

Challenges to Waste Management Practices in Indian Health Care Sector

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Abstract. The management of health care waste is of great importance due to its infectious and hazardous nature that can cause undesirable effects on humans and the environment. Government regulations and growing public awareness regarding health care waste issues have forced health care units to adopt suitable strategies for managing this waste. In fact many techniques are available for health care waste reduction and management. However waste management practices in health care sector are not free from challenges. In this study an attempt has been made to identify major health care waste management challenges faced by health care units in India.

Keywords: Health Care Waste, Green Supply Chain Management (GSCM), Challenges to Waste Management, Health Care Unit (HCU).

1. Introduction

Every action taken by a supply chain participant has the potential to generate negative social or ecological impact and the need of environmental initiatives along the entire length of the supply chain. With increased awareness of environmental issues, pressure is mounting on organizations for environmental sustainability and implementation of strategies to reduce environmental impacts of their products and services. Green Supply Chain Management (GSCM) has gained popularity with both academics and practitioners with objectives of reducing waste and preserving the quality of product-life and the natural resources. It represents integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumer as well as end-of-life management of the product after its useful life [1]. Almost every sector is hit by green fever to address environmental issues and the health care sector is no exception.

The exponential growth of Health Care Units (HCU) such as hospitals and dispensaries in India has generated massive health care wastes creating an alarming situation for local governments. Pollutants from these wastes that can cause adverse effects on human health have been identified. Two such pollutants the mercury and dioxin have been detected in significant amount in air and ash emissions from medical waste incinerators [2]. Most health care administrators address only the costs directly related to waste disposal including collection, transportation, treatment, final disposal of the wastes and efficient utilization of resources. The waste generated has indirect impacts on human health and the environment after disposal also. Previous studies show that, there is a lack of segregation practices and mixing of hospital wastes with general waste which makes whole waste stream hazardous [3] and open burning of the waste by clinics, dispensaries and some hospitals leading to release of dioxin to atmosphere [2].

2. Issues Associated With Health Care Wastes

Health care waste refers to “all wastes produced by health care units (HCU) during provision of health care services, including infectious and non-infectious waste materials, hazardous wastes and chemicals and other non-hazardous wastes. Nonhazardous waste include non-infected plastic, packaging material, paper etc.

Bio hazardous waste consists of (a) Infectious wastes like sharps, non-sharps, plastic disposables, liquid waste, etc. and (b) Non-infectious wastes like radioactive waste, discarded glass, chemical waste, cytotoxic waste and incinerated waste [4]. Some hospitals or pathological laboratory wastes may contain toxic chemicals, like mercury, xylene and formalin [5]. Although 75-90% of the hospital waste is non-hazardous and harmless as any of the other municipal waste, the remaining 10-25% is hazardous to humans or animals and deleterious to environment [4]. Hospital waste poses a risk for patients and personnel who handle these wastes. It is infectious and hazardous and poses serious threats to environmental health and requires specific treatment and management prior to its final disposal [6]. Improper disposal practices of hospital waste affects the people who come in direct contact with it. Waste piles also attract a variety of disease vectors, including mosquitoes and flies [3] and can cause environmental pollution, unpleasant odors, and growth of insects, rodents and worms; it may lead to transmission of diseases like typhoid, cholera, HIV, Tuberculosis, Hepatitis B and C through injuries from sharps contaminated with human blood [7]. Also antibiotics poured down the drain can kill beneficial microbes and bacteria in septic systems and dumping of healthcare waste in uncontrolled areas can have a direct environmental effect by contaminating soils and underground water. During incineration, if no proper filtering of flue gases is done, air can be polluted causing illnesses to the nearby populations [8].

