International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 08 | Aug - 2021 ISSN: 2582-3930

REVIEW PAPER ON MANAGEMENT OF BIOMEDICAL WASTE IN INDIA

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ABSTRACT

Unregulated medical specialty waste management (BMWM) may be a public unhealthiness. This has display a grave threat to not solely human health and safety however conjointly to the surroundings for the present and future generations. Safe and reliable strategies for handling of medical specialty waste (BMW) area unit of dominant importance. Effective BMWM isn't solely a legal necessity however conjointly a social responsibility. this text reviews the present views on BMWM and rules, conventions and therefore the treatment technologies used worldwide. BMWM ought to ideally be the topic of a national strategy with dedicated infrastructure, cradle-to-grave legislation, competent administrative unit and trained personnel. up the management of medical specialty waste begins with waste diminution. These standards, norms and rules on BMWM in an exceedingly country regulate the disposal of assorted classes of BMW to confirm the protection of the health-care staff, patients, public and surroundings. what is more, developing models for the observation of hospital health-care waste practices and analysis into non-burn eco-friendly property technologies, employment and polyvinyl chloride-free devices can get into ways for safe carbon surroundings. Globally, larger analysis in BMWM is bonded to grasp its growing field of public health importance.

Keywords:

Biomedical waste management rules 2016, medical specialty waste, treatment technology

INTRODUCTION

Expansion of health-care facilities furthermore because the recent trends of mistreatment plastic disposables and increase in medical and surgical interventions has light-emitting diode to unprecedented burden of medicine waste (BMW). Unregulated BMW management (BMWM) has display a grave threat not solely to human health and safety however conjointly to atmosphere for the present and future generations.

A prior study calculable that concerning half world's population is in danger from hazards of improper BMWM either through impact at add the atmosphere or impact on public health. the general public health threat because of improper BMWM has been reportable worldwide.[2] Of note area unit the incidence of hepatitis B virus (HBV) eruption (240 infected) at Gujarat, India, in 2009 and infectious injuries to scavengers because of BMW generated in mass vaccinations (1.6 million) in Asian nation.

A nationwide survey performed by International Clinical medicine Network in twenty five districts across twenty states highlighted that solely 2 massive cities in Asian country, city and Mumbai, had relatively higher system for BMWM. Improper pretreatment of BMW at supply and improper terminal disposal was the most important challenges determined. it absolutely was determined that around eighty two of primary, hour of secondary and fifty four of tertiary care health facilities were within the red class, i.e., the absence of a reputable BMWM in situ or ones requiring major improvement. Per the studies conducted by the globe Health Organization (WHO) in twenty two developing countries showed that the proportion of health-care facility (HCF) that don't use correct waste disposal strategies vary from eighteen to sixty fourth. In Asian country, annually concerning zero.33 million heaps of BMW is generated and rate ranges from zero.5 to 2.0 kilogram per bed per day. The poor BMWM practices area unit attributed to lack of awareness and coaching as was terminated during a recent study.

DEFINITION

According to medical specialty Waste (Management and Handling) Rules, 1998 of India"Any waste that is generated throughout the diagnosis, treatment or immunisation of human beings or animals or in analysis activities pertaining to that or within the production or testing of biological. The Government of India (notification,1998) specifies that Hospital Waste Management is a part of hospital hygiene and maintenance activities. This involves management of vary of activities, that area unit in the main engineering functions, such as assortment, transportation, operation or treatment of process systems, and disposal of waste.

