

Governance Challenges in Medical Waste Management and Way Out

Executive Summary

13 December 2022

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Acknowledgements

We sincerely acknowledge the contribution of the informants for providing their observations and suggestions on medical waste management. Sincere thanks to the colleagues of the Research and Policy, Civic Engagement, and Outreach and Communication Divisions for their support at various stages of the research. Further thanks to Shahzada Akram, *Research Fellow, R&P, TIB* and Md. Julkarnayeen, *Research Fellow, R&P, TIB* for their special support in preparation of the report.

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Executive Summary*

1. Background and Objectives

Medical waste management is an important area of the environmental and public health. Due to the lack of adequate and effective management of medical waste (identification and segregation, collection, transportation, treatment, and disposal), environmental pollution, outbreaks of infectious diseases and health risks to relevant stakeholders and citizens is increasing. According to the World Health Organization (WHO), Bangladesh ranked the second highest among the South Asian countries for average daily medical waste generation per bed. According to a recent report, about 7,440 tons of medical waste is generated every month in Bangladesh, most of which are not adequately managed.

The UN Sustainable Development Goal (SDG) 11.6 emphasizes the management of all types of waste in cities and sets targets for reducing the environmental impact from waste generation. In addition, the proper management of sustainable medical waste plays a vital role in accelerating the achievement of SDG targets of goal 3, 6, 8, 12, and 13. The National Environment Policy (2018) of Bangladesh has mandated the collection and storage of medical waste generated daily in hospitals for effective waste management. The Perspective Plan of Bangladesh (2021-2024) have also emphasized developing a planned medical waste disposal system consistent with the operational systems of other countries to ensure public health safety. Furthermore, the Fifth Five Year Plan (1997-2002) first highlighted medical waste disposal as a new area for the development in the health sector. Following this, all subsequent Five-Year Plans have emphasized treating and managing medical waste before the final disposal.

However, the latest Eighth Five-Year Plan has acknowledged the deficits in this area cautioning the severe environmental threat. An earlier study conducted by TIB identified deficits in institutional capacity in medical waste management. Besides, media reports have revealed several irregularities and failures in medical waste management. Therefore, this study is conducted to assess the existing structure of medical waste management and the initiatives taken from the governance perspective.

2. Objectives of the Research

The overall objective of this study is to identify and analyze the governance challenges in medical waste management and provide recommendations to overcome these challenges. The specific objectives are

- a. To review the laws, policies, and rules related to medical waste management and identify constraints and challenges in enacting them;
- b. To identify patterns, causes, and extents of the irregularities and corruption in medical waste management; and
- c. To suggest recommendations to achieve better governance based on the research findings.

3. Methodology

This study is based on a mixed-method (qualitative and quantitative) of data collection. Collection, verification, and analysis of primary data are performed using both qualitative and quantitative tools and techniques.

Sources of Data: Data were collected from direct and indirect sources and analyzed (see Table 31).

Table 1: Sources and Methods of Data Collection

Type of Data	Methods of data collection	Data Source
Primary Data	Key informant interview	▪ Officials from hospitals, city corporations, municipalities, Local Government Division, Directorate General of Health Services and Department of Environment;

* This is a summary of the study report titled, 'Governance Challenges in Medical Waste Management and Way Out' released on 13 December 2022 through a press conference.

Type of Data	Methods of data collection	Data Source
		contractors, civil society representatives, experts, and medical waste workers
	Survey	<ul style="list-style-type: none"> ▪ Government and private hospitals, city corporations, municipalities, contractors[†] ▪ Medical waste workers[‡]
	Observation	<ul style="list-style-type: none"> ▪ Government and private hospitals, city corporations, municipalities and contractors
Secondary data	Analysis and Review	<ul style="list-style-type: none"> ▪ Relevant laws, regulations and guidelines; related public and private reports; published research reports; record book; media reports and published data on websites

Primary Data: Key informant interviews, surveys and observations were thus conducted to collect primary data. Both qualitative and quantitative data have been collected. Checklists were used in interviewing key informants. Interviews were conducted with officials from hospitals, city corporations, municipalities, local government departments, Directorate General of Health Services and environment departments, contractors, civil society representatives, experts and medical waste workers and media personnel. Besides, survey has been completed on public and private hospitals, city corporation/ municipality authorities and contractors and medical waste workers of these institutions.

