

# A Study on Bio-Medical Waste Generation and Management in Two Hospitals of Bidar City, Karnataka, India

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**Abstract:** *Healthcare is one of the fastest growing sectors in India and undergoing rapid transition. The waste generated by healthcare activities can be hazardous and toxic, as it is contaminated by disease carrying pathogens which can infect human beings and environment. This present study is focused on effectiveness of segregation practiced and awareness of bio-medical waste management which includes collection, storage, transportation and disposal of waste generated in various hospitals in and around of Bidar Dist. Based on the literature survey two hospitals were selected, in that one was of the government and the other a private hospital of Bidar district. The study included Site visits, interviews, survey, interaction with hospital workers, questionnaires and observations to collect information regarding different medical waste management aspects in government and private hospitals. This case study revealed the improper segregation of bio waste at the source of generation in both government and private hospitals of Bidar city. Our study result recommends for a hospital, to know the waste management procedures needs a proper education, to all the workers and medical staff.*

**Keywords:** Bidar, Hospital wastes, Waste generation, Waste segregation, Quantification of waste, awareness, knowledge

## 1. Introduction

All human activities produce waste. Such waste may be dangerous and needs safe disposal. Hospitals and other health care facilities generate a lot of waste which can transmit infections particularly HIV, Hepatitis B, Hepatitis C and Tetanus to the people who handle it or come in contact with it (Sigsgaard et.al, 1994). According to (Roychoudhury et.al, 2005) India generates around three million tons of medical waste every year and the amount is expected to grow at eight per cent annually. But the waste generated from medical activities can be hazardous, toxic and even lethal because of their high potential for disease transmission. It creates risk to medical professionals like doctors, nurses, technicians, visitors, and patients (Ministry of Environment and Forests, Government of India. Draft Bio-Medical Waste (Management and Handling) Rules. 2011. "Bio- medical waste" is the waste 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 material (Rutala WA, Medical waste *Infect Control Hosp Epidemiol* 1992. (Mc. Doug al et.al, 2001) said that, main purpose of waste management is to clean up the surrounding environment and to identify the appropriate methods for waste neutralization recycling and disposal. Segregation of biomedical waste at the source of generation is the first and essential step in biomedical waste management & it continues to be the key message and central theme of the BMWR, 2016.

Bio-medical waste (BMW) mismanagement is a rapidly emerging threat to the present generation posing various environmental, biological and radiological hazards to the population (Chaithra et al., 2014). The categories mentioned in Schedule I of Bio-medical Waste (Handling and Management) Rules (1998), such as the waste generated during the treatment or immunization of human

beings or animals or in research activities pertaining there to or in the production or testing of biological diagnosis, comes under BMW (Chaithra et al., 2014). India generates 0.5 to 2.0 kg per bed per day of bio waste, which carries higher potential for infection and injury than any other type of waste, posing various environmental, biological and radiological hazards to the humans (Chaithra et al., 2014). The significant increase in the mismanagement of the biomedical waste positively correlated to the rapid increase in the number of hospitals, clinics and laboratories in the country.

Tough the percentage of bio waste production in India is less (0.5 to 1 kg of waste/person/day) compare to western countries (1 t o 105 kg of waste per bed per day). However, Karnataka State is also taking lead in the bio medical waste production, estimated to be 1.0 kg/day in diagnostic laboratory, 0.25 kg/day in veterinary clinics, 1.5 kg/day in blood bank, and 0.2 kg/day in small clinics. Segregation of biomedical waste at the source of generation is the first and essential step in biomedical waste management & it continues to be the key message and central theme of the BMWR, 2016. The present study tries to find out the real state of quantification of waste generation, segregation, awareness, and management of bio-medical waste in two government and private hospitals of Bidar district Karanataka, India.

## 2. Material and Methods

### The Study Area

➤ Bidar is a hill top city situated on the Deccan plateau in the north eastern part of Karnataka state, India. Being located at the forth east of 700 km (430ml) from the state capital Bangalore. Bidar is located at 17.9° N and 77.5°E, lies at a central position in Deccan plateau at an

elevation of 2300 feet from near the sea level. These two government hospitals are the towns of Bidar district.

- Ethical clearance from institutes ethics committee and permission from Medical Superintendent to collect data from various patients care areas was taken before the study; the study was approved by Department of P.G. Studies and Research in Zoology, Gulbarga University, Gulbarga, and Karnataka, India in 2016. Common regional facility for final disposal of infectious waste was also informal discussion with various hospital functionaries were carried out. Studied wastes generated into hospitals were weighed during a two week for each hospital.
- Site visits, Interviews and Interaction with hospital staffs including Doctors, CEO (chief executive officer of the hospital, nurses and sanitary workers of Government and private Hospitals in Bidar district.

The below figure 1: A: Shows the study area



B: ... was Dis hos hos of pla

F: While handling the biomedical waste staff should pr infection or injured by needle stick. Protective aids mu medical waste. When I had visited the hospitals and Er not wore any protective aids while performing their d with needle stick injury, We should create awareness a protective aids.

