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REVIEW OF LITERATURE
NEED/IMPORTANCE OF THE STUDY
STATEMENT OF THE PROBLEM
OBJECTIVES
HYPOTHESIS (ES)
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RESULTS & DISCUSSION
FINDINGS
RECOMMENDATIONS/SUGGESTIONS
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A STUDY ON WASTE MANAGEMENT PRACTICES IN PRIVATE HOSPITALS IN KHAMMAM DISTRICT

LAGADAPATI LAKSHMANA PRASAD
MANAGEMENT STUDENT
K L UNIVERSITY BUSINESS SCHOOL
K L UNIVERSITY
GREEN FIELDS

P V VIJAY KUMAR REDDY
ASST. PROFESSOR
K L UNIVERSITY BUSINESS SCHOOL
K L UNIVERSITY
GREEN FIELDS

ABSTRACT

Hospital waste management is an imperative environmental and public safety issue, due to the waste's infectious and hazardous character. This paper examines the existing waste strategy of hospital in with a bed capacity. The segregation, collection, packaging, storage, transportation and disposal of waste were monitored and the observed problematic areas documented. The wastewater's toxicity was also investigated. During the study, omissions and negligence were observed at every stage of the waste management system, particularly with regard to the treatment of infectious waste. Inappropriate collection and transportation procedures for infectious waste, which jeopardized the safety of staff and patients, were recorded. However, inappropriate segregation practices were the dominant problem, which led to increased quantities of generated infectious waste and hence higher costs for their disposal. Infectious waste production was estimated using two different methods: one by weighing the incinerated waste. Furthermore, measurements of the parameter in wastewater samples revealed an increased toxicity in all samples. Proposals recommending the application of a comprehensive hospital waste management system are presented that will ensure that any potential risks hospital wastes pose to public health and to the environment are minimized.

KEYWORDS

transportation, collection, public health, environment, biomedical waste management.

INTRODUCTION

Biomedical Waste Management The disease causing potential of biomedical waste is greatest at the point of generation and naturally tapers off after that point, thus presenting more of an occupational concern more than a generalized environmental concern. Risk to the public of the disease caused by exposure to medical waste is likely to be much lower than risk by occupationally exposed individual. There is no scientific evidence of disease transmission from medical waste via environmental media. Several factors limit the potential for disease transmission from biomedical health facility wastes. Biomedical waste management is a process that ensures proper hygiene in the health institution and safety of healthcare workers and communities (Sanitation Connection, Johannes Sen et al. opine that proper management of medical waste can minimize the risk, both within and outside healthcare facilities. The first priority is to segregate wastes, preferable at the point of generation into reusable and non-reusable, hazardous and non-hazardous components. The identified important steps are, the institution of a sharps management system, waste reduction, avoidance of hazardous substances wherever possible, ensuring worker safety, providing secure methods of waste collection and transportation, and installing safe treatment and disposal mechanisms.

The medical waste management processes include handling, segregation, mutilation, disinfection, storage, transportation and final disposal. These are vital steps for safe and scientific management of medical waste in any establishment. The key to minimization and effective management of medical waste is segregation (separation) and identification of the waste. The most appropriate way of identifying the categories of medical waste is by sorting the waste into colour-coded plastic bags or containers. Medical waste should be segregated into containers/ bags at the point of generation Rao et al.

The WHO suggests that hospitals should provide plastic bags and strong plastic containers for infectious waste, such as empty containers of antiseptics used in the hospital (Press et al., 1999). General waste like garbage, garden refuse etc. should join the stream of domestic refuse. Sharps should be collected in puncture-proof containers. Bags and containers for infectious waste should be marked with Biohazard symbol. Highly infectious waste should be sterilized by autoclaving. Cytotoxic wastes are to be collected in leak proof containers clearly labelled as cytotoxic waste. Needles and syringes should be destroyed with the help of needle destroyer and syringe cutters

provided at the point of generation. Infusion sets, bottles and gloves should be cut with curved scissors. Medical waste should be transported within the hospital by means of wheeled trolleys, containers or carts that are not used for any other purpose. The trolleys have to be cleaned daily. Offsite transportation vehicle should be marked with the name and address of carrier. Biohazard symbol should be painted and suitable system for securing the load during transport should be ensured. Such a vehicle should be easily cleanable with rounded corners. Transportation of medical waste on public roads must be carried out by trained staff in a dedicated vehicle with closed containers.

