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Management of: Bio-medical Waste, Nosocomial Infection Control and Solid Waste Systems in Mumbai City

By
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Introduction

The overall Status of management of Bio-medical waste and Solid waste in the City of Mumbai is no different from that of any other Urban city in India, and that is pathetic compared to the standards laid down by the prescribed authorities in India and the world over. This is very well presented in the "Report of the committee constituted by the Hon. Supreme Court of India - 1998", suggesting improvement in Solid Waste management practices in Class I cities of India. The objective of this chapter is to present a picture of positive steps being progressively implemented by the Government and the Civic authorities in the Mumbai city with regards to its sustainable waste management practices goals. The aspects summarised are about the management of: a) Clinical / Bio-medical waste management (BWM); b) Nosocomial Infection control management within Health Care Facility; and c) Solid waste (SWM), as practiced in the city of Mumbai.

A. Biomedical Waste Management:

Awareness programmes on hazards of Potentially Infected Medical Waste (PIMW) in Mumbai was initiated in 1995, around a period when Draft Rules on Bio-medical waste were being discussed and formed by Ministry of Environment & Forest (MoEF). Even earlier than that, the Importance of safe handling and disposal of Medical / Clinical Hospital waste was practiced in the early 1980s in Mumbai, by Government Medical College hospitals and Municipal Corporation's Tuberculosis hospitals where, Clinical waste Incinerators were operated. Some of the large modern speciality hospitals set up by Private Trusts (P. D. Hinduja) in the early 1990s made provision to handle infectious waste, and had their PIMW waste management systems in place, and incinerator plants in operation, prior to the MoEF Draft Rules on Bio-medical waste Management and Handling. However, very much was needed to be done to solve the waste management problems that could be caused by Large number of small quantum generators of PIMW such as small size hospitals, Nursing & Maternity homes, clinics / dispensaries, laboratories; and, at home treatment patients. Initial thrust on importance of management, handling, treatment and safe disposal in Mumbai came from 'United States - Asia Environment Partnership (USAEP)', followed by this lead, various industrial / Commerce bodies, Municipal Corporation, Government and Non-Government organisations (NGOs) progressively joined in the awareness movement. This included organisations such as: 'Bombay First' of Bombay Chamber of Commerce, 'Brihanmumbai Municipal

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Corporation's Health Department'; 'All India Local Self Government'; 'Srishti' and 'Mumbai Medical Waste Action Group (MMAG)'. After promulgation of Bio-medical Waste (Management & Handling) Rules, August 1998, other bodies such as 'Baroda Management Association'; 'Indian Environment Association (IEA)', 'Indian Institute of Technology (IIT), Bombay'; V.J.T.I. Mumbai; 'Small Nursing Home Association' and the likes have joined in the awareness program. The initial emphasis was on importance of hazards of mishandling of PIMW; then came the emphasis on Technology for Treatment & Disposal; this was followed by the importance of 'Management' solutions over 'Technology' Solutions; and, better late than never, now the prime importance has been focused on waste 'Segregation' at the source of waste generation. Let us go through the status in Mumbai city on management and handling of PIMW, under various phases the waste goes through.

- Waste generation: Mumbai has approximately 15,000 biomedical waste generators of which 1200 are major ones comprising of big hospitals and nursing homes regulated by Municipal corporation of Greater Mumbai / State Government / Central Government / Trust Hospitals / Private Organisation etc., Other, approximately 13,000 odd Bio-medical waste generators are Practitioners, Laboratories, Dentist, Veterinary Clinics and Research Organisations ⁽¹⁾. The quantum of potentially infected Bio-medical waste which is required to be segregated, treated for disinfection and then safely disposed is estimated, for the purpose of planning, to be in the region of 4,500 to 5,000 kg per day.
- Waste Segregation: Today the importance of segregation of PIMW at the source of waste generation is being well understood by the early starters as Ninety-percent (90%) of the problems and its related costs can be reduced towards its treatment and disposal. It is now being realised that PIMW constitutes on an average only 10% of the waste coming out of a health care facility (HCF). So, the first step of waste Segregation in line with the Bio-medical waste (management & handling) Rules, 1998, is beginning to being implemented. The designated waste categorisation colour codes are gradually being adopted.
- Waste Storage: Health Care Facilities (HCF), where waste segregation of PIMW is practiced, the waste is stored directly in covered waste containers or stored in plastic bags that are placed inside a sturdy metal / plastic container. The waste is further treated on-site for disinfection and destruction or alternatively transported to off-site treatment plants before final safe disposal of treated disinfected waste.
- Waste Collection and Transportation: The Brihanmumbai Municipal Corporation (BMC) has come up with a unique system for Biomedical waste collection and transportation for HCF that have entered into a contract agreement (with 283 hospitals, out of which 185 are BMC hospitals) ² for Transportation, Treatment and Disposal of PIMW with the

