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## RESEARCH ARTICLE

### A case study of Biomedical waste generation and its management at Faizabad, U. P. India

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#### Abstract

Medical waste has recently become an issue of much public concern, due in parts of its expanding bulk and adverse effects on human health. Rapid development in medical technology the proliferations of disposal supplies and increased packaging have contributed to huge expansions in the volume of medical waste produced. The disposal of biomedical waste has become an issue of growing concern due to its potential environmental hazards. The generation rates of biomedical waste in 8 major hospitals of Faizabad city have been carried out during year (Dec 11-Jan 12) on a daily basis for 7 consecutive days and then the average daily waste generation potential carried out. The rate of biomedical waste generation in 8 major hospitals ranges from 0.79 –2.27 kg/bed/day. The survey shows that the rate of biomedical waste generation and management practices applying by hospitals. These practices includes incinerator facility was available at only one private nursing home. Proper collection, treatment & disposal sites did not exist at Faizabad. The waste disposal practice was found to be quite unsafe and both clinical and non-clinical wastes were found to be disposed off without any segregation. The medical staff and other workers have reported different type of disease such as Diarrhoea, hepatitis B/C during survey.

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#### Introduction

Medical waste is defined as any solid or liquid waste that is generated in the diagnosis, treatment or immunization of human beings or animals, in research pertaining there to, or in the production of testing of biological (BAN and HCWH, 1999). Medical waste generated by hospitals clinics, research and testing laboratories and drug companies are often indiscriminately disposed off, unscientific management of such wastes, leads to serious environmental problems The problems are already acute in metropolitan cities and towns as the disposal facilities are not keeping pace with the quantum of waste being generated. It is very common to find large heaps of medical waste in disorganized manner at hospital areas (WHO, 2004).

Medical waste generated in a modern hospital may vary from 2.3- 7.7 kg/bed/daily (OME, 1995) and substantial part of this waste is potentially hazardous due to its infectious nature (UPEPA, 1986). These biomedical wastes includes, surgical and pathological waste, disposable syringes, injection needles, waste from clinical and microbiological laboratories, patient care waste discarded chemicals and drugs discarded radioactive chemicals and waste from dialysis units (Nanda and Tiwari, 2000).

The present unsanitary method adopted for disposal of medical waste becomes very serious health hazard particularly during rainy season, runoff and high humid conditions increases the health hazard. The landfills sites that are not well maintained are prone to groundwater contamination due to leachate percolation. Open dumping of medical waste is the

additional source of breeding ground for disease vector.

It is also possible that many disposable medical accessories (such as saline bottles, used bandages, surgical gloves, blood bag, catheters and intravenous tubes) are often collected by rag pickers, washed repacked and resold to customers through unscrupulous medical stores. Since such items are rarely disinfected before being resold they may infect to healthy persons with deadly disease like T.B, hepatitis B, AIDS etc. (Nanda and Tiwari, 2000).

There is strong epidemiological evidence from Canada, Japan and the USA, that the main concern of infections hospital waste is the transmission of HIV/AIDS virus and more often of hepatitis B or C virus (HBV) through injuries caused by syringes contaminated by human blood. Other than these, there is potential risk of TB, throat infection, Typhoid Dysentery, Diarrhea, Bacterial, Viral diseases, ARN (Rabies), VDRL (Sexually transmitted diseases), VTI/all C/S, and Leprosy etc. as the pathological laboratories do all these analysis to diagnose the diseases (Akter et. al., 1998).

In hospitals, nursing homes and pathological laboratories in India at present biomedical waste in not disposed of and managed scientifically. If the hospitals and other health care units continue to follow the existing trend of unscientific biomedical waste disposal. This will lead to pathological disaster. Therefore, a proper management practice of biomedical waste is urgently needed.

### **Generation of Biomedical Waste**

**Hospital Waste** – Hospitals are among the largest generators of solid waste today on a per capita basis. Much of the waste from hospital wards comes from the wastebaskets at the side of patient beds and includes old newspapers, paper and polythene bags, packaging and fruit peels. In addition broken syringes discarded splints, masks, rubber gloves and broken glass ampoules etc. generated by routine medical activities also add to the daily waste generation.

