

Biomedical Waste Management Practices at Sub-Health Centres and Medical Stores in Tehsil Shahpur of State of Himachal Pradesh: A Case Study

Varun Dhiman

Research Degree Scholar, School of Earth & Environmental Sciences, Waste Management Laboratory, Central University of Himachal Pradesh, Dharamshala, India

ABSTRACT

The study involves the field investigation, reviewing the extent of generated biomedical waste, its handling and treatment procedures, scientific disposal and management approaches adopted by SHCs and Medical stores of Shahpur tehsil in District Kangra of Himachal Pradesh. The study was conducted by preparing Questionnaire regarding the pertaining issue. Questions were asked to the associated staff of SHCs, workers and owners of Medical stores to explore the awareness level, various issues and problems associated with the scientific disposal of biomedical waste in the studied area.

Keywords: Biomedical waste, Environment, Sub-Health Centres, Medical Stores, Waste Management.

INTRODUCTION

Biomedical waste is a special category of hazardous waste and RCRA included pharmaceutical formulations, commonly used drugs (e.g. nitroglycerin, warfarin) and EDCs in this category. [1] According to the definition of Biomedical Waste Management Rules, 2016 framed by the MoEFCC, Government of India, "biomedical waste" means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps, including the categories mentioned in Schedule I appended to these rules. [2] Public-Private Health care institutions, Nursing homes, research labs, animal houses, pathology laboratories,

health care centres, medical stores etc. are some of the major contributors in generating biomedical waste across the globe. [3] Higher population demands more health care facilities which results in boom in health care sector, hence huge generation of biomedical waste occurs. [4] However, apart from providing health care facilities, it also threatens the people health due to its unscientific management practices. [5] Various contaminants of this waste mix in the surface waters and pollute them and therefore raise health concerns. The USGS agency of USA conducts a survey in the year 2002, involving the testing of contaminants in the 139 streams of the country which confirms the presence of organic pollutants and pharmaceuticals in the streams water. [6]

According to the joint study conducted by the ASSOCHAM and Velocity, 7% growth rate with average generation of 775.5 tonnes biomedical waste generation per day is estimated to be produced in India by 2022 which shows the level of problem associated with the waste management sector. [7] According to the press release by the Information and Public Relations, Government of Himachal Pradesh on dated October 24, 2016, wide letter no. 1056/2016-Pub, the corresponding biomedical waste generated is estimated to be 1.47 to 2.05 tonnes per day. [8] To tackle the persisting situation, serious considerations have been adopted across the country but lack of proper infrastructure, awareness, funds and motivation among the

responsible authorities are some of the major bars in the proper waste management of biomedical waste in the country.

This case study was conducted in year 2014 to evaluate and explore the management practices for disposal and handling, associated issues and problems in the SHCs and Medical stores of the tehsil Shahpur.

LITERATURE REVIEW

In March 2008, the Associated Press in its report confirms the presence of pharmaceutical residues in the fresh water sources of 24 major metropolitan areas. [9] These findings supported the previous findings of USGS report undertaken in the year 2002. The problem of biologically active, toxic and endocrine disruptors from the pharmaceutical mis-management has been publically reported by different academic researchers and government experts for nearly two decades. [10] But laxity, lack of awareness and proper training results in low level outcomes which ultimately threatens people live. [11] The presence of active pharmaceutical ingredients in water sources raises serious environmental concerns to the communities associated with aquatic ecosystem which directly affect human health also. [12] For the purpose of scientific biomedical and pharmaceutical waste management, USEPA in 2007 has announced amendments in the federal universal waste regulations and published its effluent program guidelines in 2008. [13,14]

Urinary Excretion Rate (UER)

Active pharmaceutical ingredients (API) from the drugs enter in the surrounding, different spheres of our environment and pollute them. Their estimation in the environment is possible using scientific modelling of API. [15] There are some commonly used drugs whose API enters in our environment through the urinary excretion. Their excretion rates have been discussed in table 1. [16]

Table 1. UER of commonly used drugs.

Drugs	Class	% Excretion Rate
Ibuprofen	Painkiller	10
Amoxicillin	Antibacterial	60
Paracetamol	Painkiller	04
Atenolol	B-Blocker	90
Metoprolol	B-Blocker	10
Carbamazepine	Antiepileptic	03
Cetirizine	Antihistamine	50

Regulatory Bodies

There are number of bodies that regulate the laws and their implementation across the globe in the field of biomedical waste management. Few important national and international bodies that are prominently working in biomedical waste management are:

EPA, DOT.
DEA, OSHA.
SEPA, SPBs.
POTW, PCBs.