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- BMC's Solid Waste Management (SWM) department. A specially designed, engineered Bio-medical waste collection motor vehicle having compartments for Waste designated for steam sterilisation / autoclaving (Red coloured), waste designated for Incineration (Yellow coloured), and a built-in computerised weighing and documentation unit. This Biomedical waste transportation vehicle comes at a designated time to the HCF for collection of waste. Currently, waste collection vehicle route trials are being conducted. The vehicle has a built-in isolated section which has an electronic weighing machine linked to a computerised system which records the weight and issues a detailed waste receipt printed document. This computerised documented waste collection receipt could be further used for the waste tracking purpose. The collected Bio-medical waste is later transported to a central plant for off-site bio-medical waste treatment and subsequent disposal to a safe site.
- Off-site Central Bio-medical Waste (BMW) Treatment & Disposal Plant (TDP): A new Privatised off-site BMW TDP has been set up by a private operator / contractor to operate on behalf of Brihanmumbai Municipal Corporation (BMC). This TDP has equipment for BMW Autoclaving with oil fired Steam boiler; a Crusher for destruction of disinfected / treated autoclaved waste; and an oil fired Incinerator with emission gas cleaning system in compliance with Central Pollution Control Board (CPCB) prescribed standard. The installed off-site central TDP capacity is of 5000 kg / day. In addition to this, at the same site location, BMC has Two BMW oil fired incinerator plants, each of 250-kg/hour capacities complete with emission gas cleaning equipment in compliance with Central Pollution Control Board (CPCB) standards, which continues to be operated by BMC's operating staff. The BMW TDP site is at the campus of GTB Tuberculosis Hospital in Sewri. The privatised TDP has been installed on Build-Own-Operate-Transfer (BOOT) basis. About 283 hospitals have signed contract with BMC for having their BMW treated and disposed, out of which 185 are BMC hospitals. The cost for waste treatment and disposal has been currently fixed at Rs.15/kg of waste for treatment. In addition, the cost of transportation for treatment and disposal of BMW is fixed at Rs.3/kg. Overall cost for treatment and disposal comes to Rs.18/kg of waste.
 - Off-site treatment and disposal of waste from small nursing homes, dispensaries and clinics: A private service company M/s. Pest Control of India (PCI) has been reported to come up with a unique scheme of solving large number of smaller BMW generators. They would supply specialised bags / bins that can store waste for a week or two which would later be transported to off-site BMW TDP set up by Brihanmumbai Municipal Corporation (BMC). For this Service PCI will charge Rs.225/= per bin per service. PCI will also ensure that PIMW will not go to the local dustbins of the city. ⁽³⁾

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- On-site Waste Treatment: Most widely practiced on-site BMW disinfection practiced by the large as well as the smaller health care facilities in Mumbai is the 'Chemical Disinfection', followed by mutilation of reusable wastes such as plastic syringes, plastic tubing, rubber gloves and the like materials. The glass vials are washed, cleaned, sterilised and re-used for pathological sample connection. The BMW and particularly the pathological waste disposal method followed by Maharashtra State Government Teaching hospitals in Mumbai is by the on-site Incineration process. These State hospitals in all have Two Oil fired incinerators at one location (Grant Medical College of J.J. Group of hospitals), and Three Electric Incinerators with one at each of the three hospitals (Gokuldas Tejpal, Cama & Albles, and St. Georges- all are J. J. Group of hospitals). Those of which that have been installed incinerators prior to the Bio-medical waste rules are being upgraded to CPCB requirements (i.e. Two-chamber, 800 to 1000 deg. C operation; and 30 meter high / or higher chimney as required confirming as per Maharashtra Smoke Nuisance Act). Three of the private trusts hospitals are known to have installed and use oil fired Incinerator (P. D. Hinduja, and Lilavati being amongst them) as an onsite waste disposal option. The Tata Memorial cancer hospitals have a BMW management system in place along with an onsite BMW steam sterilisation plant, being of a Hydroclave™ technology (from Consolidated Waste Management System), linked with a waste shredder. The end waste disposable product is sterilised, dried and shredded.
- Waste Treatment & Disposal Plant Manufacturers & Suppliers: In and around Mumbai there are Six well-known BMW Incineration plant manufacturers & suppliers (Maridi; Thermax; McClean; AirEff Detox; Ador Technology and Don Whitley). There are Three well known BMW disinfecting / sterilising plant manufacturers & suppliers (Consolidated Waste management; Nat Steels and Maridi).
- N.G.O.: Mumbai Medwaste Action Group (MMAG), is dedicated to educate, help, audit and assist in betterment / improved Biomedical Waste Management practices.
- TRAINING: The Brihanmumbai Municipal Corporation's (BMC) Information-Education-Communication (I.E.C) cell have prepared detailed Training Modules, and conducts very successfully the training courses for hospital staff and workers, in association with 'All India local Self Government', Mumbai. Selected Private Trust Hospitals (P. D. Hinduja hospital) conduct each year an In-house Training Program, on Bio-medical waste segregation, handling, packaging and transportation, for their staff and workers.

