

Original research article

Health care Waste Management among Health care establishments in Karimnagar city.

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Abstract

Background: Biomedical waste management problem in healthcare establishments (HCE) has become an issue of growing concern globally. Further the problem is aggravated due to the marked increase in disposable health-care materials. Improper healthcare waste management may have serious health consequences and a significant impact on the environment as well.

Methods: A cross-sectional and observational study was conducted during June 2017 to August 2018 among the Health care establishments in Karimnagar city. A total of 234 health care centers present in the city, 58 health-care centers were taken up for the study. For descriptive purpose, the 58 health-care centers were grouped in five different groups (i.e., group 1 to group 5). Data was collected from both the health care workers and hospital administration by using preformed questionnaire and was analyzed using SPSS 24 and valid inferences were drawn.

Results: The overall management of category yellow waste was not done properly in many groups of health centers except group 1(government hospitals), group 2 (private medical college teaching hospitals) and few health-care centers in group 3 and group-5 and over all segregation of category white waste was 26(45.5%). The Segregation of category of red waste was observed in 20 (34%) in the current study.

Conclusion: The present study demonstrates that there has been an improper procedure of medical waste management in Karimnagar city. No HCE segregated their generated wastes, except medical college teaching hospital and few private specialty hospitals. In some HCE, they used to segregate their sharps and infectious wastes in separate bins and send off them to the Venkataramana incinerators (CBWTF), Karimnagar for the final disposal waste.

Keywords: Health care waste management, Health care establishments, category, segregation

Introduction

Health-care waste management has become a critical issue and has taken a pivot place in national health polices of many countries. ¹ In India, with exception to a few large hospitals, most of the smaller hospitals and nursing homes lack any effective system to safely dispose off

their waste. Even the Government and municipal hospitals are no better than the private nursing homes in this regard. Current waste management practices are characterized by poor quality collection service and improper disposal at open dumpsites. Wastes generated during health services provision, the used bandages, syringes, human tissues, used culture media containing microorganisms are dumped in the open bins on the roadsides or low lying area or directed into the water bodies. Thus, an unauthorized reuse of medical wastes by rag pickers is being promoted through irresponsible dumping of these dangerous wastes into open bins² and in turn facilitates in spread of many diseases.

Majority of the problem can be avoided if the health-care waste management is properly managed. The activities that are commonly done in the health care waste management are segregation, storage, collection, transportation and disposal of health-care waste. It encompasses, planning, organizational, administrative, financial, legal, engineering aspects and human resource development and their management involves inter-disciplinary relationships.³

Knowing the types and quantities of waste produced in a health-care facility is an important first step in safe disposal. Waste-generation data are used in estimating the required capacities for containers, storage areas, transportation and treatment technologies. Waste-generation data can be used to establish baseline data on rates of production in different medical areas and for procurement specifications, planning, budgeting, calculating revenues from recycling, optimization of waste-management systems, and environmental impact assessments.⁴

In order to minimize impacts of clinical waste, a proper and workable waste management system is a pre-requisite in hospitals. The safe management of clinical waste may be achieved by ensuring care in dealing with clinical waste. Hence it is the ethical responsibility of management of hospitals and health-care establishments to ensure proper medical waste management. This involves the determination of sources, waste characterization, generation rate, safe handling practices, segregation, storage, transportation and final disposal.⁵ Therefore, the current study is important and was undertaken to assess and improve management systems and to increase public awareness concerning about health hazards of the health care waste among the health care establishments in Karimnagar city.

Material & Methods

A cross-sectional and observational study was conducted during June 2017 to August 2018 among the Health care establishments in Karimnagar city, the headquarters of Karimnagar district of Telangana state was taken for the study. The district has a population of 261,185 within its corporation limits, according to 2011 census, making it the fourth largest city in Telangana state. It serves as a major educational and health hub for the northern districts of Telangana. Karimnagar has progressed into an important health center from the beginning of the 21st century because it is located in center to all the talukas like Jagtial, Sircilla, Ramagundam, Kodimyal, Manthani, Huzurabad, Jammikunta, Husnabad, Choppadandi, Malyal and Gangadhara. Patients come from all over the surrounding districts. Government Civil Hospital is the dominant medical institution. There were 234 functional health care establishments in this city at the time of the study. A total list of Health care establishments in Karimnagar city of about 234 was prepared. Among them, 25% of the total health care centers⁷³, i.e. 58 centers were selected for the study. By using the stratified sampling method from those HCE who were willing to provide us information was selected for this study. It was not easy to collect relevant medical waste data from HCE since a number of HCE did not follow the existing rules and regulations to run them properly. This is why some HCE authorities were