STUDY METHODOLOGY

Study Area

Shahpur is a town in Kangra District of Himachal Pradesh State in India with its geographical coordinates 32.2197° N, 76.1728° E. It is one of the Assembly constituencies in the state of Himachal Pradesh. It is located 253.8 km distance from its State Capital, Shimla and is located 32.4 km distance from its District headquarters Dharamshala. The study was conducted in the 31 SHCs and randomly selected Medical Stores which come under the jurisdiction of CHC-Shahpur. Data from these SHCs and Medical Stores were collected through field visits and observations, interviews and questionnaire survey.

Field Visits and Observations

Field visits and observations were made to explore the potential problems and issues pertaining to the biomedical waste management at medical stores and SHCs level.

Interview Process

The associated staff members, responsible authorities at SHCs and Owners of medical stores were interviewed with the main objective to determine the level of general awareness on the managing and

handling rules and regulations related to the biomedical waste management. The data on total supply and pharmaceuticals, its storage, disposal and treatment facilities were collected from the log books and demand-supply registers maintained at SHCs and Medical stores.

Survey Using Questionnaire

The responses of the related authorities, staff members and workers of SHCs and medical stores were recorded using a well framed questionnaire. The following list of questions is taken into consideration in this questionnaire:

What type of waste management practices you are following presently?

What type of containers you are using for waste disposal?

How will you see the existed waste management system?

Is there any idea or suggestion from your side to improve the existing waste management system?

RESULT AND DISCUSSION

EPA, 1986 framed biomedical waste management guidelines for the scientific disposal of biomedical waste. [17] The MoEFCC made amendments in the framed laws according to the current scenario. The efforts have been made to protect human health and environment from the spreading of infectious disease. These waste management rules in India laid the foundation of scientific biomedical waste management. In the Biomedical Waste Management Rules, 2016, more emphasis has been given to phase out the chlorinated plastic bags, gloves and blood bags in two years duration. According to these rules, 4 to 10 categories of biomedical waste have been identified at source level for the purpose of enhancing segregation process which is one of the most effective strategies for waste management. [18] Table 2 shows the biomedical waste category, container colour and treatment options for biomedical waste.

Table 2. Biomedical Waste Category, container colour and treatment options for biomedical waste. [19]

Waste Class	Type of container	Colour	Treatment
Human anatomical waste	Plastic	Yellow	Incineration/ Deep Burial
Animal waste	-do-	-do-	Incineration/ Deep Burial
Microbiology and Biotechnology waste	-do-	Yellow/Red	Incineration/Autoclaving/Microwaving
Waste sharp	Plastic bag puncture proof containers	Blue/White Translucent	Chemical treatment/Shredding/Microwaving
Discarded medicines and Cytotoxic waste	Plastic bags	Black	Incineration and Destruction
Solid (biomedical waste)	-do-	Yellow	Chemical treatment/Disinfection
Solid (plastic)	Plastic bag puncture proof containers	Blue/White Translucent	Incineration
Chemical waste (solid)	-do-	-do	Chemical Treatment
Incineration waste	Plastic bag	Black	Landfill

Apart from above methods for biomedical waste disposal, there are list of other methods also that may use according to the type of pharmaceutical and biomedical waste category. These are:

Immobilization using waste encapsulation and inertization.

Medium Temperature Incineration using 2-chambered incinerator.

Fast Flowing Water Course.

Chemical Decomposition.

High Engineered Sanitary Landfill.

Sub Health Centres in Shahpur

The total numbers of Sub Health Centres are 31 that come under CHC Shahpur, District Kangra (H.P). Following is the detail of sub-centres including the total population comes under them (Table 3).

Table 3. Sub Health Centres in Shahpur with their population data

CHC	PHCs	SHCs	Population Count
Shahpur	-	Sadoon	3117
		Kiari	4437
		Prei	3605
		Nareti	4864
		Makroti	3887
		Meharana	1785
		Bhadiara	5164
		Kuthman	5496
	Charri	Dodhamb	3202
		Bhatech	3061
		Ansui	3827
		Garoh	3287
		Khadi behi	2697
		Bhitlu	1461
		Sudher	2425
		Langni	1112
	Odder	4013	
	Darini	Boh	0529
		Ruled	2707
		Salli	3189
		Bhaled	1494
	Lapiana	Harchakkian	3368
		Dharkalan	2322
		Manai	3925
		Baranj	2936
		Salwana	0926
	Seon	Dohb	4421
		Bhanala	4027
		Rehlu	4564
		Basnoor	4703
		Ladwara	3808
	Mecleodganj	-	6442
	Sarah		3243
	Battala		0317
	Totarani		8934
	Chola tau		7969