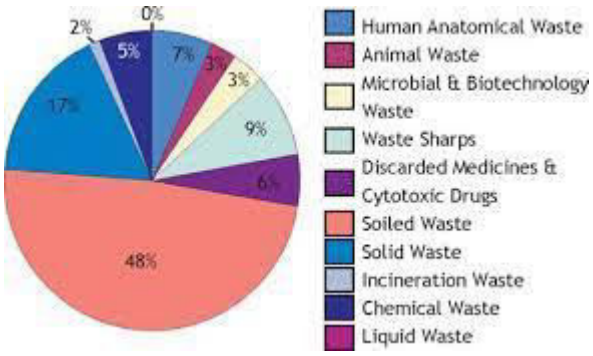
One of India's major achievements has been to vary the attitudes of the operators of health care facilities to include smart HCW management practices in their daily operations and to purchase on-the-spot waste management services from the personal sector. (Bekir Onursal, 2003) World Health Organization states that eighty fifth of hospital wastes are literally non-hazardous,whereas 100% ar infectious and five-hitter ar non-infectious however they're enclosed in dangerous wastes. regarding 15 August 1945 to thirty fifth of Hospital waste is regulated as infectious waste. This vary is dependent on the entire quantity of waste generated(Glenn and Garwal, 1999).

Sources of medicine Waste

Hospitals manufacture waste, which is increasing over the years in its quantity and kind. The hospital waste, additionally to the danger for patients and personnel UN agency handle them additionally poses a threat to public health and setting.

Minor Sources

- Physicians/ dentists' clinics
- Animal homes/slaughter houses.
- Vaccination centers.
- Acupuncturists/psychiatric clinics/cosmetic piercing.
- Funeral services.
- Institutions for disabled persons



Problems concerning medicine waste

A major issue associated with current Bio- Medical waste management in several hospitals is that the implementation of Bio-Waste regulation is unsatisfactory as some hospitals square measure doing away with waste during a haphazard, improper and indiscriminate manner. Lack of segregation practices, results in mixing of hospital wastes with general waste creating the whole waste stream unsafe. Inappropriate segregation ultimately leads to Associate in Nursing incorrect method of waste disposal. Inadequate Bio-Medical waste management therefore can cause environmental pollution, unpleasant smell, growth and multiplication of vectors like insects, rodents and worms and will cause the transmission of diseases like typhoid fever, cholera, liver disease and AIDS through injuries from syringes and needles contaminated with human. Various communicable diseases, which spread through water, sweat, blood, body fluids and contaminated organs, square measure vital to be prevented. The Bio Medical Waste scattered in and around the hospitals invitations flies, insects, rodents, cats and dogs that square measure liable for the unfold of communication illness like plague and zoonosis. Rag pickers within the hospital, searching for the rubbish square measure at a risk of obtaining tetanus and HIV infections. The recycling of disposable syringes, needles, IV sets and different article like glass bottles while not correct sterilization square measure liable for

liver disease, HIV, and other microorganism diseases. It becomes primary responsibility of Health directors to manage hospital waste in most safe and eco-friendly manner.

Biomedical Waste Management Outside INDIA

India In 2012, WHO conducted a survey on the BMWM standing of 24 countries of West Pacific space, including countries such as Japan, China, Australia, New See land, Philippines, Malaysia, Vietnam, Cambodia, Republic of Korea, Micronesia, Nauru, and Kiribati. The survey enclosed a literature search, review of publications, newspaper articles, and alternative sources of data. The standing in every country was assessed on 5 main areas of BMW, namely, management, training, policy and regulative framework, technologies enforced, and monetary resources. In the field of management, training, and policies concerning BMWM, all West Pacific countries fared satisfactory except Micronesia, Nauru, and Kiribati. solely Japan and Republic of Korea use BAT (best on the market technologies) for BMW logistics and treatment, that were well-maintained and regularly tested. Most of the countries had no or terribly less monetary resources for BMWM. Therefore, HCWM is still faraway from ideal in most of West Pacific countries, and additional backing for the enlargement of HCWM systems in countries is significant to confirm that inside consecutive decade, safe HCWM systems area unit applied. In Canada, there's variation seen within the medical waste – management practices across completely different provinces. Not all provinces have rules governing the handling.