not interested to give permission in collecting data from their own institutions. Before entering a Health care establishment, a number of formal meeting with the concerned authority of each HCE have been done to explain the purpose of the study and seek their cooperation. Data was collected from both the health care workers and hospital administration by using preformed questionnaire. The questionnaire was pilot tested in a sample of 10 health care centers and after necessary changes the final version was prepared. The study protocol was approved by the institutional ethics committee of the institute. The purpose of the study was explained and written and signed informed consent was obtained. The data thus collected was coded and entered on a Microsoft excel sheet and analyzed using SPSS 24. Results are presented in the form of tables and percentages.

Results

Results from Table -1, shows the distribution of the health centers into different groups for descriptive purpose. Group 1 includes one District hospital and one Mother and child health center present in the study area. Group -2 consists of one private medical college teaching hospital. Group 3 has 31 private hospitals, which includes specialty and nursing homes and 14 clinics, including allopathic, AYUSH, physiotherapy and dental clinics. Group 4 has four diagnostic centers and Group 5 includes six supportive services like blood bank, pharmacy, mortuary and veterinary hospitals.

Table 1:Health Care Centers in Karimnagar studied under various groups

Groups	Types of health care center	Number	Studied
Group-1	Government hospitals	8	2
Group-2	Private teaching hospitals	2	1
Group-3	Private hospitals (specialty & Super specialty hospitals, Nursing homes, Clinics)	183	45
Group-4	Diagnostic centers	16	4
Group-5	Supportive services (Blood bank, Pharmacy, Mortuary and Veterinary hospitals)	25	6
Total		234	58

Table-2 describes the services provided by the various groups of health care centers. It was found that all the groups of health care centers provide the general OPD services. Group1, group 2 and group 3 health care centers provided general OPD & IPD services as well as specialty OPD & IPD services. Super specialty OPD & IPD services were provided by group 2 and 3 health care centers. Whereas laboratory services were provided by group1, group 2, 31 health care centers in group 3, group 4 and 3 health care centers in group-5. The average OP/day was 230 in group 1, 658 in group 2, 1550 in group 3, 168 in group 4 and 84 in group 5. While the average IP/day was 40 in group 1, 56 in group 2 and 30 in group3.

Table 2: Services provided by the various groups of health care centers.

S.NO.	Services provided	Groups of Health care centers				
		Group-1 (n=2)	Group-2 (n=1)	Group-3 (n=45)	Group-4 (n=4)	Group-5 (n=6)
1	General OPD	2	1	45	4	6
2	General OPD & IPD	2	1	35	0	0
3	Specialty OPD & IPD	2	1	31	0	0
4	Super specialty OPD & IPD	0	1	10	0	0
5	Laboratory services	2	1	31	4	3
6	Average OP/day	230	658	1550	168	84
7	Average IP/day	40	56	30	0	0

Table 3: Methods of Waste disposal being used by the various groups of health care centers.

Groups of Health care centers	Burial	Burning on open field	Incineration	Dumping in public bin	Indiscriminate dumping
Group-1 (n=2)	1	1	1	0	0
Group-2 (n=1)	1	1	1	1	0
Group-3 (n=45)	0	21	6	10	12
Group-4 (n=4)	0	1	0	2	2
Group-5 (n=6)	0	1	0	2	4
Total (n=58)	2(3.4%)	25(43%)	8(13.7%)	15(25.8%)	18(31%)

The above table-3 reflects the mode of management of different categories of wastes. Out of 58 health care centers, the segregation of human anatomical waste is being done only by group 1, group 2 and group 3 i.e., 14 health care centers. Disinfection was not done for this waste in any of health care centers. The safe transportation of this waste and appropriate final disposal were adopted by 17 (29.3%) health care centers respectively. A few health care centers in group 3 and group 5 do not generate this type of waste. In group 4 appropriate mode of management of category 1 waste does not exist. The overall management of this category of waste was not appropriately done in many of the group of health care centers except group 1 (District hospital and MCH hospital) and group 2 (Private medical college teaching hospital). Regarding the segregation of category white and blue waste was observed in group 1 (government hospital), group 2 (Private medical college), 17 health care centers of group 3, four health care centers of group 4 and only 2 health care center of group 5. Disinfection is being done by 12 (20%) health care centers. Safe transportation of this type of waste was observed in 21(36%) health care centers. Final disposal option available in group 1 (District hospital& MCH), group 2(Private

