

Health Care Waste Management Practices in Private Hospitals in Chennai

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Abstract

Objective: To assess health care workers' involvement in health care waste management in private hospitals.

Methods: Questionnaires were administered to randomly selected health care workers from selected private hospitals

Results: Among 105 health care workers that participated in the study, 25 (23.8%) were doctors, 5 (4.7%) were pharmacists, 25 (23.8%) were medical laboratory scientist, 25 (23.8%) were waste disposer and 25 (23.8%) were nurses. Knowledge about health care waste disposal system among the participants were above average 76 (72.3%), 59 (57.4%) health care workers were aware of health care waste disposal system but the nurses and medical laboratory workers were more aware of waste management system than other health workers. The level of waste generated is quite moderate among more than 25 bedded private hospitals and waste management practice is also in moderate level. The materials for health care waste disposal management were adequately provided in private hospitals. Only few health care workers aware of the existence of health care waste management committee exist in their institutions. The existence of the committee was very low in the private hospitals.

Conclusion: Though the private hospital provided adequate material for waste management, segregation practice is in moderate level. The existence of infection control and waste management committee is unsatisfactory.

Keywords: Health Care workers, Waste management, Infection control

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I. Introduction

Health care activities, although protect and restore health as well as save lives, generate a lot of wastes and by-products that can impact on both health and environment [1]. Wastes that emerge from health care institutions are named as hospital wastes, and cause considerable environment pollution. Such wastes represent significant health risks for the hospital employees, patients and the society. Hospital wastes are categorized as household wastes, medical wastes, chemical wastes, infective wastes, chemical wastes and radioactive wastes. Surveys carried out by various agencies show that health care establishments in India are not giving due attention to their waste management. The need for treating BMW was not taken up as a serious issue till the late 90's. However, the initiatives taken up led to the formulation of the 'Bio-medical Waste – Handling and Management Rules – 1998' which was amended in 2000 by the MoEF and taken forward by the Central Pollution Control Board. After the notification of the Bio-medical Waste (Handling and Management) Rules, 1998, these establishments are gradually streamlining the process of waste segregation, collection, treatment, and disposal. The MOEF in 2011 indicated that 13,037 health care facilities in the country have been found to be in violation of BMW generation and disposal rules (Table 1). The figures show that Maharashtra ranks first (4,667) followed by Bihar (1,221) and Kerala (1,547).[2] Health care waste is a by-product of health care that includes sharps, non-sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and radioactive materials [3].

II. Hospital Waste Classification

Municipal solid wastes

General waste like the domestic waste includes paper, diapers, plastic cups, food etc. This waste remains non-infectious if managed properly and not brought in contact with the infectious wastes.

Hazardous solid wastes

Includes laboratories and pharmaceutical chemicals and containers including discarded medicines, disinfectants, alcohols, anti-neoplastic agents, heavy metals etc.

Biomedical solid wastes

These are hazardous in nature and commonly referred as clinical and pathological wastes. The cultures, stocks of infectious agents, associated biologicals, human blood and blood products, contaminated sharps, ambulated body parts, isolation waste. Further, the BMW is grouped into 10 categories for the proper handling, thereby making it non-hazardous to people and environment [4].

Table-1

Option	Treatment & Disposal	Waste Category
Category 1	Incineration /deep burial	Human Anatomical Waste (human tissues, organs, body parts)
Category 2	Incineration /deep burial	Animal Waste, tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals / colleges, animal houses)
Category 3	Local autoclaving/ micro waving/ incineration	Microbiology & Biotechnology waste (laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents)
Category 4	Disinfections (chemical treatment /autoclaving/micro waving and mutilation shredding	Waste Sharps (needles, syringes, scalpels blades etc.) fable
Category 5	Incineration / destruction and drugs disposal in secured landfills	Discarded Medicines and Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)
Category 6	Incineration, autoclaving/micro waving	Solid Waste (Items contaminated with blood and body fluids including cotton, dressings, soiled plaster casts, line beddings)
Category 7	Disinfections by chemical treatment autoclaving/micro waving& mutilation shredding.	Solid Waste (waste from disposable items other than the waste sharps such as tubing, catheters, intravenous sets etc.)
Category 8	Disinfections by chemical treatment and discharge into drain	Liquid Waste (waste from laboratory and washing, cleaning, house-keeping and disinfecting activities)
Category 9	Disposal in municipal landfill	Incineration Ash (ash from incineration of any bio-medical waste)
Category10	Chemical treatment and discharge into drain for liquid and secured landfill for solids	Chemical Waste (chemicals used in production of biological, chemicals, used in disinfection, as insecticides, etc.)