Biomedical Waste state of affairs in India

In July 1998, initial BMW rules were notified by Government of India, by the erstwhile Ministry of surroundings and forest. In India, BMW downside was any compounded by the presence of scavengers WHO type out open, unprotected health-care waste with no gloves, masks, or shoes for use, and second, reuse of syringe while not applicable sterilization.During 2002–2004, International Clinical medical specialty Network explored the present BMW practices, setup, and framework in primary, secondary, and tertiary health care facility (HCF) in India across twenty states.They found that around eighty two of primary, hr of secondary, and 54% of tertiary HCFs in India had no credible BMWM system. In 2009, around 240 folks in Gujarat, India narrowed hepatitis B following employ of unsterilised syringes.This and lots of additional studies shows that despite India being among the primary country to initiate measures for safe disposal of BMW, there's Associate in Nursing pressing have to be compelled to take action for strengthening the present system capability, increase the funding and commitment toward safe disposal of BMW.He BMW 1998 rules were changed within the following years – 2000, 2003, and 2011. The draft of BMW rules 2011 remained as draft and failed to get notified as a result of lack of accord on categorization and standards.

TOP 5 BIOMEDICAL WASTE GENERATING STATES

State	Biomedical waste generation and disposal (kg/day)	
	Waste	Disposal
Karnataka	62,241	43,971
Uttar Pradesh	44,392	42,237
Maharashtra	40,197	40,197
Kerala	32,884	29,438
West Bengal	23,571	12,472
All India	4,05,702	2,91,983

Now Ministry of surroundings, Forest and global climate change in March 2016 have amended the BMWM rules [Table 1].These new rules have exaggerated the coverage, simplified the categorization and authorization whereas up the segregation, transportation and disposal strategies to decrease environmental pollution [Table 2]. it's four schedule, 5 forms and eighteen rules [Tables three and 4].The new medicine waste management rules are notified to with efficiency manage BMW within the country. These rules are changed to incorporate the word handling and bring additional clarity within the application. additionally, strict rules are created to make sure no stealing of recyclables item, no secondary handling or in advent scattering or spillage by animals throughout transport from the HCFs to the common BMW treatment facility (CBMWTF). There is a shot to boost assortment, segregation, transport, and disposal of waste. at the same time, the role of incinerator in increasing environmental pollution has been checked by issue new standards for incinerators and up its operations.

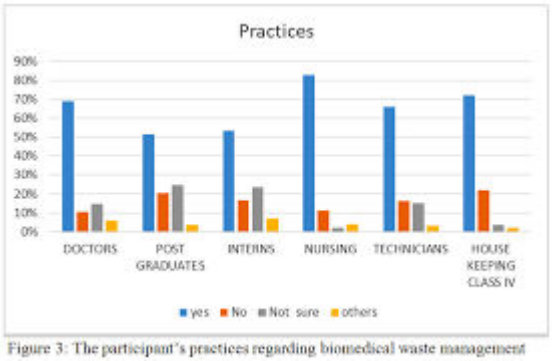


Figure 3: The participant's practices regarding biomedical waste management

Treatment and disposal techniques for medical specialty waste

There square measure many strategies that are made within the treatment of infectious waste. the subsequent square measure the methods which will show the treatment that will be offered at your facility.

The methods are: Autoclaving, Incineration, Thermal inactivation, Gas/Vapor Sterilization, Chemical Disinfection etc.

- **Autoclave**

Autoclaves square measure closed chambers that apply each heat and pressure, and typically steam, over a amount of your time to sterilize medical instrumentation. Autoclaves are used for nearly a century to sterilize medical instruments for re-use . Autoclaves square measure wont to destroy microorganisms that will be gift in medical waste before disposal in an exceedingly traditional lowland. Autoclaves may be wont to method up to ninetieth of medical waste, and square measure simply scaled to satisfy the needs of any medical organization . Little counter-top autoclaves square measure usually used for sterilizing reusable medical instruments whereas massive autoclaves ar accustomed treat massive volumes of medical waste. Steam sterilization is most effective with low-density material like plastics, metal pans, bottles, and flasks . High-density polythene and polypropene plastic mustn't be employed in this method as a result of they are doing not facilitate steam penetration to the waste load. Plastic luggage ought to be placed in an exceedingly rigid instrumentation before steam treatment to forestall spillage and drain clogging. Luggage ought to be opened and caps and stoppers ought to be untangled forthwith before they're place in the steam autoclave. Care ought to be taken to separate infectious wastes from different dangerous wastes. Infectious waste that contains non transmissible hazards mustn't be steam-sterilized . Waste that contains opposing growth medication, poisonous chemicals, or chemicals that may be gasified by steam ought to not be steam-sterilized.

