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Bio-Medical Wastes Management in Davanagere City

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Abstract: **The present work highlights on practices adopted in Davanagere city for Bio-Medical Waste management. The present work highlights on Davanagere city practices in bio medical waste management. The city contains around 130 Medical care facilities including hospitals, clinical laboratories and blood banks major and minor sectors. Here we have considered four major hospitals contributing this kind of waste. For our research work the waste management activities like segregation, storage, collection, transportation, disposal of bio-medical waste under taken in hospitals and also emphases on organizational, planning, administrative, financial, engineering, legal aspects and their management involving interdisciplinary relationships where proved and are discussed.**

Keywords: **Biomedical waste Management, Rules and regulations, waste generation, collection of wastes, treatment and disposal.**

1. INTRODUCTION

Bio-medical waste (BMW) collection and disposal has become major factor of concern for environmentalist, health managers, local governing bodies and general community. The effective management of such wastes now have not only become medical and legal necessities, but also social responsibility**.** 'The Bio-medical waste' means any waste generated during diagnosis, treatment or immunization of human beings or animals. Management of health care waste is an integral part of infection control and hygiene programme in health care facilities. These facilities are a major contributor to community-acquired infection, as they produce large amount of bio-medical waste. Bio-medical waste can be on categorised based on the risk of causing injury or infection during handling and disposal. Waste targeted for precautions during handling and disposal include sharps, pathological wastes and infectious wastes. Other wastes generated in health care settings include radio-active wastes, mercury containing instruments and poly vinyl chloride (PVC) plastics. Common producers of biomedical waste contain hospitals, nursing homes, clinics, laboratories, offices of physicians, dental and veterinarians, house health care, mortuaries and funeral homes. It must be properly managed to avoid the harm for the general public, specifically healthcare and sanitation workers who are continuously uncovered to bio-medical waste as an occupational hazard. Biomedical waste has been brought in India, with the notification of the BMW (Management and Handling) Rules, 1998. The law makes it obligatory for the health care improvement to segregate, sanitize and dispose their waste in an ecological manner.

The management of bio-medical waste is still in its infancy all over the world. There is a lot of confusion with the problems among the generators, operators, decision-makers, and the general community about the safe management of bio-medical waste. The reason may be a lack of awareness and legislations. Hence resource material on the environment for hospital administrators, surgeons, doctors, nurses, paramedical staff and waste retrievers, is the need of the hour. WHO stated that 85% of hospital wastes are actually non-hazardous, around 10% are infectious and around 5% are non-infectious but hazardous wastes. In India infectious waste could range from 15% to 35% depending on the total amount of waste generated (As per international journals on bio-medical waste in India and other countries).

The Biomedical waste treatment and disposal are to be done very carefully, as it is infectious in nature. Considering the level of information and knowledge, the Government of India has specifically laid down the treatment and disposal options. Any biomedical waste treatment system should comprise of segregation at sources, storage in colour coded

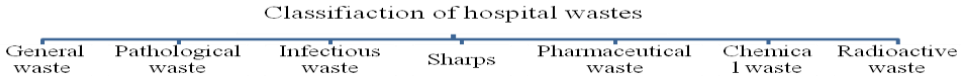
containers, systematic collection, transportation to treatment site, treatment and disposal considering the type of waste. Segregation of biomedical waste is based on the category of waste. Storage and collection of waste in colour-coded containers is based on the treatment plant. The treatment options for biomedical waste are incineration, deep burial, autoclave, microwave, chemical treatment, destruction and shredding, and disposal in secured landfills. All health care institutions are required to follow this without fail. As per the rule Bio-Medical Waste (Management and Handling) Rules 1998.

2. SOURCES OF BIOMEDICAL WASTE

There is a lack of concern for some special sources of wastes and its management. One such waste is BMW generated primarily from health care establishments. The health care sector generates all the types of waste listed under the biomedical waste are

- **Primary Sources:** e.g. Hospitals, Nursing homes, Veterinary hospitals, Clinics, Dispensaries, and Blood.
- **Other Sources:** e.g. Households, Industries, Education Institutes, and Research centre.