Karnataka is the first state to generate biomedical waste

Table 1: Top 5 Biomedical waste generating states

Biomedical waste generation and disposal Kg/day		
State	Waste	Disposal
Karnataka	62,421	43,971
Utterpradesh	44,392	42,237
Maharashtra	40,197	40,197
Kerala	32,884	29,438
West Benagal	23,571	12,472
<b>Total</b>	<b>4,05,702</b>	<b>2,91,983</b>

Table 2: Facility available and segregation of bio waste at Bidar Government and private hospitals

Sl. No	Facility available	Segregation of bio waste in Government Hospital Bidar	Segregation of bio waste in private hospital Bidar
1	Causality	Yes	Yes
2	Minor OT	Yes	Yes
3	Psychiatry ward	Yes	No
4	Injection room	Yes	No
5	Orphan baby ward	Yes	No
6	Burn's ward	Yes	No
7	Maternity ward	Yes	No
8	General ward	Yes	No
9	Post operative ward	Yes	No
10	Post operative O.T	Yes	No
11	Male orthopedic ward	Yes	No
12	Male surgical ward	NO	No
13	Female orthopedic ward	Yes	Yes
14	Pediatric ward	NO	No
15	Female surgical ward	Yes	No
16	Special room	Yes	No
17	Cardiac IICU	Yes	No
18	Labor room	NO	No
19	ANC Ward	Yes	Yes
20	Emergency ward	Yes	No
21	Dental OPD	Yes	No
22	Surgical OPD	NO	NO
23	Laboratory	NO	NO
24	Orthopedic OPD	NO	NO
25	ENT OPD	NO	NO
26	Eye OPD	NO	Yes
27	NICU	Yes	NO
28	Gynecology OPD	Yes	Yes

\*The data represented with Yes or NO

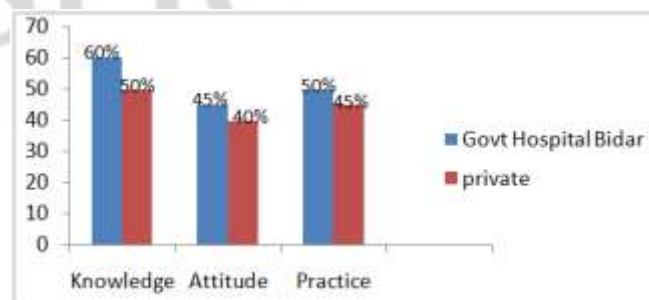


Figure 2: Knowledge Attitude and Practice in the Hospital

**Table 3:** Quantification of bio waste in Government hospital Bidar district (Date of quantification 1-05-2017 to 15-05-2017)

SL.NO	Name of wards	Average Quantity of waste in Kgs/Day						Total number of beds	Total number of patients
		Black	Yellow	White	Blue	Red	Green		
1	Causality	Empty	0.19	No bin	4	5	6	3	2
2	Minor OT	Empty	0.18	No bin	-	4	4	1	-
3	Psychiatry ward	Empty	-	No bin	4	2	2	10	1
4	Injection room	No bin	0.30	No bin	-	2	2	2	-
5	Orphan baby ward	Empty	No bin	No bin	-	-	-	5	3
6	Burn's ward	Empty	0.95	No bin	2	5	6	18	16
7	Maternity ward	No bin	0.9	No bin	9	2	2	30	20
8	General ward	No bin	Empty	No bin	-	-	-	8	06
9	Post operative ward	Empty	0.25	No bin	2	4	4	20	18
10	Post operative O.T	Empty	0.25	No Bin	3	2	2	22	16
11	Male orthopedic ward	Empty	2	No bin	5	4	4	18	12
12	Male surgical ward	NO bin	4	No bin	2	-	5	20	18
13	Female orthopedic ward	No bin	2	No bin	2	1	2	19	15
14	Pediatric ward	No bin	0.25	No bin	4	2	4	12	10
15	Female surgical ward	No bin	2	No bin	4	2	-	22	20
16	Special room	Empty	-	No bin	0.40	1	2	32	20
17	Cardiac ICU	No bin	0.45	No bin	4	0.50	0.50	6	4
18	Labor room	No bin	0.25	No bin	4	4	-	5	5
19	ANC Ward	-	0.9	No bin	4	2	6	15	13
20	Emergency ward	No bin	2	No bin	5	2	7	39	34
21	Dental OPD	No bin	0.95	No Bin	2	2	-	1	-
22	Surgical OPD	Empty	-	No bin	2	-	-	1	-
23	Laboratory	Empty	0.130	No bin	0.30	2	-	-	-
24	Orthopedic OPD	Empty	-	No bin	-	2	-	1	-
25	ENT OPD	Empty	0.25	No Bin	-	2	-	1	-
26	Eye OPD	No bin	0.20	No bin	0.75	2	-	1	-
27	NICU	No bin	6	No bin	-	-	-	6	4
28	Gynecology OPD	No bin	0.25	No bin	0.75	4	-	1	-
	<b>Total</b>		<b>24.65</b>		<b>64.2</b>	<b>56.5</b>	<b>57.50</b>	<b>319</b>	<b>237</b>

