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A STUDY ON MEDICAL WASTE MANAGEMENT SCENARIO OF BADDA THANA

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ABSTRACT

In Badda thana, Dhaka city, a medical waste management investigation was conducted. Medical waste is the result of the continued operation of health centers such as hospitals, medical colleges, private practices, clinical laboratories and dental practices. This form of waste is extremely hazardous and contagious. Every mishandling or mismanagement causes human health and a country's climate to be very catastrophic. Medical waste causes various health hazards such as bad smell, animal infestation, vomiting, skin diseases, and so on. This project highlights that medical waste management has now become a major concern for the environment due to the rising number of health care facilities in both the public and private sectors of Bangladesh and the simultaneous production of enormous amounts of medical waste. This research focuses on the current waste management system of the five major hospitals. Data was gathered from project authority, superintendents, nurses, evaluation, and secondary sources through direct fieldwork. Dhaka North and South City Corporation has assumed full responsibility with the aid of a non-governmental organization' PRISM' to collect the waste as well as dumping. This work is also primarily focused on the proper management of medical waste materials from multiple sources. This research also shows that in order to achieve the spontaneous and productive participation of the group of people in proper medical waste management, the level of awareness and understanding among the people who are involved in the medical industry about the risks of medical waste management needs to be increased to the acceptable level.

Through this inquiry, it was quite clear that Badda's hospitals lack a proper framework for the management of hospital waste. The lack of proper record keeping of hospital waste and the hospital authority's mysterious indifference in cooperating with me have been major challenges in gathering data for this study. Dhaka was the country's only city with a long-standing hospital waste management system (HWMP). Generally, PRISM collects, transports and dumps waste in the open space as there was no waste treatment plant in it. But they do not treat waste before dumping. Although there are small numbers of hospitals in my area of study, there were no satisfactory hospital waste management facilities. In the last couple of years, PRISM has initiated programs to collect hospital waste from various hospitals and transport it to the Matuail area's open dumping site away from town. The organization still has no plan for any treatment of hazardous hospital wastes before its final dumping and it does not have any waste treatment plant.

Lastly, it can be concluded that it was quite evident that Badda's health care facilities completely lack a satisfactory medical waste management system and awareness level that needs sustainable improvement and further study at every stage of waste management.

Keywords: *Medical waste, Comparison, Amount of waste, Classification of waste, Decomposition technique.*

1. INTRODUCTION

Medical waste is extremely contagious and generates a significant environmental threat. The proper management system is necessary to ensure protection for the climate and wellbeing. According to the World Health Organization (WHO), approximately 85% of hospital waste is not dangerous or non-hazardous, 10% is contagious, and around 5% is non-infectious yet hazardous. Around 15 percent of hospital waste, for instance, is controlled as infectious waste in the US. In India, this could vary between 15 and 35% depending on the total quantity of waste generated (Chartier, 2014). In Pakistan, substantially 20% of medical discharge is considered to be potentially infectious or harmful (Agarwal, 1998). The total waste production in Dhaka is 3,500 metric tonnes per day, of which only 5.7% originates from a health care center (Nasima, 2000). Nearly 200 metric tonnes of hospital waste is created daily in the city of Dhaka, Bangladesh. Approximately 20% of this quantity is contagious. The study shows that hospital waste is not correctly and consistently handled except in a few private hospitals that isolate their contagious or infectious waste. It was found that many cleaners used needles, sterile bags, blood bags and test tubes for retail value and reuse. Decent hospital waste disposal is a recent phenomenon in Bangladesh, and the government of Bangladesh is working on developing a new and fresh solution to proper medical waste treatment. Farming, rural agriculture, scientific and medical Project (PRISM BANGLADESH FOUNDATION Bangladesh), a nationally recognized NGO in Bangladesh, has started to develop a low-cost hospital waste management facility in Dhaka City with monetary support from the Canadian International Development Agency (CIDA) (Hossain, Santhanam, Nik Norulaini, & Omar, 2011)

In the late 1990s and early 2000s, with the cooperation of City Corporation, some relevant authorities such as DGHS (Directorate General of Health Services) and in some major cities in Bangladesh such as Dhaka & Narayanganj, NGOs started working on hospital waste management (PRISM Bangladesh, 2018). A reliable local NGO in Bangladesh, PRISM is now collaborating to control hospital waste (Thesis & Rumi, 2014).

Hospital waste management systems in Bangladesh concentrated only on Dhaka and Narayanganj, the major city corporation. For the rest of Bangladesh's cities and towns, no significant attention was given to hospital waste treatment, and medical waste is processed and disposed of as solid household waste.