3. Health Care Waste in India

In India, there are about 6,00,000 hospital beds, over 23,000 Primary Health Centers, thousands of registered nursing homes, countless unregistered nursing homes and dispensaries, and above all a very large number of quacks practicing at every nook and corner of urban and semi-urban locality. The hospitals are tertiary care hospitals usually associated with teaching colleges, district hospitals (more than 2,000), and health care dispensaries. There are innumerable pathology laboratories, the data of which is hardly available [9]. According to health information statistics 20% of total beds are in rural hospitals while 80% are in urban hospitals. Extrapolating from past figures of number of beds and average quantity of waste generation at the rate of 1 kg per bed per day, it is estimated that about 0.33 million tonnes of hospital waste is being generated per year [10]. 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. 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 bins [5] and in turn facilitates in spread of many diseases. World Health Organization (WHO) predicted that India is on the verge of having an HIV epidemic. Tuberculosis (TB) and HIV combined together is taking great toll on the human health and life. Hepatitis B and C infections are on the rise. Mortality due to Hepatitis C has gone up significantly [9]. A study conducted by the Central Pollution Control Board (CPCB), an apex pollution monitoring body of Government of India, on incinerators in Delhi Hospitals, concluded that the incinerators were found to spew a high level of deadly residues and toxic emissions such as cancer-causing dioxins and furans besides chemicals which cause neonatal abnormalities, reproductive and skin disorders, endocrine disruption and suppression of the immune system [11].

4. Challenges to Health Care Waste Management Practices in India

The public outcry against health care waste disposal practices and several public interest litigations (PILs) filed in various courts, exerted tremendous pressure on Government of India to enact a law governing health-care waste management (HCWM). Finally, in view of the serious situation involving biomedical waste management, the Ministry of Environment and Forests, Government of India created the Biomedical Waste (Management and Handling) Rules, which came into effect on 20th July, 1998 [12]. Despite these rules and initiations, a lot of challenges to health care waste management practices are faced by Indian health care sector. The major challenges identified from literature review are:

4.1 Lack of Segregation Practices

Segregation practice prevents non-infectious waste to get mixed with infectious waste. Lack of segregation practices significantly increases the quantity of infectious medical waste as mixing of infectious component with the general non-infectious waste, makes the entire mass potentially infectious [3]. There is inadequate practice of segregation of the waste starting from generation to disposal as seen in Indian hospitals. Even if the segregation of waste at the point of generation is effective, waste handlers are found mixing it together during the collection and results in loss of ultimate value of segregation [13].

4.2 Lack of Proper Operational Strategy

Operational plans should include the location and capacity of the storage containers, frequency of collection for various types of wastes and schedule of activities. Infectious wastes are to be stored in the designated colour-coded leak-proof containers for safe handling and can be disinfected / sterilised by the available facility in the hospital. Transportation of waste within the hospital is to be carried out in closed handcarts to avoid spillage of waste to a disinfection or treatment facility. After disinfection/sterilisation the waste is transported to a common treatment facility, such as an incinerator or controlled landfill [10]. In Indian hospitals wastes are collected in mixed forms, transported in open carts thus allowing spillage to occur [13], and waste sharps are discarded without disinfection and mutilation, which may result in their being, re-used thus spreading an infection [10].

4.3 Poor Regulative Measures

In India, Central Pollution Control Board and the State Pollution Control Boards, the agencies responsible to enforce these rules in hospitals are on one hand lacking adequate power and on the other hand there is no commitment. As a result, most of the large hospitals have not complied with these rules even after expiry of new deadlines [5]. Even the regulatory authorities have to take the blame for not doing enough to ensure implementation. There is lack of coordination between the regulatory authorities (pollution control boards/committees) and Department of Health who exercise functional control over all healthcare facilities in one way or the other; and lack of will to enforce implementation. No agency has been assigned the task of spreading awareness [9]. Moreover the Rules have not been publicized as widely as required. Hence, smaller HCUs may not be fully aware of them. A number of issues have not been dealt with in detail, such as standards of collection and storage devices, equipment, etc. [10].

4.4 Lack of Green Procurement Policy

Personnel responsible for procuring health care products and services (materials managers or purchasing agents) come from varying backgrounds. Environmental background or training is not a prerequisite for the individuals responsible for securing health care products and services. Waste minimisation can be achieved by purchasing reusable items made of glass and metals which can be disinfected and reused [10]. For example, a polyolefin intravenous (IV) bag does not contain chlorine, so it has less potential to produce dioxins through incineration than an IV bag containing polyvinyl chloride (PVC) [2]. Similarly mercury thermometers can be replaced with mercury free thermometers. Health care units should stimulate the purchase of environmentally preferable products by mandating certain practices in their purchasing policy.

