BIOMEDICAL WASTE MANAGEMENT PRACTICES IN PUNE

A look at how biomedical waste is collected and disposed by hospitals in Pune, and the implications of these practices on the society and environment

Healthcare is a never dying industry in any country. Hospitals, which are at the center of this industry, have immense scope for continual expansion, in terms of their infrastructure and services. As in any other industry, hospitals also generate waste. However, this waste is different in terms of content. Hospitals generate biomedical waste, the handling of which is one of the major concerns of hospitals across the globe, in particular, those of the developing countries.

Let us look at how biomedical waste is handled, segregated and disposed of by private hospitals in Pune. Popular as a well-planned and progressive city, an examination of the waste management practices in this city will give us a fair idea of how this issue is handled in other hospitals across India, and the implications on the society and the environment. We will also examine the method of collecting and disposing waste, as practiced by the Common Biomedical Waste Treatment Facility.

What is waste?
The term ‘waste’ refers to ‘all the materials arising from human and animal activities that are discarded as useless or unwanted.’

Waste is produced in every household or industry where human beings reside or work. This waste is an inherent part of our lives. Overproduction of waste or its careless disposal can have long-term effects on human lives, and indirectly on the environment too.

1. wgbis.ces.iisc.ernet
Waste in the society can be classified into the following categories:

i) Municipal solid waste
ii) Bio-medical waste
iii) Hazardous waste
iv) Electronic waste
v) Construction waste

Let us now understand what biomedical waste is.

**Biomedical waste: A life-threatening issue**

The waste produced by hospitals is known as 'biomedical waste'. This waste is different from all other waste, mainly because of its hazardous nature. Since this waste is directly generated from the human body and animals, it is the content more than the quantity which makes it dangerous and risky.

Hospitals are institutions that form a part of the category of emergency services. They are frequented by people from every layer of the society. Despite technological advancement, and the progress made in terms of knowledge, there has been no reduction in the amount or form of waste produced by hospitals. Strict prohibition of reuse of medical equipment only adds to the problem. Naturally, this has led to an increase in the use of disposable medical supplies, causing an increase in the quantity of biomedical waste.

The hazardous nature of biomedical waste came to the limelight in the 1980s and the 1990s. Till then, it was not considered a life-threatening issue. In the 1980s and 1990s, the exposure to HIV and Hepatitis B virus increased the awareness of biomedical waste. It also brought forth the potential risks involved in bio-medical waste.\(^2\)

\(^2\) [www.jomfp.in/article.asp](http://www.jomfp.in/article.asp)

Not only is biomedical waste a risk to the society and the environment, but people who collect, segregate and dispose it are at potential risk from this waste too. Needles, blades and other sharp instruments that are not disposed of properly or not disinfected can infect them or harm them. Also, the high temperatures and toxic gases released during waste disposal pose a health hazard to the workers.

Surprisingly, 80% out of the total quantity of biomedical waste, is non-hazardous. Only 15% is harmful or infectious. If bio-medical waste is allowed to mix with municipal solid waste and dumped in the garbage bins meant for other waste, then the entire mass becomes infectious and can pose a potential risk to the nearby residents. Since this will be disposed of at landfills, the environment will also be harmed. If incinerators are not operated properly, environmental degradation is inevitable. Considering the hazardous nature of biomedical waste and the risks associated with it, the Ministry of Environment and Forests formed the Biomedical Waste (Management and Handling) Rules in 1998.

The Biomedical Waste (Management and Handling) Rules, clearly define various terms including ‘biomedical waste’, ‘occupier’ and biomedical waste treatment facility. They cover important areas like treatment and disposal, segregation, packaging, transportation and storage of biomedical waste. They clearly state that the government of every state will establish a prescribed authority.

Data reveals that 15.69% of the Health Care Establishments (HCE)
Biomedical waste management scenario in Pune city

Pune is becoming a sought after destination for healthcare. Many healthcare companies are looking at Pune and major hospitals are planning large-scale expansion.4

Currently, the city generates about 1750 kgs of biomedical waste everyday. This quantity comes from 592 hospitals, 575 nursing homes, 1627 dispensaries, 192 path labs and 12 blood banks, which are registered with the Pune Municipal Corporation.5

Methodology

In order to understand biomedical waste management in Pune, case studies of three hospitals and the common biomedical treatment facility were carried out. The data obtained was tabulated and an attempt was made to understand the biomedical waste storage, segregation, handling and disposal in the hospitals of Pune. The study involved hospitals within the Pune Municipal Corporation (PMC) limits only.

