeria, to identify and quantify these wastes. The hospitals were categorized into Tertiary, Secondary and first health institutions, and grouped into Public and personal owned facility. The result revealed that every one the hospitals involved disposed their

generated waste into municipal waste dumpsites with none style of treatment, leading to unhealthy and unsafe environment around the health institutions, affecting patients and staffs and so the well-being of the general public. The study concluded with suggestions for changes in the handling and treatment of biomedical waste in order to make the waste disposal system in Nigerian health institutions acceptable and sufficient.

Nageswara Rao (2015) in this study about Biomedical waste management stated that Hospital wastes pose a significant impact on health and environment. From this study it are often said that there's an urgent need for raising awareness and education on medical waste issues. Proper waste management strategy is required to make sure health and environmental safety. For further study, it's needed to gather more information on impacts, disposal and management to draw a transparent conclusion. It is important to gather information and examples from developing countries or countries that have a sound system of medical waste management. Seeking options for developed countries and suitable technologies. All over the planet, there's an exodus of individuals from villages to cities, partly for education and employment and partly because agriculture has subsided and fewer profitable.

## Statement of the Problem

In the healthcare sector, bio-medical waste disposal has been a big concern over the years. Therefore, the main problems facing Bio Medical waste management at McGANN Hospital are indiscriminate disposal, irregular waste collection and insufficient funding. The research intends to investigate the problem described above at Shivamogga McGANN Hospital on the basis of this.

## Need for the Study

The research seeks to establish the causes of this problem by answering the following questions:

- What types of Bio Medical waste are generated in the McGANN Hospital?
- How do individuals dispose of their household waste?
- How regular is the storage and disposal of waste?

- What are the tools available to collect the waste produced?
- What will be the way forward?

### Objectives of the study

The main objective of the study is to analyze the factors that influence the successful management of solid waste in the McGANN hospital and to suggest potential steps to resolve the issue. The study is primarily aimed at achieving the following objectives.

- To assess the types and components of Bio Medical Waste generated in the McGANN Hospital.
- To examine means of waste disposal by McGANN Hospital
- To analyse the mode and frequency of Bio Medical waste collection.
- To make recommendations for effective management of Bio Medical waste in the McGANN Hospital.
- In the hospital, awareness of the methods of segregation of medical waste prevails.

### Scope of the Study

Geographically, the study area covered McGANN Hospital, Shivamogga was chosen because it is a biggest Private Healthcare Industry and as such is facing a bigger problem of managing its Bio Medical waste effectively. Contextually, the study focused on Bio Medical waste management.

### Research Methodology

The research work conducted on the basis of exploratory research.

### Sources of Data Collection

**Primary Data:** In the form of Questionnaire & Observation, which are the two basic methods of primary data collection, primary data was used, which is adequate for all research goals.

**Secondary Data:** Secondary data sources like catalogue of the hospital, journals and articles, various internet sites and Literature Reviews have been used.

### Sampling Design

The research is designed to achieve the above mentioned objectives and the following tools were used to collect the required data.

**Sampling Method:** To carry out this project non probability sampling method is used.

**Sampling Technique:** To carry out this project Convenience technique has been used

**Sampling Unit:** This particular survey was directed at only in McGANN Hospital

**Sample Size:** The sample size is of 50 respondents consisting of employees in McGANN Hospital.

**Data Collection Tools:** The methods for data collection were Standardized Questionnaires. In line with the purpose of the analysis, the questionnaire was neatly designed and created for the purpose.

### Hypothesis

H0: The role of hospitals in Bio chemical waste management is not very prominent.

H1: The role of hospitals in Bio chemical waste management is very prominent.

### Limitations of the Study

- Analysis of the study was depended only on the information provided by the organization.
- The research process was confined to the rules and regulations of the McGANN Hospital. The store department kept some of the details private.