medical teaching college hospital), 10 health care centers of group 3, group 4 and only one health care center of group 5. While the segregation of category Red waste was observed in 20 (34%) health care centers .e., group 1 (District hospital MCH hospitals), group 2, 13 health care centers of group 3, three health care centers in group 4 and only one health care center in group 5. Safe transportation of this type was observed in 15(26%) health care centers. Disinfection of this waste was done only in few of health care centers i.e., group 2 and 4 health care centers in group3.The final disposal is being done by 12 (21%) health care centers.

Table 4 shows the management mode of category yellow (Chemical liquid waste). It was observed that all health care centers disposed liquid waste directly into open drains. There was no underground drainage system in the Karimnagar city. Most of the health care centers not practiced disinfection before disposal in that only few 3(5.1%) were disinfecting liquid waste before disposal. The management of liquid waste was inappropriate in many health care centers.

Table 4: Provision of immunization by HCE to their staff

Groups of Health care centers	Tetanus & Hepatitis B
Group-1 (n=2)	2
Group-2 (n=1)	1
Group-3 (n=45)	38
Group-4 (n=4)	4
Group-5 (n=6)	3
Total (n=58)	48 (82%)

Figure 1 presents that among the 58 health care centers, majority 36 (62%) of health care centers were transporting majority of their hospital waste manually to the site of final disposal whereas only 22(37.9%) health care centers were using containers and trolleys. A very few 8(13.7%) health care centers were using closed vehicles for transportation of waste to the final site of disposal.

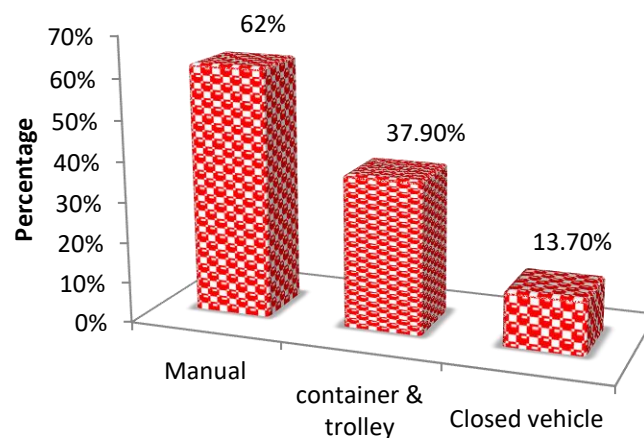


Figure 1: Method of transportation of HCW to the site of disposal.

Table 5 describes the waste disposal methods used by various groups of health care centers. It was observed that the most commonly used methods by the health care centers was burning the waste in the open field and 18 (31%) health care centers throw waste indiscriminately within and around their premises. And a few 8 (13.7%) health care centers group1, group 2 and 6 health care centers in group 3 were using incineration as an alternative option. About 15 (25.8%) health care centers dump their waste in public bins. While only a few health care centers 2(3.4%) use burial as disposal options.

Table 5: Personal protective measures used by the various groups of health care centers.

Groups of Health care centers	Personal protective measures				
	Apron	Masks	Gloves	Boots	Soap & water
Group-1 (n=2)	1	1	1	0	1
Group-2 (n=1)	1	1	1	0	1
Group-3 (n=45)	13	5	26	0	44
Group-4 (n=4)	0	2	4	0	3
Group-5 (n=6)	1	2	5	0	3
Total (n=58)	16(28%)	11(19%)	37(63%)	0	52(90%)

Figure 2 presents storage period of hospital waste in the health care center. It was observed that the majority 46 (79.3%) of health care centers are not storing hospital waste > 24hrs while about 8 (13.8%) were storing waste > 48 hrs. And a very few health care centers 4 (6.9%) were storing > 72hrs. None of the health care center was storing hospital waste for more than 1 week.

