

# AN APPRAISAL ON BIO-MEDICAL WASTE: CASE STUDY OF THREE PRIME HOSPITALS IN KOLKATA, WEST BENGAL

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**Abstract:** The concern for our health starts on the very day we are born and sometimes even from the day we are at our mother's womb. Here lies the importance of Hospitals. To ensure a good and quality treatment, it's necessary to manage the waste generated from there also. Therefore, this research "An Appraisal on Bio-Medical Waste: Case Study of Three Prime Hospitals in Kolkata" depicting current scenario of the Hospitals aided by the government, the health workers involved in it and the awareness among the patients and their family.

The principal goal of this report is to identify the sources of generation of the *bio-medical waste*, harmful impacts related to it and those who are at risk. The patient and their family are also playing important role in identifying the reality of this problems. In this report the perception of patients are also handled with due care because now a days the perception study has become an important technique to delineate the reality which often remain unexposed. Though, there are some physical and socio-economic constraints regarding this perception studies. The report has so much to do with the future research in this field of medical research and awareness among the masses.

**Keywords:** Bio- medical waste, Bio- hazard, Colour Coded Bags, skilled personnel

## I. INTRODUCTION

Medical care is vital for our life and health, but the waste generated from medical activities represents a real problem of living in 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. Large amount of potentially infectious and hazardous waste are generated in the health care hospitals and facilities around the world. **Biomedical waste** is any kind of waste containing infectious materials. It may include waste associated with the generation of biomedical waste that visually appears to be of medical or laboratory origin. These wastes are very much infectious, hence the hospital administration should look after the proper management and a keen knowledge about the health workers and waste handlers who are directly in contact with this kind of work. The major problem of this type of waste is generally faced by the developing countries and India is one of them. It is a major issue for them because managing wastes require huge expenditure, innovative machineries and skilled labour technicians and above all a missionary attitude to deal with it.

## STUDY AREA

The study area is Kolkata, the capital city of West Bengal. For this study, three major Govt. Hospitals have been chosen which handle a lot of population pressure in the central Kolkata, north Kolkata namely Chittaranjan National Medical College and Hospital, R.G. Kar Medical College and Hospital and Nil Ratan Sircar Medical College and Hospital.

## OBJECTIVES

- To fulfil the criteria of the basic research question there are certain sole objectives of this research Work. The objectives are:
- To identify the people at risk from bio medical waste.
  - To know the level of awareness among the patients and their family members.
  - To know about the methods and techniques of waste handling by the health workers and the attitude towards their work in the hospitals

## II. DATABASE AND METHODOLOGY

This data comprises of both primary data and secondary data. And this can be classified into two stages.

- **Hospital survey:** Visiting hospital with permission approved by the principal of medical colleges for getting relevant data that would feed the prepared questionnaire.
- **Perception survey:** For the people's perception purposive sampling technique has been applied. 10 samples from each hospital with a total of 30 samples have been surveyed for this study.

## 2. Case studies in some government hospitals

Three major govt. Hospitals have been chosen for case studies mainly because of the existence of huge number of patients both inter and intra nation. The hospitals are namely-**Chittaranjan National Medical College and Hospital (CNMCH)**, **Nil Ratan Sircar Medical College (NRS) and Hospital**, &**R.G. Kar Medical College and Hospital**.

The people who are at risk are:

- **Doctors, Para-Medical Staff, Ward Boys, Sweepers, Municipal Workers, Patients, Attendants Public at large, Rag pickers in the hospital.**

### 2.1 Waste generation from different hospitals in five months

#### 2.1(a) CHITTARANJAN NATIONAL MEDICAL COLLEGE AND HOSPITAL

**Table 2.1(a): Waste Generation in Kg**

	CNMCH(MONTH,2017), IN KG					MEAN	STDEV	M+1SD
	JANUARY	FEBRUARY	MARCH	APRIL	MAY			
BLUE	1569	2242	1409	1614	903	1547	480.046	2027.446
YELLOW	1903	2544	1922	1972	1038	1876	538.561	2414.401
WHITE	367	483	936.6	956.8	842	717.2	273.271	990.4315

CNMCH hospital has three bags for collection of BMW. Like other two hospitals they do not use RED BAG instead red, they use WHITE BAG. Why this difference? On asking it was known that the plastic bags come from the companies only who are assigned to collect the BMW. The other two hospitals have four bags.

