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AN ASSESSMENT OF BIOMEDICAL WASTE MANAGEMENT IN SELECTED HOSPITALS OF KADAPA TOWN

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ABSTRACT
Health care services generates waste just like other human activities which has to be managed and dispose in a safe manner to avoid or reduce risk it poses to the environment. An attempt has been made to review the current practice of biomedical waste such as collection, storage, transportation and disposal along with the amount of generated biomedical waste in government and private hospitals of Kadapa town. Field visit and questionnaire survey method was implemented to collect information on biomedical waste management aspects. During the study it was observed that waste is collected and segregated at regular intervals.

KEYWORDS: Biomedical waste, disposal, collection, segregation.

INTRODUCTION

Hospital solid waste or biomedical solid waste generally include sharps, human tissue or body parts and other infectious materials that are generated from the hospitals, health care centers, medical research institutions, medical laboratories etc. United States Environmental Protection Agency[1] refers to hospital wastes as all biological or non-biological wastes that are discarded and not intended for further use and these include pathological, infectious, hazardous chemicals, radioactive wastes, stock cultures, blood and blood products, animal carcasses, pharmaceutical wastes, pressurized containers, batteries, plastics, low-level radioactive wastes, disposable needles, syringes, scalpels and other sharp items.

Globally, wastes generated from hospitals are now recognized as serious problems that have detrimental effects on the environment and/or human beings through direct or indirect contact. Exposure to hazardous healthcare waste can result in disease or injury.[2] Diseases like typhoid, cholera, acquired immunodeficiency syndrome (AIDS), and viral hepatitis B can be transmitted through the mismanagement of hazardous hospital waste.[3] In India, the Ministry of Environment and Forests has promulgated the biomedical waste (Management and Handling) Rules 1998 for proper management of biomedical waste. These rules are meant to improve the overall waste management of health care facilities in India.[4]

Biomedical waste management involves management of a range of activities, which are mainly engineering operations, such as collection, transportation, treatment of processing systems, and disposal of waste. However, in most cases, initial segregation and storage activities are the direct responsibility of nursing personnel. If the infectious component gets mixed with the non-infectious waste, the entire mass becomes potentially infectious. It is the responsibility of hospitals and other healthcare institutions to ensure that there are no adverse health and environmental consequences as a result of their waste handling, treatment and disposal activities.[5] The objective of the present study is to assess the quantity and different kind of waste generated in Government and private hospital and to assess the practices adopted for collection, segregation, storage, transportation, treatment and disposal of biomedical waste.

Study Area

The geographical coordinates are 14°28'0" N, 78°49'0" East. As per the provisional reports of Census, population of Kadapa in 2011 is 28, 82,469; of which male and female are 14, 51,777 and 14, 30,692 respectively.