3. CLASSIFICATION OF BIOMEDICAL WASTES



4. SEGREGATION, COLLECTION, TREATMENT AND DISPOSAL OPTIONS

The system of using different coloured bins or bags to collect different types of solid medical wastes is known as "colour coding".

According to the 1998 Indian Rules notified for disposal of biomedical wastes such wastes are to be segregated in the bins or containers of colours Yellow, Red, Blue, White/ Translucent PPC, Black.

Colour Coding	Type of Container	Waste Category	Treatment and Final Disposal Options
Yellow	Plastic Bin (with bio-hazard logo) Yellow Plastic Bag (liner) - Non Chlorinated	**Anatomical waste:** Human Anatomical Waste Animal Waste	Hand Over to Common Bio-Medical Treatment Facility OR Disposal through Deep Burial.
Red	Plastic bin (with bio-hazard logo) with red plastic bag /liner (non-chlorinated)	**Infectious (Soiled) Waste (Non-Plastic):** Cotton, Dressing, Bandage, Plaster Casts Etc.	Hand Over to Common Bio-Medical Treatment Facility OR Disposal through Deep Burial.
Blue	Plastic bin with Blue plastic bag/liner	**Contaminated Plastics:** Plastic syringes, Intra-venous fluid sets/ Fluid bags, Blood Bags, Catheters, cannula, Gloves, corrugated rubber drains etc.	Hand over to CBMWTF, in the absence of service of CBMWTF disinfect and mutilate /deform before discarding/handed over to recycler
White/Translucent PPC	Puncture Proof Container with lid (PPC) filled 3/4th with freshly prepared bleach solution	**Sharps:** Needles, broken glass pieces, cut ampoules, glass slides, broken blades , scissors aluminium foils of vials etc.	Disinfection and put contents in Sharp Pit (needle-pit) or Hand over to Common Bio-Medical Treatment Facility
Black (To be kept in the pharmacy)	Plastic container with black plastic liner	**Discarded Medicines*** (after expiry date) Waste Solid and liquid Chemicals* /containers storing them Containers of Silver nitrate *	Hand over to Common Bio-Medical Treatment Facility OR Secured Land Fill

Source: *Guidelines on "Bio-Medical Waste Management" in Karnataka.*

4.1 Labelling for identification of Bio-medical wastes:

Labelling is essential for identification, safe management of medical wastes, handling of different types of medical wastes and also warns the workers, patients and the public. All the infected solid, pathological, human and sharp wastes should be marked with bio hazard symbol in black colour, representing cytotoxic wastes. The symbol of cytotoxic hazard that is in a triangle of C (▲) is used for this labelling.

5. STORAGE AND TRANSPORTATION OF BIOMEDICAL WASTES

According to the Rules the infectious waste cannot be stored for more than 48Hours. If immediate treatment and disposal cannot be done, wastes should be refrigerated on site to prevent rotting and evolution of offensive smells. The major care should be taken for storage and accumulation of waste is different types of coloured containers as used for collection of different wastes.

Before treatment of wastes the wastes should be subjected to the disinfection process, in order to destroy the microorganisms from the used objects, instruments, and equipment's. In this process freshly prepared 1% of Hypochlorite solution is used daily for make it as disinfectant then the waste is shipped with suitable designated vehicles.