#### 2.2(b) NIL RATAN SIRCAR MEDICAL COLLEGE AND HOSPITAL

**Table 2.2(b): Waste Generation in Kg**

	NRS(MONTH, 2017), IN KG					MEAN	STDEV	M+1SD
	JANUARY	FEBRUARY	MARCH	APRIL	MAY			
BLUE	1725.5	2572.2	2622.7	2919	2624	2492.7	450.22	2942.899
YELLOW	2963	3238.8	4011.2	3604.8	3342.3	3432	397.07	3829.092
WHITE	1409.2	1539.2	1864.7	1290	1539.2	1528.5	214.69	1743.154
RED	3283.2	3460	2560.6	3092.4	2277.6	2934.8	498.5	3433.256

The difference of this bag allocation is due to change in company. Both NRS and R.G.KAR are having contracts with MEDICARE Pvt. Ltd. and alone CNMCH have contract for collection of BMW with GREENTECH.

#### 2.3(c) R.G. KAR MEDICAL COLLEGE AND HOSPITAL

**Table 2.3(c): Waste Generation in Kg**

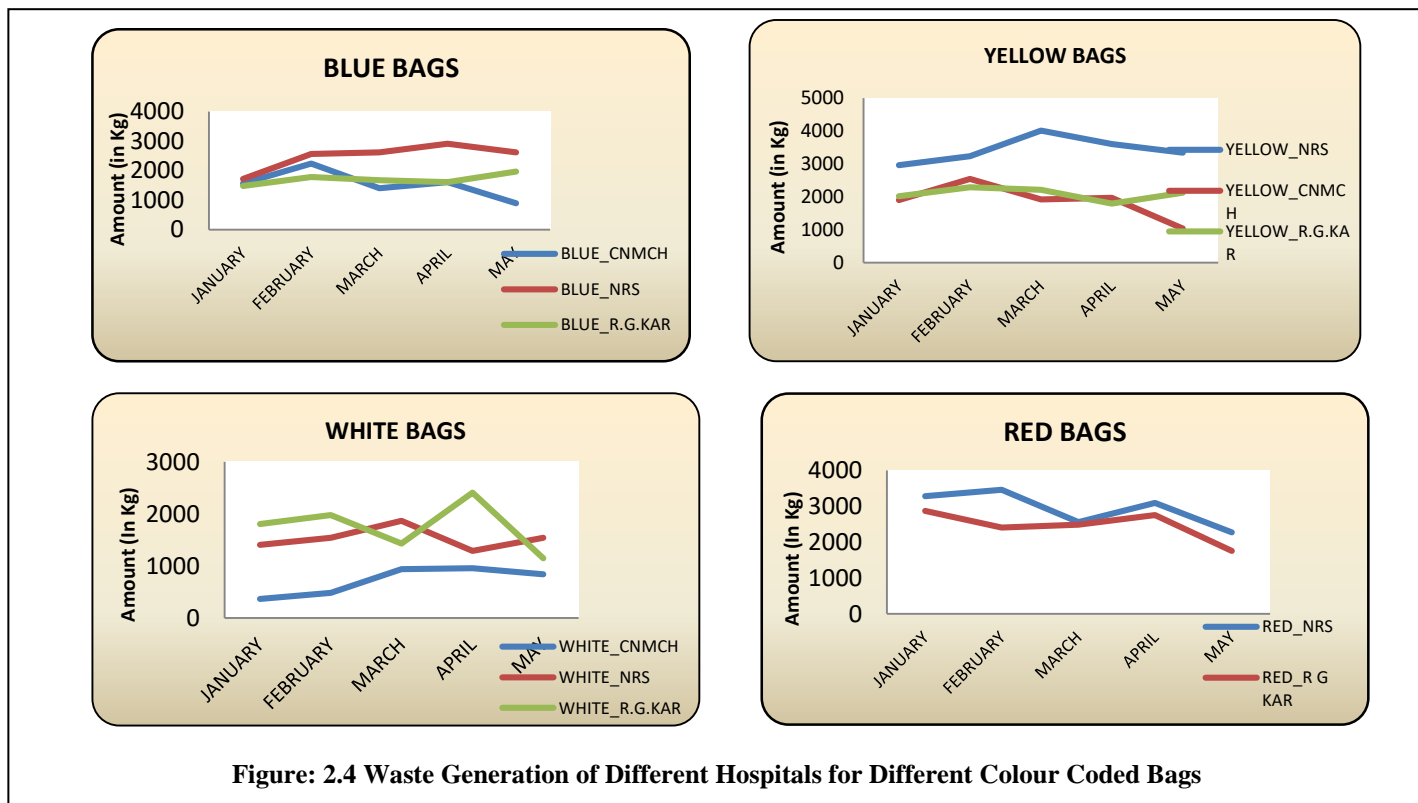
	R.G.KAR(MONTH, 2017), IN KG					MEAN	STDEV	M+1SD
	JANUARY	FEBRUARY	MARCH	APRIL	MAY			
BLUE	1488	1792	1674	1614	1971	1707.8	183.4508	1891.251
YELLOW	2015	2296	2210.3	1792	2126	2087.86	195.3268	2283.187
WHITE	1808	1977.8	1433.7	2409	1151.4	1755.98	486.7596	2242.742
RED	2876.8	2411.1	2486.2	2754.7	1758.9	2457.54	434.4994	2892.039