For recycling, industrial dumps and dumping grounds have often been used. They were found to be less concerned with proper medical waste disposal. According to the United States Health and Preventive Medicine Center of the Army (1995), medical waste must be segregated from a regular waste starting point of generation and continuing during storage, transportation and through to treatment point and ultimately waste disposal (Zhu, Asnani, Zurbrügg, Anapolsky, & Mani, 2008). Sadly, there is no formal form of treatment for medical waste in Bangladesh, and for natural degradation, most waste is dumped in open areas. In dealing with waste disposal and laboratory testing of infectious or dangerous materials, no safety measures are found (Bleckman & McLarney, 1985).

Hospital waste is created by hospitals, private practices, laboratories for pathology, clinics, testing centers, and other health centers and research facilities. These wastes include infectious, hazardous, radioactive and other general wastes. Hospital wastes are categorized according to their weight, density, and constituents. Here is a brief list of health care centers around Dhaka city in table 1.

Table 1: Number of HCEs in the city of Dhaka (PRISM, 2013)

Types of HCE	DCC North	DCC south	Total (%)
Hospitals	85	89	174 (17)
Clinics	118	46	164 (16)
Pathology	143	66	209 (21)

Types of HCE	DCC North	DCC south	Total (%)
Dental Clinic	289	176	465 (46)
Total	635	377	1012

1.1 Types of waste

Infectious waste: Waste infected with blood and several other bodily fluids (e.g. discarded test samples), crops and supplies of laboratory-based pathogens (e.g. autopsy waste and laboratory-based infected species) or contamination from patients in insulation unit sand instruments (e.g. swabs, bandages, and disposable medical devices).

Sharp waste: syringes, needles, scalpels and blades that can be disposed of.

Recycled waste: waste not posing a specific biological, chemical, nuclear or physical risk and can be further used after proper disinfection.

2. METHODOLOGY

After a review of the literature, the major difficulties regarding medical waste management that took place in Badda thana were gone through. Subsequent to that, six major hospitals in this region identified that were found to lead to medical waste. Their position, storage type, and building form are also listed for convenience as shown in Table 2. Data were collected over a total of 11 months via fieldwork for the study. Furthermore, the types of waste produced in different medicines and potential risks may emerge from them were found out. Next, a description of the existing management, color schemes and necessary materials used to manage the waste were done. Subsequently, the data were analyzed to resolve major concerns of waste treatment in healthcare centers. Finally, the fieldwork observations were compared with the PRISM foundation for the validity of the result. The hospital authority was not so friendly on some of the hospitals to work separately. For this reason, the survey team had to collaborate with the NGO to follow the same procedure of sorting wastes. We couldn't distinguish some other wastes because of our limitations.

Table 2: Details of major six hospitals at Badda thana

SL. No	Name	Location	Story	Single	Multi/Joint Building
1	Ibn Sina Hospital	Uttar Badda	7	✓	
2	Prescription point	Uttar Badda	3	✓	
3	Sun Health Care	Uttar Badda	5	✓	
4	Surjer Hashi Clinic	Middle Badda	4	✓	
5	Labaid Diagnostics	Merul Badda	8	✓	
6	Asian Hospital	Merul Badda	6	✓	

3. ILLUSTRATIONS

3.1 Waste generation rate in different hospitals

This segment addresses the total medical waste created by Badda thana's selected medicines and hospitals. PRISM Bangladesh Foundation involves the collection and dumping of all waste from the medicines and hospitals selected. Data provided by PRISM was cross-checked and validated during fieldwork analysis where a similar procedure of collection of wastes has been followed. From Table 3, it is shown that as per PRISM the highest overall amount of waste produced in IbnSina Hospitals. The average daily production of this medication is 6.752 kg/day. But, as described in table 3 below from weekday production and Friday waste production which is 7.4 kg/day and 7.07 kg/day respectively, the values were a little larger from our fieldwork.

Table 3: Estimated medical waste production by the selected hospitals in Badda thana

Hospitals & Medicals	No. of beds	Daily Production (PRISM) (kg/day)	Weekday Production (kg/day)	Friday Production (kg/day)	Average Production (kg/day)
Asian Hospital	20	0.993	1.5	1.7	1.397
IbnSina Hospital	NA	6.752	7.4	7.07	7.074
Labaid Hospital	NA	1.883	2.3	2.605	2.26
PrescriptionPoint Hospital	NA	0.922	1.60	1.825	1.449
Sunhealth Hospital	NA	0.888	1.5	1.70	1.363
Surjerhashi Hospital	20	0.990	1.85	1.99	1.61