6. TREATMENT AND DISPOSAL METHODS OF BIOMEDICAL WASTES

The various methods that may be used for disposing of the hazardous wastes from hospitals include:

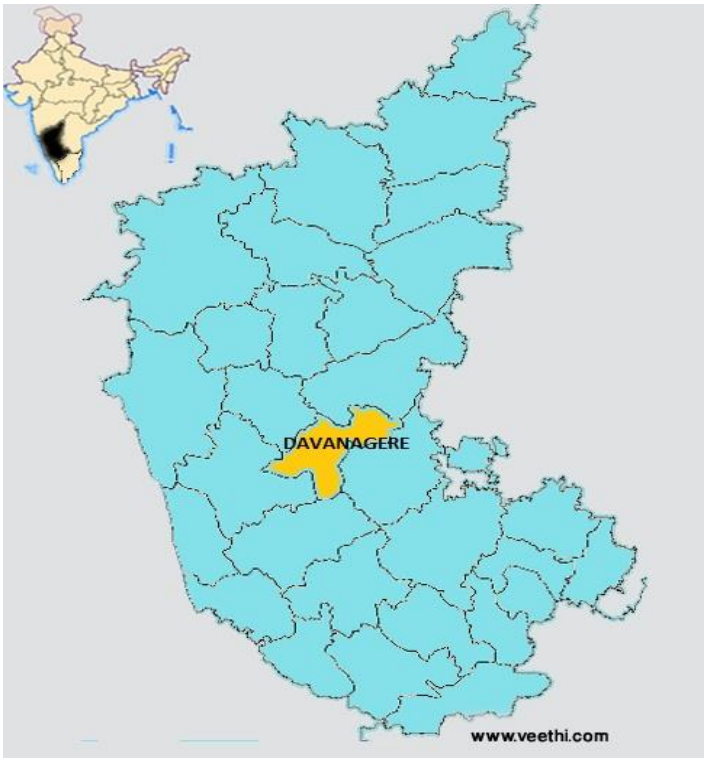
1. Incineration: Incineration system is a controlled combustion process where waste is completely oxidized and harmful micro-organisms present in it are destroyed / denatured under high temperature.

2. Autoclaving: Autoclaving is a low heat thermal process where stream is brought into direct contact with waste in a controlled manner and for sufficient durations to disinfect the wastes.

3. Hydroclaving: Hydroclaving is an innovation of the Autoclave. Here indirect heating is done by providing steam into outer jacket of double walled container, while the inside the inner container is termed on by a suitable mechanism.

4. Shredder: Shredding is process by which waste are de-shaped or cut into smaller pieces so as to make the wastes unrecognizable.

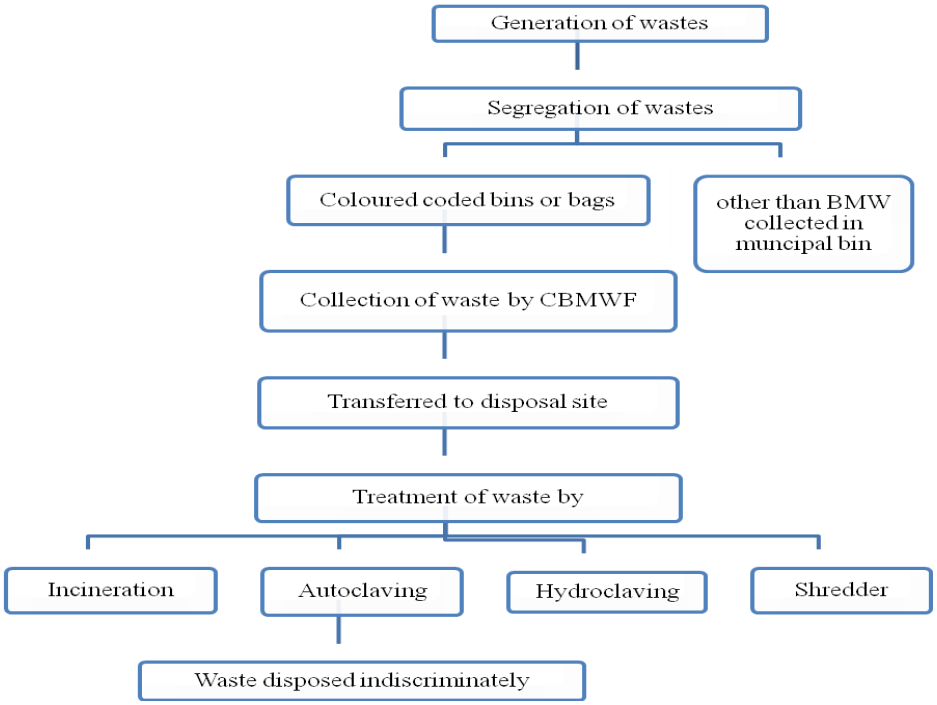
6.1 Study area:



