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Critical Issues of Present Medical Waste Management Practice in Rajshahi City and its Improvement Strategies

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Abstract

The study was conducted to evaluate medical waste management practices and to determine the critical issues in medical waste management in Rajshahi City. A survey was conducted to collect information about the practices related to waste segregation, collection procedures, types of onsite storage containers, onsite handling, processing and storage, primary dumping point, transfer and transport, treatment of wastes, and final disposal options. This study indicates that the rate of medical waste generation varies among health care establishment as 336.23 kg/day, 7.14 kg/day, 2.11 kg/day, 3.92 kg/day, 1.21 kg/day and 15.05 kg/day at Rajshahi Medical College Hospital, Christian Mission Hospital, Al-Madina Clinic, Mohanagar Clinic, Rajshahi Dental College and Popular Diagnostic Center, respectively. The highest 15 types of wastes are analyzed from wastes generated in Rajshahi medical college hospital. However, only two to six types of wastes are obtained in other health care facilities. The critical issues identified from this study are not accumulation of all types of wastes in every hospital, colour containers are not always used by many hospitals, collection of wastes from source of generation is not properly performed, primary dumping site is not cleaned after transferring and transporting the waste, there is no incinerator except Rajshahi Medical College Hospital and it is not used regularly, hazardous wastes are burnt in open place. Rajshahi City Corporation, the waste management authority, has no treatment and disposal facility for medical wastes. The wastes collected from all health care facilities are dumped by municipal authority along with the municipal solid wastes by open dumping method. From this study it can be mentioned that there is an urgent need to take immediate action for raising awareness and education on medical waste management issues. Moreover, trained and skilled medical wastes management workers are essential in Rajshahi City.

Keywords: Medical waste, Hazardous, management, Critical issues, Improvement

1 Introduction

The appropriate management of medical waste is essential due to its infectious and hazardous nature that can cause risks on environment and public health. The medical waste management study covers the critical aspects in the process of Medical waste generation, separation, collection, transportation, storage, treatment and final disposal. Improper management of medical waste management can create many problems especially threats to the health, safety and environment. Hazardous medical waste can be extremely dangerous to public health and also environment even though the waste is small in quantity (Morgan, 1994). The hazardous medical wastes include pathological and infectious material, sharps, and chemical wastes (Askarian, *et al*., 2004, Mato and Kaseva, 1999, Henry, *et al*., 1996). Various kinds of treatments are applied to the patients such as surgery, resection of gangrenous organs, biopsy, autopsy, dialysis, delivery, cobalt therapy, chemotherapy, para clinical test, injections etc. in hospitals. Various hazardous and infectious wastes like sharp objects, radioactive wastes and chemical materials may produce through these treatment processes (Prüss, *et al*., 1999).

Medical waste arises from a number of sources including hospitals, health clinics, nursing homes, medical research laboratories, dentists, and veterinarians, home health care, and funeral homes. In Bangladesh like many

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other countries, hazardous and medical wastes are still handled and disposed together with domestic wastes, thus creating a great health risk to municipal workers, the public and the environment. Bangladesh did not compile yet proper and efficient rule about medical waste management. Moreover, there is lack authentic information regarding medical waste management. It is therefore important to investigate the present medical waste management situation.

People without considering age, sex, race and religion have to visit frequently to hospitals for their treatment (Rudraswamy, 2013). However, its wastes management becomes most critical concern in Bangladesh like other Asian countries. This is because of ignorance of hospital authority and also wastes management authority. Whereas, medical wastes management deserves more attention same as treatment of patients and it should be an essential component of hospital services, involves technical, financial, managerial, administrative and logistic support (Biswas, 2009). Hospitals are supposed to safeguard the health of patients, hospital workers and the whole community (Mohr, 2006). However, the improper management of medical wastes may become greater threat than the original diseases to the patients. It also endangering the environment and violating human rights to have a healthy, congenial environment free from any kind of pollution and contamination.