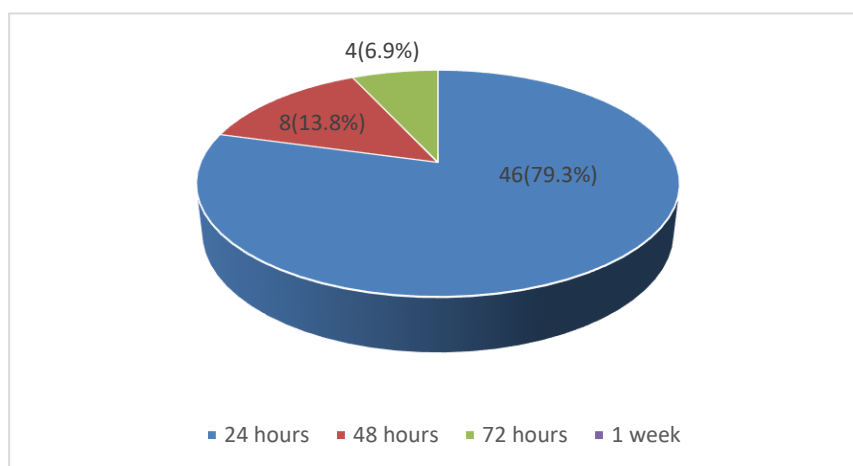


Figure 2: Distribution of HCE in respect to storage period of BMW at institution.

Figure 3 depicts the usage of color coding system in the health care center. It was seen from the figure that a total of 24 (41.4%) health care centers were using color coded bin system in health centers whereas 34 (58.6%) were not provided with the color coded bin system.

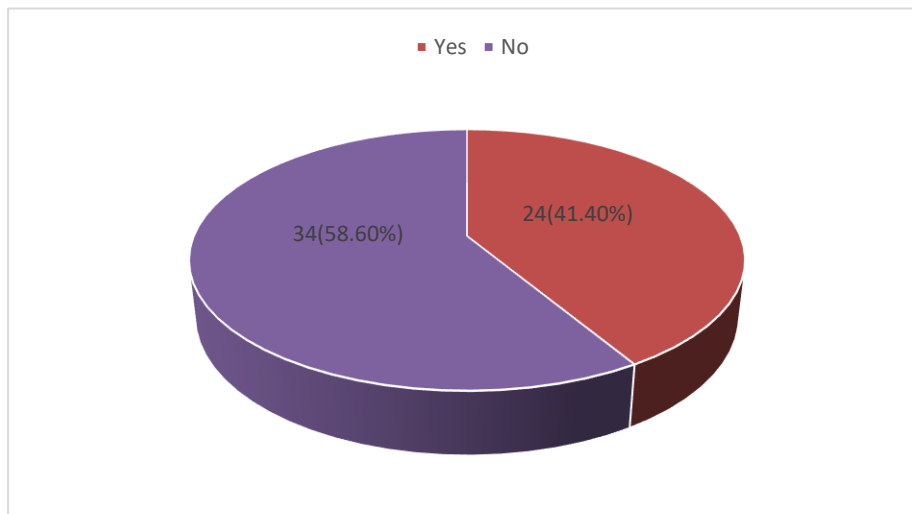


Figure 3: Distribution of respondents in relation to availability of colour coding bins.

Table 6 show the availability of facilities in health-care centers. It was observed that majority 42(72.4%) were having needle destroyer followed by autoclave 48(65.5%) facilities in HCE. Only 10(17.2%) HCE were provided separate storage area and no health-care center were provided with micro-wave facility.

Table 6: Facilities available in the institution for the waste management.

Variables	Number (58)	Percentage
Incineration	8	13.70%
Micro wave	0	0.00%
Autoclave	38	65.50%
Needle destroyer	42	72.40%
Separate storage area	10	17.20%
Separate personnel for handling	34	58.60%

Discussion

Disposal of medical wastes is a growing environmental problem in Karimnagar city. Hospitals and other health-care establishments have a “duty of care” for the environment and for public health, and have particular responsibilities in relation to the waste they produce.⁶ Until recently, the management of medical wastes has received little attention despite their potential environmental hazards and public health risks. All health-care institutions are required to handle biomedical waste in a specified manner. A total of 234 health care centers present in the city, 58 health-care centers were taken up for the study. For descriptive purpose, the 58 health-care centers were grouped in five different groups (i.e., group 1 to group 5).

Health-care waste is produced from a number of activities performed in different areas of health-care facilities. This includes, but is not limited to, consulting rooms, waiting areas, reception and the staff canteen. Different categories of health-care waste are generated from different health-care activities. HCRW, if not treated and disposed of properly, poses a serious threat to public health and to the environment.⁷ The generation of medical waste in Karimnagar has been increasing in quantity and variety, due to the wide acceptance of single-use disposable items.