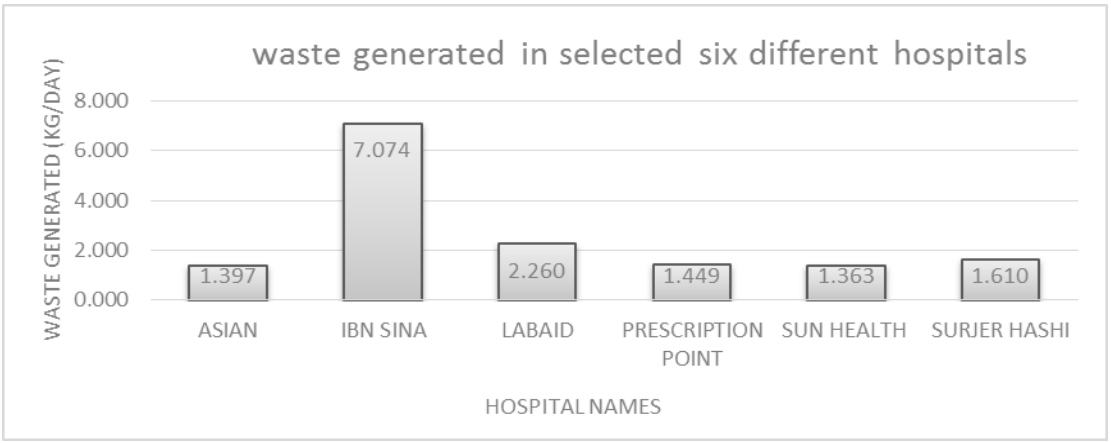

Figure 1: Average everyday waste generation per bed in different hospitals and medicals

The total average waste resulting from different medicines per bed in a day was estimated according to the bar diagram above. Waste amounts in Asian Hospital, Ibnsina Hospital, Labaid Hospital, Prescription Point Hospital, Sun Health Hospital, and Surjerhashi Hospitals were 1.397 kg, 7.074 kg, 2.260 kg, 1.449kg, 1.363 kg, 1.610 kg per bed per day.

Separate containers were used to store medical waste, and varying types of wastes are handled by the medical authority using color code. Under the medical authority, there were some workers works to collect the waste from the wards to the primary processing center.

3.2 Quantity of different categories of waste generated

Asian Hospital is one of Badda's oldest private medical. This number of beds is 20. The patient is more crowded than the hospital's capacity. The authority is using separate plastic containers to store waste in addition to any wards. Some workers are working here to move the waste from this container to the temporary storage building behind the site.

The temporary storage building is a space designed specifically for storing waste. It can not render an odor to its surroundings by storing medical waste in this space. In this medication, according to PRISM, the average total waste generated was 0.993 kg/day. We then separately did the sorting and compared with the result PRISM for the validity of their program. In most cases, they were right, with a slight decrease in value. This may happen because they got a very short period of time for sorting and human errors can easily occur while counting.

Table 4: Generation of medical waste in Asian Hospital

Types of waste	Waste generated(kg/day)			
	PRISM Bangladesh foundation	Field Work Observation 1	Field Work Observation 2	Comparison[(Ob1+Ob2)/2]-PRISM Bangladesh foundation)
Infectious	0.78	0.92	0.95	0.155
Sharps	0.10	0.40	0.45	0.325
Recycled	0.053	0.19	0.13	0.107
Total	0.993	1.51	1.53	0.527

Likewise, in Table 4, all the data were compared for all the six hospitals with the PRISM foundation. The waste collected by the waste collection vehicles of Dhaka City Corporation from this temporary location. DCC collects and disposes of waste in the Matuail region. Before dumping, they do not treat the waste.

3.3 Contributions of six hospitals in a different category of waste

This section discusses the current situation where various kinds of medical discharge are produced from different sources. One of the objectives of this study is to examine the types of waste generated from different hospitals. Different waste materials are produced and waste is typed as the following class for better management options. From Figure 2, the percentage of different waste from the six hospitals can be seen. Out of the three wastes categories infectious waste holds a major chunk of 81%. Whereas, the sharp waste contains 16% and recycled wastes only 3%.

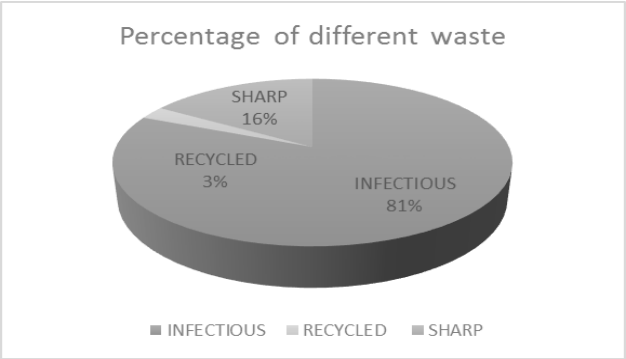

Figure 2: Percentage of different waste accumulated after separation

Figure 3, 4, 5 expresses the same thing but for different category of waste. It may be seen as in Figure 3, the maximum percentage of sharp waste that is generated in Badda thana comes from IBN SINA hospitals which are about 49%. The next big contributor in this category is LAB AID hospitals with a percentage of 39%.