The rapid increase of hospitals, clinics, diagnostic laboratories etc. in Rajshahi city exerts a tremendous impact on human health ecology. It is observed that the solid medical wastes are being disposed off in the City Corporation's collection bins in and around the hospital premises. The waste is collected by City Corporation's vehicles and then transported to the open dumping sites. Simply disposing it into dustbins, drains, and canals or finally dumping it to the outskirts of the city poses a serious public health hazard. However, these wastes may contain many hazardous components like infectious materials, human organs, body parts, needles, syringes, used cotton bandage and other similar items. Low income people collect, wash and repack for reselling some items from these wastes to the public and continuing the transmission of diseases (Hossain and Uddin, 2014). The problem is getting worse with the increasing number of hospitals, clinics, and diagnostic laboratories in the city. The improvement of waste management will have significant long-term impact on keeping the spread of infectious diseases to a minimum and result in a cleaner and healthy environment. Therefore, the aim of this study is to critically observe the present practice of medical waste management for identifying the critical issues in every steps of management system and to set improvement strategies.

2 Methodology

The study has been carried by field investigation through visual observation, taking exclusive photograph, primary data collection and secondary data collection in the selected hospital and clinics. The relevant data for this study were mainly collected from the published and unpublished sources. The data were analyzed to address the critical issues of medical waste management with relation to the generation of wastes, on-site processing and storage, collection, transfer and transport, treatment and ultimate disposal.

2.1 Selection of Hospital, Clinics and Diagnostic Center

There are more than 40 hospitals and clinics in Rajshahi City among which Rajshahi Medical College Hospital is a government hospital and the largest one. In consideration of establishment age, Christian Mission Hospital is second in position after Rajshahi Medical College Hospital. Popular Diagnostic Centre is the largest health care facilities among the diagnostic centers in Rajshahi City. On the other hand, there are some medium size and small size hospital and clinics based on number of beds. Nevertheless, Rajshahi Dental College is the only dental health care center. Considering all these matter the following hospitals, clinics and diagnostic center are selected and listed in Table 1 with detail information.

2.2 Data Collection

Information regarding the number of beds in different wards and other related information are collected from hospital authority. Information about medical waste management practice i.e. waste generation, on-site collection and storage system, collection system, transportation, treatment and disposal are collected by direct field survey. Wastes generated from different wards of selected health care facilities are determined for consecutive five days. The generated wastes are classified in different types by manual sorting. The rate of generation per bed per day is also analyzed. The cleaners of the respective health care facilities are hired for sorting and taking weight of generated wastes. Electric weight measurement machine is used to take the weight of waste accurately. The classification of medical wastes that is followed in this study is shown in Figure 1.

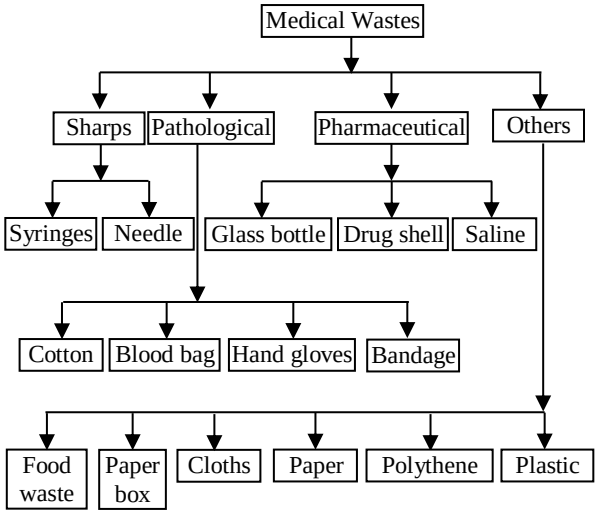

Figure 1: Types of waste segregated from different health care facilities

2.3 Data Analysis

Waste generation data is analyzed to determine the total quantity of medical waste from each selected health care

facility and rate of generation per beds in each day. The standard deviation of rate of generation is also calculated to understand the variation. The fraction of each type of waste in terms of percentage is calculated.

3 Result and discussion

It is essential to identify the aspect of mismanagement in medical waste management. However, it could be very difficult to find out while different facilities and arrangements for well management system are available in hospitals or clinics. Apparently it seems to be medical wastes are managed properly. To perform this difficult assignment, sequential study has been carried out considering the functional elements of waste management. The results are discussed for every selected health care facility following the functional elements of waste management.

3.1 Waste Generation

The generation of waste varies from hospital to hospital and even ward to ward of the same hospital based on the types of hospital and wards as well as activities. The quantification of generated waste is done on the basis of wastes collected by cleaners from each ward.