There has been an improper procedure of medical waste management in Karimnagar city. No HCE segregated their generated wastes, except medical college teaching hospital and few private specialty hospitals. Medical wastes need to be segregated separately according to their characteristics at the point of generation.⁸ Results of the present study are similar to those of a study done by Abdulla et al., 2008,⁹ in Jordan, who reported that the main problem encountered in hospital waste management was inappropriate segregation. In a study conducted in 1300-bedded Government College and Hospital and 50-bedded private hospital of a south Indian city, it was found that waste segregation was not proper.¹⁰ However, the number of areas where it was not proper has not been mentioned in the study. Another study conducted in Jordan also, it was found that waste segregation practices were non-existent in spite of existence of a regulatory framework.¹¹ Similar findings were found in studies conducted in Egypt, England and Ethiopia also, the waste segregation practices were found to be poor. But in contrary to above studies, a study conducted in a 350-bedded polyclinic at Lucknow, India¹² and 574-bedded tertiary care Medical Institute located at Belgaum, Karnataka, India¹³, the waste segregation practices were found to be good. However, the findings in the study did not mention the exact percentage of areas where segregation practices were found good.

Regarding segregation of category yellow waste there was no existence of appropriate mode of management of this type of waste in group 4 health-care centers. The overall management of category yellow waste was not done properly in many groups of health centers except group 1 (government hospitals), group 2 (private medical college teaching hospitals) and few health-care centers in group 3 and group-5. In a study conducted by Ramakrishna Gowda B., had also observed the similar findings that the management of human anatomical waste was not being appropriate.¹⁴ The existing overall situation for poor management of this particular human anatomical waste could be related to existence of inadequate facilities in the health-care centers.

According to new Bio-medical waste management rules 2016¹⁵, the category 8 (chemical liquid waste) now included under category 1 yellow waste. It was found in the present study that the management of (chemical liquid waste) was inappropriate in many health care centers. In our study there was no underground drainage system in Karimnagar city. All the HCE discharge their liquid pharmaceutical and chemical waste into the open drains in Karimnagar city because none of them have any proper liquid waste management facilities. Liquid waste is mainly generated from patient's service units, operation and surgical units, laboratories and other health-care centers. Most of the health care centers not practiced disinfection before disposal. The liquid waste when let into open drains can also lead to water pollution and many spread the disease causing agents if not properly and adequately treated.¹⁶

The management of category- white (Waste Sharps) and blue (glass slides) was inadequate. In our study it was found that the segregation of waste sharps is being done by group 1 (District hospital and MCH hospital), group 2, 17 health-care centers of group 3, four health care centers of group 4 and only 2 health-care center of group 5. The overall segregation of this type of

waste in the present study was 26(45.5%) Most of other studies have also shown poor management of sharps. In a study in Pakistan, practices of poor disposal of sharps were found as 60% of observed practitioners were found throwing syringes at open places.¹⁷ Practices of poor disposal of sharps were also found in a province of China as 8.9 to 23.3% of HCWs were disposing off used needles and syringes in an inappropriate manner.¹⁸ In a hospital at Indore, Madhya Pradesh, India, there were found to be good practices of mutilation of used hypodermic needles and syringes.¹⁹ However, authors have not mentioned to what extent, the practices were followed.

Reuse of syringes and needles is extremely harmful to human health. There was no system and/or practice of destroying needles from used syringes in most of the HCEs in Karimnagar city. To protect resale and reuse of syringes, both manual and electric needle destroyers have recently been introduced to different HCE to cut needles from syringes to protect against HIV and Hepatitis Viruses. These sterilized materials are mixed up with the general civic waste for disposing in MCK dumping area. Organic infectious waste and sharp items are sent to the final disposal sites.

It has been observed from the current study that the category-red (disposable items other than waste sharps) was segregated because of the economic value i.e., as this waste was collected by a vendor and same was sold to the contractor who reclaimed the waste for recycling purpose. The Segregation of red category of red waste was observed in 20 (34%) in the current study. Most of the time, disposable equipment was discarded without disfiguring and thus got recycled by rag pickers in collaboration with hospital staff. Often, newspapers and television report the recycling rackets flourishing in the country. The disposables are recycled and repacked under standard company brands. In addition to the problem of recycling of hospital disposables, sharps injuries sustained by rag pickers also lead to spread of infectious diseases like hepatitis B virus, hepatitis C virus and HIV.²⁰

Regarding the usage of various waste disposal methods by health-care centers it was found in the present study that the majority of health-care centers 25(43%) health-care centers burn the waste in the open fields followed by 18 (31%) throw the waste indiscriminately within around their premises.