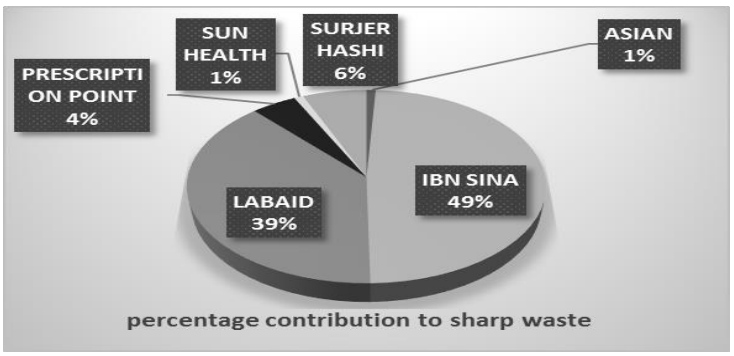

Figure 3: Percentage contribution of six hospitals to sharp waste

The similar process was followed for Figure 4 and Figure 5 to find out the most contributing hospital in infectious waste and recycled waste. In both cases, IBN SINA was the major contributor. But in case of recycled waste ASIAN hospital holds the major position surpassing LAB AID hospital right after IBNSINA hospital.

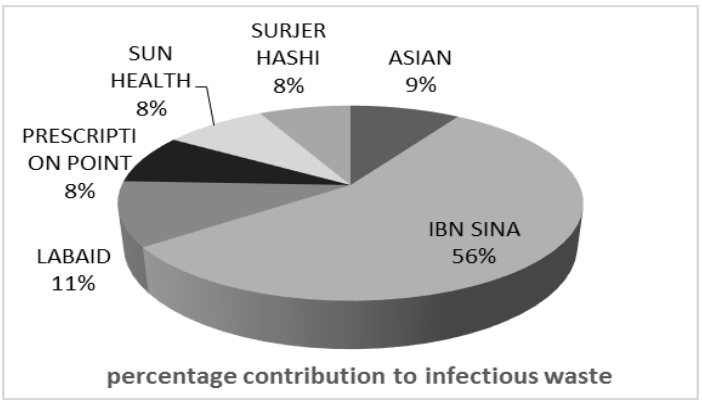

Figure 4: Percentage contribution of six hospitals to infectious waste

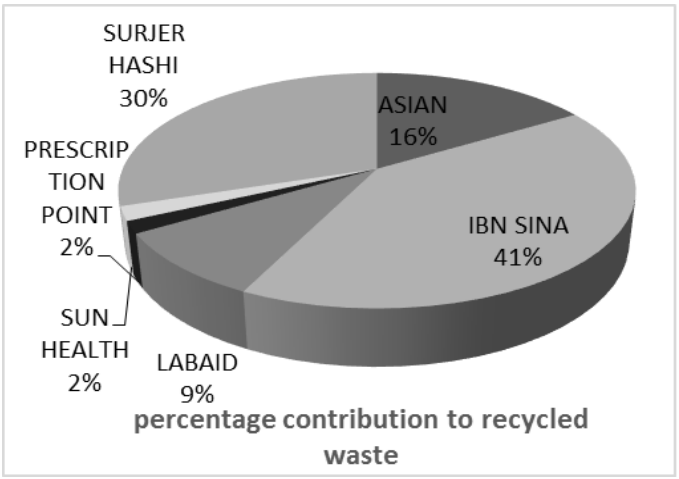

Figure 5: Percentage contribution of six hospitals to recycled waste

3.4 Disposal method and dumping site

Safe disposal is the most important thing in hospital waste management. Matuail, approximately eight kilometers south of Dhaka from Gulisthan / zero points, is used for solid waste dumping. The DCC authority uses various open locations to dump landfill waste, which increases the local community's risk of health hazards.

Figure 6: Matuail area; the waste dumping site

4. CONCLUSIONS

This study can be concluded as the followings:

1. Overall, the experience gained from the study presented in the current paper is that IBN SINA is the largest producer of all categories of medical wastes at every level in Badda thana.
2. Total medical waste production is 15.153 kg/day in targeted hospitals and medicines. Most of the waste is divided into certain categories, such as contagious waste, recycled waste, sharp waste.
3. Difficulties are identified primarily due to the lack of sufficient staff training on hospital waste treatment problems and the dangers that may emerge from their improper treatment. Inadequate steps have been applied to the safety and health of waste handlers. In view of the identified issues, the suggestions discussed in this study should be implemented so that proper waste management, as well as a treatment method, can be implemented by the hospital management.

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