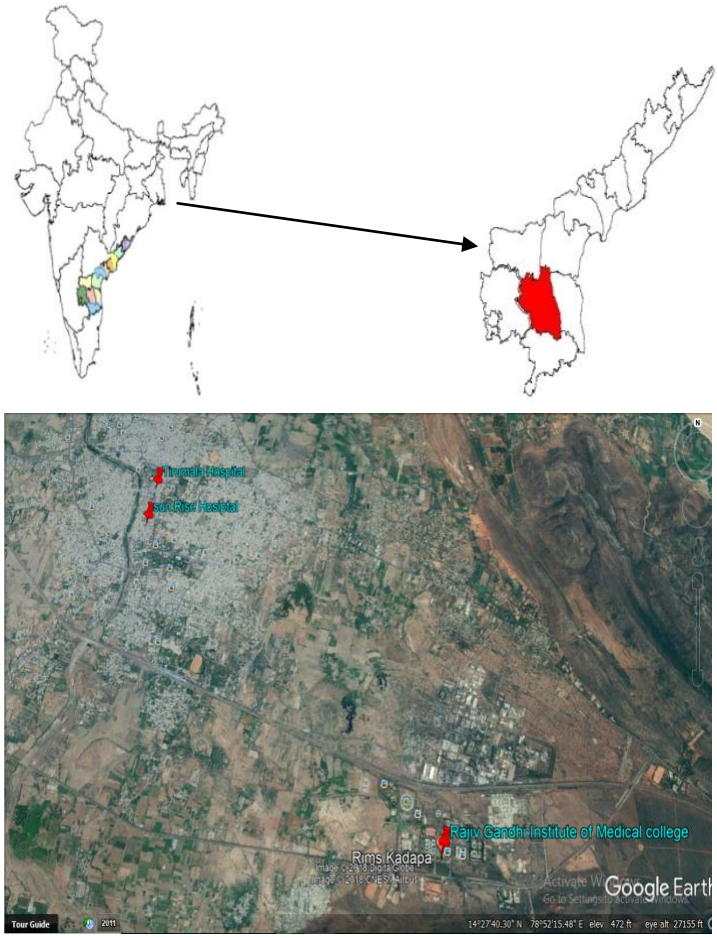
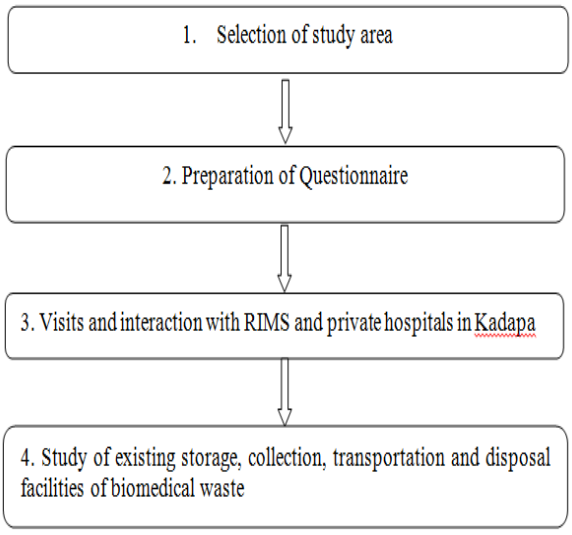


Fig. 1: Location map of the study area.

MATERIALS AND METHODS

A cross sectional study was conducted in one government and two private hospitals of Kadapa. The hospitals were visited and the presence or absence of waste management technique was noted. A questionnaire was designed and used for data collection during the course of this project. Questionnaire contains 11 questions regarding waste generated in a month, handling, segregation, disposal and health safety practices of biomedical waste was prepared. For characterization, Quantification and evaluation of waste generated from hospital a survey on three consecutive days was conducted. The wastes from the hospitals are segregated in four color bags (Green, Red, Yellow and Blue).

Green bag contain leftover food, fruit peels, vegetable waste, waste paper, packing material, empty box bags.
Red bag contain tubing, catheters, gloves, intravenous sets, urine bags, plastic bottles.
Yellow bag contain human tissues, plaster, cotton, blood bags, placenta, amputated parts of human beings.
Blue bag contain blades, ampoules, broken glass, bottles.



RESULT AND DISCUSSION

The amount of the Hospital Waste generated in Kadapa town was calculated with the help of personal observation and questionnaire and was tabulated. At the study area, the management of waste was conducted as follows:

Segregation of hospital waste

It is important that the general refuse are segregated from biomedical waste. For the purpose of separating general waste from hazardous waste and other glass and plastic related material, bins were placed with color coding system. Staff was asked to dispose of waste accordingly. Segregation and collection of waste was found regular at hospital level, but no proper disposal method was found. It was found that hazardous waste produced was highest at RIMS and Tirumala Hospital when compared with newly established Sunrise hospital.