3.1.1 Rajshahi medical college hospital

Rajshahi Medical College Hospital is the largest general hospital and situated at the centre point of the Rajshahi city. The capacity of the hospital is 1200 Beds. The total no of doctors, nurses and cleaners are 169, 349, and 137 respectively. The average of five days waste generation and rate of generation with respect to number of bed are presented in Table 1.

It is observed from table that total daily average collected waste by the cleaners is 336.23 kg. The rates of generation per bed in wards are varying in wide ranges (0 to 835 gm/bed/day). Furthermore, there is no waste produced in Casualty wards and minimum waste of 0.22 kg/day is produce in general ward number 35 (Radiotherapy). The zero waste production is not the real situation because there are some activities in every ward. It might be that produced waste in this ward is not accumulated and otherwise disposed of. It could not be observed any direct relation between number of bed and waste generation rate. Furthermore, the average rate of generation of total wastes per bed is 280.20 gm/bed/day which are very small quantity. It could due to categories of wards and its function as well as due to the unauthorized disposal of wastes by patients and their attendants. The composition analysis and the percentage of major component of wastes generated in RMCH are shown in Table 2. Table 2 shows that the highest fraction of waste is general type which is about 46% of the total waste followed by about 24% pharmaceutical, 21% pathological and 9% sharps. Among the different types of waste food waste generation is the highest amount of 100.44 kg/day and second highest is blood bag of 41.72 kg/day. The important matter is that it is very difficult to quantify the total amount of generated wastes. During the field investigation it is found that different types of wastes are thrown in various places in and around the hospital.

Table 1: Ward wise daily average generated waste in RMCH

Name of the Ward	No. of Beds	Generated waste (kg)	Generation rate (gm/bed)
Orthopediatric Female	30	3.6	120.0
Surgery Male-1	30	3.0	100.0
Surgery Female-1	30	17.6	586.6
Surgery- 3/4	30	6.4	213.3
Surgery-2	30	5.8	193.3
Surgery- 3/4	30	11.2	373.3
Neuromedicine	30	13.2	443.3
Neuro Surgery	30	4.9	163.3
Peadiatric Surgery	30	6.9	230.0
Peadiatric Medicine	30	6.0	200.0
Model Clinic	16	4.5	281.2
Gynecology	30	13.4	446.6
Medicine-2	30	4.4	146.6
Medicine-1	30	11.4	380.0
Medicine-1	30	5.4	180.0
Medicine-4	30	5.7	190.0
Medicine-3	40	5.2	130.0
Medicine (Student)	6	2.6	433.3
Gastro Entarology	0	2.3	0.0
Nephrology	15	10.7	713.3
Nephrology	15	0.6	40.0
Gynaecology-1	33	16.3	493.9
Gynaecology-2	30	7.5	250.0
Pediatrics Medicine	38	10.8	284.2
Eye Male & Female	59	10.5	177.9
Pediatrics- NICU	20	16.7	835.0
Pediatrics Medicine	32	7.6	237.5
Gynaecology-3	38	8.8	231.5
Burn-Unit	38	11.2	294.7
Neuro Surgery- Mother & Child	25	8.4	336.0
Orthopeadiatric Male	30	3.5	116.6
Cardiology	28	12.8	457.1
ENT	22	0.9	40.9
Radiotherapy	15	6.4	426.6
Radiotherapy	15	0.2	13.3
Medicine-2 Female	30	10.3	343.3
Medicine- 3/4 Female	14	2.1	150.0
Medicine- 3/4 Female	14	2.0	142.8
Causality	4	0.0	0.0
Cabin	22	0.0	0.0
Prison	4	0.0	0.0
Ward 42-57	80	12.5	156.2
BB	0	6.7	0.0
I.C.U & H.D.U	7	5.0	714.2
PO- old, New & I.C.U	36	2.3	63.8
OCC & I.D	24	1.5	62.5
GOT	0	12.4	0.0
MOT	0	15.0	0.0

Figure 1 shows some real scenario of medical wastes thrown in the surrounding places. In these illegal dumps, there are some hazardous wastes are also observed.