Sampling: Multistage stratified sampling method was followed to determine the sample size for this survey. In the first phase, 45 districts were randomly selected from all districts of Bangladesh. In the second phase, 47 city corporation/Municipal areas under the selected districts were selected. In the third stage, hospitals from each study area were divided into two strata based on the number of beds (one stratum with less than 100 beds and another stratum with more than 100); one public and one private hospital from each stratum were selected - a total of 188 hospitals were selected for the survey. Besides, 47 city corporations/municipalities within the study areas and 12 contractor institutions involved in medical waste management in these areas were also selected for the survey. Finally, 231 institutions (181 hospitals, 38 city corporations/municipal authorities, and 12 contractor institutions) participated in the study. Data were collected through interviews with 93 medical waste workers from these institutions using a proportional sampling method.

Table 2: Survey Sampling

Sampling		Selected sample (organization/people)	Survey completed (organization /people)
Organizations	Hospitals	188	181
	City Corporation/Municipality	47	38
	Contract agency	12	12
Total Organizations:		247	231
Medical waste workers		95	93

Secondary Data: Secondary data were collected from relevant laws, rules and guidelines; related public and private reports; published research reports; record book; reports published in media and information published on related websites etc.

Data collection time: Data were collected and verified during June 2021 – November 2022.

[†] The contractor refers to ‘occupiers’ as defined in the Medical Waste (Management and Processing) Rules, 2008. They include societies, NGOs, voluntary organizations, etc., who are involved in the collection, transportation, treatment, and disposal of waste through license or legal agreement.

[‡] Medical waste workers, as per medical waste management guidelines, means ward boys/nurses/cooks, cleaners/sanitary workers of the hospital; sweeper/cleaner /cleaning workers of the City Corporation/Municipal; and waste workers in contractor institutions are considered as medical waste workers.

4. Analytical Framework

The data has been collected, verified and analyzed based on seven indicators of good governance (Table 3).

Table 3: Analytical framework based on indicators of good governance

Indicators of good governance	Specific areas of observation
Compliance with laws and policies	Relevant laws, policies and rules on medical waste management
Capacity	Infrastructure; use of technology; human resources management; budget; safety and security measures
Transparency	Disclosure of information of related institutions
Accountability	Monitoring of medical waste collection, storage, processing and disposal activities; environmental monitoring; audit; grievance redress mechanism
Participation	Stakeholders' involvement in medical waste management activities
Coordination	Coordination between government agencies; Coordination between public and private institutions
Irregularities and corruption	Implementation of medical waste management activities; recruitment of medical waste workers and contractors; data management; involvement of various stakeholders

5. Key findings

5.1 Limitations and Challenges in ensuring compliance of laws and policies

Medical Waste (Management and Processing) Rules, 2008: The Medical Waste (Management and Processing) Rules mandated the formation of an 'Authority' but do not specified who is responsible for constituting this 'Authority'. Besides, there is no mention to whom the 'Authority' will be accountable. Although the 'Authority' was supposed to be constituted within three months of publishing the gazette, it has not been implemented even in the last 14 years. Besides, the process of providing license contractors for medical waste management has not been implemented. Therefore, activities related to medical waste management are being carried out without license, by appointing certain contractors, by the city corporation/Municipality and the hospital, on a contractual basis. Besides, the rules do not specify any organization responsible for generating a central database related to medical waste. As a result, hospitals, city corporations, and municipalities do not store information on medical waste, and no central database has been developed in this regard.

The rules do not clarify the responsibilities and accountability of city corporations and municipalities for outhouse management of medical waste. As a result, the city corporation/Municipality has not developed any action plan. There is a tendency for city corporations and municipalities to evade responsibility in this certain area. Besides, the rules do not guide the disposal of liquid/chemical wastes, identifying and segregating liquid wastes separately as hazardous and non-hazardous. The ratio of water to the chemical in the disposal of liquid and chemical wastes by mixing with water is not specified. Besides, the amount of water mixing according to the type and amount of waste is not specified. As a result, there is scope for indiscriminate discharge of liquid and chemical wastes into sewers, and discharged liquid wastes create environmental hazards.