Davangere city is one of the developing cities in Karnataka. The city has six taluks, 923 villages in all spans and area of 7,042 sq.km. The total population of Davanagere city is 4, 35,128 as per official census for 2011. The quantity of waste generated in each hospital of about 600-1100 kg/year.

The health care system in Davangere is very good with both Government Hospital and Medical Colleges and Hospitals functioning well. There are several private nursing homes, numerous clinics, & laboratories. The Ayurvedic College & Hospital has its own importance. People need not travel to bigger cities for health care facilities.

6.2 Steps of biomedical waste:



Flow chart shows schematic representation of steps of biomedical waste path from source to disposal.

7. RESULT AND DISCUSSION

The details of city hospital and wastes generation are given under Government Hospital sector in Davangere city, there will be five Taluk Hospitals of above 50 beds, six community Health Centre of approximately 30 beds, eight Urbanization Health Centre, depends on consultations, hundred Primary Health Centre of (24*7).In Davangere, there are around 130 medical health care facilities are there including hospitals, clinical laboratories and blood banks. The highest quantity of BMW is generated in Hospital by Chigatere General Hospital of about 1064 kg, in Clinical Laboratories by Mahatma Gandhi Diagnostics of about 43 kg and in blood banks by Davangere Blood Bank of about 7 kg.

Following hospitals are surveyed for present study i.e.

These results are collected individually by consulting the each hospital organization. Table shows quantity of waste generated per hospital to treatment unit that are listed below.

Sl.No	Name of the Hospitals	Quantity of biomedical waste received,(kg)			Total quantity (kg)
		Incinerable waste in (kg)	Autoclave in (kg)	Shredder in (kg)	
1	SS hospital	508	-	81	589
2	JJM medical college	165	-	18	183
3	SNR hospital	30	01	08	39
4	Apporva hospital	25	02	04	31

These obtained wastes are taken to treatment site which is located at Amaravati colony in Harihar Taluk, Davangere District after proper segregation. At this treatment uint wastes are treated not only from Davangere, it is collected from various parts of the district like Haveri, Ranebennur, Malebennur, Honnali, etc.

The different method used in treatment unit to treat the biomedical waste which is obtained from various sectors of Davangere; currently they are using three methods i.e. Incineration, Autoclaving, and Shredder. Amaravati colony biomedical treatment unit treating daily around 100kg of different type of waste collected in different bins shown below

Report of Daily Manifest of Biomedical waste:

Coloured bags	**Waste collected in coloured bags per day**
Yellow bags	40
Red bags	27
Blue bags	30
Puncture proof containers	-
Total no of bags per day	97

8. CONCLUSION

According to this survey of BMW management in hospitals, it was found that still more proper care should be taken for segregation of wastes and wastes should be placed as per colour coding provided in guidelines which help in to minimize the amount of potentially hazardous waste. It is observed that lack of awareness and improper waste management in our research work. Systems in health care establishments to protect general health and environment condition.

In treatment plant it is observed that the waste is dumped in the treatment plant yard. This stale waste decomposes and causes foul odour which attracts rodents which further acts as diseases carriers and further the leachate will enter underneath the water table and nearby water sources and it leads to polluting the surface and subsurface water sources. Treatment plant does not have any option for treatment and disposal of liquid waste, also there is no provision for material recovery and re-usage. Hence the government has to take the responsibility organizational, planning, administrative, financial aspect for proper maintaining of treatment plant without cause the environment pollution i.e. air, water and land pollution. Lesser amount of BMW means lesser burden on water disposal system. This should include management of waste in an environmentally friendly manner.

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