Quantification of waste generated at the hospitals

The quantity of the daily wastes generated was done according to the Department/Unit where the wastes were generated. These are shown in Table 1, 3 and 5. In all departments, waste was found to be segregated using color coding according to the directions given by the hospital management. General waste from the hospital consists of organic waste mostly food remains and kitchen related byproducts, paper waste, plastic waste, bottles. Every department from the hospital generates general waste which is mostly gathered in green bags. The average waste generated is 420 kg/day of green category, 362 kg of red category and 326 kg, 209 kg is of yellow and blue category of waste generated respectively in RIMS hospital. The quantity of waste generated in hospitals should be known while making a good waste management system.[6] In the present study RIMS, tirumala and sunrise hospitals generate 1315.2, 148 and 5.92 kg/day. Similar findings was seen in a study that the M.L.B medical college generates 0.52 kg waste per bed per day and maximum waste is generated in wards.[7]

Table: 1 Bio-Medical Waste generated per day in Kg in RIMS Hospital.

Department	Green bag	Red bag	Yellow bag	Blue bag
Casuality	160	150	180	170
MICU & CCU	180	4	17	2
Labour ward	15	1	10	4
Labour OT	3	50	1	3
Antanatal and postnatal	6	120	4	2
Male ortho	11	5	11	3
Female ortho	6	4	11	2
Female ward	3	1	51	4
Male ward	3	3	5	1
Surgical ICU	3	12	1	1
Male ENT	2	2	3	2
Female ENT	2	2	3	2
Male surgical	4	-	4	2
General ward	3	2	2	2
T. B. ward	2	2	2	1
Surgical physiotherapy and minor OT	6	1	3	1
Pediatrics	6	2	3	2
Pharmacy and gynic OP	2	1	3	2
Medical OP and Paediatric OP	1	0.0017	11	2
Skin and DVL OP	2	0.2	1	1
Total	1315.2 Kg/day			

Table 2.Quantification of biomedical waste at dumping site.

Characterization	1st day (g)	2nd day (g)	3rd day (g)	Mean	Percentage
Plastic	2	3	200	68.33	1.27
Paper	3	4	1.7	2.9	0.05
Bandage	2	2	4000	1334.67	24.99
Gloves	4	5	1000	336.33	6.29
Needles	5	6	200	70.33	1.31
Bottles	9	7	1000	338.67	6.34
Mask waste	4	3	400	135.67	2.54
Glass bottles	9	9	1400	472.67	8.85
Syringes	7	8	500	171.67	3.21
Cotton	6	5	1000	337	6.30
I.V. set	6	6	6200	2070.67	38.77
Body parts	3	3	0	2	0.037
Total				5340.91	

Table 3: Bio-Medical Waste generated per day in Kg in Tirumala Hospital.

Department	Green bag	Red bag	Yellow bag	Blue bag
Casuality	10	2	3	4
ICU surgical	3	5	9	6
ENT	3	0.001	2	3
Ortho	11	4	5	6
General male ward	4	2	1	5
General surgical ward	1	1	2	1
Ophthalmology	4	3	0	0
OT's	2	4	3	3
SICU	3	4	3	3
ICU - surgical	3	5	9	6
Total	148.001 Kg/day			

Table 4: Quantification of biomedical waste in Tirumala hospital.

Characterization	1st day (kg)	2nd day (kg)	3rd day (kg)	Mean	Percentage
Plastic	3	2	3	2.67	8.22
Paper	2	1	1	1.33	4.09
Bandage	1.5	4	3	2.83	8.70
Gloves	3	2	4	3	9.23
Needles	4	5	5	4.67	14.37
Bottles	2	2	2	2	6.15
Mask waste	1	1	1	1	3.08
Glass bottles	4	5	5	4.67	14.37
Syringes	2	3	2	2.33	7.17
Cotton	1	2	2	1.67	5.14
I.V. set	4	5	4	4.33	13.32
Body parts	2	1	3	2	6.15
Total				32.5	

Table 5: Record of Bio-Medical Waste generated per day in Kg in Sunrise Hospital.