All disposable plastic should be subjected to shredding before disposing off to vendor. Final treatment of medical waste can be done by technologies like incineration, autoclave, hydrolase or microwave. Some of the more common treatment and disposal methods utilized in the management of infectious healthcare wastes in developing countries are: autoclaves and retorts; microwave disinfection systems; chemical disinfections; combustions (low, medium, and high technology); and disposal on land (dump site, controlled landfill, pits and sanitary landfill)

PROBLEM RELATED TO WASTE MANAGEMENT

The problem of waste management in hospitals are it hospitals are it become an issue of increasing concern promoting hospital administration to seek new ways of scientific safe. The need of proper hospital waste management of prime importance and is essential component of quality assurance in hospitals

SOLUTION TO WASTE MANAGEMENT

Alternative solution is incinerators by using incinerators 60% of waste can be reduced.

Incineration is the preferred method for disposing of pathological and infectious waste.

Manufactures of medical suppliers should be encouraged to supply products that have a smaller impact on the environment. Bio medical waste has become serious health hazards in many countries, including India. Careless and indiscriminate disposal of this waste by health care establishments and research institutions can contribute to the waste by health care establishments and research institutions can contribute to the spread of serious diseases such as hepatitis and aids (HIV). The study shows that infectious and noninfectious wastes are dumped together with in the hospital premises resulting in mixing of the two which are than

in disposal of with municipal waste at the dumping sites in to the city. All types of waste are collected in common bins places outside the patient's wards in the hospitals.
The major problem arises when the hospital refuse is dumped in the open and is mingled with domestic waste leading to various types of hazardous. The exposure to infectious and hazardous hospital waste can cause serious health problems to those who handle it, particularly to waste collection. This can also become a source of many communicable diseases of healthcare waste are categorized as infectious and noninfectious. Infectious waste includes human tissues, body fluids, sharp-edged and glass pieces many of which may be contained. Infectious waste is generated from laboratory work and waste from surgery with infectious diseases. The hospital refuse can also become harmful when reusable items. It is very important to segregate the waste before treatment and disposal because this helps to identify hazardous and potentially infectious waste and there by reduces overall handling cost. The study concludes that healthcare waste management should go beyond data compilation enforcement of regulations and acquisition of better equipment. It should be supported through appropriate education, training and the commitment of the health care staff, and the health care managers with in effective policy and legislative frame work.

STANDARDS FOR BIOMEDICAL WASTE DISPOSAL SITES

According to regulation 47 no person shall be issued with a license to operate a biomedical waste disposal site or plant unless such site or plant complies with the requirements set out in the Third and Tenth Schedule to these Regulations. The Mater Hospital does not have a biomedical waste disposal site as all the waste segregated or treated either by incineration, chemical treatment or autoclaving is usually disposed of by a contracted private waste company and there are no burial sites and neither do wastes get burnt openly at the premises.

POLICIES AND PROCEDURES SHOULD BE MADE AVAILABLE TO ALL WASTE HANDLERS AND SHOULD INCLUDE THE FOLLOWING

a) Strategies for minimizing the quantities of biomedical waste generated and disposed of;
b) Methods of segregating, packaging, labeling, moving, storing, treating, and transporting the various waste types (both on- and off-site, as appropriate);
c) Methods for keeping records of the quantities of biomedical waste generated, treated, and disposed of;
d) A list of all regulations and legislation concerning biomedical waste that is applicable
e) A list of those responsible for managing biomedical waste in the event of an accident or spill; and
f) Provision for regular, ongoing staff instruction about proper handling and potential hazards of biomedical waste.
In assessing awareness on how the hospital controls the large volume of waste that would require the use of most of the land available on landfills 49% of the respondents are aware that the waste is incinerated but 43% do not know how the waste is handled. The remaining 8% split in 2% for each category are aware that there should be no wastage of paper particularly the hand paper towels, recycling and manure generation and private waste disposal. The results indicate that a satisfactory percentage of the staff 57% are aware of the means to waste reduction and offsite disposal which does not allow for landfill usage at the hospital.
From observations and informal interviews, it was noted that Mater Hospital has an online system used for all stages of patient's services that is paperless and therefore minimizes the amount of paper used. However, this system is not used in the consultant's clinic and the doctors' plaza. Paper waste which mainly came from packaging and writing materials was shredded at the hospital then collected by the private waste company for recycling. As the hospital does not have a BMW disposal site or plant, the large volume of waste that has been given the necessary treatment is collected daily by the private waste disposal company and there is no BMW heaped up at the hospital therefore, does not pose any environmental threat at the facility.

