Bio-medical waste

Waste management: a timely prescription

Hospitals produce a variety of waste that can be utilised as a resource if it is collected, segregated and recycled properly. Comprehensive recycling and waste minimisation programmes can decrease the financial burden on facilities, and at the same time systematic waste management practices can help save the environment.

Waste reduction strategies go beyond recycling, which comes into play only at the end of a product’s lifecycle. Good strategies focus on minimising the amount of waste generated in the first place. This involves switching to less wasteful practices and using products that are non-polluting.

Only 15% of the hospital waste stream is potentially infectious. The majority of hospital waste is similar to that found in any office: mostly paper, cardboard, metal and food waste. All of this can be used as resources through recycling or composting. A good segregation system in the hospital, therefore, helps in generating extra resources.

Case studies of successful waste reduction programmes in hospitals

International
- In 1996, Beth Israel Medical Center in New York City implemented an aggressive waste minimisation plan that sought to minimise the volume as well as the toxicity of waste generated. As a result of the drive, it continues to save over $600,000 a year. (Source: Going Green, HCWH, October 15, 2001)
- Albany Medical Center, a 500-bed research hospital in New York has a model recycling programme through which it has recycled 7,273,000 kg of waste and saved the hospital $4 million in its first six years. The facility is now recycling 43% of its total waste stream. In addition to a host of typical items it recycles, such as paper, cardboard and steel cans, the Center is also able to recycle five different types of medical waste.

AT A GLANCE
- Hospitals are a hotbed of dangerous chemicals and medical products which are hazardous to the user.
- Switching to safer products and materials is an important step towards reducing the harm caused by bio-medical waste.
- Hospitals can make a big difference to their waste problem by adopting Environmentally Preferable Purchasing (EPP).
- Proper workplace procedures and waste management systems can also reduce the threat of pollution.
waste chemicals into usable products through the use of a $75,000 chemical distillery it built in 1995. The distillation centre can convert waste alcohol, formalin, xylene, mineral spirits and paint into pure products that the centre then uses in its labs. The distillery is expected to reduce the waste production of hazardous chemicals from 29 tonnes to 6 tonnes and save $250,000 per year in disposal and chemical purchasing costs. (Source: Going Green, HCWH, October 15, 2001)

National

A 600-bed multi-speciality hospital in Delhi has an effective waste management programme, through which it generates Rs 150,000 to 200,000 annually. The hospital solicits quotations for the purchase of its annual scrap; the highest bidder is chosen.

Waste items are recycled and fetch a good economic return for the hospital. The hospital, through an effective mercury spill management programme, collected 1.6 kg of mercury (spilt due to breakage of thermometers and sphygmomanometers) and returned it to a thermometer manufacturing unit in the city. Such programmes exemplify a smart waste management approach that not only reduces the waste burden but also generates revenue from waste.

Another 500-bed hospital in New Delhi has its recyclable waste picked up by a contractor. The contractor pays the hospital Rs 100,000 a month to collect the garbage.

Holy Family Hospital, a 300-bed multi-speciality hospital in New Delhi, segregates its plastic waste from patient care into eight categories. Recyclers appreciate this practice as it reduces work at their end; they collect the different kinds of plastic, paying the hospital a good price. The hospital also reuses discarded bedsheets by cutting out the unusable portion and converting the remaining sheet into nappies to be used in its nursery, or for cloth dusters. Holy Family Hospital also sends its kitchen waste to a piggery, while the garden waste is composted to produce manure.

Similarly, Sir Ganga Ram Hospital passes on its discarded linen to recyclers who use it for manufacturing recycled paper.

How healthy is your hospital?

Hospitals are a hotbed of dangerous chemicals and medical products which are hazardous to the user. When improperly disposed, they cause dangerous levels of pollution. The list includes disinfectants like glutaraldehyde and formaldehyde; medical products such as tubings and blood/urine bags; and mercury containing equipment such as thermometer, blood pressure apparatus, dental amalgams, etc.