### Bio-Medical Waste Management

In order to protect the environment, the general public and workers, in particular health and sanitation workers who are at risk of exposure to biomedical waste as a hazard, biomedical waste should be properly managed and disposed of. Biomedical waste management steps include generation, accumulation, handling, storage, treatment, transportation and disposal.

The national waste management policy can be developed and implemented to improve the management of biomedical waste in health facilities during the rustic period. The Bio-medical Waste (Management and Handling) Rules, 1998 and further amendments to the regulation of the management of bio-medical waste have been adopted. On 28th Mar

2016 Biomedical Waste Management Rules 2016 were also notified by Central Govt.

The Pollution Instrument Panel or the Pollution Control Committee of each state is responsible for enforcing the new legislation.

In India, though there are style of various disposal methods, things is desultory and most are harmful rather than helpful. If body fluids are present, the material must be incinerated or put into an autoclave. Although this can be often the correct method, most medical facilities fail to follow the regulations. It's often found that biomedical waste is dumped into the ocean, where it eventually washes au courant shore, or in landfills because of improper sorting or negligence when within the medical facility. Improper disposal can cause many diseases in animals also as humans. For instance, animals, like cows in Pondicherry, India, are consuming the infected waste and eventually, these infections are often transported to humans who consume their meat or milk. Sizable amount of unregistered clinics and institutions also generate bio-medical waste which isn't controlled.

The next color coding is suggested by the most current recommendations for bio-medical waste segregation:

- **Red Bag** - Syringes (without needles), soiled gloves, catheters, IV tubing, etc. should all be disposed of in a very red bag that can be incinerated at a later date.
- **Yellow Bag** - All bodily fluids, blood bags, human anatomical waste, and body parts dressings, bandages and cotton swabs are to be discarded in yellow bags.
- **Cardboard Box with Blue Marking** - Throughout a cardboard box with a blue marking/sticker, glass vials, ampules and other glass ware shall be discarded.
- **White Puncture Proof Container (PPC)** - In a highly white transparent puncture proof container, needles, sharps, blades are disposed of.
- **Black Bags** - These are for non-bio-medical waste purposes. This includes stationary, vegetable and fruit peels, leftovers, packaging like medications, disposable caps, disposable masks, shoe covers, disposable tea cups,

cartons, sweeping dust, kitchen waste, etc., in an extremely hospital setup.

As per the act passed in 1986 by the Ministry of Environment and Forests and notified in July 1998 of the Bio Medical Waste (Management and Handling) Rules, it is the duty of any occupier (in the case of AIIMS, the Director, AIIMS), i.e. someone who has control over the institution or its premises, to want all measures to ensure that waste produced is treated with no adverse effect on human healing health and environment.

In accordance with the Biomedical Waste Management Rules 2016, notified by the Ministry of Atmosphere, Forest and Forestry, the biomedical waste management policy adopted at AIIMS is

According to the gazette notification dated 28 March 2016, Climate Change, Government of India. Before this notification, AIIMS had been following the Bio-medical Waste (Management & Handling) Rules 1998 notified by identical ministry. At present, the biomedical waste management at AIIMS has been outsourced to regular biomedical waste management facility, M/S Biotic Waste Solutions Pvt. Ltd.

### **Need of Biomedical Waste Management in Hospitals**

The reasons thanks to which there's great need of management of hospitals waste such as:

- Sharp injuries occurring in any or some types of hospital workers and waste handler infection.
- Nosocomial infections and poor waste management in patients with poor infection prevention procedures.
- Chance of infection outside the hospital for waste handlers and scavengers and the general public living in the vicinity of hospitals at the time.
- Danger linked to toxic substances, drugs at the lowest degree levels to individuals handling waste.
- Disposable to be repacked and sold without even washing by unscrupulous elements.
- Drugs that have been disposed of, repacked and distributed to unsuspecting consumers.
- Risk of air, water and soil contamination directly from waste or due to faulty emissions from incineration and ash.