### 2.4 Comparative analysis and reasons for variation in each Hospital

There is a huge variation in the generation of the bio medical wastes from different hospitals. The variation is mainly for the huge number of patients in comparison to the area. The total generated waste in five months is calculated to be highest for NRS hospital and lowest for CNMCH hospital. NRS having huge area & has many wards and departments .So it generates huge amount of BMW. In contrary CNMCH have less wards and departments, thus it generates less amount of BMW. One thing can be noticed here that there is a variation in the wastes collected in different bags in different months. The mean value of blue bag is more in NRS than other two hospitals. This implies that from January to May the generation of glassware, vials and ampoules were more in NRS. It is a little lower in the month of March. If we look at the yellow bags we will find that the amount of waste collected in yellow bag is highest in NRS hospital and it is showing a huge variation from other two hospitals. Yellow bag

generally include organs, body parts and foetus, dressings, plaster cases, cotton swabs, Silver X-ray film developing liquid etc. This means that NRS hospital handles a huge percent of population mainly for surgery. The reason for these phenomena may be for cheap surgery facilities that are mainly provided in govt. Hospitals. Most of the operations are taking place in the month of January, February and March because of dry weather. In the month of April the waste collected in white bag is more in R.G. KAR hospital. The Mean value of white bag is more than NRS hospital which shows that it generates more needles, syringes, with fixed needles, blades.

Thus, we can conclude that even though NRS hospital deals with maximum surgeries yet R.G. Kar Hospital has more generation of white bags. In the month of March the amount of waste seems to be almost equal for both R.G. Kar and NRS hospital.



The problem of bio-medical waste disposal in the hospitals and other healthcare establishments has become an issue of increasing concern, prompting hospital administration to seek new ways of scientific, safe and cost effective management of the waste, and keeping their personnel informed about the advances in this area. The need of proper hospital waste management system is of prime importance and is an essential component of quality assurance in hospitals.

**2.5 Impact of bio- medical waste and the personnel who are at risk**

Bio – Medical wastes are not harmful until they become *bio- Hazard*.

