Scenario of Clinical Waste Management: A Case Study in Khulna City

By Sm. Arifurrahman, Abu Sayed Mohammad Akid, Mishuk Majumder & Sanjida Khair

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Abstract- Urbanization and population growth enhance facilities in public and private sectors where health facility is one of the main peak point. In this focus, an immense amount of clinical waste is generated everyday in the metropolitan cities in Bangladesh. Moreover, the clinical waste management has become a critical environmental concern all over the world. The study mainly illustrates the existing clinical waste management in Khulna city, classification of different types of clinical waste, waste generation rate, contribution of public organization (KCC) and private organization involved in clinical waste management. The methodology of this project was consisted of questionnaire survey and interviews with the authorities of the different health centers and personnel involved in the management of clinical waste. There are about 150 health facilities in Khulna City Corporation and the total waste generation in Khulna city is about 520 ton/day and the amount of clinical waste generation is 2.5 ton/day. Huge amount of waste leads this study to conclude a sustainable solution for the recyclable wastes and proper scientific dispose of non-recycle able waste.

Keywords: clinical waste, clinical waste management, disposal of waste, health facilities and waste generation.

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Abstract- Urbanization and population growth enhance facilities in public and private sectors where health facility is one of the main peak point. In this focus, an immense amount of clinical waste is generated everyday in the metropolitan cities in Bangladesh. Moreover, the clinical waste management has become a critical environmental concern all over the world. The study mainly illustrates the existing clinical waste management in Khulna city, classification of different types of clinical waste, waste generation rate, contribution of public organization (KCC) and private organization involved in clinical waste management. The methodology of this project was consisted of questionnaire survey and interviews with the authorities of the different health centers and personnel involved in the management of clinical waste. There are about 150 health facilities in Khulna City Corporation and the total waste generation in Khulna city is about 520 ton/day and the amount of clinical waste generation is 2.5 ton/day. Huge amount of waste leads this study to conclude a sustainable solution for the recyclable wastes and proper scientific dispose of non-recyclable waste. The management procedure for clinical waste such as collection, transportation and disposed at dumping site is demonstrated one by one for KCC area. KCC authority and Prodipan are involved in off-site transport of clinical waste from various health centers to dispose at Rajbandh. Though Prodipan extends its hand in managing clinical waste, the condition of maximum health centers is hazardous as most of the owners of the health centers are found to be disinclined to dispose the clinic waste with sufficient care, workers and money. So proper segregation, collection, transportation, final disposal as well as public awareness and training of staff are mandatory for sound medical waste management.

Keywords: clinical waste, clinical waste management, disposal of waste, health facilities and waste generation.

1. Introduction

The study of solid waste has become a matter of major concern in recent days because of the socio-economic development, urbanization and growth of population in most cities of developing countries. One of the important components of solid waste, waste generation from health centers, is a serious problem in the developed as well as developing countries. Medical effluents are infectious and dangerous too. Hassan et al (2008) reported, wastes of medical centers are serious threat to environment and needs specific treatment and management prior to its final disposal. Clinical waste as a whole is being disposed with the municipal garbage (Pathak; (1998)). But clinical waste management in developing countries is still poor and disposed without adequate experience and supervision. In some other countries, hospital effluents have not been legally declared (Dutta, 1998; Kwok-Kuen, 1998). Often medical staffs was found to generate revenue through sale of medical waste due lack of knowledge and interest in safe waste disposal and absence of a budget to effectively implement safe waste disposal (Akter, 2000). At present, Bangladesh has no rigorous laws or regulation which is enforced in various cities of the country.

Khulna, the largest metropolitan city of Bangladesh, stands on the banks of the Rupsha and the Bhairav rivers. Establishment of various health care centers, clinics and hospitals has made difficult for management of different waste (A. U. Jabbar, 2009). Waste products from these are not treated or destroyed properly, rather thrown into the dustbins thereby creating health hazards (A. A. Talukdar, 2009). The present practice of improper handling of generated clinical wastes in Khulna city is playing a contributing role in spreading out various diseases such as diarrhea, tuberculosis, haemorrfetanus, AIDS, STD, meningitis, infection of the liver, stomach, breathing infection, infection of the reproductive organs, various skin diseases, etc. Khulna is currently facing the impacts of improper management of hospital wastes. Realizing the intensity of the problem, some NGOs have already extended their helping hand to KCC for the management of clinical waste, yet the existing management system is a threat to environment and human health (Khandaker, 1999).