Although there are guidelines from the WHO for the management of recyclable and reusable waste, the rules do not indicate separate categories for reusable and recyclable waste. Besides, the rules do not have any guidelines on procurement of reusable and recyclable medical supplies such as eco-friendly procurement policy/effective model. As a result, reusable and recyclable wastes are not properly managed. There is opportunity to collect partial or full management cost of recycling medical waste through sales of recyclable waste. But the sale is not possible due to the lack of an effective procurement policy and model of selling the recyclable waste. The WHO guidelines give utmost importance to reducing medical waste. But any relevant clause to reducing medical waste is not mentioned in these rules. Consequently, the hospitals take no initiative to reduce waste generation.

As per the WHO guidelines, there need to be separate color codes and labels on the trolleys according to the type of waste for in-house transportation of medical waste. However, mention of such coding is missing in the rules. As a result, all types of waste are transported in the same trolley, causing contamination and environmental hazards. For out-house management, WHO guidelines mandates that waste be transported in closed containers and by drivers vaccinated against infectious diseases. But the rules do not define or schedule 'approved' vehicles for transporting medical waste. In absence of the definition of authorized vehicles, medical waste is transported by different kinds of vehicles, which creates infectious diseases and environmental risks.

Local Government (City Corporations) Act, 2009 and Local Government (Municipalities) Act, 2009: There is no clear direction in the acts regarding the responsibility of the city corporation/municipality regarding the management of waste generated in hospitals in their areas. As a result, it has not been possible to ensure effective participation and accountability of city corporations/municipalities in this specific tasks by law.

Environment Conservation Act, 1995: This Act does not specifically identify medical waste as harmful to the environment, and there are no specific guidelines in this regard. There is a lack of emphasis on medical waste management as there is no separate mention of medical waste within the Act, due to which it is not possible to bring such polluters and rule breakers to punish.

Environment Conservation Rules, 1997: Rule 13 prescribes standards for waste discharges and emissions, but not in conformity with internationally followed standards in certain areas. As a result, most hospitals discharge liquid and chemical wastes more than the prescribed levels.

5.2 Challenges related to capacity

Challenges related to Infrastructure

- **Lack of specific color containers for waste storage:** According to the Medical Waste (Management and Processing) Rules, 2008, 60 percent of surveyed hospitals do not have six specific color containers for waste storage. In the absence of specific colored containers, medical waste is thrown everywhere inside the hospital, and in some cases, waste is stored together in buckets/pots.
- **Lack of waste storage rooms:** As per rules, hospitals are directed to have waste storage rooms with adequate light, air, and water supply for cleaning the waste. But there is a lack of specific rooms and facilities in this regard. Overall, 66 percent of surveyed hospitals do not have designated rooms for waste storage. Amongst the hospitals having waste storage rooms (34 percent), 23 percent of the storage rooms do not have adequate lighting and ventilation, and waste is left in the open because the hospital does not have a designated space for waste storage.
- **Lack of technical capacity in medical waste management:** There is a shortage of autoclave machine in the surveyed hospitals despite the direction of mandatory use of autoclave for waste treatment. Due to a lack of autoclave equipment or improper autoclaving, non-sterile medical equipment has been reused. As per the Environment Protection Rules, 1997, as 'red' category institutions, it is mandatory to have Effluent Treatment Plant (ETP) in hospitals. But 83 percent of surveyed hospitals do not have ETPs, while 16 percent do not operate ETPs amongst the hospitals that have ETPs (17 percent).
- **Lack of medical waste treatment plants and landfills:** Most of the surveyed city corporations/municipalities do not have medical waste treatment facilities despite the guidelines for setting up suitable sites and infrastructure for treatment and disposal of medical waste. Overall, 80 percent of surveyed city corporations/ municipalities do not have treatment facilities for treating medical waste. Only eight (8) city corporations/ municipalities have the treatment plants, among them six do not operate it.