Department	Red bag	Yellow bag	Blue bag
OPDS	0.2	0.1	0.7
Pharmacy	0.1	0.2	0.1
X-ray	0.3	0.0004	0
Super specialty	0.2	0.4	0.1
Labor rooms	0.0014	0.000117	0.0017
MICU	0.0014	0.0016	0.0013
Post operative ward	0.00111	0.00114	0.00113
Operation theater	0.00133	0.0015	0.0012
General ward	0.1	0.00013	0.4
Dialysis unit	0.2	0.7	1
Burns ward	0.4	0.2	0.5
Total	5.92 Kg/day		

Table 6: Quantification of biomedical waste in Sunrise hospital.

Characterization	1st day (kg)	2nd day (kg)	3rd day (kg)	Mean	Percentage
Plastic	0.0015	0.0012	0.2	0.0676	0.40
Paper	0.2	0.2	0.2	0.4666	2.77
Bandage	0.7	0.3	0.7	1.5	8.91
Gloves	0.0015	0.0014	0.0011	0.0032	0.02
Needles	1	2	0.0015	3.0005	17.83
Bottles	0.2	0.3	0.1	0.5333	3.17
Mask waste	0.00011	0.00014	0.00038	0.0004	0.002
Glass bottles	1	4	1.5	5.5	32.68
Syringes	0.2	0.4	0.7	0.4333	2.57
Cotton	0.0005	0.7	0.3	0.8005	4.76
I.V. set	1	3	1.13	4.3766	26.00
Body parts	0	0	0.15	0.15	0.89
Total				16.83	

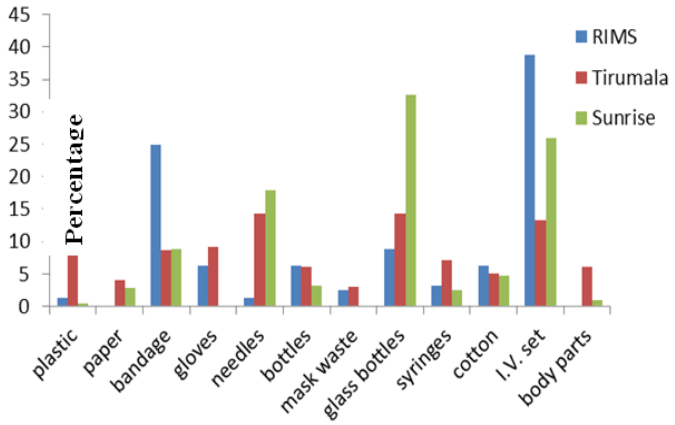


Fig: 2: Average percentage of waste generated from hospitals.

Plate 1. Color coding containers in hospital.

Plate 2. Transportation of biomedical waste.

Plate 3: Dumping of hospital waste at RIMS.

Figure 2 illustrates the percentage biomedical wastes quantification of hospitals in which the I. V. set was higher followed by glass bottles and bandage. Observation indicates that autoclaving was provided in Tirumala hospital and two of studied hospitals do not use any treatment facility.

Usage of personal protective clothing in Sunrise hospital is more compare to other hospitals and RIMS hospitals shows least usage of protective clothing in Kadapa.

Final disposal method

The largest leading government hospital RIMS in Kadapa dump the waste in there vicinity outskirts of the hospital, where as Tirumala and sunrise hospitals hand

over their bio- medical waste to the common dumping site situated at Dumpetla village in Batthalapalli, Ananthpuram district.

Significance of the study

Improper handling of solid waste in the hospital may increase the air borne pathogenic bacteria which could adversely affect the hospital environment and community at large. The safe disposal and subsequent destruction of medical waste therefore, is a key step to the reduction of illness or injuries through contact with this potentially hazardous material and in the prevention of environmental contamination. This study will provide a practicable hospital waste management approach that will be beneficial to the government and will reduce the negative impacts on the environment and communities within the neighborhood of the waste dumpsites of the selected hospitals.

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