Table 2: Rate of generation of different components of waste in RMCH

Types of wastes		Generation rate (kg/day)	Composition (%)	
Sharps	Syringe	19.26±5.13	5.73	9
	Needle	10.91±3.88	3.24	
Pathological	Cotton	6.14±2.90	1.82	21
	Blood Bag	41.72±33.32	12.41	
	Hand Gloves	8.74±3.28	2.52	
	Bandage	15.64±5.76	4.65	
Pharmaceutical	Glass Bottle	39.90±10.63	11.87	24
	Drug Shell	11.61±6.53	3.45	
	Saline	29.34±18.55	8.73	
General	Paper	10.08±6.43	3.00	46
	Plastics	11.40±3.92	3.40	
	Polythene	9.81±7.58	2.92	
	Food Waste	100.44±20.4	29.90	
	Cloths	7.00±3.55	2.10	
	Paper Box	14.33±5.16	4.26	
	Total	336.23		

Figure 1: Wastes thrown at unauthorized place in RMCH

3.1.2 Christian mission hospital

Christian mission hospital is guided by Christian Organization. The capacity of the hospital is 30 beds. The total no of doctors, nurses and cleaners are 10, 20, and 4 respectively. The average number of inpatients and outpatients per day are 20-25 and 15-20, respectively. Total amount of waste generated is 7.14 kg/day of which amount of hazardous waste (sharps and infectious) is 4.46 kg/day (Table 3). The collected waste components are Saline packet, Saline set, Injection ampoule, Syringes with needles, N.G tube and Catheter. It is observed that only some specific wastes are produced. It means that other types of wastes are not kept in container and swept away to somewhere else.

3.1.3 Al-Madina clinic

Al-Madina Clinic is a private and a small clinic. The capacity of the hospital is 15 beds. The total no of doctors, nurses and cleaners are 3, 10, and 2, respectively. The average number of inpatients and outpatients per day are 5-10 and 1-5. Total amount of waste generated is 2.11 kg/day and mostly are Saline bottle, Saline bag, Saline set, Injection ampoule and Blood bottle (Table 3). Unlike Christian Mission Hospital other wastes are not found.

Table 3: Percentage of Waste Generated from other Selected Hospitals and Clinics

Health care establishment	Type of wastes	Generation rate (kg/day)	Fraction (%)
Christian Mission Hospital	Saline packet	1.50	21
	Saline set	0.71	10
	Injection ampoule	0.46	6.5
	Syringes with needles	0.82	11.5
	N.G tube	1.18	16.5
	Catheter	2.46	34.5
	Total wastes generation rate	7.14	
Al- Madina Clinic	Saline bottle	0.50	23.73
	Saline bag	0.53	25.08
	Injection ampoule	0.31	14.92
	Saline set	0.50	23.73
	Blood bottle	0.26	12.54
	Total wastes generation rate	2.11	
Mohanagar Clinic	Saline bags	0.67	17.12
	Injection syringes	0.64	16.21
	Bottles	0.50	12.75
	Goj and cotton	1.47	37.52
	Gloves	0.64	16.39
	Total wastes generation rate	3.92	
Rajshahi Dental College	Injection syringes	0.61	50.30
	Saline bottle	0.60	49.70
	Total wastes generation rate	1.21	
Popular Diagnostic Centre	Plain tube	5.07	33.70
	EDTA tube	1.11	7.36
	Urine sample pot	4.57	30.37
	Glass plate and ESR tube	4.30	28.57
	Total wastes generation rate	15.05	

3.1.4 Mohanagar clinic

Mohanagar clinic is also a private health care establishment which is mainly popular for its surgical treatment. The capacity of the hospital is 12 beds. The total no of doctors, nurses and cleaners are 5, 9 and 3, respectively. The average number of inpatients and

outpatients per day are 10-15 and 6-10. Total amount of waste generated is 3.92 kg/day of which amount of hazardous waste is 2.61 kg/day. The amount of waste is very small compared to actual generation. Other wastes are not kept in container. Therefore, total generated wastes are not obtained.

3.1.5 Rajshahi dental college

Rajshahi dental college is a dental unit of Rajshahi Medical College Hospital. Total amount of waste generated in this hospital is 1.21 kg/day (Table 3). Only injection syringe and saline bottle are found (Figure 8). It is obvious that where some people will live and activities are involved definitely some wastes will produce. It might be that other wastes are not kept in bin and swept away to somewhere else.