Fourteen percent of surveyed city corporations/ municipalities have no landfill for medical waste disposal. Although having the sanitary landfill is essential for environmental protection, only one city corporation in the study area has a sanitary landfill. The minimum safe distance of the landfill from the settlement area is 500 meters, but 77 percent of the city corporation/ municipal landfills are located less than 500 meters away from the residential area. Moreover, landfills are not well protected in 86 percent of the city corporations/ municipalities covered within this study.

Challenges related to human resource

- **Manpower Shortage:** There is a shortage of manpower for medical waste management-related activities in relevant institutions. Although there are guidelines for disposal of hospital waste within a minimum of 24 hours, it is not possible to do so in most cases due to shortage of manpower. Due to non-removal of waste within the stipulated time, the patients have to suffer from stench spreading in various wards. Moreover, there is a shortage of skilled manpower for handling medical waste management equipment (autoclaves, incinerators, ETPs etc.) and to drive motor vehicles.
- **Lack of proper adherence to work distribution and working hours:** There is a discrepancy in fixing the work distribution and working hours of medical waste workers. Overall, 28 percent of the surveyed waste workers has no specific assignment or working hours. Twelve percent of surveyed waste workers work more than 8 hours daily (average work hour ten and a half). On the other hand, 44 percent of workers work less than 8 hours a day (average work hour 5). Due to the high workload of a section of waste workers, there is a negative impact on the collection, segregation, storage, treatment, and disposal of medical waste.
- **Lack of training:** While the rules mandated adequate training for medical waste workers, there is a lack of compliance. Overall, 44 percent of workers have no training in waste management. Besides, 68 percent of workers do not know the significance of color containers to store medical waste, due to which there is a lack of capacity in waste collection, segregation, storage, and transportation, including the operation of machines such as autoclaves, incinerators, ETPs, etc.
- **Lack of awareness about occupational hazards:** There is a lack of awareness among waste workers about occupational hazards such as injury from sharp waste, risk of infectious diseases, inhalation of bad odors, risk of skin diseases etc. Overall, 17 percent of waste workers surveyed were unaware of occupational hazards.

Deficiency of Budget in medical waste management

All the surveyed city corporations and 77 percent of the municipalities have no separate budget allocation for medical waste management. Only 23 percent of municipalities spend BDT 1-8 lakh (US\$ 970 - US\$ 7800 approx.) annually on medical waste management. But, depending on the category of the municipality, medical waste management requires BDT 10-50 lakh (US\$ 9,800 - US\$ 48,000) annually. Besides, hospitals cannot afford to purchase modern technology like ETPs and incinerators due to budget deficits. However, hospitals do not use ETPs, incinerators, autoclaves, and other waste treatment and destruction devices with an excuse of extra electricity bills.

Challenges related to ensure protection

- **Health risk to workers in waste management activities:** Medical waste is collected together with other wastes even though there is an instruction not to do so. Overall, 54 percent of waste collectors regularly collect medical waste together with other waste. According to the rules, there are instructions to provide protective equipment such as clothing (gloves, masks, boots, etc.), and other materials, which, however, are not provided to 31 percent of the waste workers. Twenty-six percent of waste workers were not vaccinated against COVID-19, and 38 percent of them were not vaccinated against other communicable diseases (tuberculosis, hepatitis, diphtheria, influenza etc.) (up to the time of data collection).
- **Lack of in ensuring environmental protection:** Although rules prescribe for the use of incinerators for disposal of medical waste, they are not used by most of the city corporation/ municipality for disposal of medical waste and in some cases open burning is done. Overall 83 percent of the city corporations/ municipalities do not dispose of medical waste in incinerators and 46 percent of medical wastes are disposed of by open burning.

Although there is a provision to treat medical waste as per the rules, the city corporations/ municipalities are disposing of untreated medical waste along with domestic waste and similarly disposing of COVID-19 waste along with domestic and other waste. Ninety-one percent of city corporations/ municipalities dispose of untreated medical waste along with household waste and 69 percent of city corporations/ municipalities dispose of COVID-19 waste along with household waste. As a result, soil and water pollution is occurring and germs of infectious diseases are spreading in the environment.