Table 1: Data from the case studies

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Location</th>
<th>No. of Beds</th>
<th>Private/ Govt.</th>
<th>Method of disposal</th>
<th>Main Storage area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pune</td>
<td>411</td>
<td>Private</td>
<td>Given to CBWTF - Pascco</td>
<td>Near the main entry</td>
</tr>
<tr>
<td>2.</td>
<td>Kamla Nehru park, Pune</td>
<td>100</td>
<td>Private/ Trust</td>
<td>Given to CBWTF - Pascco</td>
<td>On the side of the hospital</td>
</tr>
<tr>
<td>3.</td>
<td>Aundh, Pune</td>
<td>75</td>
<td>Private</td>
<td>Given to CBWTF - Pascco</td>
<td>On the rear side of the hospital</td>
</tr>
</tbody>
</table>

Table 2: Hospital and quantity of biomedical waste

<table>
<thead>
<tr>
<th>Hospital</th>
<th>No. of Beds</th>
<th>Quantity of Bio-medical waste generated/ month</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>411</td>
<td>5,150 kg</td>
</tr>
<tr>
<td>2.</td>
<td>100</td>
<td>900 kg</td>
</tr>
<tr>
<td>3.</td>
<td>75</td>
<td>20 kg (note: since the hospital was opened 15 days back, the waste generated was very less)</td>
</tr>
</tbody>
</table>

4. www.expresshealthcare.in
The number of beds, the location, the technique of disposing waste and the main storage area are mentioned in Table 1.

**BIOMEDICAL WASTE MANAGEMENT IN HOSPITAL 1**
This is a huge hospital with nine floors and a capacity of 411 beds. It generates almost 6000 kgs of biomedical waste every month. This waste is segregated at the source itself. Before disposal into garbage bins, the waste, such as plastic is disinfected using 1% sodium hypochlorite. This waste is shifted to the garbage room located on the same floor. All the segregated biomedical waste from the same floor is collected in this garbage room. The waste from each floor is then brought to the common storage area located near the main hospital gate within the premises. This shifting is done at night, when there is less crowd, using the common lift. Once in the common storage area, the colour coded waste bags are kept in a closed container. These are later picked up by the Central Biomedical Waste Treatment Facility (CBWTF).

**BIOMEDICAL WASTE MANAGEMENT IN HOSPITAL 2**
This is a multi-speciality private hospital with 100 beds. Each department that generates biomedical waste has colour-coded waste bins. The waste from each floor, after being disinfected, is collected in the colour coded bins placed in the area on the rear side of the building. This shifting of waste is done using the patient lift only. The waste is then collected by CBWTF.

**BIOMEDICAL WASTE MANAGEMENT IN HOSPITAL 3**
This is a newly opened 75 bed private hospital, in Pune. Being fairly new, the biomedical waste generated is not very significant as compared to the old and established hospitals. In this hospital also the waste is segregated and disinfected at the source itself. An electric needle cutter is used to break the needle portion of each used syringe, to prevent needle injuries. The waste collected from all the floors is brought down using the common lift. It is then stored in colour-coded bins, in the area behind the hospital, from where it is picked by the CBWTF vehicle every morning at 10 am.

**AREAS OF CONCERN**
The study of these three hospitals brought to light certain problem areas as follows:

i) The absence of a separate, designated area for storage of biomedical waste.
ii) No separate lift that could be used to collect waste from each floor and bring to the main storage area.
iii) No proper planning for the transportation of the waste from each floor to the main storage area.

**COMMON BIOMEDICAL TREATMENT FACILITY (CBWTF): A CASE STUDY**
A Common Biomedical Waste Treatment Facility or CBWTF is a place where the biomedical waste generated from various healthcare establishments is treated and disposed of properly. This ensures that the adverse effects on the society and environment is reduced. There are many reasons that make it impossible for hospitals to have their own biomedical waste disposal facility:

i) High capital investment required to set up an individual biomedical waste treatment facility.

ii) Separate manpower and expert staff required to operate the facility.

iii) Since hospitals are majorly located in areas surrounded by residential and commercial establishments, location of a CBWTF in such an area will pose a health hazard to its residents due to the emission of toxic gases during the disposal process.

Keeping all these factors in mind, the concept of CBWTF has been introduced to cover up for all the issues related to biomedical waste disposal. It is a proven concept, which many developed countries have adopted. The Central Pollution Control Board (CPCB) has prescribed guidelines for CBWTF.