OBJECTIVES

1. TO examine and review existing environmental, social, organizational, aspects of medical waste project.
2. TO suggest an efficient system having the ability to collect manage and dispose waste management properly
3. TO suggest appropriate methods of disposing waste management to reduce the evolution of toxic chemicals in to environment.
4. We include volume reduction, disinfection, or other changes of composition to reduce hazards to health and environment.
5. After such treatment the residues can be handled safely, transported, stored and disposed of.

THE SCOPE OF THE STUDY

The study focused on the Khammam Hospital in industrial area in not considering the other sub-branches. Neither did it consider other hospitals nearby whether public or private. It mainly covered the healthcare wastes generated at the hospital and the management practices implored at the facility, assessing its compliance with EMCA regulations. This also included the general wastes from the offices, public area and the kitchen within the hospital but not wastes outside the Facility. Therefore, the waste management practices of the waste handling company subcontracted by the facility to dispose of the wastes outside the facility were not considered. Various departments of the facility were covered including the casualty, wards, consultants' clinics, doctors' plaza, theatres, dialysis unit, laboratories, x-ray, pharmacy, administration offices, nursing school, laundry and kitchen.

LIMITATIONS

There were many limitations during the field research as the hospital management took too long to allow the researcher to start the field work since there are specific dates set for looking at the research project requests. The researcher was also expected to visit the hospital on specific days when the Quality Assurance manager and key informant interview guide (head of housekeeping) were available according to their schedule which brought a lot of delays as the researcher also was on fulltime employment and had to ask for leave in order to make the field visits. Some departments were also restricted and the researcher could not take photos like the theatre, wards and the dialysis unit, and the researcher could only take notes on the information given.

REVIEW OF LITERATURE

In developing countries, hospital waste is typically derived from two main sources: emergency relief donations and long-term healthcare services. The aim of healthcare services is to reduce health problems as well as prevent potential risk. As a result, waste, which is potentially harmful to public health and the environment, are often generated. Leftover emergency relief donations normally create one of medical care waste issue, and can be dealt with in the same manner as long-term healthcare services management waste. The World Health Organization defines hospital waste as the total waste stream from health care establishments, research facilities, laboratories, and emergency relief donations. A number of studies have indicated that the inappropriate handling and disposal of hospital waste poses health risks to health workers who may be directly exposed and to people near health facilities, particularly children and scavengers who may become exposed to infectious wastes and a higher risk of diseases like hepatitis and HIV/AIDS. The World Health Organization estimates that each year there are about 8 to 16 million new cases of Hepatitis B virus (HBV), 2.3 to 4.7 million cases of Hepatitis C virus (HCV) and 80,000 to 160,000 cases of human immune deficiency virus (HIV) due to unsafe injections and mostly due to very poor waste management systems A near total absence of institutional arrangements for HCW in has been reported by others. In effect, various methodologies have been used all over the world to assess and quantify Hospital waste. They include the use of physical observation, questionnaire
Administration and quantification as well as checklists and private and public records. Recent studies in has estimated waste generation. A good example is given by the findings of the study in which reported the similarity in waste data and Hospital management practices in two General hospitals, characterized by a lack of waste minimization or waste reduction strategies, poor waste segregation practices, lack of instructive posters on waste segregation and disposal of hospital waste with general waste. And also a study carried out in Ibadan Nigeria reveals that there is a near total absence of institutional arrangement for hospital waste in. The mismanagement of hospital waste poses health risks to people and the environment by contaminating the air, soil and water resources. Hospitals and Primary

health care centers are supposed to safeguard the health of the community. A Primary Health Care Centers had a transport vehicle also 8% of PHCs had an established dumpsite. More than 90% of the hospital waste generated in is directly disposed on land in an unsatisfactory manner. Therefore, information on the amount of hospital waste and its management practices. To improve monitoring and compliance with environmental standards.

METHODOLOGY

Inceration-The low quantity inheritors that have been installed in hospitals cause more than harm than good. The incerators presently in use in the hospitals of the to reduce the amount of garbage. These incerators are mostly single chambed and do not reach temperature more than 300c.

TYPES OF INCINERATORS

Waste incinerators are used to destroy solids, sludge's, liquids, and tars. Depending upon the physical, chemical characteristics of the waste and the handling they require, different incinerator designs will be applied. Solids, sludge's, and tars are incinerated in fixed-hearth and rotary kiln incinerators. Liquids may also be burned in these systems and used as support fuel. In many plants where liquids are the primary wastes, liquid injection incinerators are used. Boilers, process furnaces, cement kilns, and lightweight aggregate kilns also utilize the energy available from liquid wastes and burn liquid wastes as well as the fossil fuels (natural gas and oil).