3.1.6 Popular diagnostic center

Popular diagnostic center is one of the largest diagnostic centres in Rajshahi city having latest technology. Total amount of waste generated is 15 kg/day. The generated components of wastes are Plain tube, EDTA tube, Urine sample pot and Glass plate and ESR tube.

3.2 On-Site Processing and Storage

Through the field investigation it is observed that on-site processing and storage activities are not proper in RMCH. Although there are some colour coded waste storage containers in some places provided by Health Department (Figure 2a) for different types of waste, these are not used properly to put into designated waste. Many hazardous wastes like syringe, medicine cells etc are thrown at outside the hospital without keeping in designated containers and waste pickers collect the saleable components (Figure 2b).

Waste pickers collect some saleable portion of medical wastes to sale in waste material shop. It was found that reusable or recyclable materials are syringes, plastic bags and bottles, urine bags, plastics accessories, glass bottles, glass accessories, polythene, metal, rubber and paper. Other hospital, clinic or diagnostic centers are also use some kind of container (plastic bucket) for storing different types of wastes specially sharps and infectious wastes (Table 2c). The standard container for medical wastes storage is of 55 gal drum with lid. According to WHO standard, the minimum thickness of infectious waste bag is 70 μm (ISO 7765 2004). But the facilities and management are not up to the mark. It is seen in Figure 3c that plastic buckets are used for keeping hazardous wastes but some wastes are already put down.

3.3 Collection

Collection of waste means the picking of waste from on-site storage point and carry it to some point from where waste to be transported to the treatment plant or processing station or disposal site. Usually, Rajshahi Medical College Hospital workers collect wastes from different wards and designated place and carried either to the incinerator or municipal waste accumulation points. Figure 3(a) shows the wastes carrying to the municipal waste accumulation points. However, all wastes are not dumped in primary dumping point. Many backward places are used as illegal dumping point within the hospital compound. Figure 3(b) shows such illegal two dumping points. Some medical wastes are also accumulated into the internal drain of hospital.

(a) (b) (c)

Figure 2: Improper on-site storage of medical wastes: (a) Colour coded containers are not in use, (b) Using plastic bucket, (c) Some saleable wastes are picking by scavenger

The situations for other health care establishment are more ruthless than RMCH. Christian mission hospital, Al-Madina Clinic, Mohanaga clinic, Rajshahi dental college and popular diagnostic center do not have any designated primary wastes accumulation point or establishment. They usually throw their wastes directly to the municipal secondary waste dumping point or handover to municipal wastes collection workers. However, most of the saleable wastes such as saline bag, saline bottle, saline set, syringe, glass bottle etc are taken by cleaning workers and sold them to the wastes material buyers. This activity is dangerous for the environment as well as public health.

3.4 Transfer and Transport

While primary dumping is done from each and every ward of the RMCH then City Corporation's waste transport vehicle comes at the primary wastes dumping point. Conservancy workers also collect wastes from illegal dumping points in irregular intervals. The wastes are transferred to the transport vehicle and then transported to the final disposal site. The operation is not provided every day and does not follow any particular frequency. Figure 4 shows the wastes transfer operation by the City Corporation workers. One more problem is that they only pick the wastes from primary accumulation place but not clean the surrounding place after transferring. As a result the surrounding place remains dirty and spreads liter at the nearby places. Other health care establishments do not have any primary dumping point. Therefore, there is not transfer operation in these health care establishments. They either throw the wastes at municipal wastes accumulation points or directly hands over to the waste collection workers.

(a) (b)

(c)

Figure 3: Medical wastes collection scenario: (a) Waste carrying waste to the primary dumping point inside RMCH, (b) Illegal dumping of medical waste, (c) Wastes accumulated in internal drain

Figure 4: Waste collection crew of RCC transferring waste to transport vehicle

3.5 Treatment

All infectious wastes are needed to be incinerated for the safe disposal and to protect the spread of diseases. Rajshahi medical college hospital has an incinerator for this purpose. The hazardous wastes include blood, sharps, malignant organ and human body parts from Operation Theater are separated from other medical wastes and incinerated inside the RMCH in an incinerator (Figure 5a). The medical waste management workers claimed that incineration is done twice a week but not every day. The incinerated residue is then dumped into the primary waste disposal point and finally disposed of by municipal authority. However, it is evident from the field investigation that there is a doubt about the running of incinerator because many wastes are carelessly thrown at surrounding of the incinerator. Sometimes wastes are disposed of just besides the incinerator and also burn some wastes here openly (Figure 5b). In this case question arising that what is happening for the hazardous wastes produced in other days. There are many treatment methods for Medical waste as per WHO guideline. Medical wastes include general waste and hazardous waste from health care facilities. The general wastes are not treated any more. Other than RMCH there is no scope of treatment of medical wastes.