All the hazardous materials except plastic and polymer materials can be incinerated. The use of an incinerator treats a large amount of waste as well as reduces the volume of waste considerably. Our study found that manually operated incinerator present in private medical college teaching hospital and many of other health-care centers used incinerator as a common bio-medical waste disposal facility located in Manakondur mandal. Only 2 (3.4%) health-care centers use burial as disposal options. A study conducted by Raheelah Amin²¹, reported that the facilities available for the waste disposal in different hospitals included burial, burning and incineration etc. burial of the waste was conducted 86.67% of the hospitals while in the rest it was burned. For risk waste, incineration was carried out in 33.3% of the hospitals but no proper facility for disposal of radioactive waste was present. Studies conducted in UK showed that the major means of disposal of waste there is landfill, with about 4000 sites for the purpose. Incineration is the second most important means with 14.5% of the waste disposed of in this manner, discouraged now owing to the potential adverse effects to the environment. A similar study in Kathmandu, Nepal showed that 62% of the hospitals practiced combustion of waste, either by incineration or open burning.²² In the hospitals of Peshawar, even though incineration is carried out, apart from a few most hospitals make use of make-shift incinerators that operate

at lower temperatures releasing noxious gases into the environment making it a great environmental hazard.²¹

In recent times, increased concerns over improper disposal of medical waste have led to a movement to regulate the waste more systematically. Efforts have to be made for minimize and recycling of some medical wastes prior to final disposal, if not infected or contaminated. Incineration could be used in medical waste treatment until another common treatment method and steam sterilization is available in near future. Therefore, toxic substances such as dioxin emissions at medical waste incinerators should be closely monitored to reduce potential risks to humans and the surrounding environment.²³

In some HCE, all the infectious waste were found to be separated from the non-infectious waste stream at the site of production, but during disposal in the MCK dustbins the wastes were then mixed together. The intermingling of infectious wastes with general waste in the HCE used to collect their in-house waste systematically. They used to segregate their sharps and infectious wastes in separate bins and send off them to the Venkataramana incinerators, Karimnagar for the final disposal waste.

About 15 (25.8%) health care centers dump their waste in public bins. The clinics, diagnostic centers and few private hospitals in Karimnagar city generally were found to be disposing of their wastes into the MCK bins without segregating them. This poses serious health risks to the personnel handling the waste, to the scavengers and to the public at large. The consequences of this practice extend to the possibility of polluting both surface water and ground water resources in the vicinity of dumpsite.²⁴

Regarding storage of bio-medical waste in the present study revealed that the most of the health care centers 46 (79.3%), maximum time period for health-care waste storage was 24 hrs. AL-khatib and Sato²⁵, had found that there is no special storage room for medical waste in the hospitals that, hazardous waste was sometimes stored in the same containers as the domestic waste, and there is no control measures existed for the management of these waste materials. While in the study carried out by Abdulla et al., 2008²⁶, recommended the need for upgrading the internal and the external storage facilities to meet the MoH requirements, and the maximum time period for temporary storage is 12 hours, while the maximum storage time in central storage has been 2 days as well as in India the medical waste bins were strictly placed away of patients and from nursing stations, also biomedical solid wastes were not stored for more than 18 hours offsite.¹³

Internal and central storage facilities are important to store the collected waste for certain period until safe disposal. Some small HCE do not have any temporary storage and they simply used to dispose the waste directly into the nearest MCK bin. Every morning, the MCK collects their bins from different roadsides and finally dumps at different waste disposal sites located outside the city boundary. The present study shows that majority of the surveyed HCE dispose of their domestic waste at the same site as the municipal waste. Medical facilities in different HCEs in Karimnagar city are characterized by inadequate and inappropriate refuse storage facilities, lack of refuse collection services, improper disposal methods and inadequate and inappropriate protective gear for the refuse handlers.