5.3 Challenges related to transparency

Lack of information disclosure

It has been observed that there is a lack of disclosure of information related to medical waste management on the website of concerned ministries and departments. The concerned stockholders do not publish medical waste management-related statistics, budgets, annual reports etc. There is a deficiency in displaying waste disposal guidelines (posters, information boards etc.) in surveyed hospitals. Overall, 67 percent of surveyed hospitals do not display waste disposal guidelines. Color-coded and signposted waste disposal guidelines are not displayed for outpatients, inpatients, or visitors at the hospital. In addition, the Department of Environment does not disclose specific information related to medical waste management.

5.4 Challenges related to accountability

Lack of supervision

There is a lack of monitoring of medical waste management activities by stakeholders (see Table 4).

Table 4: Deficiencies in monitoring medical waste management activities

Responsible institution	Lack of institutional monitoring
Directorate General of Health Services (DGHS)	<ul style="list-style-type: none">▪ Internal waste management of hospitals; follow rules and guidelines
City corporation/ Municipality	<ul style="list-style-type: none">▪ Collection, treatment and disposal of medical waste by contractors including own waste workers▪ Medical waste disposal activities in landfills
Department of Environment (DoE)	<ul style="list-style-type: none">▪ Medical waste management programs of hospitals and city corporations/municipalities▪ Pollution control and environmental management of landfills

There is a lack of oversight by the DGHS on whether hospital internal waste management regulations and guidelines are being followed. Similarly, there is lack of monitoring of medical waste collection, treatment and disposal activities by city corporation/ municipality including its own waste workers and contractors. Moreover, there is lack of supervision of medical waste disposal activities in landfills by the city corporations/ municipalities. There is also lack of monitoring of medical waste management activities of hospitals and city corporations/ municipalities by the Department of Environment (DoE). Moreover, there is no proper plan of supervision by DoE for monitoring the pollution and environmental degradation of landfills.

Deficits in auditing

An environmental audit on medical waste management was initiated in 2016 by the Office of the Comptroller and Auditor General of Bangladesh (OCAG), but no further audits have been conducted since then. Appropriate action (formation of authorities and local committees, construction of landfill etc.) has not been taken by the concerned stakeholders to address OCAG's observation given in 2016.

Deficits in redressing complaints

There is no institutional mechanism for filing and redress of complaints related to medical waste management.

5.5 Challenges in ensuring participation

There is a lack of participation by stakeholders in medical waste management activities. The rules mentioned to ensure the participation of private organizations, including waste management experts in the National Advisory Committee on Medical Waste Management, but no initiative has been taken by the relevant authorities. Although the guidelines on internal medical waste management of hospitals are directed to form committees at various levels with the participation of concerned citizens for waste management, it has not been implemented. For example, there was no consultation or discussion meeting with civil society members including journalists, NGO workers, sector experts for effective medical waste management. Although the management of this sector has started with the interest and

self-motivated initiative of some private organizations, no arrangements have been made to issue licenses to the aspirant organizations as per the guidelines of the rules.

5.6 Challenges related to coordination

Lack of coordination among government institutions

There is no coordination between concerned ministries, including the DGHS, DoE and Office of the Divisional Commissioner, to form the 'Authority' on medical waste management. Due to lack of coordination, National Advisory Committee, including the Appellate Authority and Waste Management Committees at city corporations/ municipalities, district and upazila levels are ineffective. The hospital representative does not regularly participate in the monthly coordination meeting of the office of District Administrator/ Upazila Executive Officer. Besides, the work of the city corporation/ municipality is not coordinated with the hospital.

Lack of coordination between public and private institutions

Due to lack of coordination between hospital and city corporation/ municipality with the contractors, effective action plan was not developed.

5.7 Irregularities and corruption

Irregularities in storage of medical waste in hospitals

As described in the rules, each waste storage container should be color coded according to the type of waste and there are instructions to use symbols approved by the WHO. But there is a lack of compliance in hospitals. Overall, 29 percent of hospital do not maintain color code and 51 percent hospitals' containers have no symbols. Moreover, hospitals do not use symbols for containers according to the type of waste. All types of waste are kept in the same container without segregating the waste in the correct container according to the type. It has been observed that waste was not disposed of in designated containers but is left next to it. There is a lack of segregation and careful management of chemical and radioactive waste.