- **burning**

This is tested within which there's increase temperature causes dry chemical reaction. to scale back organic & flamable waste to inorganic fire-retardant to scale back volume & weight that can't be reveled, reused or disposed in outer land fields . The drawbacks to burning embody the massive capital and operational prices for contemporary technologies. The advantage of burning isn't any Pretreatment is needed and appropriate for low heating volume on top of 2000 Kcal/Kg for single chamber & 3500 Kcal/Kg for double-chamber. The waste ought to be less moistured as but half-hour and additionally combustible .

- **Thermal inactivation**

Thermal inactivation involves the treatment of waste with high temperatures to eliminate infectious agents. This method is typically used for big volumes . Liquid waste is collected in vessel and heated by heat exchangers or a steam jacket surround the vessel. the kinds of pathogens within the waste verify the temperature and length of treatment. Once treatment, the contents are often discharged into the healthful sewer in an exceedingly manner that complies with State, Federal, and native necessities. This technique needs higher temperatures and longer treatment cycles than steam treatment.

- **Gas/vapor sterilization**

Gas/vapor sterilization uses gaseous or volatilized chemicals because the sterilizing agents. ethene chemical compound is that the most commonly used agent, however ought to be used with caution since it's a suspected human matter. as a result of ethene oxide could also be adsorbable on the surface of treated materials, the potential exists for employee exposure once sterilized materials ar handled .

- **Chemical medical aid**

Chemical medical aid is that the most popular treatment for liquid infectious wastes. take into account the following: style of microorganism , Degree of contamination , quantity of supermolecule material gift, style of disinfectant, Contact time , different relevant factors like temperature, pH, commixture necessities, and therefore the biology of the organism final disposal of with chemicals treated waste ought to be in accordance with State and native necessities.

- **Disposal of treated waste:**

Infectious waste that has been effectively treated isn't any longer biologically dangerous and will be mixed with the

disposed of as standard solid waste, provided the waste doesn't create different hazards that ar subject to federal or state rules..

EPA recommends:

• Contacting state and native governments to spot approved disposal choices.

• Discharge of treated liquids and pathological wastes (after grinding) to the healthful sewage system.

• Approval of the native sewer authority should be obtained.

CONCLUSION

BMWM ought to be a shared cooperation with committed government backing, smart BMW practices followed by each each staff and HCFs, continuous monitoring of BMW practices, and powerful general assembly. It is our elementary right to measure in clean and safe environment. The pillar of BMWM is segregation of waste at supply and WR. this BMWM 2016 rules ar Associate in Nursing improvement over earlier rules in terms of improved segregation, transportation, and disposal strategies, to decrease environmental pollution and make sure the safety of the workers, patients, and public. Moreover, additional use of non-PVC medical devices and development of newer novel, eco- friendly systems for disposal of BMW ought to be inspired. All participants in BMWM ought to pledge to guarantee a cleaner and greener setting.

quantity of hospital waste and proportion of infection waste is certainly over one would expect in Asian nation thanks to extensive use of medical and non-medical disposals. Most of the waste generated in

hospitals, as well as waste matter is not any over general municipal waste. Therefore, hospital waste ought to be quarantined into risk wastes and non- risk wastes and disposed off consequently. The last century witnessed the fast mushrooming of hospitals within the public and personal sector, dictated by the requirement of the increasing population, and also the advent and acceptance of “disposable” has created the generation of hospital waste a big think about gift hospitals.

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