A major issue related to current Bio-Medical waste management in many hospitals is that the implementation of Bio-Waste regulation is unsatisfactory as some hospitals are disposing of waste in a haphazard, improper and indiscriminate manner. Lack of proper segregation practice, results in mixing of hospital wastes with general waste, makes the whole waste stream hazardous. Inadequate Bio-Medical waste management thus will cause environmental pollution, unpleasant smell, growth and multiplication of vectors like insects, rodents and worms and also may lead to the transmission of diseases. The Bio Medical Waste scattered in and around the hospitals invites flies, insects, rodents, cats and dogs which spread communicable disease like plague and rabies. Rag pickers in the hospital, while sorting out the garbage are at a risk of getting tetanus and HIV infections. The recycling of disposable syringes, needles, IV sets and other article like glass bottles without proper sterilization are responsible for Hepatitis, HIV, and other viral diseases

**III. DE FACTO OBSERVATIONS**

The acquired data from the hospitals which were actually the secondary data received from the hospital authorities are to some extent not that reliable. All the surveyed hospitals have provided data that supports their positive awareness about the bio-medical waste among their health workers. The reality is different. Here lies the importance of *de facto* observation.



**Photo plate 3.1: mixing of bio-medical waste with common hospital waste.**

### 3.1 Faulty practices and loopholes of the collection and storage procedures

Chittaranjan National Medical College (CNMCH) has provided us data that speaks their management for bio medical waste is up to the mark. And the health workers are well trained by the nurses. The methods for collection and storage of BMW are supervised by the nurses. Reality is that they are not at all trained all the health workers are actually unskilled. They have less experience regarding this work thus; sometimes wastes are collected in inappropriate colour coded bags. The wastes sometimes also get mixed up with the common municipal wastes and are stored in an open big trolley shown in (photo plate 3.1.)

The bio medical wastes are stored in a closed chamber but the area surrounding it is water logged and blood, syringes are lying here and there. R.G. Kar hospital is far better than other two Hospitals.

**3.2 Awareness Poster or Banner** Awareness posters are very limited. It is only available at the doors of the BMW storage chambers and tugged in the display boards in the rooms of Assistant Superintendent and Superintendent. Banners were not at all seen in any of the hospitals.

### 3.3 Waste Bins

There are plenty of waste bins available in all the surveyed hospitals. Each and every department has its own waste bin. But the problem is that most of the bins are flooded with wastes and thus the wastes are lying down. This is a major issue of CNMCH. Most of the waste bins are without lid.

### 3.4 Ward and their surroundings

In the CNMCH while collecting the primary data I had to visit OPD department. It is the worst department in govt, hospital I have ever seen. It is stinging. A typical foul smell with breathtaking odour is coming from there. I don't know how the patient's family were waiting there sleeplessly. The gynaecology department of R.G. Kar hospital is also bearing a foul smell other than most of the wards are neat and clean. The Emergency Block of NRS hospital is little bit dirty and foul smell is also coming out from there.

### 3.5 Common Space

The aesthetic beauty of R.G. Kar hospital is far better than NRS and CNMCH. This year R.G. Kar stood 11<sup>th</sup> in India among all the government hospitals in India. But CNMCH with a small area couldn't maintain its aesthetic beauty. Another reason can be its huge population pressure. It is recorded that many of the patients are from Purulia, Bardwan, and Murshidabaad and even from Bangladesh. NRS right now (2017) is going under construction may be renovations in their college building and in a plan with opening up some new wards. Therefore, anyhow the beauty of the common space is worn down by the construction materials.

### 3.6 Sanitation condition

Sanitation condition mainly the public toilets for the visitors in the hospital premises are in its poorest condition in the surveyed hospitals. I didn't get the scope to visit the toilets attached with the ward room. But as the book cover tell us many things about the book itself. Similarly, I can assume that the condition inside is also not palatial.