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II. Main Objectives of the Study

The main objectives of the study are as follows: (1) to quantify the amount of clinical waste generated from various health centers of Khulna city (2) to investigate the present clinical waste management and dumping systems in Khulna city (3) to qualitative study on the level of knowledge and increase the level of awareness of the people about the health hazards happening due to this uneven management.

III. Study Area

Khulna lies between 22.04°7´16´´ to 22.05°2´00´´ north latitude and 89.03°1´36´´ to 89.03°4´35´´ east longitude. The city is 4 meter above the mean sea level (MSL). The city covers an area of 45.65 square kilometers (17.62 square miles) with a population of near about 1.5 million. The city, for administrative purposes, is divided into 31 wards: each ward consists of different masalas, the total number of which is 143 (Population Census, 2001). The city generates a huge quantity of waste everyday from different sources. Khulna City Corporation generates about 520 tons of municipal solid waste per day considering all the sources. The maximum part is organic waste among all generated wastes in KCC and rest is inorganic waste. In spite of all total waste as well as clinical waste management programs taken by both government and NGO’s, the practical situation of waste management of Khulna city is no better.

IV. Methodology

The methodology includes field observation and field level data collection through inventory, questionnaire survey and interviews in formal and informal ways. Data were collected from the two main types of source; primary data sources and secondary data sources. Primary data collected through questionnaire survey in the field. A number of formal and informal approaches were adopted in order to gather data. Interviews were conducted with the involvement of the hospital waste management authority, word master of the hospital and office staff, KCC and NGO’s. Questionnaire was conducted with people involved in providing waste handling and pretreatment of hospital waste before final disposal. After collection of data, it was possessed, analyzed and interpreted by the graphical presentation.
V. Findings and Analysis

According to the KCC and NGO’s report, there are 10 governmental hospitals, 15 private hospitals, 60 clinics, and 65 diagnostic centers at Khulna City Corporation. The percentage of all these health facilities in Khulna City Corporation is given below in Table 1.

<table>
<thead>
<tr>
<th>Type of facility</th>
<th>Number of facility</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Hospital</td>
<td>10</td>
<td>6.67</td>
</tr>
<tr>
<td>Private Hospital</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Clinic</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Diagnostic Center</td>
<td>65</td>
<td>43.33</td>
</tr>
</tbody>
</table>

a) Clinical Waste

Clinical waste is defined as the waste generated by hospitals, clinics, pathological laboratories, diagnostic centers, doctor’s offices and other hospital and research facilities. Clinical waste includes syringes, live vaccines, laboratory samples, body parts, bodily fluids and waste, sharp needles etc. Though WHO (1999) classified clinical wastes in nine categories, but it is extremely difficult to conduct such survey in the context of the Khulna City hospitals. So it is classified in four categories. They are:

i. Infectious Waste

This includes wastes from infectious wards and materials or equipment contaminated with blood and its derivatives, other body fluids or excreta. Blood soaked bandages, dressings, surgical gloves, laboratory culture, swabs from laboratories, contaminated blood clots and glassware material generated in the medical analysis laboratories.
ii. **Sharps**

This comprises all hypodermic needles and syringes, intravenous needles, ampoules, sharp blades, lancelets, broken glassware, broken glassware and vials without content.

iii. **Plastic Type Waste**

This includes saline bags, syringe, tubes, ampoule vial, etc.

iv. **General Waste**

This includes food waste, office paper, packaging, plastics, cardboard, non-contaminated plastic or metal, cans or glass.

The following data were collected by questionnaire survey in the field from KCC, NGO’s and different hospitals. There are various health centers such as large, medium and small in size. Among them the data of clinical waste of some popular hospitals and clinics is given below in Table 2.

