A Study on Bio-Medical waste Segregation Monitoring in a Tertiary Care Hospital at Telangana

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Abstract

The most appropriate way of identifying the categories of healthcare waste is by sorting the waste into color-coded plastic bags or containers.[2,3] Since early recovery of patients and health of clinical staff directly depends on a clean and hygienic environment, excellent hygiene practices in health care facilities are the prerequisite for good medical waste management [8]

Objective: Aim of this study is to see effectiveness of segregation practiced in the hospital and establish a monitoring system to monitor deficiencies in segregation.

Method: This cross sectional study conducted during the period of June to August 2012 in a tertiary care Hospital. Eighty Two (82) areas were identified as BMW generation area. As per the norms segregation was done in four different color coded containers. So, total segregation containers will be 82X4=328. Any mix up or wrong segregation will be noted in the register daily by the Infection Control Nurse. A Monthly report based on BMW Register was developed.

Results: The index named as Bio-Medical Waste Segregation Deficiency index (BMWSD index). calculated as number of deficiencies found in a area/areas divided by the possible number of deficiencies can occur in that area/areas. Daily data then entered into the Monthly report and monthly BMWSD index was made. Though this is a continuous process, for this study three months data (June, July and August 2012) were taken for analysis.

Discussion: In this Cross sectional study, it was found that there was a over all deterioration in segregation of BMW when compare to June, July and August reports. The areas with high BMWSD index or where segregation is poor will be reflected through this monitoring system.

Conclusion: This BMWSD index can be used as an indicator of Infection control Practice. This report is to identify the deficiency areas in the entire hospital in BMW segregation, which can be used for analysis and planning for better BMW Management like, training of the staffs of particular units, modification in methods etc.

***Key Words**: Waste Segregation, BMW Color coded system, Biomedical Waste Management,*

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Introduction

Bio-Medical Waste (BMW) Segregation is one of the most important steps to successfully manage Hospital Waste. Given the fact that only about 10-20% of the hospital waste is hazardous. Treatment and disposal costs could be greatly reduced if a proper segregation were performed. Segregating BMW from Hospital

waste reduces also greatly the risks of infecting workers handling hospital waste and can be reduced to 2-5% if the hazardous part were immediately separated from the other waste. But, if 1% of the biomedical waste is mixed with the general waste, the whole becomes biomedical waste! Liquid wastes in particular. A worst case scenario of BMW management is in developing countries. [1,2,,3] Hospital waste management is a part of hospital hygiene and maintenance activities. World Health Organization[4] also states that 85% of hospital wastes are actually non-hazardous, whereas 10% are infectious and 5% are non-infectious but they are included in hazardous wastes. This range is dependent on the total amount of waste generated [5]. Since the infectious waste gets mixed with municipal solid waste, it has potential to make the whole lot infectious in adverse environmental conditions[6] The hazardous waste is a potential reservoir of the infection and diseases in patients are transmitted through it [7]. The key to minimization and effective management of biomedical waste is segregation (separation) and identification of the waste. Since early recovery of patients and health of clinical staff directly depends on a clean and hygienic environment, excellent hygiene practices in health care facilities are the prerequisite for good medical waste management [8].

Review of Literature

Bio-medical waste classified as per WHO in nine different categories which includes Radioactive waste. [9,10] But as per Bio-medical Waste (Management and Handling) Rules, 1998; waste are classified into ten different categories without mentioning Radioactive waste.[9] Based on Schedule I (Rule 4 and 7) Draft BMW Rules, 2011; Bio- Medical Waste were categorized into eight categories excluding Liquid waste and Incineration ash from 1998 rules. The Kuwaiti Environmental Public Authorities (KEPA) [20] divided the health waste into two categories: Non-hazardous and Hazardous. In few other literatures [11, 12, 13, 14,] waste was classified into two namely, contaminated and non-contaminated waste. The unified medical system of the Gulf Cooperation Council Countries , [15] classified hospital waste into eight categories including Radioactive waste and Pressurized gas containers. Another source [16] categorizes the health-care waste into seven types including radioactive waste and general waste. Total BMW volume generated in the hospitals is 611.5Kg/per day and 18345Kg / per month as found in all the surveyed hospitals in Lagos Metropolis in Nigeria. [17] According to Manyele (2006) [18], BMW generation is high and is increasing in Tanzania reaching up 0.75Kg/bed per day on average. Hospitals generate up to around 8 kg of waste per bed per day in USA, if not properly managed [19]. Table shows the average quantity generated by various countries [20, 21, 22, 23,24].