### 3.7 SATISFACTION LEVEL OF THE WORKERS

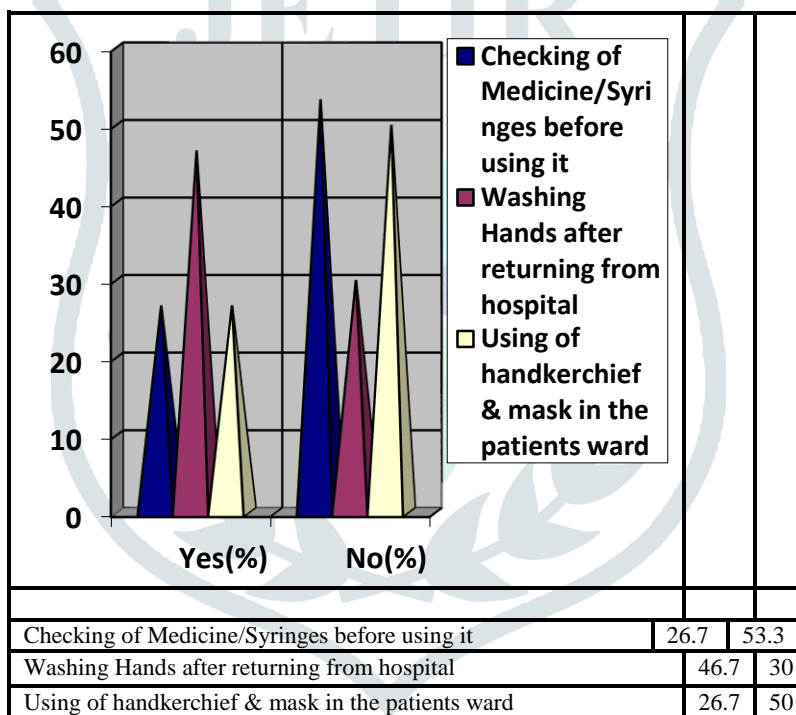
Satisfaction always gives a better shape to the work done. If a person is satisfied with his work then either the work is good or the person is keen on doing that. The satisfaction level of the health workers varies from hospital to hospital. In the R.G. KAR hospital most of the workers are satisfied with their work and the system under which they are working. They said that the entire system of waste generation, collection, segregation and disposal takes place in an organised way.

In NRS hospital a little disappointing behaviour was received. They said there should be more organised way of handling this issue. The coordination among the health workers is very good but with the upper level they do not maintain a smooth relation. According to them the disposal chamber is very near to the hospital building. NRS has a huge area so this disposal chamber should be shifted somewhere else in order to maintain the aesthetic beauty.

CNMCH hospital health workers are saying totally a different thing. They said that they are not properly trained but they have learnt by doing only. Most of them are almost in this job for 10-15 years so they know how to sort the wastes into different coded plastic bags. One thing they admitted that they have a closed chamber of disposing BMW yet, sometimes they throw it in the big waste bin of the municipality which is without any lid. It has been also observed that the blue bags are mixed up with the black bags. Black bags are municipal waste containing paper, left over foods of the patients, peel of fruits, wrappers, water bottles etc.

### 3.8 AWARENESS OF THE PATIENTS AND THEIR FAMILY

Most of the patient’s family members are not at all aware about the minimum hygienic condition which should be followed prior to visit hospital and after coming back. They do not even know that they should check the expiry date while buying the medicine. They feel that these are not at all necessary. They also do not check the proper sealing of the saline bottles while purchasing and not even the syringes. Some of the people are educated still they do not bother to act like knowledgeable one. Hospital and cleanliness has a strong relation within. We always expect that the hospital premises as well as inside the hospital should be clean enough. On visiting these three above mentioned hospitals and surveying the patients a different scenario was obtained. It has been found that patients are more satisfied with the cleanliness of the R.G.KAR hospital. They are most dissatisfied with the conditions prevailing in the CNMCH hospital. NRS on the other hand having huge area coverage seem to be less dirty because the waste is scattered.