4.5 Waste-picking and Reusing

Reuse of plastic syringes and other plastic material used in the health care is a thriving business of billions of Indian Rupees. More than one million people are engaged in rag picking (more than 100,000 in Delhi alone). The estimated figure of business on this score in Delhi alone is more than 50 million Indian Rupees per year [9]. Lucrative monetary returns and lack of awareness about the problems associated with biomedical wastes encourage waste-picking and reusing activities [11]. It would not be fair to blame the rag pickers only for this as the circle of connivance starts from the hospital staff itself. It thereafter goes to the waste handlers, then to the rag pickers, to the packaging outlets situated in a decrepit area of a 'basti (slum)', to the medical shop, and finally sold to the unsuspecting patients or their relatives [9].

4.6 Lack of Top Management Commitment

Governments and the health care providers have gone in for one type of option for treatment of the waste. No health care provider wants or has undertaken a base line survey to collect data regarding quantum of waste and its type being generated, nor about the waste generation points in its premises. Budgetary support

is poor in the government run hospitals, the corporate hospitals and the nursing homes. Therefore they find it convenient to ignore the rules for monetary consideration [9]. Top management in most of Indian hospitals is showing inertia in dealing with the waste problem. The wastes are therefore instead of being segregated, discharged in a mixed condition to the site of disposal, separating only the saline bottles, which are sent for auctioning [13].

4.7 Lack of Adequate Facilities

Efforts to provide facilities for storage, collection, treatment and disposal of health care wastes as well as appropriate technologies have so far been limited in India. Additionally, adequate and requisite number of sanitary landfills is lacking in India. Therefore, the biomedical waste are openly dumped into the open bins on the road sides, low lying area or they are directed into the water bodies; through which severe disease causing agents are spread into the air, soil and water [5]. Self contained onsite treatment methods may be desirable and feasible for large healthcare facilities but are impractical or uneconomical for smaller institutes. An acceptable common system should be in place which will provide free supply of colour coded bags, daily collection of infectious waste, and safe transportation of waste to offsite treatment facility and final disposal with suitable technology [14]. Moreover available disposal techniques are neither able to meet disposal requirements nor innovations in disposal options are in pace with the evolution of complexity of health care waste streams.

4.8 Lack of Institutional Arrangements

Management of health-care waste depends on the input from the administration and active participation by trained staff in segregation, storage, collection, transportation, treatment and disposal. In India personnel responsible for these activities are mainly ward attendants and other supporting staff [9]. A committee consisting of the head of the establishment, all the departmental heads, hospital superintendents, nursing superintendents and hospital engineers should be formed with a waste management officer who would be advised by an environmental control advisor and an infection control advisor is required for proper waste management purposes [10]. Studies showed lack of such kind hospital waste management committee or a documented waste management and disposal policy in Indian hospitals [13].

4.9 Financial Constraints

With dedicated systems being installed in most of the HCUs, financial provision is necessary for capital and recurring expenditure including funds for sufficient manpower, disinfectants, devices and equipment. Normally, a separate allocation of funds for waste management is not found in Indian hospitals. It is estimated that INR 3000–4000 (US\$ 70–93) per tonne of hospital waste is required [10]. Additionally funds are required for conducting training and awareness programs for health care staffs. Smaller HCUs ignore waste management practices due to financial constraints [14].

4.10 Inadequate Awareness and Training Programs

Awareness of appropriate handling and disposal of health-care wastes among health personnel is a priority; it is essential that everyone should know the potential health hazards. Regular programs will help prevent exposure of health-care wastes and related hazards. Poster exhibition, proper labeling, and explanation by staff are effective methods. Seminars and workshops, and participation in training courses are also essential [5]. Management in most of Indian hospitals is not aware of cost savings achieved due to good waste management practices. It has also been estimated that disposal savings of between 40% and 70% could be realised through the implementation of a healthcare waste reduction program [15].

4.11 Reluctance to Change and Adoption

Though now alternative technologies are permitted as per the Biomedical Rules, it takes a long time to change the mindset of the people. Even now most of the health care providers and decision making authorities talk of incinerator only although autoclaves and other advanced waste handling equipments are available. Indiscriminate throwing of the waste is still seen in most of the hospitals and the waste handlers still are without protective clothing and gears. There is hardly any change in the applied knowledge and awareness seen in Indian hospitals [9].

4.12 Inadequate Pressure from Societies

Previous studies show that pressure from various Environmental advocacy groups forces, organizations to seriously think about their environmental management programs [16] which is lacking in case of Indian organizations. There is no doubt in the mind of any educated or enlightened person that improper hospital waste management is the source of many communicable and infectious diseases. But when it comes to doing anything there is a complete lack of will, and there is a lackadaisical attitude towards the problem [9].