3.6 Disposal

All Medical wastes generated in Rajshahi City are disposed of by conservancy department of Rajshahi City Corporation along with the other municipal solid wastes. City corporation authority does not have any treatment or processing facilities for municipal wastes and even for medical wastes. They disposed of all types of wastes following open dumping method. The disposal of medical wastes along with the municipal waste is a threat to the surrounding environment as well as public health.

(a) (b)

Figure 5: Incinerator in RMCH: (a) Supposed to use for incineration of hazardous medical wastes, (b) Open burning place of hazardous medical wastes.

3.7 Observed Critical Issues

The issues on which more attention must be paid to improve the present medical wastes management practice is the major attempt of this study. Following issues are identified as critical for present medical wastes management practice in Rajshahi city through an extensive field investigation.

3.7.1 Generation

Generated wastes in health care establishment are not properly handled at the point of generation. Major portion of the generated wastes are thrown at road side, drain, municipal waste bin etc. All types of wastes are not kept in storage container for collection, treatment and disposal. As a result the quantity of official generated wastes is very less compared to the actual quantity and few types of wastes are obtained in some clinics and hospitals.

3.7.2 On-site handling, Processing and Storage

All generated wastes are not sorted at sources and kept into designated waste containers. In some health care establishment, different coloured pales or buckets without any lid are used for sharps and infectious wastes. As a result, wastes spread at surrounding places. However, the department of health supplied colour coded containers for on-site waste storage but containers are piled at somewhere else without using.

3.7.3 Collection

There is no trained waste management worker in any selected health care establishment. The workers either do not have or use any safety wares like gumboot, hand gloves, musk, apron, and so one. Most of the health care establishments collect wastes everyday but not all types of generated wastes. The waste workers are not aware of mismanagement of Medical wastes.

3.7.4 Transfer and Transport

Accumulated wastes are transferred from primary dumping site to the transport vehicle at Rajshahi Medical College Hospital only. During the transferring of wastes surrounding areas are not cleaned properly. The wheels and

body of the wastes transport vehicles are not washed or cleaned before entering the road from the primary waste dumping site or from final wastes dumping site though the vehicle is covered with polyethylene cloth. As a consequence, wastes carrying roads and surrounding area are polluting by littering.

3.7.5 Treatment

There is no waste treatment facility in Rajshahi city except an old incinerator at RMCH and does not run every day. The hazardous wastes generated at different health care establishments are not brought to the RMCH incinerator for incinerator. It is due to the lack of workers, facilities as well as coordination among the government and non-government health care establishments.

3.7.6 Disposal

All most entire wastes generated in Rajshahi city from different health care establishments are disposed of without any treatment or taking any special care to the municipal waste dumping site. The medical wastes are dumped by open dumping method. Therefore, surrounding environment and public health are in danger.

3.8 Improvement Strategy

The current practice of medical waste management in Rajshahi City proved through the study that it has so many critical issues in every steps of management. Based on the findings of this study, medical waste management practice is needed to improve. To achieve this improvement of medical waste management some aspects are proposed.

3.8.1 Generation

A set of trained medical waste management workers should be employed in every health care facility. The hospital should have weighing facilities so as to have quantified statistics of medical waste generated. This will assist them in making informed decisions regarding medical waste generated and disposed of. Documents of medical waste generation and waste management practices in the hospital should be maintained and updated.

3.8.2 On-site handling, Processing and Storage

Colour coded and labeled on-site waste storage container with proper design according to Bangladesh Medical Waste Management Code of practice or WHO standard code of Practice should be used consistently in the hospital. Adequate numbers of on-site storage container should be placed at suitable locations within wards, corridor, staircase, kitchen, Operation Theater, pathological sampling points, and any other relevant work place. Proper instructions regarding waste handling, separation at source and keeping in designated container should be posted at the on-site storage locations.