III. Segregation

Segregation reduces the waste management problem to 15%. Segregation is done accordingly to colour coded bags (Table 2) which ensures handling and proper management of wastes and minimizes further handling of the wastes till the time of treatment. Segregation reduces risk of infecting workers, costs of treatment, risk of infecting community at large, recycle, and reuse of non-infectious waste. Though, the hospital waste generated is about 2 kg/bed/day, only 0.25 to 0.3 kg/bed/day of it is infectious. Therefore, about 10 to 15% of the total waste generated at the health care establishment is infectious in nature.

As per MOEF rules, the wastes cannot be stored for more than 48 hours. Hence, the authorized recyclers’ collect the waste on daily basis. The collected wastes are placed in closed containers enclosed in a specially designed containerized vehicle and transported.

Table:2

Color Coding	Type of Containers	Treatment Options
Red	Disinfected Container/ Plastic bag	Autoclaving/Micro waving/ Chemical Treatment
Blue/ White translucent	Plastic bag/puncture proof container	Autoclaving/Micro waving/ chemical treatment and destruction/shredding
Black	Plastic bag	Disposal in secured landfill
Yellow	Plastic bag	Disposal in secured landfill

Source: http://www.mppcb.nic.in/Bio_Categories

Every year, an estimated 16 000 million injections are administered worldwide, but not all of the needles and syringes are properly disposed of afterward. Health-care waste contains potentially harmful microorganisms which can infect hospital patients, health-care workers and the general public. According to the official regulation, the Ministry of Environment is responsible for the dispersion of the trainings on waste disposal. Relevant legislation assigns to the Head doctor with the responsibility for the organization of the waste management training system in health care institutions. However, the trainings on HCWMS are organized by the Head Nurses, Assistant Head Nurses or Hospital Managers, and subjects taught by head nurses in charge of organizing training .

Even hazardous health care wastes are not properly managed, it could lead to infections, infertility, genital deformities, cancers, mutagenicity, dermatitis, asthma and neurological disorders in children; typhoid, cholera, hepatitis, AIDS and other viral infections through sharps contaminated with blood [4]. The people at risk of health care hazardous waste include all health care workers, patients, visitors, workers in waste disposal management, administrative staffs and scavengers'. The adverse effects of health care wastes are usually not attributed to them unless a careful and thorough investigation is carried out. Improper handling of solid waste in the hospital may increase the pathogenic aerosol, which may adversely affect the hospital environment and community [5].

The hazard in a health care setting includes exposure to body fluid such as blood, saliva, urine, CSF that may hold infectious materials such as hepatitis B and C, HIV, influenza or other blood-borne or body fluid pathogens [6]. Previous studies show that in many of the private hospitals health care waste management is followed without proper training of health care workers by trained staffs. Hence this research aims to find out the health care waste management in private hospitals of Chennai

IV. Materials and methods

Study participants

A total of 105 different health care workers, were administered questionnaires out of which 25 (23.8%) were doctors, 5 (4.7%) were pharmacists, 25 (23.8%) were medical laboratory scientist, 25 (23.8%) were waste disposer and 25 (23.8%) were nurses. The inclusion criteria were that the participants must have worked in the hospital for minimum of one year in private hospitals and may be working at any of the following department of the hospital: the medical, surgical, surgery/gynecology, neonatology/pediatrics wards, Operation Theater, intensive care unit, blood bank/hematology, pathology, microbiology, histopathology laboratories, waste disposing unit and pharmacy units. After getting informed consent, questionnaire was given to participants and the data was collected.

V. Method of Data Analysis

Data was analyzed using SPSS version 17.0. Frequency distribution of variables was calculated. Chi-square was used to test association between the independent variables and their outcomes. The cut-off point for statistical significance was set at 5% ($P < 0.05$).