Waste disposal and treatment facilities at SHC level

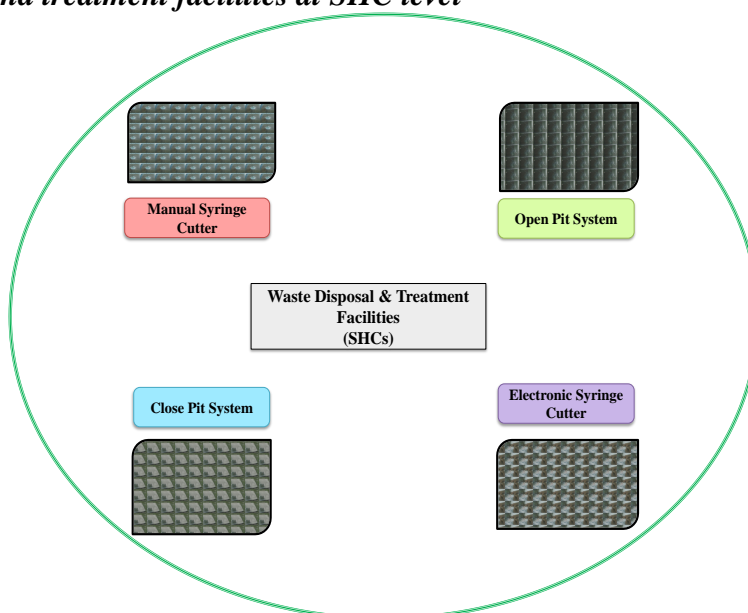


Figure 1. Disposal and treatment facilities available at SHCs

The field visits to explore the level of waste disposal and treatment facilities reveals the drastic condition at SHCs level for management of biomedical waste. At this level, following disposal and treatment facilities were available as shown in figure 1.

During the study it has been observed that different types of biomedical waste generated in SHCs were collected in different colour coded dustbins provided by the government and hence segregation process is adopted at source level. The concerned authorities maintained their log book which contains the data of daily consumption and discarded material in the SHCs. But from the viewpoint of disposal and treatment facilities, SHCs have limited resources. They collect and dump their waste in open and close pit systems. Also, there are provided with the manual and electronic syringe cutters for needle disposal. Body fluids are disposed off in sewer systems. There is no facility of incinerator available in the surrounding area and all the biomedical waste is picked up by the company situated at Pathankot, Punjab for the purpose of incineration. The local medical stores of the area do not follow the proper rules and regulations and burn their waste in the open air due to lack of awareness and proper facilities.

CONCLUSION

The present study of SHCs and medical stores of tehsil Shahpur is helpful in understanding the existed waste management plans and issues related to the pertaining problem in the healthcare sector. Boom in the healthcare sector results in higher amount of biomedical waste therefore proper waste management strategies are the need of the hour. It has been observed that there is limited supply of pharmaceuticals in the SHCs that are consumed and therefore the amount of discarded pharmaceuticals is very low. There is lack of infrastructure, staff and proper waste management facilities at this

level. Local medical stores are also facing the problem of lacking of nearby waste management facilities in the area. It has been concluded that, beside the low generation of biomedical waste generation at local level, there must be a futuristic approach and waste management plan is prepared by the responsible authorities accordingly.

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Conflict Of Interest

The author declares that there is no conflict of interest.

List of Abbreviations

SHCs: Sub-Health Centres; **CHC:** Community Health Centre; **RCRA:** Resource Conservation and Recovery Act; **EDCs:** Endocrine Disruptor Chemicals; **MoEFCC:** Ministry of Environment, Forest and Climate Change; **USGS:** United States Geological Survey; **USA:** United States of America; **ASSOCHAM:** The Associated Chambers of Commerce of India; **USEPA:** United States Environmental Protection Agency; **EPA:** Environmental Protection Agency; **DOT:** Department of Transport; **DEA:** Drug Enforcement Administration; **OSHA:** Occupational Safety and Health Administration; **SEPA:** State Environmental Protection Agencies; **SPBs:** State Pharmacy Boards; **POTW:** Publicly owned treatment works; **PCBs:** Pollution Control Boards.

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