Table 1: Quantity of hospital waste generated in various countries.

Country	Quantity (kg/bed/day)
U. K.	2.5
U.S.A.	4.5
France	2.5
Spain	3.0
India [25]	1.5
Kuwait	3.8

In a study [26] at Bangalore, India, found that solid waste generated from hospitals and nursing homes generally varies from ½ kg to 4 kg per bed per day in Govt. hospitals, ½ to2 kg per bed per day in Private hospitals, and ½ to 1 kg per bed per day in Nursing homes. Total quantity of hospital waste generated at Bangalore about 40 tons per day; out of it 45-50% infectious waste and segregation of BMW done in only 30% of hospitals [9, 26, 27]. Based on hazard Hospital Waste in India can be divided as given in Table .

Table 2: The basic types of the Hospital wastes in India.

Type of waste	Percentage [21]
Non Hazardous	85%
Hazardous	15%
Hazardous but not infective	05%
Hazardous and infective	10%

Another study also says that 80% of the hospital waste are of generated waste and rest of the hospital wastes requiring specific management.[28] The approximate chemical composition of health-care waste shows 50% carbon, 20% Oxygen, 6% Hydrogen and rest other elements. [29]

The Segregation processes should:[30] Always take place at the source,

Be simple to implement and applied uniformly throughout the hospital;

Be safe and guaranty the absence of mixing in the domestic waste flow;

Be well understood and well known by the staff of the hospitals;

Be regularly monitored to ensure that the procedures are respected.

Mutilation / shredding must be such so as to prevent unauthorized reuse. [31]

Indian BMW Legislation Status

First law related to Bio-Medical Waste, is "The Bio-Medical Waste (management and Handling) Rules, 1998". [9]. By this law India is become the one of the country having legal regulation regarding BMW. The said law is in the vicinity of Ministry of Forest and Environment, and executed through Pollution Control Board (PCB). The law has been amended twice in 2000 and 2003.[9] A draft Rule has been formulated in 2011.

Objective

Aim of this study is to see how effective segregation practiced in the hospital under study. Also, to establish a monitoring system, that can pick up deficiencies in segregation properly and easily and segregation practice can be improved.

Method

This cross sectional study conducted during the period of June to August 2012 in a tertiary care super specialty hospital in the major towns of the state of Telangana. Through out the Hospital Eighty Two (82) areas were identified as BMW generation area. As per the norms segregation was done in four different color coded containers. So, total segregation containers will be 82X4=328. Any mix up or wrong segregation will be noted in the register daily by the Infection Control Nurse. A Monthly report based on BMW Register was developed. This report is to identify the deficiency areas in the entire hospital in BMW segregation, which can be used for analysis and planning for better BMW Management like, training of the staffs of particular units, modification in methods etc.

Results

Daily Infection Control Nurse, document any deviation in the segregation of BMW as per Rules, in those 328 containers. For every day and for each area a index has made for comparison with other areas and for subsequent future comparison. The index is named as Bio-Medical Waste Segregation Deficiency index (BMWSD index). The index is calculated as number of deficiencies found in a area/areas divided by the possible number of deficiencies can occur in that area/ areas. Daily data then entered into the Monthly report and monthly BMWSD index was made. Though this is a continuous process, for this study three months data (June, July and August 2012) were taken for analysis.

First Top ten (10) areas with descending order of BMWSD index is shown in the below table.

Table 3: Top Ten Areas as per BMWSD index in June, July and August 2012.

	June 2012		July 2012		August 2012	
S No.	BMW Generation Area(s)	BMWS D Index	BMW Generation Area(s)	BMWSD Index	BMW Generation Area(s)	BMWSD Index
1	Casualty/ER	10	Casualty/ER	9.677	9th -B	9.677
2	7th GW - B	10	2nd C	6.451	9th -D	9.677
3	ANCU - S/D	6.666	AMCU	6.451	Casualty/ER	6.451
4	Urodynamics	6.666	Block – C	6.451	Serology	6.451
5	Block - C	6.666	7th RAS	6.451	AMCU	6.451