Periodic training should be provided to healthcare workers and anyone who involved in the medical waste management process regarding appropriate segregation practices. The medical authority should ensure that adequate protective clothing is available and waste handlers wear full protective clothing or safety wares like gumboot, hand gloves, musk, apron etc at all times when handling medical waste. A monitoring cell should be formed at every health care facility to ensure the storing of different types of waste in designated containers.

3.8.3 Collection

Wastes must be collected at regular interval based on types of waste. Wastes must be put into a designated primary accumulation bin or house of any similar facilities. Storage facilities should be cleaned and disinfected in conformity with WHO medical waste management Code of Practice to reduce possibility of risks after every emptying. The surrounding area of on-site storage point must be cleaned every day.

3.8.4 Transportation

Medical waste should be transported in suitable dedicated transport facilities with leak proof containers which are clearly marked BIO HARZARD. Medical waste which is subject to transportation for off-site incineration is packed and labeled in conformity with the requirements of Bangladesh Medical Waste Management Code of Practice and generally accepted and recognized international standards for easy identification and urgent incineration. Fixed schedule for off-site transportation of medical waste should be defined, thus reducing the complexity of medical waste management.

3.8.5 Treatment

Possible resource recovery can be performed with appropriate treatment and disinfection. Storage shelves to keep medical waste before incineration should be erected in the storage room at the incineration plant, to avoid putting the medical waste on the floor. It should be checked properly that the waste has been appropriately treated and disposed of in order to minimize risks to human health and environment. In any circumstances open burning must be protected.

Private companies might come forward to medical waste treatment. Government should give license to own incinerators so that they can treat medical waste they collect. Private health care facilities should make memorandum with the RMCH to send their medical wastes for incineration. Residuals/ash should be regularly tested for harmful substances that could affect human health and the environment and disposed appropriately.

3.8.6 Disposal

Only the nonhazardous wastes produced in health care facilities should be disposed of along with the municipal solid waste. Local government authority must follow the scientific sanitary approach for disposal of wastes.

3.8.7 Training and Education

Staff at all levels should be continually trained on medical waste management issues to ensure awareness according to WHO guideline. The medical waste management concern parties should periodically evaluate the effectiveness of training and education programs. The medical waste management authority should develop training modules in both English and Bengali on medical waste management procedures for all health personnel at different levels. Clinics and health posts should have

Infection Control Team/committees which include environmental health experts and waste management experts. This will improve the ability and effectiveness of the Infection Control Team to carry out its operations. Information with respect to risks involved in healthcare waste management practices have to be disseminated to the public or general community.

3.8.8 Overall

Medical waste management concern parties should develop strategic plans for dealing with management of medical waste issues, which include performance indicators in order to address health and environmental risks. It is time to upgrade the Current Medical Waste Management Code of Practice, Medical waste Management Plan and Waste Management Act in order to meet the current international standards on medical waste management. Government should conduct spot checks to ascertain compliance of medical waste management to local and international laws and to ensure environmentally sound principles are adhered to. The Government should use mass media in sensitizing the general public and raising their awareness level on environmental risks associated with improper management of medical waste. Healthcare facilities should manage risks so as to protect human health and environmental risks associated with inappropriate management of medical waste.

4 Conclusion

Medical waste poses a great impact on human health and environment. It is utmost important to identify the critical issues where it needs to pay special attention for preparing the improvement strategy. The critical issues at every steps of medical waste management in Rajshahi City are identified through this study. Proper waste management strategy is needed to ensure health and environmental safety. There is lack of proper technical support from the local government authority in this sector and needs more investment. Practice of proper medical waste management is also inadequate. It is seen from the study that there is a lack of man power, technical knowledge and investment for waste management in the hospital. It can be said that there is an urgent need for raising awareness and education on medical waste management issues. At a regular interval training and workshop should be arranged to increase awareness and skill of the hospital authority and waste managing workers. Medical waste management system should be designed based on local conditions, resources and facilities. Implementation strategy should also be set for proper management. Government must take care of proper medical waste management through the local government agency or private sectors. Finally, it could be concluded that immediate action is needed to be taken to overcome the critical issues identified through this study.

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