**Table 4:** Quantification of bio-waste in Private hospital (Date of quantification from 10-15-2017)

Sl. No	Name of wards	Average weight of bio waste kg/day	Total number of beds	Total number of patients
1	Causality	5	2	2
2	Trauma care	1	-	2
3	Orthopedic OPD	4	1	1
4	Male surgical ward	4	5	5
5	ENT OPD	0.5	2	2
6	Pathology lab	1	-	5
7	SICU	1	1	2
8	MICU	0.5	1	3
9	Labor room	7	8	7
10	Female surgical ward	6	5	5
11	Pediatric ward	5	6	8
12	Eye ward	4	5	5
13	Gynecology OPD	9	20	18
14	Post operative ward	4	3	3
15	NICU	1	1	1
	<b>Total</b>	<b>53</b>	<b>60</b>	<b>69</b>

**Table 5:** Awareness regarding bio-medical waste (Management and handling) rules, 1998 in the hospitals

SL. No	Designation	Aware (A) Not Aware (NA)	
		Name of the Hospitals	
		Government Hospital, Bidar	Private Hospital, Bidar
1	Doctor (specialist)	A	A
2	Doctor (Resident)	A	A
3	GDMO	A	A
4	Nurse	A	A
5	Technician	A	A
6	Pharmacist	A	A
7	Ward boy	A	NA
8	Peon	NA	NA
9	Ayahs	A	NA
10	Sweeper	NA	NA

### 3. Results and Discussion

- Our main object of qualitative analysis of biomedical waste in both the hospital was to analyze whether they are following prescribed (According to the biomedical waste management rule 2016) segregation rules at the source of waste generation or not.
- Each color-coded bin or liner meant for collection of particular waste in each block was weighed and recorded for 15 days for each hospital to get average value. Table 1 shows the facility available and proper segregation in both the hospitals. Table 2 and 3 shows the average quantity of waste in Kg/day of each liner in each block of Bidar Government and private hospitals respectively.
- And the Fig: 2 shows the KAP (Knowledge-Awareness-Practice) government Hospital staff. Fig: 4 shows that KAP of both the Hospitals.
- KAP of Bidar Hospital was not up to the mark and it was about only 60% whereas KAP of private hospital was found to be poorer than government hospital. Peon and Ayahs didn't have the knowledge about the segregation rules but all the staff members have positive attitude towards proper segregation of waste and practicing it properly.
- Table 5 shows the awareness regarding biomedical waste management rule (1998). This shows that in Bidar government hospital only Doctors, GDMO and nurses are aware about Handling Rules remaining staff members are not aware. In private hospitals doctors are aware about the Handling Rules remaining nurses and other auxiliary staffs are not aware.

#### Result of Private Hospital

It was seen that the hospital lacked the color coded waste bins so that proper segregation was not taking place.

- However, in a few wards the closed type of waste bins was available.
- There is no permanent identified place for placing the waste bins.
- None of the wards had the color liners for segregation at the point of generation and all wastes were dumped in common color bins present in the each ward.
- The transportation of waste was not regular as by "ENVIRO BIOTECH".
- The wastes such as syringes, glucose, empty bottles and other bio waste were dumped in the corner of the hospital compound. According to the (WHO, 2005a) the whole mixed volume, therefore, could be considered as being infectious which portends a serious risk to the general public.
- The waste disposed in corner of the hospital not only affects the health of patients but also the flora, fauna and the surrounding environment.

#### Result of Government Hospital

- In most of the wards there were no liners and only one common bin. However, some of the remaining wards and OPD (out-patient department) has liners and was maintained with proper segregation of wastes, collection

and transportation of the generated wastes by Envirotech treatment plant.

- All nurses, ayahs, workers maintained this properly on a regular basis.
- This hospital the response and communication was good.
- 80% of the waste is segregated and transported regularly.
- All workers in the hospital have 60% the knowledge of segregation in the particular liners
- Few wards do not have liners and all the wastes are dumped in the one common bin.
- There is no common white puncture proof plastic box to collect the used needles.

### 4. Conclusion

From the results obtained, out of two hospitals one hospital did not segregate and dispose their wastes according to bio-medical waste management rules and regulations (2016). Hospital management needs intensive training and orientation workshop for those hospital staffs to improve the knowledge, attitude, segregation and practice about disposal of bio-medical waste management. Hence monitoring at regular time intervals is needed for all staffs, along with strict implementation as per the guidelines of bio-medical waste management. It is firmly believed that each collective community effort rather than individual attempts would make handling and disposal of bio-medical waste economically and operationally viable. Hence, the final goal is a system that it is in harmony with sustainable development and protects the environment and human health.

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