COVID-19 waste collected and stored together with general medical waste

General medical waste and COVID-19 medical waste are not managed separately. In total 42 percent of cases COVID-19 waste is collected and storage together with general medical waste.

Irregularities and corruption in treatment and disposal of medical waste

As per the rules 2008, there are guidelines to prick or cut rubber/plastic tubes and various bags into pieces to prevent re-use of medical waste, but there is lack of compliance. Overall, 28 percent of hospitals do not cut of rubber/plastic bags and overall 31 percent of hospitals do not cut of rubber/plastic tubes. The survey shows that 49 percent of hospitals do not have needle destroyers.

Sale of medical waste through syndicates

Two types of medical waste are sold illegally. Firstly, reusable waste is sold through syndicates and secondly, recyclable waste is sold through syndicates.

- **Selling re-useable waste through syndicate:** A section of the hospital staff (part of the syndicate) sells re-useable waste, such as used glass bottles, syringes, saline bags, and rubber/plastic tubes to the recyclable waste collectors (part of the syndicate) without cutting or destroying them. The syndicate then cleans and packages the reusable waste without proper sterilization and sells it to drug stores, hospitals, and clinics. These materials are not adequately sterilized. The reuse of these materials is very dangerous, and there is a risk of various infectious diseases, including HIV.
- **Selling recyclable waste through syndicate:** A section of the hospital staff (part of the syndicate) sell recyclable medical waste (used syringes, beds, knives, scissors, blood bags and tubes, metallic materials, etc.) without spoiling/ destroying them to scrap shops and recycling factories (part of the syndicate). Transporting these wastes in an infected state increases the risk of contracting various infectious diseases among the associated workers and recycling plant workers. The staff of hospitals in a district has been accused of illegally selling around 3,500 kg of plastic medical waste daily.
- **Illegal sale of waste by contractors:** There are allegations of illicit trade in medical waste against contractors. They sell medical waste in the black market without wasting/ disposing these. A well-known contractor has been accused of illegally selling plastic medical waste on the black market.

Irregularities and corruption related to medical waste workers

- **Irregularities and corruption in recruitment of medical waste workers:** The survey shows that 55 percent of waste workers were recruited through irregularities and corruption. Among the waste workers recruited through irregularities and corruption, 46 percent were recruited through nepotism, 42 percent through influence peddling, and 14 percent through bribery or illegal payments. Furthermore, medical waste workers are not recruited separately. They are recruited as general waste workers and later had to work as medical waste workers. There are also allegations of irregularities in the process of job confirmation of waste workers. For example, new and temporary workers got their job confirmation before the end of their apprenticeship through bribe or illegal payments. There are allegations of bribe in the recruitment of waste workers in hospitals, city corporations/ municipalities, and contractors, and the amount of transactions vary from BDT 2 thousand to BDT 2 lakh (US\$ 20 - US\$ 2,000) depending on the position. The amount of bribes in government hospitals for the recruitment of waste workers is BDT 1-2 lakhs (US\$ 1000 - US\$ 2,000) and in this case, the recipients of the money are some of the high-level officials and employees of the DGHS. In city corporation/ municipality, the amount of bribe is worth BDT 5-60 thousand (US\$ 50 - US\$ 600) in the recruitment of waste workers; the receivers of the money are a section of officials and employees from top to bottom, and the leaders of labor unions. The amount is BDT 2-10 thousand (US\$ 20 - US\$ 100) in the recruitment of waste workers in the contractor company; in this case, the recipient of the money is a section of the officers and employees of the contractor institutions.
- **Irregularities and corruption in payment of salaries of medical waste workers:** There are complaints of delay in payment of monthly wages/ salaries of waste workers in hospitals, city corporations/ municipalities, and contractors. Besides, there are allegations of partial deduction in monthly salary payments to waste workers recruited through agencies.