VI. Results

Among the health care workers that participated in the study, 25 (23.8%) were doctors, 5 (4.7%) were pharmacists, 25 (23.8%) were medical laboratory technologists, 25 (23.8%) were waste disposers and 25 (23.8%) were nurses. Figure 1 shows the number of health care workers participated from different private hospitals. Table 1 shows the percentage of participant have knowledge and awareness on health care waste disposal system (HCWDS). There was significant difference ($P = 0.001$) in the level of knowledge and awareness of workers between the private institutions being compared.

Figure-1

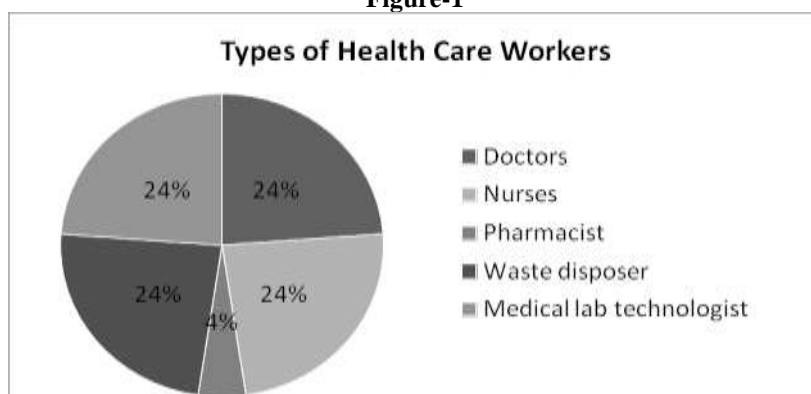


Table -3: Knowledge and awareness of Health care workers on HCWDS.

Types of Health care workers	Knowledge on HCWDS (%)	Awareness on HCWDS (%)
Doctors	35	65
Nurses	55	78
Pharmacist	50	70
Waste disposer/handlers	75	85

Medical lab technologist	85	90
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Table 4 shows the analysis of health care workers that have attended training on HCWDS. The study showed that only 34 (32%) participants in the study had attended training on HCWDS.

Table-4: Training attended on HCWDS

Types of Health Care workers	Training attended on HCWDS (%)
Doctors	2(8)
Nurses	3(12)
Pharmacist	0(0%)
Waste disposer	15(60)
Medical lab technologist	14(56)

Figure 2 shows the participants' knowledge of the existence of HCWDS in their hospitals. The study showed that 56(53%) of workers in private hospital workers confirmed the existence of Health care waste disposal system in their hospitals and rest of the study participants saying that HCWDS did not exist or did not know. Generally, the percentage that answered yes was 53% which was above average, indicating the existence of HCWDS in the hospitals.

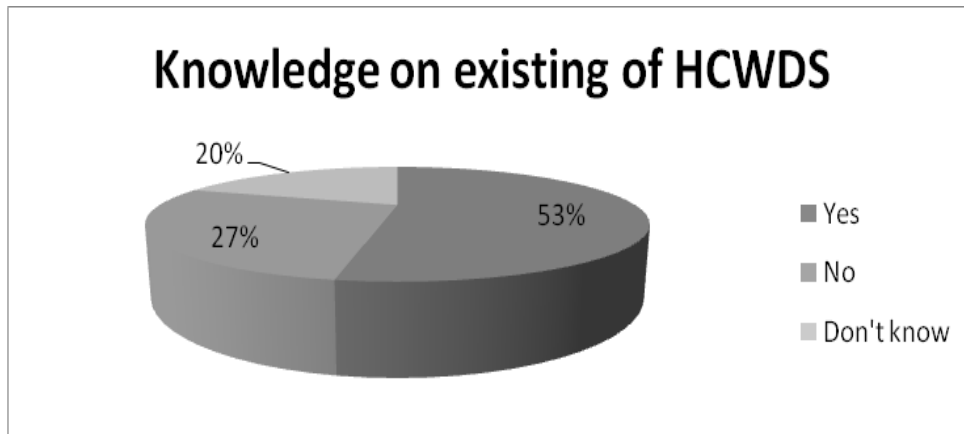


Figure2. Knowledge on existence of HCWDS in the hospitals.