In recent years, there has been an increasing trend towards the use of disposable products or single purpose medical items, which may now accounts for one-half or more of the total biomedical waste generated. The waste generation rate can vary considerably from hospital to hospital.

### **Pathological laboratories:**

Waste generated in pathological laboratories is considered to be infectious biomedical waste from pathological laboratories contains a very high percentage of plastics (ranging from 50% to 60%). The remaining waste is mostly composed of wet materials such as body fluids, blood, used diagnostic

reagents and small quantities of paper and cellulose. (Tiwari and Nanda, 2001).

## **Material and Methods**

Faizabad district is an important and religious city of Hindu's. Faizabad district have a special importance because the birthplace of Lord Ram, Ayodhya is situated at a distance of 10 KM from Faizabad city and thousands of pilgrimage and tourists visits Faizabad every day.

The present survey was conducted in the month of December-January 2011-12. There are 22 Clinics, 35 hospitals and 9 X-ray pathology (Registered) in Faizabad districts, which generates solid and Biomedical waste tremendously.

The daily generation of Biomedical waste in the Faizabad district for 8 major Hospitals were determined by collecting and weighing the total daily waste generation on one week of December 10. – January11 and then finding the average values (rounded the nearest kg) for each hospitals.

## **Result and Discussion**

The result of the survey are shown in Table 1(A, B), 2, 5 and 6. The numbers of beds in different hospitals are shown in table 5. The total numbers of beds are 502, which generates the 502 Kg/day of biomedical waste. There are 22 clinics 35 hospitals and 9 X-ray/Pathology (Registered) in Faizabad city (Table 1,B). The registered practitioner in Faizabad district is represented in table 1 A. In table 3, the causative agents and then related diseases is represented. The Table 4 indicates the color coding and type of container for the disposal of biomedical waste.

The minimum, maximum and average values of the generation of biomedical waste are represented in table 6. In table 2 presented the disease suffering for long time % of the positive case only which shows different type of disease found in hospital staff and waste pickers. The result shown in table 6 indicates that the cleaners are highly affected by biomedical waste.

It is noted that from table 6 that the min, max, and average rate generation of biomedical waste is 0.7, 2.27 and 1.22kg/bed/day, respectively. Similar observation was reported by Accarino, et. al.,(2000), Collins and Kennedy (1992) and Poulsen, et al., (1995).

It may be noted that the waste generation rates obtained by the present authors for different hospitals of Faizabad city are similar to those reported in the literature for other Indian hospitals for example Pruss, et al., (1999) have reported 1.0 to 1.4

kg/bed/day of biomedical waste generation for Shri Venkateshwara Institute of Medical Sciences (A.P.). Charlotte and Smith (2002) reported that the

production of biomedical waste for various hospitals and nursing homes in Chandigarh ranges from 1.0 to 3.5 kg/bed/day.

**TABLE –1(A) Registered Practitioner in Faizabad district (year 2010).**

S.No.	Practitioner	No.
1-	Bachelor of homeiopathic medicine surgery	216
2-	Ayurvedic	270
3-	Bachelor of unani medicine surgery	188
4-	Bachelor of medicine and bachelor of surgery	100
5-	Pathology/X-ray	45

**Table 1 (B) Clinics, Hospitals, X-ray Pathology in Faizabad city**

S.No.	Practitioner/Pathology	No. Of hospitals/Pathology /Clinics.
1	Clinics	22
2	Hospitals	35
3	X-ray/Pathology	9

**Table 2-Disease suffering for long time % of positive case only.**

Disease	Nurse (100)	Cleaners (100)	Waste pickers
Diarrhoea/dysentery	1	13	6
Hepatitis B/C	10	25	18
Sickness	5	21	15
Skin diseases allergy	2	10	6
Malaria	-	2	3
Tuberculosis	-	-	3
Small pox	2	3	5
Leg injury	-	1	5
Typhoid	-	-	8