Switching to safer products and materials is an important step towards reducing the harm caused by bio-medical waste. Environment-friendly substitutes exist for many products that contain PVC plastic, mercury, etc. Hospitals should make a conscious effort to adopt these.

Making changes in the purchasing patterns, when combined with proper workplace procedures, and waste management systems can substantially reduce the threat of pollution.

Environmentally Preferable Purchasing

Every day, hospitals purchase thousands of different products requested by different departments. Often, unknowingly, hospitals may

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### Monthly waste generated in a 600-bed hospital

<table>
<thead>
<tr>
<th>Item</th>
<th>Waste generated (monthly, in kg)</th>
<th>Recycling price (Rs/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardboard boxes</td>
<td>500</td>
<td>-</td>
</tr>
<tr>
<td>Waste paper (packaging)</td>
<td>500</td>
<td>2-3</td>
</tr>
<tr>
<td>Plastic glucose bottle</td>
<td>100</td>
<td>22-30</td>
</tr>
<tr>
<td>Oil tins</td>
<td>100 pieces</td>
<td>-</td>
</tr>
<tr>
<td>Phenol cans</td>
<td>100 pieces</td>
<td>-</td>
</tr>
<tr>
<td>Waste plastic</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Rubber gloves</td>
<td>225</td>
<td>8</td>
</tr>
<tr>
<td>Sacks</td>
<td>50 annually</td>
<td>-</td>
</tr>
<tr>
<td>Broken glass</td>
<td>100</td>
<td>2.50</td>
</tr>
<tr>
<td>Iron items</td>
<td>200-250</td>
<td>6.50</td>
</tr>
<tr>
<td>Plastic cans (like Cidex)</td>
<td>250-300</td>
<td>Rs 4 per can</td>
</tr>
</tbody>
</table>

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### Monthly waste generated in a 500-bed hospital

<table>
<thead>
<tr>
<th>Item</th>
<th>Waste generated (monthly, in kg)</th>
<th>Recycling price (Rs/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic container</td>
<td>250</td>
<td>13</td>
</tr>
<tr>
<td>Syringe plunger</td>
<td>150</td>
<td>19</td>
</tr>
<tr>
<td>Aluminium foil</td>
<td>400-450</td>
<td>24</td>
</tr>
<tr>
<td>Cups/glasses</td>
<td>9</td>
<td>112</td>
</tr>
<tr>
<td>IV plastic bottle</td>
<td>300</td>
<td>21</td>
</tr>
<tr>
<td>Silicon dialyser</td>
<td>70-80</td>
<td>21</td>
</tr>
<tr>
<td>LD bottle</td>
<td>300</td>
<td>24</td>
</tr>
<tr>
<td>Vacutainers</td>
<td>168</td>
<td>20</td>
</tr>
<tr>
<td>Glass</td>
<td>14,000</td>
<td>1.50</td>
</tr>
<tr>
<td>Dialyser filter</td>
<td>7 pieces</td>
<td>5</td>
</tr>
<tr>
<td>Cardboard</td>
<td>4,500</td>
<td>3</td>
</tr>
<tr>
<td>Paper</td>
<td>2,500</td>
<td>1.80</td>
</tr>
<tr>
<td>PP transparent bag</td>
<td>170</td>
<td>16</td>
</tr>
</tbody>
</table>
purchase items that are toxic. Some products may affect patient and worker health, while others may have serious environmental impacts.

Environmentally Preferable Purchasing (EPP) is a system that identifies and avoids these problems.

From eliminating unnecessary packaging to seeking substitutes for mercury and PVC-containing products, purchasing decisions can have a major impact in providing safe healthcare.