In the present study, it was observed that transportation of health care waste was done manually in 36 (62%) followed by 22 (37.9%) of HCE in Karimnagar city. In an Egypt pilot study conducted by Soliman and Ahmed et al., 2007²⁷, showed that, the department aid workers are

usually responsible for bio-medical waste collection and transportation; but those workers are not specially assigned for handling of waste, as they move wastes to the storage area of the hospital on a trolley or cart, which is not especially designed for this purpose. Another study done by Abdulla et al., 2008²⁶, in Jordan showed collection and internal transportation in were carried out primarily by private contractors with little experience and who have a significant number of overturned containers, and most carts (95%) were yellow in colour with wheels and a lid. Safe transportation of high-risk HCW items such as sharps and infectious waste is needed to prevent accidental injuries and infections to anyone who comes into contact with it during transit. Dedicated and purpose built vehicles are required; these vehicles must be fully enclosed, seamless and easy to clean. This type of closed vehicles were used only by a few health care centers 8 (13.7%) in the present study. The drivers, according to WHO (undated), who transport HCRW must at all times carry consignment documents detailing the HCRW being transported. According to McLean et al., there is insufficient training of staff that are handling and transporting HCRW.²⁸

It was observed that only 2 (3.4 %) health care centers i.e. one private medical college teaching hospital and one private super-specialty hospitals had both infection control and waste management committees. Our study findings were contrary to the study conducted in Thailand by Vorapong Manowan²⁹, showed that 97.4% of the hospitals have a mission policy concerning hospital waste management within their organization, while only 2.6% do not have any policies concerning hospital waste management. In addition, 12.8% of infection control committees schedule a meeting once a year, 7.7% meet twice a year, 7.7% meet four times a year, and 69.2% meet more than 4 times a year, while 2.6% do not have any meetings. It was noted that the majority of health-care establishments in the Karimnagar do not have a structure or system for dealing with HCW. Many clinics do not have health-care waste management teams which are central to a proper HCW management plan. Oweis et al., had noted in his study that that the health care waste management team plays a pivotal role in the successful implementation of a HCW management plan.³⁰

In majority of both government and private hospitals no color coding scheme for collection and segregation of waste was observed due to lack of training and knowledge about the meaning and differences of these color. The current study revealed that about 34 (58.6%) health care centers were not provided with colour coded bin system. The results of study conducted by Raheelah Amin et al.²¹, showed that still, 46.67% of the hospitals were not labeling/color coding the waste which is essential for their proper disposal according to their source, nature and level of bio-hazard. The rest of 53.3% labelled the waste according to date/content or source etc. On the contrary; a study performed in America showed that most of the hospitals used color coding to segregate their wastes. They also used purpose designed containers especially for sharps leading to a low percentage of disposal related injuries i.e. only 20% at a New York teaching hospital.³¹

Therefore the present study shows that the overall implementation level of HWM rules in terms of collection, segregation, storage, disposal and transportation in private hospitals are much better than government hospitals due to their strict management and regular monitoring. Another reason is that due to various numbers of private hospitals, there is a tough competition among them.

Conclusion

The present study demonstrates that there has been an improper procedure of medical waste management in Karimnagar city. No HCE segregated their generated wastes, except medical

college teaching hospital and few private specialty hospitals. In some HCE, they used to segregate their sharps and infectious wastes in separate bins and send off them to the Venkataramana incinerators (CBWTF), Karimnagar for the final disposal waste. The clinics, diagnostic centers and few private hospitals in Karimnagar city generally were found to be disposing of their wastes into the MCK bins without segregating them. Medical facilities in different HCEs in Karimnagar city are characterized by inadequate and inappropriate refuse storage facilities, lack of refuse collection services, improper disposal methods and inadequate and inappropriate protective gear for the refuse handlers. The overall management of (Category yellow) was not appropriately done in many of the groups of health care centers except teaching hospital whereas management of category white and blue and chemical liquid waste (category yellow) was poor. The transportation of health care waste was done manually in 28 (70%) of HCE in Karimnagar city. It is observed that only 3(8%) health care centers i.e. one private medical college teaching hospital and one super-specialty, specialty hospitals had both infection control and waste management committees. It is recommended that the various fundamental agencies, Hospitals, Medical Association & Municipal Corporation should work together for proper management of Bio-medical waste in the cities/towns. Successful implementation of rules by surprise visits and inspection by appropriate authorities and fixing the accountability of each and every person involved in management of Bio-Medical Waste.

Acknowledgement : None

Source of Support: Nil

Ethical Approval : Approved by Institutional Ethical Committee, CAIMS Karimnagar.

Conflict of Interest: None declared.

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