FIXED-HEARTH INCINERATORS

Fixed-hearth incinerators are used extensively for medical and municipal waste incineration. Fixed hearths can handle bulk solids and liquids. A controlled flow of "under fire" combustion air (70 to 80 percent of the theoretical air required) is introduced up through the hearth on which the waste sites. Bottom ash is removed by dumping into a water bath.

Unburned combustibles and high levels of carbon monoxide and hydrogen exit above the hearth. These volatiles are oxidized in the combustion zone where over fire air provides sufficient excess air and residence time at temperature to ensure complete burnout. The three Ts of combustion and oxygen provide high combustion efficiency. Natural gas or oil is supplied to maintain temperatures as high as 2,000°F. In some large municipal waste combustors, called waste-to-energy plants, heat recovery boilers are used to generate steam for electric generation. These plants are also referred to as trash-to-steam plants. All incinerator systems are now regulated by exhaust emissions. Air pollution control systems are installed to control emissions of particulate matter including metals and ash, hydrocarbons including dioxins and furans, and acid gases created from the combustion of wastes containing chlorine, sulphur, phosphorous, and nitrogen compounds.

ROTARY KILN INCINERATION

Solid wastes as well as liquid wastes generated by industry are destroyed by on-site and commercial-site rotary kiln incinerator systems. The rotary kiln is a cylindrical **refractory** -lined shell that is rotated to provide a tumbling and lifting action to the solid waste materials. This exposes the waste surface to the flames from fuel burning as well as liquid waste burning in the rotating kiln. Flames will also be generated over the surface of waste solids exposed to the heat and incoming air. Pumpable sludges and slurries are injected into the kiln through nozzles. Temperatures for burning vary from 1,300 to 2,400°F. Lower temperatures are often necessary to prevent slagging of certain waste materials.

The rotary kiln provides excellent mixing through a rotating-tumbling action that distributes heat evenly to all the waste materials contained within it. The kiln is the primary combustion chamber

(PCC) where organic compounds in the wastes are **volatilized** and **oxidized** as air is introduced into the kiln. The unburned volatiles enter the secondary combustion chamber (SCC) along with

the hot products of combustion from the PCC where additional oxygen is introduced and ignitable liquid wastes or fuel can be burned. Complete combustion of the volatized waste from the PCC, liquid wastes and fuel occurs in the SCC.

LIQUID INJECTION

The chemical industries generate liquid wastes that contain toxic organics. Typical wastes from the agricultural and pharmaceutical plants may contain compounds such as chlorinated benzenes, vinyl chloride, toluene, phosphorous, and naphthalene. On-site liquid injection incinerators are used to destroy these wastes. Liquid injection incinerators are refractory-lined

INCINERATION

It is a waste treatment process that involves the combustion of organic substances contained in waste materials. Incineration and other high-temperature waste treatment systems are described as "thermal treatment". Incineration of waste materials converts the waste into ash, flue gas, and heat. The ash is mostly formed by the inorganic constituents of the waste, and may take the form of solid lumps or particulates carried by the flue gas. The flue gases must be cleaned of gaseous and particulate pollutants before they are dispersed into the atmosphere. In some cases, the heat generated by incineration can be used to generate electric power.

Incineration with energy recovery is one of several waste-to-energy (WTE) technologies such as gasification, pyrolysis and anaerobic digestion. While incineration and gasification technologies are similar in principle, the energy product from incineration is high-temperature heat whereas combustible gas is often the main energy product from gasification. Incineration and gasification may also be implemented without energy and materials recovery.

Research Design This study examined the biomedical waste management practices and planned as a single case study of the facility. It adopted an observational and descriptive research design. This design described the current situation of the Hospital if the hospital is complying with the biomedical waste management rules and regulations as described in the Environmental Management and Coordination Act 1999 as well as Environmental Management and Coordination.

(Waste Management) Regulations 2006. This involved surveys and fact-finding of different kinds.

In several countries, there are still concerns from experts and local communities about the environmental effect of incinerators (see arguments against incineration).