As of today, the Balance weighs heavily in favour of things not being practiced as required, but that would change in time with currently growing

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trend in implementation of gradual awareness, realisation and increased pace in implementation of Bio-medical waste (management and handling) rules.

B) NOSOCOMIAL INFECTION CONTROL

The demarcation of hospital waste management and that of the control of hospital acquired (Nosocomial) infection control is a very thin line. Infection Control Committee (ICC) has been set-up in all of the Teaching Institute Hospitals, Municipal Hospitals and many of the major Private Trusts hospitals in Mumbai. This is primarily to control Hospital acquired infection (the nosocomial infection). Members of the ICC are a part of National Association on Infection Control, and these members from each of the member-hospital meet periodically every fortnight / monthly to discuss issues and exchange views related to nosocomial infection. The Infection Control Committee of a hospital meets periodically with its management. The Maharashtra State's Health Ministry takes keen interest on hospital acquired infection control procedures.

C. Solid Waste Management (SWM)

Many of the positive things happening in Mumbai city for its SWM, include:

- Waste segregation of Dry waste and Wet waste has come up in selected localities. Accordingly the rules set by Brihanmumbai Municipal Corporation (BMC) are in place.
- Doorstep collection of waste is now put in practice. Thereby, the Community open waste collection dumps are being eliminated / removed gradually from many of the localities.
- Ban on throwing waste on the streets, footpath, open spaces, drains, and water bodies.
- Waste transport trucks are being covered by canvas so as to prevent spillage of garbage along the travel route through the city.
- Privatised waste composting plant set up in association with BMC.
- Composting / Vermiculture Waste processing being advocated / encouraged for on-site waste treatment of biodegradable wastes.
- Exercise is in planning stage for setting up of Sanitized Landfill Sites on the outskirts of Mumbai.
- Local Area Waste Management and Development being pursued by the NGOs.
- Role of rag pickers is very effective and efforts being put to channelise the efforts of rag pickers.
- 'Ban on plastics': campaigns and implementation.
- Approach and plan for waste collection from slums, narrow lanes in suburban localities.
- Sweeping and cleaning of market area roads at night.
- Seaside Beach cleaning operation by NGO and Beach Beautification work by NGO.

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- Waste disposal projects: composting, sanitised landfills, and power generation.
- Silt removal from storm water drains.
- Construction waste and debris being dumped at designated sites separate from garbage dump sites.
- Rag pickers are being given Identity cards by NGOs to organise their useful contributory efforts.
- Shop / street vendors: segregations and storage of garbage at site.
- Temples / Marriage Hall locations are being organised to segregate and separately collect their biodegradable wet waste from the recyclable dry waste.

CONCLUSION

The Brihanmumbai Municipal Corporation (BMC) has very well staffed Administrative and Technical infrastructure to administer civic requirements of Mumbai city, including that of the Solid Waste Management. The management and handling of Bio-medical Waste (BMW) Management challenge came up in the mid 1990s and since then the BMC has been very closely studying the magnitude and the intricacies of this challenge. Gradual incremental steps that have been well thought, widely discussed and co-ordinated with the stakeholders of BMW management, and of conducting implementation of pilot schemes in most represented area in the city has founded a firm base for better things to come in future. This foundational effort will enable sustainable growth in Bio-medical waste management for India's Class-I city of Mumbai

References:

1. "Training Module on Hospital waste Management", Brihanmumbai Mahanagarpalika, Public Health Department: by Dr. Neera Kewalramani, Dr Alka Karande and Prof. Sneha Palnitkar.
2. "Times of India - Times News Network", September 25, 2001.
3. "Bombay Times", Times News Network, October 27, 2001

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