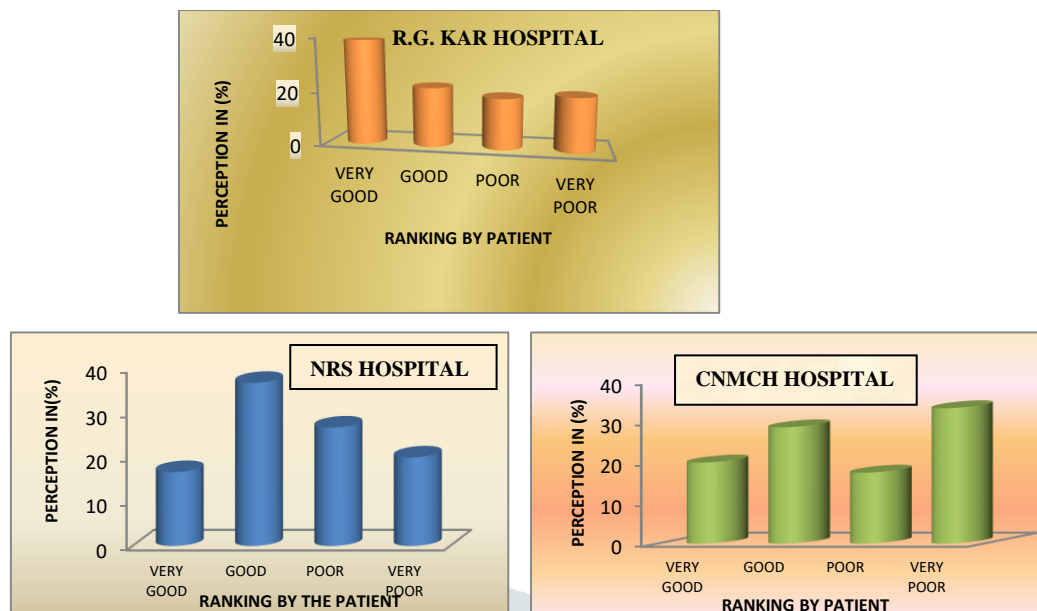
(Figure: 3.8 Awareness of the patients & their family members)

Source: field survey

### 3.9 PERCEPTION ABOUT THE CLEANLINESS OF THE HOSPITALS

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(Figure: 6.10 perception of cleanliness in hospitals)

*Source: field survey*

#### IV. FINDINGS

- The report has been prepared keeping in mind the four pillars of this work. To deal with the first pillar; the collection and segregation of the waste by hospital authority it can be said that there is a huge variation and inequality between the white bags in three surveyed hospitals. Red bag is not considered in one of the hospitals which are also a major concern.
- The second pillar; the management techniques of wastes in the hospitals allow to know about the hospital authority's duty and organisation. In this part R.G. Kar is in the top list.
- The third pillar; perception of the health workers involve here who are the spines of the hospital waste management. The workers are trained by nurse superintendent. Health workers are not aware of the harmful effect of these hazardous wastes.
- The fourth and the last pillar; awareness of the patient is very crucial in terms of perception study as the patient has nothing to do with hospital authority thus their opinion is little bias free.

#### V. SUGGESTIONS

While surveying I went through many things. I found that there is ample scope for the hospitals to do an improvement in their collection, segregation and disposal methods. Even the hospitals themselves can do a lot to aware the patient.

- The collection method should be improved and for that more skilled workers are required.
- There should be a double check in the collection so that clarifications can be made about right waste going into right bags. Otherwise incineration machineries might create problem.
- Place of disposal should always be a closed chamber and far away from the main building.
- More and more charts and banners should be posted in the hospital premises to aware people.
- A proper training should be provided with the help of workshops.
- A proper weighing machine should be there for measuring weights of different bags per day.

#### VI. CONCLUSION

The entire work was done with a view to developing the health condition and lessens the hazards of BMW management in different govt. hospitals. It was aimed to acquire knowledge about the process of BMW collection, segregation and disposal. The case studies of Govt. Hospitals namely, NRS, CNMC, R.G.KAR are very similar with other govt. hospitals of West Bengal. Moreover, the BMW management may be even poorer in other hospitals. So, if the observations, case study of patients & health workers are given due care and attention, then the hospitals will be free of diseases and the environment will be much better.

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