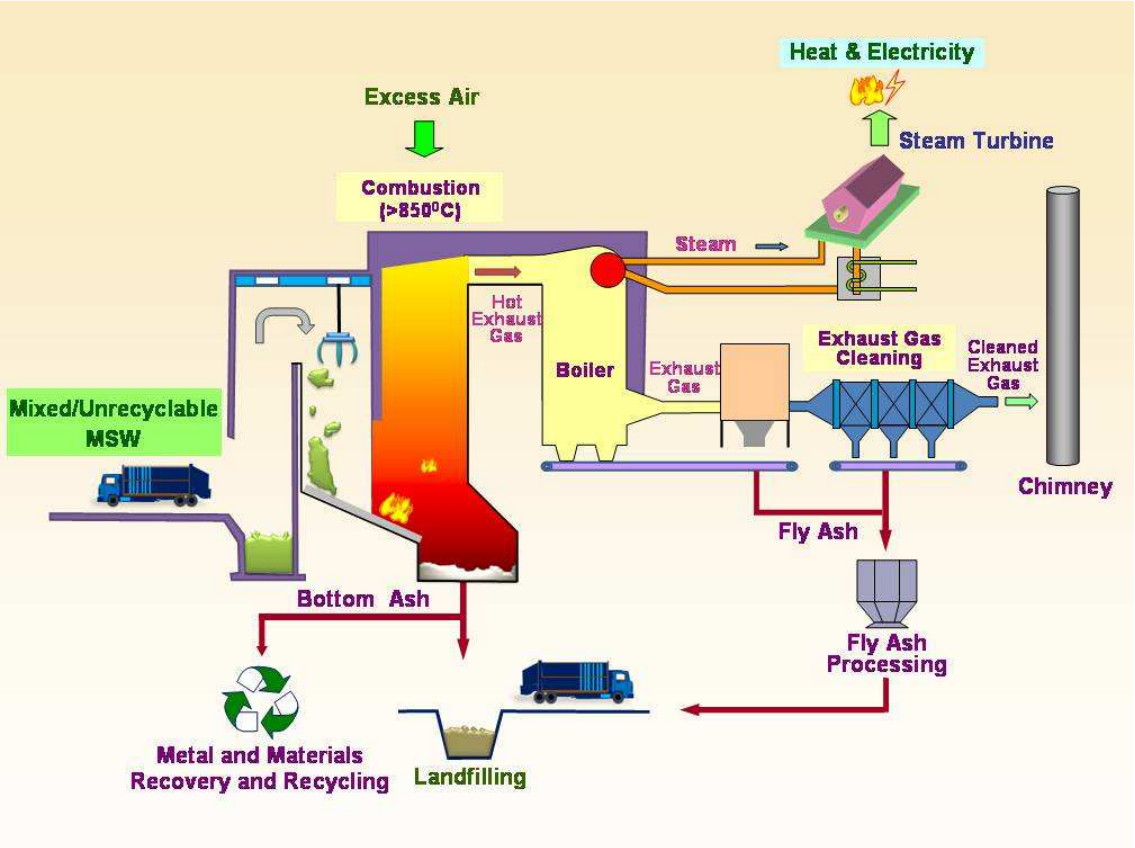
In some countries, incinerators built just a few decades ago often did not include a materials separation to remove hazardous, bulky or recyclable materials before combustion. These facilities tended to risk the health of the plant workers and the local environment due to inadequate levels of gas cleaning and combustion process control. Most of these facilities did not generate electricity.

Incinerators reduce the solid mass of the original waste by 80–85% and the volume (already compressed somewhat in garbage trucks) by 95–96%, depending on composition and degree of recovery of materials such as metals from the ash for recycling. This means that while incineration does not completely replace land filling, it significantly reduces the necessary volume for disposal. Garbage trucks often reduce the volume of waste in a built-in compressor before delivery to the incinerator. Alternatively, at landfills, the volume of the uncompressed garbage can be reduced by approximately 70% by using a stationary steel compressor, albeit with a significant energy cost. In many countries, simpler waste compaction is a common practice for compaction at landfills.

Incineration has particularly strong benefits for the treatment of certain waste types in niche are as such as clinical wastes and certain hazardous wastes where pathogens and toxins can be destroyed by high temperatures. Examples include chemical multi-product plants with diverse toxic or very toxic wastewater streams, which cannot be routed to a conventional wastewater treatment plant.

Waste combustion is particularly popular in where land is a scarce resource. Have been leaders in using the energy generated from incineration for more than a century, in localised combined heat and power facilities supporting district heating schemes. In 2005, waste incineration produced 4.8% of the electricity consumption and 13.7% of the total domestic heat consumption in A number of other rely heavily on incineration for handling municipal waste.