Environmentally preferable products are generally:

- Less toxic
- Minimally polluting
- More energy efficient
- Safer and healthier for patients, workers and the environment
- Easily recycled
- Minimally packed
- Fragrance-free

Waste minimisation

Minimising waste not only protects people and the environment, it can save hospitals a great deal of money in the long run. Waste can be minimised by various methods:

**Containers and liners make a difference:** Is the container of the same size as required? If the bin is larger in size than required that means the hospital is spending extra money on purchasing the bigger liner. In case the dustbin is small in size, it would fill up quickly and, therefore, more liners would be generated. To prevent either of these situations it is essential that the needs of different departments are assessed before the procurement of any waste management tools.

**Source reduction:** Minimising the amount of waste generated at the source itself is possible through product substitution, technology change and good operating practices. Changes in purchasing policies and product substitution can also reduce the toxicity of the waste generated.

**Resource recovery and recycling:** The majority of waste from healthcare facilities is similar

Holy Family Hospital segregates its waste for recycling. Shown here are glass bottles (left) and tins (top right), collected for recycling. Garden waste is composted through vermi-composting to generate manure (bottom right).

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Environmentally Preferable Purchasing (EPP) is a system that tackles the waste problem by opting for safer products with reduced packaging.
The majority of waste from healthcare facilities is similar to that of an office. Hospitals can implement fairly simple programmes that divert these materials from the solid waste stream.

Educating the staff: It is critical to train the nursing and housekeeping staff in the ways of proper segregation of waste. They should be educated about the various categories of waste so that they may be able to differentiate between infectious and non-infectious waste.

Composting organic waste: Composting is a form of recycling. Organic waste, usually in the form of vegetable food scraps, is mixed with a nitrogen source and provided with air and water. After some time, the waste is broken down into compost, which is used in lawns, gardens or farms to add nutrients and texture to the soil.

Build your own vermicompost:
- Select a composting site, preferably under shade.
- Place a layer of broken bricks or pebbles (3-4 cm in height).
- Add a 6-7 cm layer of coarse sand to allow proper drainage.
- Add 15 cm of loamy soil into which you will have to inject 100 earthworms.
- Scatter small lumps of cattle dung over the soil and cover it with a 10 cm thick layer of hay. Spray enough water.
- Cover the unit with broad leaves of coconut or banana. Monitor for 30 days.
- Add organic refuse, not exceeding 5 cm of thickness at a time. Keep adding the refuse and watering and turning it.
- At the end of 45 days, the compost is ready.

Waste reduction opportunities
- Buy in bulk whenever possible; it saves packaging. Legacy Good Samaritan Hospital, a 341-bed hospital in Portland, Oregon, switched from buying juice in 32-oz (approximately 900 ml) glass containers to 60-oz (approximately 1.7 litre) plastic containers that the hospital recycles. The hospital saves $125 per year and has reduced its annual waste by 1,130 kg.
- Improve ordering practices so that perishable products don’t become outdated and unusable.
- Cut down on multiple subscriptions of medical publications by asking staff to share journals and magazines.
- Reuse packaging.

Cafeterias

- Use washable plates, utensils, glasses and cups for cafeteria and patient service. New York City Department of Sanitation estimates that a 1,000-bed hospital switching from disposable to reusable food service items would save up to $500,000 per year and reduce its waste by approximately 182,000 kg.
- Switch to a bulk milk dispenser for patients instead of individual milk cartons.
- Compost kitchen and food waste.
- Offer discounts to people bringing their own mugs for coffee.

Conclusion
The successful development of comprehensive waste reduction programmes has been limited by the public perception that all patient-generated waste is ‘medical waste’, and therefore, must be infectious. Developing and implementing practical waste-management plans can reduce the volume of both general and medical waste, which results in reduced costs for on-site treatment and off-site transportation, treatment and disposal.

It is also important to remember that successful waste-reduction programmes have been adopted in hospitals where the support of the top-level management has been secured for the necessary organisational changes, investment and personnel.

Source: [http://www.ciwmb.ca.gov/BizWaste/Factsheets/Hospital.htm](http://www.ciwmb.ca.gov/BizWaste/Factsheets/Hospital.htm)