***Cont.*.. Table 3: Top Ten Areas as per BMWSD index in June, July and August 2012.**

6	7th RAS	6.666	9th –A	6.451	Sample Collection -I	3.225
7	9th –B	6.666	9th –C	6.451	ENT OP	3.225
8	9th –C	6.666	Dressing Room	3.225	2nd C	3.225
9	Dental OP	3.333	Sample Collection –I	3.225	ICCU - II	3.225
10	2nd C	3.333	Sample Collection –II	3.225	OT - 4	3.225

Below is the representation of the entire hospital Avg. BMWSD index calculated taking average of 82 areas BMWSD indices for the three month

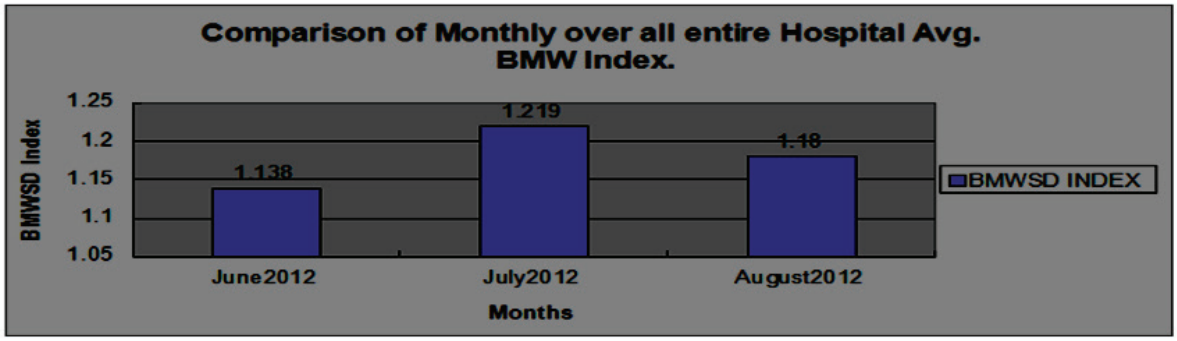

Figure 1: Comparison of Monthly over all entire Hospital Avg. BMW Index.

Along with these, at a glance different area performing poorly will be identified and the probable reasons for the loopholes were searched through the interview with the corresponding unit in-charges and local observations listed at end. This will help to take necessary Corrective and Preventive Actions (CAPA).

DISCUSSIONS:

In this Cross sectional study, it was found that there was a deterioration in segregation of BMW when compare to June, July and August reports. This shows a gradual deterioration in BMW segregation. The BMW segregation (BMWSD) index of overall Hospital was increase in July (1.219) as compared to June (1.138) and again goes down in August (1.180) but still higher than June 2012. Which means the BMW segregation was good at in June but deteriorates in July and again improves a little in August as shown in Figure 1. In terms of generation areas, Casualty/ER shows a continuous improvement in segregation of BMW Management. BMWSD index in June (10) to in July (9.67) to in August (9.45). Similarly, in the generation area of 2nd C there is a deterioration in BMW segregation in July (6.45) as compare to June (3.33) and again improve in August (3.2). Also it can be seen that in the generation areas of 9th C, there was improvement in segregation of BMW (from 6.6 to 6.45) and in Sample Collection -I there was constant deterioration in BMW segregation (from July to August at 3.22).

Though only three months data has been taken for analysis, it is a continuous process. The areas with high BMWSD index or where segregation is poor will be reflected through this monitoring system. As shown in above in casualty/ER for the month of June (BMWSD -10) was high which after training the staff is gone down in August (BMWSD - 9.45).

Conclusions

Segregation of BMW is the prime and first step in the Bio Medical Waste Management. This study revealed that the BMW management requires proper monitoring for an effective tracking at all times. This BMWSD index can be used as an indicator of Infection control Practice. Control means that competent authorities can act rapidly to ensure the possibilities of minimizing inappropriate handling and segregation of BMW. Also there is an immediate need to train all handlers of BMW

on methods and new techniques to adopt in effective waste management practices using WHO manual and Personal Protective Equipment (PPE) . Furthermore, they should also be trained on how to make proper use of these PPE.

Recommendations

We recommend the following suggestions to improve BMW management service in this hospital under study from the point of view of Monitoring study of BMW segregation:

More Strict supervision and surveillance to be followed in day to day BMW management activities.

Intensive training and displayed information regarding risk associated to BMW on BMW at regular interval and also at the time of joining to all staff emphasizing the importance of segregation.

Ethical Clearance*:* Ethical clearance had been obtained from Multispeciality hospital , Telangana

Conflict of Interest: NIL

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