**TABLE –3 Different pathogen and diseases caused by them.**

Bacterial	Tetanus, gas gangrene and other wound infections, anthrax, cholera, other diarrhoeal diseases, enteric fever, shigellosis, Plague etc.
Viral	Various hepatitis, poliomyelitis, HIV-infections, HBV, TB, STD, rabies etc.
Parasitic	Amoebiasis, giardiasis, ascariasis, ankylostomiasis, taeniasis, echinococcosis, malaria, leishmoniasis, filaraiasis etc.
Fungal infection	Various fungal infection like candidiasis, cryptococcoses, coccidiomycosis etc.

**Table- 4 Colour coding and type of container for disposal of biomedical wastes.**

Colour Coding	Type of Container	Waste Type
Red	Disinfected container plastic bag	For plastics tubes, IV bags, syringes, blood, urine catheters & gloves.
Yellow	Plastic bag	Cotton, swabs, pathological tissues & body parts, microbiology waste, surgical masks.
Blue/White Transulant	Plastic/puncture proof wires	Sharps, needles, swlpts, blade, CV catheters, Ampoules
Black	Plastic bag	Papers, plastic packing, food waste, disposable cups & plates.

**Table –5 Generation rates of Biomedical waste in hospitals of the Faizabad city.**

S.No.	Hospitals	Total No. of beds	Waste generation	
			Total waste kg/day	Generation rate kg/bed/day
1	District Hospital	212	196	0.92
2.	District Hospital (Women)	168	133	0.79
3.	Deva Hospital	30	25	0.83
4.	Avadh Arthro Centre	25	53	2.12
5	Jagat Arthro Centre	22	50	2.27
6	Balak Ram Memorial Hospital	18	25	1.38
7	Renu Memorial Hospital	17	12	0.70
8	Saket Hospital	10	8	0.8
	Total	502	502	

**Table 6- Summary of results on the generation rates of biomedical waste (No. of samples taken twice daily) of Faizabad city.**

S.No.	Minimum	Maximum	Average
1	0.79	2.27	1.22
2	0.5	2.21	0.94

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### References

Accarino R, Michols C, Parson R, Richardson J, Bhatti P, Wilson A, Reder A, Nzimo M, Aksante G.. Improving hospital waste management practices and reducing exposure to infectious agents: the case of muhimbite National Referral Hospital in Tanzania. 2000.

Akter Nasima. Medical waste management. Environmental Engineering program school of

Environment, Resources and Development, Asian Institute of Technology. 1998.

BAN & HCWH.. Medical Waste in Developing Countries. An analysis with a case study of India and A critique of the Basel – TWG guidelines. Basel Action Network (BAN) secretariat, Asia Pacific Environmental Exchange, 1827 39<sup>th</sup> Ave, E., Seattle, W.A. 98112 U.S.A. 1999.

Charlotte A, Smith R P H. Managing pharmaceutical waste. Journal of the pharmacy society of Wisconsin. 2002, 17-22.

Collins C H and Kennedy D A . The microbiological hazard of municipal and clinical wastes J. Appl Bacteriology. 1992, 73:1-6.

Guerin T F. Co-Composting of Pharmaceutical wastes in soil in the society for applied microbiology, 2001, 256-263.

Poulsen O M, Breum N O, Ebbelohj N, Hansen A M, Lvens U I, Van Lelieveled.. Collection of domestic waste. Review of occupational health problems and their possible causes. Science of the Total Environment. 1995, 170 (1-2): 1-19.

Pruss A, Giroult E and Rushbrook P. Safe management of wastes from health care activities Geneva, World Health Organization, 1999.

Tiwari T N and Nanda S N. Generation rates of biomedical waste in different wards of a large hospital in Burla, Orissa. In Indian J.Environmental Protection. 2002, 22,(3) , 351-355.

USEPA.. Guide for Infectious waste management. United States Environmental Protection Agency, Washington, D.C. (USA), 1986.

World Health Organization. Draft report on occupation and environmental health issues of solid waste management: special emphasis on developing countries, 2004.