Table 5 shows the availability of materials for health care waste disposal. The study showed that 62 (59%) of the workers answered 'always', 38 (36%) told 'mostly' and 5 of them answered 'rarely'.

Availability of Material for Waste management	Response from the participants
Always	62(59%)
Mostly	38(36%)
Rarely	5 (4.7%)

Table-5: Availability of Material for Waste Management

Generally, the availability for health care waste disposal in private hospitals was in moderate level. Materials for waste disposal always available only in 59% of the private hospitals and very few hospitals were maintaining inadequate material. World Health Organization guideline for disposal of sharps said that it should be disposed in puncture proof containers with yellow color marked "sharps". The study showed that 75% of workers disposed straight into puncture proof boxes which complied with the rule. The knowledge of the study participants on the existence of health care waste management/infection control committee in their hospitals was very poor. The study showed that the existence of the committee was very low in the private hospitals.

VII. Discussion

Health-care waste management system in India is receiving greater attention due to rules and regulations of the Biomedical Wastes Management & Handling in 1998. The prevailing situation is analysed covering various issues like quantities and proportion of different constituents of wastes disposal methods in various health-care units (HCUs). It is estimated that annually about 0.33 million tonnes of waste are generated in India. Hazards associated with health-care waste management and shortcomings in the existing system are

identified. There is adequate knowledge of the health care workers on HCWDS which reveals health workers were aware of waste segregation, improper handling and disposal of waste. Therefore, training and seminars should be organized so as to educate the health care workers on safe management of waste so as to reduce the incidence of nosocomial infections in the hospitals. Also, this reveals the quality of health care workers in the two hospitals and means that workers in government hospitals in Southeast Nigeria are better equipped than those in private hospitals. This may be due to some reasons ranging from enhanced income to greater quest for personal improvement.

World Health Organization guidelines predicted that hazardous waste should be between 10% and 25% generation levels [7]; The high generation level witnessed in the hospitals visited means effort is needed to control the waste generation and proper training of health care workers and waste handlers are needed so as to prevent spread of infections emanating from this health care waste. Wastes should be segregated at the point of generation before treatment and disposal to protect both humans and the environment. Segregation of waste would result in a clean solid waste stream which could be easily, safely and cost effectively managed through recycling, composting and land filling [8]. Therefore, this shows that rules and regulations should be put in place and laws enacted so as to ensure proper waste segregation to prevent the rise in cases of nosocomial infection encountered in the hospitals. Generally, the study showed the existence of the infection control committee or person in hospitals to be low. Similar low level had been previously reported [9]. The infection control team or individual is responsible for the day-to-day functions of infection control, as well as preparing the yearly work plan for review by infection control committee and administration [10].

Therefore, effort to establish the committee in private hospitals is needed so as to regulate the spread of infection within the hospital and also proper management of waste generated in the hospital. The study revealed that health care workers in private hospitals have less knowledge on health care waste management system. This is a major concern as poor compliance to the guidelines and other factors lead to the increase in nosocomial cases in the hospitals. The study further showed that the existence of health care waste management/infection control committee is low in private hospitals. However, the existence of committee in the private hospitals is generally unsatisfactory at many places, authorities are failing to install appropriate systems for a variety of reasons, such as non-availability of appropriate technologies, inadequate financial resources and absence of professional training on waste management. Provision of materials for waste disposal ensures proper isolation, segregation and disposal of waste which helps to reduce the incidence of nosocomial infections in the hospitals. Poor availability of the materials for the disposal contributes to the cases of nosocomial infection in the hospital.

From the study, it was revealed that the availability of material for waste segregation, training for health workers regarding WMS and knowledge and awareness of the existence of infection control committee is generally in moderate level. It is therefore recommended that: private hospitals should take initiative for modern waste disposal systems and equipment and engage more persons for the day-to-day cleaning of the hospitals; training of more hospital health workers through attending conferences, seminars and workshops in order to increase their knowledge about hospital waste, its risks and sanitation; development of standards on health care waste management for hospital workers, and encourage various hospitals to conduct a critical self-appraisal on their health care in accordance with standards.

Conflict of interest statement

We declare that we have no conflict of interest.

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