**Source:** Field survey, 2012; (KMCH=Khulna Medical College Hospital, KSAH=Khulna Sadar Hospital, GMCH=Gazi Medical College Hospital, KSH=Khulna Sishu Hospital, IBH=Islami Bank Hospital, NMH=Nargis Memorial Hospital, SMH=Santa Maria Hospital, KPH=Khulna Police Hospital, NCH=Navy Camp Hospital, PGH=Pongu and Gyne Hospital, SSANSH=Shahid Sheikh Abu Naser Specialized Hospital, BH=Bokkhobadhi Hospital, GH=Khulna Police Hospital, NMHC=Saatia General Hospital, SMHC=Shamela Memorial Clinic, GNC=Garib Newaz Clinic, AAMCH=Ad-din Akij Medical College Hospital).

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### Table 2: Waste generated from various hospitals and clinics

<table>
<thead>
<tr>
<th>Name of the centre</th>
<th>No of bed</th>
<th>General waste Kg/day</th>
<th>Hazardous waste Kg/day</th>
<th>Total waste Kg/day</th>
<th>Waste generation rate Kg/bed/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMCH</td>
<td>500</td>
<td>450</td>
<td>150</td>
<td>600</td>
<td>1.20</td>
</tr>
<tr>
<td>KSAH</td>
<td>250</td>
<td>306</td>
<td>84</td>
<td>313</td>
<td>1.25</td>
</tr>
<tr>
<td>GMCH</td>
<td>250</td>
<td>229</td>
<td>17</td>
<td>66</td>
<td>0.66</td>
</tr>
<tr>
<td>KSH</td>
<td>200</td>
<td>114</td>
<td>17</td>
<td>141</td>
<td>0.71</td>
</tr>
<tr>
<td>IBH</td>
<td>100</td>
<td>49</td>
<td>8</td>
<td>66</td>
<td>0.66</td>
</tr>
<tr>
<td>NMH</td>
<td>100</td>
<td>37</td>
<td>12</td>
<td>66</td>
<td>0.66</td>
</tr>
<tr>
<td>SMH</td>
<td>100</td>
<td>9</td>
<td>4</td>
<td>21</td>
<td>0.21</td>
</tr>
<tr>
<td>KPH</td>
<td>100</td>
<td>21</td>
<td>6</td>
<td>30</td>
<td>0.30</td>
</tr>
<tr>
<td>NCH</td>
<td>100</td>
<td>24</td>
<td>17</td>
<td>17</td>
<td>0.34</td>
</tr>
<tr>
<td>PGH</td>
<td>50</td>
<td>14</td>
<td>4</td>
<td>28</td>
<td>0.56</td>
</tr>
<tr>
<td>SSANSH</td>
<td>50</td>
<td>24</td>
<td>5</td>
<td>45</td>
<td>0.90</td>
</tr>
<tr>
<td>BH</td>
<td>50</td>
<td>40</td>
<td>2</td>
<td>15</td>
<td>0.30</td>
</tr>
<tr>
<td>KH</td>
<td>50</td>
<td>13</td>
<td>1</td>
<td>14</td>
<td>0.28</td>
</tr>
<tr>
<td>NMSC</td>
<td>20</td>
<td>16</td>
<td>2</td>
<td>20</td>
<td>1.00</td>
</tr>
<tr>
<td>SHC</td>
<td>20</td>
<td>15</td>
<td>3</td>
<td>18</td>
<td>0.90</td>
</tr>
<tr>
<td>MSC</td>
<td>20</td>
<td>26</td>
<td>19</td>
<td>45</td>
<td>2.25</td>
</tr>
</tbody>
</table>
b) Types of Waste Generated

All the wastes have been categorized in four groups according to their composition and hazardous character. They are:

- Infectious waste
- Sharps waste
- Plastic waste
- General waste

A survey by Prodipan (2012) has confirmed that 76% of organic waste and 24% of inorganic waste is generated in Khulna city corporation area.

c) Clinical Waste Management

A proper management procedure of clinical waste includes:

- Waste segregation
- Storage of waste
- Waste handling
- Collection of waste
- Transportation
- Treatment and final disposal

i. Collection, Transportation and Disposal

KCC collects all types of wastes including clinical wastes in the same vehicle twice a day from public dustbins. Though KCC has 20 trucks and about 200 wheel carts, only 16 trucks go for the collection of wastes at a time and after collection the clinical wastes are dumped together with other wastes. The trucks are used for collecting wastes only from primary dustbins. On the other hand, the wheel carts bring wastes from the secondary dustbins to the primary dustbins.
ii. Dumping Site