## Bottom of Form

### Problems relating to biomedical waste

A major problem related to the current management of biomedical waste in many hospitals is that the implementation of the control of bio-waste is unsatisfactory because certain hospitals haphazardly, inappropriately and indiscriminately dispose of waste. The absence of segregation procedures leads to the mixing of hospital waste with general waste, making the whole waste stream hazardous.

Eventually, improper segregation results in an inaccurate waste disposal process. Inadequate management of bio-medical waste would therefore cause environmental contamination, unpleasant odor, growth and proliferation of vectors such as insects, rodents and worms and which contribute to the transmission of diseases such as typhoid, cholera, hepatitis and AIDS through human-contaminated syringe and needle injuries.

It is necessary to avoid various communicable diseases spreading through water, sweat, blood, body fluids and infected organs. Scattered in and around the clinics, the Bio Medical Waste invites flies, mosquitoes, rats, cats and dogs responsible for the spread of communication diseases such as plague and rabies. Rag pickers are at risk of having tetanus and HIV infections in the hospital, digging out the garbage. Hepatitis, HIV, and other viral diseases are responsible for recycling disposable syringes, needles, IV packs, and other products including glass bottles without adequate sterilization. Health managers are largely responsible for handling hospital waste in the most protected and eco-friendly environments.

### Procedure for Waste Collection

Specifically, it is important to hold the colored plastic bag in its container. The biohazard symbol should be worn on bins and bags.

1. It should be removed from the container as soon as three quarters of the bag is full of waste, wrapped tightly with a plastic string and properly labelled.
2. No infectious waste can, in any conditions, be combined with non-infectious waste.
3. Disposable objects (syringes, I/V bottles, catheters, rubber gloves, etc.) should be removed

when chemically disinfected (cut) have been mutilated (by dipping in 1 percent hypochlorite solution for 30min.)

4. Prior to disinfection, the syringe barrel should always be removed from the plunger. Needles and needle destroyers should be destroyed. Manual sharp mutilation should never be attempted, as it can cause damage.
5. Sharps must (chemically) be strongly disinfected until they are shredded or eventually disposed of. Sharps should be stored and properly marked in puncture resistant containers.
6. In order to prevent injuries and incidents, biomedical waste handlers should be skilled in the handling of waste and made aware of the correct way to treat waste.

### Transportation and Storage

Depending on the volume of waste, the waste may be temporarily deposited in the central storage area of the hospital, and from there it may be sent in bulk to the final disposal site once or twice a day. The following points should be taken care of during transportation:

1. Ensure the correct sealing and labelling of waste bags/containers.
2. Bags are gathered from the neck and placed so that bags can be picked up for further handling by the neck again. The hand should not have been positioned under the bag. Just one bag should be lifted at a time.
3. To reduce the risk of needle prick injury and infection, manual handling of waste bags should be reduced.
4. Only in a designated storage area should BMW be maintained.
5. After removal of the bag, clean the container including the lid with an appropriate disinfectant.
6. Waste bags and containers from wards / OPDs or wards should be collected regularly.
7. Waste bags/containers should be transported in a covered wheeled container or large bins in covered trolleys even more often if necessary (as in Activity Theatres, ICUs, and labor rooms).
8. The area of BMW storage should be different from the general area of waste storage.



### Transport to Final Disposal Site

Transportation from the health care center to the final disposal site in a closed area

It is desirable to use a motor vehicle (truck, tractor-trolley, etc.) as it avoids waste spillage on the way. Vehicles used for BMW transport must have the sign ‘Bio-Hazard’ and they should not be used for any other purpose.

### Disposal of Bio Medical Waste Pretreatment

Infected waste that cannot be incinerated must first be disinfected (e.g. plastic and rubber articles, sharps) before it is sent for final disposal.

### Final Disposal

Incineration is a dry oxidation process at high temperatures, which reduces inorganic incombustible matter to organic and combustible material. For waste that can not be reused, recycled or disposed of at the landfill site, this process is typically used.