PICTURE 1



GENERAL

In the process of health care, waste generated is usually includes sharps, human tissues or body parts and other infectious materials. As a result of developing healthcare technology, the amount of hospital wastes being generated is increasing due to the use of more disposable products. The waste produced in the course of health-care activities carries a higher potential for infection and injury than any other type of waste. Environment and natural resources can be polluted, and consequently human beings, animals and plants can be impacted.

CHARACTERISTICS OF BIOMEDICAL WASTE

Biomedical waste is defined as any solid, fluid or liquid waste including container and any intermediate product, which is generated during diagnosis, treatment or immunization of human beings or animals or in research activities or in the production or testing of biological products [Biomedical Waste (Management and Handling) Rules 1998]. Hospital

Wastes include different kinds of wastes such as infectious, radioactive, chemical, heavy metals and regular municipal wastes (DoE 1998). Biomedical waste can be categorized based on the risk of causing injury and/or infection during handling and disposal. Wastes targeted for precautions during handling and disposal include sharps (needles or scalpel blades),

Pathological wastes (anatomical body parts, microbiology cultures and blood samples) and infectious wastes (items contaminated with body fluids and discharges such as dressing, catheters and I.V. lines). Other wastes generated in healthcare settings include radioactive wastes, mercury containing instruments and polyvinyl chloride (PVC) plastics. These are among the most environmentally sensitive by-products of healthcare (Remy 2001). WHO (1999, 2001, 2004) stated that 85% of hospital wastes are actually nonhazardous, around 10% are infectious and around 5% are non-infectious but hazardous wastes. In, about 15% of hospital waste is regulated as infectious waste. In India this could range from 15% to 35% depending on the total amount of waste generated (Glenn and Grewal 1999

FINDINGS

The findings show indicates that majority of the respondents fell between the ages years with from the distribution, Majority of the respondents with of the respondents were having 9 and above unit in their hospitals. Majority of the respondents participate in the study were having 20 beds in their hospital. The average number of inpatient per day were while highest average number of outpatient per day. The majority of the respondents were community health worker's para-medics The above findings illustrate those factors like sex, age, place of residents/work, profession, number of patients visits the hospital may influence the potential risk to health and the environment from improper handling of waste from hospital and clinics. The study is in line with various studies in the literature which indicated an association between factors such as sex, age, profession, work place, non-challenge, and deliberate negligence on part of the waste handlers. Unfortunately, hospital waste management is not yet carried out with a satisfactory degree of safety by the staff in many parts of the globe especially in the underdeveloped world. Hospital waste segregation is an important step in reducing the volume of hazardous waste as its offers the ability to make accurate assessment of composition using labeled bags. Results from the research revealed that of the hospital survey segregate only sharps using safety box. This is in congruence with the study conducted by Majority of waste is collected daily by hospital attendant and cleaners transported within the hospital premises mainly with the use of bare hands. Only use wheel barrow to transport waste within the hospitals. Which is contrary to the study of in a teaching hospital and 2 maternity hospitals it was reported that waste moved three times daily to coincide with the shift changes by ground staff. These wastes were packed into a temporary storage area from where the waste transporter comes to collect it for disposal every morning. This variation could be explained by the fact that the wastes generated by the tertiary hospitals were greater than those obtained in this study, and also the availability of more staff in the tertiary hospitals.

SUGGESTIONS

1. They have to use proper bag for collecting bio-medical wastes from the hospital for not getting effected within the hospital premises.
2. Every hospital should conduct awareness programs weekly once on waste management.
3. The auditors should check the records every month to know the status of the hospital.

CONCLUSION

The bio-medical waste generated from the hospitals and all other source will be treated without polluting the environment. Incineration of bio-medical waste is one of the techno economical scheme, which have advantages such as weight reduction.

Expect persons should be recruited by the management. Then only we can reduce the bio-medical waste. Proper collection and segregation of waste management is important. There is not enough information on waste management technologies and its impact on public health and environment. Practice of proper medical waste disposal and management is also inadequate. Arrangement of proper training programme of hospital staff evolution of hospital waste management interventions. The need for health care waste management planning to facilitate the implementation of necessary measures to improve the present health care waste management situation. Bio medical waste generated from the hospitals and all other source will be treated without polluting the environment. Incretion of bio medical waste is one of the techno economical scheme, which have many advantages such as weight reduction.

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