5. Conclusion

Green Supply Chain Management(GSCM) has been widely adopted and implemented by various sectors to reduce environmental impact of their operations thus by gaining improved brand image and competitive advantage. Health care units produce large amount of waste in the process of providing services to mankind. Many efforts have been made by environmental regulatory agencies and waste generators to better manage the waste from healthcare facilities in recent years but still these are not sufficient enough to prevent environmental hazards and associated health hazards caused by health care waste. So there is an urgent need for raising awareness and education on medical waste issues. This study has made an attempt to identify various challenges faced by Indian health care units for managing their waste properly and ensuring health and environmental safety. This information would be especially helpful as a guideline for improving and developing the health care related waste management standard criteria in India. This may be also useful for resolving problems with the said waste management process in India and provide basis for recommendations to the government, healthcare authorities, private healthcare industries and those interested in improving their existing health care waste management strategies and standards.

6. References

- [1] S.K. Srivastava. Green supply-chain management: A state-of-the-art literature review. *International Journal of Management Reviews*. 2007, **9**: 53–80.
- [2] B.Kaiser, P.D. Eagan and H. Shaner. Solutions to Health Care Waste: Life-Cycle Thinking and “Green” Purchasing. *Environmental Health Perspectives*. 2001,**109**(3):205-207.
- [3] S. Gupta and R. Boojh.Report: Biomedical waste management practices at Balrampur Hospital, Lucknow, India. *Waste Management Research*. 2006, **24**: 584–591.
- [4] M.S. Dinesh, K.S.Geetha, V. Vaishnavi, R. D. Kale and V. Krishna Murthy. Ecofriendly Treatment of Biomedical Wastes Using Epigeic Earthworms. *Journal of ISHWM*. 2010, **9**(1): 5-20.
- [5] A.K.Dwivedi,S.Pandey, and Shashi. Fate of hospital waste in India. *Biology and Medicine*. 2009, **1**(3): 25-32.
- [6] H. M.Manzurul, S. A. Ahmed, A. K. Rahman, and T. K. Biswas. Pattern of medical waste management: existing scenario in Dhaka City, Bangladesh. *Journal of BMC Public Health*. 2008,**8**: 36.
- [7] F.Abdulla, H.A. Qdais and A.Rabi. Site investigation on medical waste management practices in northern Jordan. *Journal of Waste Management*. 2008,**28**(2):450-458.
- [8] S. V.Manyele and T. J. Lyasenga. Factors affecting medical waste management in low level health facilities in Tanzania. *African Journal of Environmental Science and Technology*. 2010, **4** (5): 304-318.
- [9] L.K. Verma. Managing Hospital Waste is Difficult: How Difficult?. *Journal of ISHWM*. 2010, **9**(1): 46-50.
- [10] A.D. Patil and A. V. Shekdar. Health-care waste management in India. *Journal of Environmental Management*, 2001, **63**: 211–220.
- [11] Patil, V.Gayatri. and K.Pokhrel. Biomedical solid waste management in an Indian hospital: a case study. *Waste Management*. 2005, **25**:592–599.
- [12] S.Gupta, R.Boojh, A.Mishra, and H. Chandra. Rules and management of biomedical waste at Vivekananda Polyclinic: A case study. *Waste Management*. 2009, **29**: 812–819.
- [13] A.V. Athavale, and G. B. Dhumale. A Study of Hospital Waste Management at a Rural Hospital in Maharashtra. *Journal of ISHWM*. 2010,**9**(1):21-31.
- [14] S.K.M. Rao, R.K.Ranyal, S.S. Bhatia and V.R. Sharma. Biomedical Waste Management : An Infrastructural Survey of Hospitals. *Medical Journal Armed Forces India*. 2004, **60**(4):379-382.

- [15] T.L.Tudor, C.L. Noonan and L.E.T. Jenkin. Healthcare waste management: a case study from the National Health Service in Cornwall, United Kingdom. *Waste Management*. 2005, **25**:606–615.
- [16] H.Walker, L.Di Sisto, and D.McBain. Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors. *Journal of Purchasing & Supply Management*, 2008, **14**:69–85.