### Analysis and Interpretation

**Table 1: Social-Economic Profile and Opinion of Respondents**

S. No	Particulars	No. of Respondents	Percent (%)
<b>Gender</b>			
1	Male	7	14%
2	Female	43	86%
	<b>Total</b>	<b>50</b>	<b>100</b>

<b>Educational Qualification</b>			
1	SSLC	11	22%
2	PUC	13	26%
3	Graduate	14	28%
4	Post Graduate	12	24%
	<b>Total</b>	<b>50</b>	<b>100</b>
<b>Age group</b>			
1	Below 25	11	22%
2	Between 25 – 35	21	42%
3	Between 35 – 50	14	28%
4	Above 50	4	8%
	<b>Total</b>	<b>50</b>	<b>100%</b>
<b>Income</b>			
1	Less than 20000	9	18%
2	20000-30000	7	14%
3	30000-40000	6	12%
4	Above 40000	28	56%
	<b>Total</b>	<b>50</b>	<b>100%</b>
<b>Working Departments of Respondents</b>			
1	Nursing	33	66%
2	HR	3	6%
3	R & D	3	6%
4	Accounts	9	18%
5	Others	2	4%
	<b>Total</b>	<b>50</b>	<b>100%</b>
<b>Major Source of Waste Generated in the Area</b>			
1	Biomedical Waste	43	86%
2	Clinical Waste	1	2%
3	Bio hazardous Waste	0	0%
4	Infectious Medical Waste	2	4%
5	Regulated Medical Waste	1	2%
6	Healthcare Waste	3	6%
	<b>Total</b>	<b>50</b>	<b>100%</b>
<b>Waste Disposal Method</b>			
1	Open Dumping	6	12%
2	Controlled Tipping	32	64%
3	Dumping into Water Body	6	12%
4	Other Method	6	12%
	<b>Total</b>	<b>50</b>	<b>100%</b>

<b>Concern with Medical Waste Management</b>			
1	Highly Concerned	37	74%
2	Concerned	7	14%
3	Neutral	3	6%
4	Not Concerned	3	6%
Total		50	100%
<b>Expenditure for Bio Chemical Waste Management</b>			
1	Less than Rs.10000	40	80%
2	Rs.10000-Rs.20000	2	4%
3	Rs.20000-Rs.30000	4	8%
4	Above Rs.30000	4	8%
Total		50	100%
<b>Effect of Bio Chemical Waste Management</b>			
1	Water pollution	2	4%
2	Environment Pollution	3	6%
3	Both water & environment pollution	3	6%
4	Effects on Human Health	42	84%
Total		50	100%
<b>Opinion about Waste Management System in Hospitals</b>			
1	Satisfied	39	78%
2	Highly Satisfied	5	10%

3	Moderately Satisfied	4	8%
4	Dissatisfied	2	4%
Total		50	100%

Source: Survey data

The above table analysis the social economic profile and opinion of the respondents working in the hospital and play an important role in the Bio Chemical waste management process in the hospital. Out of 50 respondents, 86% of females and 16% are males

Among them, 28% are graduates, and 42% aged b/w 25-35 and their monthly income being above 40000 p.m. 66% of the respondent's are nurses who are working for the waste management process,

Among the various types of waste generated in the hospital, 86% are Bio Chemical waste. 64% of the respondents opined that controlled tripping method is used as the waste disposal Method in the hospital. 74% of the respondents opined that they are highly concerned with the waste management process.

80% of the respondents opined that they incur less than 100000 for the waste management process. 78% of the respondents opined that they are satisfied with the waste management system in the hospital.

Overall respondents are satisfied with the waste management system in the hospital and they suggest much more initiatives for improvement.