Rajbandh, about eight kilometers south of Khulna city is used for dumping of the waste by KCC. For land filling purpose, KCC uses different open location to dump waste which increases the risk of health hazard of the local community.

iii. Private Organization Involved in Clinical Waste Management

Prodipan an NGO is playing a contributing role in managing Khulna city clinical waste. They started their clinical waste management service in May, 2000 with funding from Swiss development cooperation (SDC), UNDP and World Bank. Prodipan felt it when it was developing a community based solid waste management in the city. The vision of Prodipan is the developing a sustainable society for ensured standard of living and improved quality of life for the underprivileged. At early phase of its operation Prodipan didn’t have any waste treatment plant and used to dump waste casually. Recently Prodipan has taken some initiatives to expand its program to include clinical waste treatment before dumping and has installed its own waste treatment plant dumps waste after treating it. Now Prodipan has covered about 70% of all clinical waste management in Khulna City Corporation.

iv. Segregation, collection and transportation

Prodipan provides each hospital with at least a set of four covered drums to dispose four types of waste separately to segregate waste at the source of generation. The four drums are marked with four different colors for easy identification. The number of set of drums may vary with the size of the hospital. But actually it has been noticed that many hospitals have been provided with less than four drums. An auto van carrying 1.5 ton waste is used for transportation of clinical waste from the various health facilities in KCC area.

v. Final disposal method

In the management of clinical wastes safe disposal is the most important thing. Prodipan follows the method illustrated below for safe disposal of the clinical waste.

To burn the gauge, bandages, human organs etc Prodipan has developed a simple burning chamber. The reminders are disposed of by open dumping and also needle, blade, broken and unbroken glasses and all other sharp type materials are disposed in a concrete pit to check them from spreading germs. The syringes, saline bags, vial and tubes are sliced in small pieces and then dumped in another concrete pit.

Prodipan disposes the clinical waste in the following way:

a) Infectious wastes such as Gauge, bandage, human organ etc are wet in nature, they are dried with Ca(OCl)Cl, washed and then burned in furnace.

b) Sharp wastes such as Needle and all other sharp type material are disposed in a concrete pit.

c) Plastic wastes such as Syringe, vial, ample, saline bags etc are wetted, washed by Ca(OCl)Cl, then cut to be unsuitable for using and sold.

d) General wastes are dumped openly.

Dumping Site: KCC has fixed a piece of land at Rajbandh to dispose the clinical waste properly. However there is concrete blocked box to dispose the needle and sharps and a locally made incinerator to burn the infectious waste.

VI. Conclusion

Over the last two decades, the clinical waste management has become one of most crucial issue around the world. This study was mainly carried out to have a clear idea about the clinical waste management practices and amount of waste generation rate in Khulna City Corporation. However the present system of clinical
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Waste management of Khulna City Corporation is neither satisfactory nor adequate. About 0.6 ton of hazardous waste is generated every day in Khulna City Corporation. There is no existing law and regulation of clinical waste management in Bangladesh and there is no penal action against improper disposal of hazardous waste. So it is necessary to formulate appropriate laws for the management of clinical waste. Strict law policy should be made or should improve the old system. As KCC does not give proper attention for the collection and disposal of clinical wastes, so it should involve more Non-Governmental Organizations to upgrade the waste disposal system. However, the participation of Local NGO Prodipan illuminates most of the clinical management system in Khulna City Corporation. Again proper attention is required for the segregation, collection, transportation and final disposal of clinical waste. The overall clinical management system should be safe. Hygienic and cost effective measures have to be taken for the final disposal and treatment of the hazardous waste. Sometimes some cleaners are engaged to mishandle the generated wastes. They do not segregate infectious wastes from non-infectious wastes and dispose the wastes to the open dumping site. The authority of the clinical waste management system should follow WHO guideline properly. Also there is an urgent need for planning and implementation of clinical waste management systems. Public awareness and training are the most important factors for proper management of clinical waste. People need to know about the adverse effect of solid waste in environment. Therefore, it becomes urgent for the KCC authorities and the personnel of the health care centers to adopt sound medical waste management policy according to the guidelines of World Health Organization (WHO) to minimize medical waste related problems.

References Références Referencias

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