Irregularities and corruption in the appointment of contractors

According to the rules, there is a provision to issue a license to the contractor organization for medical waste management and processing according to the capacity and competence for medical waste management. Still, it is not being followed. Rather, the contractor organizations are implementing the medical waste management under contract with the city corporation/ municipality and the hospital. Most of the contractors are operating without following proper rules for segregation, transportation, treatment, and disposal of medical waste. In the two city corporations of Dhaka, only one organization has been appointed on a contractual basis for medical waste management for a long time without giving opportunity to any other organization. There are allegations of creating a 'monopoly' with the collusion of the concerned officials of the city corporation. A city corporation has employed an unskilled and inexperienced contractor. Although there were allegations of irregularities, no action was taken to investigate them and take action accordingly.

Irregularities in data management

According to the 2008 rules, there are instructions to prepare annual reports on medical waste management and preserve the documents, but there is a lack of compliance by the hospitals. For example, 73 percent of hospitals do not prepare annual reports, 63 percent do not maintain waste management records, and 46 percent do not have stock registers. Of those hospitals (27 percent) that report on waste management, about 16 percent do not report regularly.

Irregularities and corruption related to environmental clearance certificate

Although there is a provision for taking environmental clearance certificate for all hospitals, it is not taken by government hospitals in some instances. Besides, there have been allegations of harassment by officials of the DoE to obtain environmental clearance certificate in private hospitals, such as deliberate delays in issuance and renewal and forced to pay 3-4 times more than the prescribed fee in some cases.

6. Overall observations

Various weaknesses exist in the legal framework related to medical waste management. The relevant stakeholders, including the DoE, DGHS, and the Office of the Divisional Commissioner, have failed to comply effectively with the existing medical waste management related laws, rules and guidelines. No effective steps have been taken to comply with the Medical Waste (Management and Processing) Rules,

2008 even after 14 years. The 'Authority' has not been formed yet. As a result, the contractors are operating without a license.

Concerned stakeholders, including hospital and city corporation/ municipal officials are not adequately aware of the existing legal framework and their consecutive responsibilities of medical waste management. However, there is dearth of transparency, accountability, and coordination among the institutions related to the management of this area. Most hospitals do not have proper management system for their internal waste.

The failure of the in-house and out-house management of medical waste is noticeable due to the lack of infrastructure, budget, modern technology, skilled human resources, and environmental protection. There is a lack of coordination among the institutions concerned with medical waste management due to the absence of a single designated institution. On the one hand, the risk of infection and environmental pollution increases as a result of selling the waste without destroying/disposals it with the collaboration of some of the concerned workers and contractors. Similarly, irregularities and corruption in this sector seems to be institutionalized as a result of lack of effective measures to prevent illegal financial transactions. In addition, there is mismanagement in this area due to negligence of responsibilities of the concerned institutions and lack of effective action by the local government institutions. After all, medical waste management is not given adequate importance.

7. Recommendations

1. Coordination, monitoring, and supervision of institutions related to medical waste management must be ensured. The 'Authority' and coordination committees at national and local levels must be formed.
2. The Medical Waste (Management and Processing) Rules, 2008 must be amended following international standards and specify the responsibilities of concerned stakeholders.
3. That medical waste is harmful to the environment must be clearly defined in the relevant section of the Environment Protection Act, 1995.
4. An effective action plan in coordination with the concerned stakeholders, including the DoE, DGHS, hospital and city corporations/ municipalities for managing medical waste must be developed.
5. The capacity and effectiveness of stakeholders related to medical waste management should be increased. Medical waste management must be prioritized and financial allocation in the budget must be increased.
6. The use of modern and advanced technologies in medical waste management should be increased.
7. ETPs in all public and private hospitals and area wise central incinerators must be installed. Medical waste must be disposed by skilled manpower.
8. Awareness on risks of medical waste should be raised among hospital officials, health workers, medical waste handlers and the general public.
9. Dedicated manpower with proper trainings must be employed in city corporations/ municipalities for medical waste management.
10. Health insurance benefits must be provided to medical waste workers.
11. A central database should be developed and regularly updated with information on waste generated.
12. The reports on waste management must be disclosed and make them available on the website of the concerned ministries and divisions.
13. Strict action against corruption and irregularities must be taken to stop the illegal trade in re-use and recyclable medical waste.