**Table 2: Problems Encountered in Biomedical Waste Management**

Problems	Serious	Very Serious	Not so Serious	No Problem
Lack of financial resources	4	1	8	37
Lack of trained personnel	36	2	8	4
Lack of vehicles	1	1	10	38
Lack of equipment	0	2	10	38
Lack of authority to make financial and administrative decision	42	4	4	0
Old vehicle/equipment frequent breakdown	4	1	44	1
Lack of planning (short, medium and long-term plan) Poor cooperation by Government agencies	1	2	46	1
Lack of control on hazardous waste	7	2	39	2
Lack of qualified private contractors	3	39	6	2

Source: Field Survey

The above table states that,36 respondents serious problem in biomedical waste management, opinion that lack of trained personnel causes 38 respondents opinion that lack of vehicle causes

no problem in biomedical waste management, 38 respondents opinion that lack of equipment causes no serious problem in biomedical waste management, 42 respondents opinion that lack of authority to make financial and administrative decision causes serious problem in biomedical waste management, 46 respondents opinion that Old vehicle/equipment frequent breakdown causes not so serious problem in biomedical waste management and 39 respondents opinion that lack of qualified private contractors

causes very serious problem in biomedical waste management.

**Test Application**

Chi square Test

H0: The role of hospitals in Bio chemical waste management is not very prominent.

H1: The role of hospitals in Bio chemical waste management is very prominent

Responses	Observed	Expected	(O-E)	(O-E) <sup>2</sup>	(O-E) <sup>2</sup> /E	Values
Agree	15	10	5	25	25/10	2.5
Disagree	20	30	-10	100	100/30	3.33
Neutral	15	10	5	25	25/10	2.5

Calculated Value = 8.33

Degree of freedom n-1 i.e., 3-1=2

Table value of chi square for 2 degree of freedom @ 5% level of significance is 5.99

Since the calculated value is more than the table value, Null hypothesis is rejected. Hence alternative hypothesis is accepted .Hence proved that the role of hospitals in Bio chemical waste management is very prominent.

**Findings**

- 86% of females and 16% are males
- Among them, 28% are graduates, and 42% aged b/w 25-35 and their monthly income being above 40000.p.m.
- 66% of the respondent’s are nurses who are working for the waste management process,
- Among the various types of waste generated in the hospital, 86% are Bio Chemical waste.
- 64% of the respondents opined that controlled tripping method is used as the waste disposal Method in the hospital.
- 74% of the respondents opined that they are highly concerned with the waste management process.
- 80% of the respondents opined that they incur less than 100000 for the waste management process.
- 78% of the respondents opined that they are satisfied with the waste management system in the hospital.

**Suggestions**

- Hospital should give proper guidelines for their employee towards Bio Medical Waste
- Adopt a strategy of sustainable procurement
- Each health care facility should have a waste management unit to take the practice of waste management seriously.
- Handless cleaners, nurses and health workers should be adequately trained.
- Sorting of waste at source should be implemented using the color-coded scheme that is being practiced.
- Government regulations on good waste management practices should be formulated and implemented.
- Government should ensure that there are good and working incinerators in health care facilities or have a central incinerating facility where these waste can be taken and processed prior to final disposal.

**Conclusion**

Health-care waste management is an integral a part of health-care, and creating harm through inadequate waste management reduces the general benefits of healthcare. Improvements in health-care waste management believe the next key elements: The buildup of a comprehensive system addressing responsibilities, resource allocation, handling and disposal. this can be an extended term process, sustained by gradual improvements.



Awareness raising and training about risks associated with health-care waste, and safe and sound practices; Selection of safe and environmental-friendly management options, to shield people from hazards when collecting, Handling, storing, transporting, treating or taking out waste. Government commitment and support is required to achieve an overall and long-term improvement of things, although immediate action are often taken locally. Finally there should be proper coordination between Hospital administration/committee and Municipal administration for collection and disposal of biomedical waste.

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### Author Details

**H. Manjula Bai**, Faculty Member, Department of Post Graduate Studies and Research in Commerce, Sahyadri College of Commerce and Management, Shimoga, Karnataka, India,  
**Email ID:** manjularaikar76@gmail.com