Founded in 1995, Passco Environmental Solutions Private Limited is a leading environmental and waste management organization in Pune associated with biomedical waste disposal. It operates on Build-Own-Operate (BOO) and Build-Operate-Transfer (BOT) basis. Everyday Passco collects approximately 3000 kgs of biomedical waste from 370 locations in Pune. It owns seven collection vehicles and two vans, which are equipped with weighing scales and bar code scanning facilities. Each vehicle has a 24x7 GPS tracking system to check foul play.

The final disposal site is located in the premises of the Kailas crematorium.

Figure 3. Biomedical waste in yellow bags
torium in Pune, which is equipped with incinerators, a waste autoclave, waste shredder and an Effluent Treatment Plant (ETP). There is a separate place for storing the waste generated from the disposal of biomedical waste. Also, there is a separate area for washing the vehicles after the waste has been unloaded.

The rates charged by Passco are based on the Nursing Homes Act.

They have prescribed rates for different categories of healthcare facilities.

<table>
<thead>
<tr>
<th>Waste category</th>
<th>Disposal method followed by Passco</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic waste (autoclaved, shredded and treated)</td>
<td>Recycling</td>
</tr>
<tr>
<td>Incineration ash</td>
<td>Sent to a company in Ranjangaon which disposes it to secured landfill</td>
</tr>
<tr>
<td>Waste sharps (disinfected)</td>
<td>Secured landfill</td>
</tr>
</tbody>
</table>

Figure 5. Passco vehicles equipped with weighing machine. (Photo Courtesy: Passco)

Figure 6. Shredder and autoclave (Photo Courtesy: Passco)
All hospitals are required to register themselves before they start operating. The registration is done with the local authority, CBWTF and MPCB. The Common Biomedical Waste Treatment Facility is appointed by the local authority, that is, the Pune Municipal Corporation (PMC) in Pune, for collection and appropriate disposal of waste. The entire process of waste management in hospitals, right from segregation to storage, handing over of the waste to the CBWT and the disposal procedure followed by the CBWTF, is monitored closely by the MPCB. Hence, all the three are dependent on each other. With co-ordination from each other, they are bound to function well.

Observations
- The area for storage of biomedical waste, for collection by the CBWTF vehicle, is not situated away from the main hospital building.
- The area for storage is neither fenced properly nor has any covering (on the top).
- In many hospitals, the biomedical waste storage area is not defined.
- There is lack of knowledge about the categories of waste, as per the rules leading to mixing of one waste with another.
- The people who actually handle, segregate and store the waste are not educated about the hazardous nature of biomedical waste.
- Heavy charges required to be paid prevent many small healthcare facilities from registering for biomedical waste disposal.
- There is no separate lift for transferring biomedical waste from all floors to the area of storage.
- The CBWTF vehicles collect and transport the waste to the disposal site during the morning hours, which poses a threat to the areas in which they operate.
- There is a difference in biomedical practices prescribed as per rule and actually followed in private hospitals.

Recommendations

EFFECTIVE BIOMEDICAL WASTE DISPOSAL AT CBWTF CAN BE ENSURED BY:
- Training the hospital staff on safe biomedical waste handling practices
- Segregating and storing on a regular basis and not as and when needed.
- Making it mandatory for all healthcare facilities to register with the CBWTF for effective biomedical waste management and disposal.
- Ensuring that biomedical waste is not mixed with other waste as it damages the equipment used for its disposal.
- Transporting biomedical waste to the disposal plant during the night to avoid heavy traffic and crowded places.
- Monitoring hospitals and also CBWTF periodically (by PMC and MPCB) to ensure proper biomedical waste handling and disposal.

Conclusion
The first step in biomedical waste management is to understand the categories of wastes, the potential risks they possess, and the best practices for effective disposal. Though
the Biomedical Waste (Management and Handling) Rules of 1998 have laid out norms for safe and effective biomedical waste handling and disposal, it is clear that there are still many loop holes in the entire process. Though discrepancies are evident and solutions have been suggested, it is difficult to pin point a single cause or factor. However, it is clear that only a joint venture between the local government, CBWTF, HCEs and MPCB can effectively and successfully ensure proper biomedical waste management practices in the city.

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References
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Kirti Shirsat Sagaonkar is a graduate from NDMVPS’s College of Architecture, Nasik. With a post graduate degree in Environmental Architecture from Dr. BN College of Architecture, she is currently working as an Assistant Professor, at Marathwada Mitramandals College of Architecture, Pune. She has a keen interest in Climate Responsive Architecture and is actively involved in formulating guidelines and policies for historic housing in the area of Kasba Peth, Pune, which was part of the exhibition at the Royal Institute of Art, Stockholm, Sweden.
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