

ORIGINAL ARTICLE

HEALTHCARE WASTE MANAGEMENT (HCWM) IN PAKISTAN:
CURRENT SITUATION AND TRAINING OPTIONSRamesh Kumar, Ejaz Ahmad Khan, Jamil Ahmed, Zulifiqar Khan*, Mohamed Magan*,
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Background: Hospitals in Pakistan produce about 250,000 tons of waste per year. Hospital waste has been reported to be poorly handled and managed by the hospital staff and administration respectively. This leads to environmental and health consequences within hospitals as well as to outside population. Our study aimed to describe the qualitative results of observations of ten large private and public hospitals in the cities of Rawalpindi and Islamabad Pakistan. **Methods:** The qualitative data was obtained through direct and indirect observations on hospital staff including doctors, nurses, sweepers and persons in administration and the way they handled the waste. Also direct observations of the hospitals premises inside and outside were made and noted. We also describe the process of involving the hospital staff for trainings. **Results:** Our results showed that almost all of the hospitals did not have practice of HCWM on their priority. Segregation, handling, storage, transportation and disposal of waste were below WHO and Pakistan bio-safety rules 2005 standards. The ten hospitals did not have HCWM rules and regulations in place hence the staff do not follow the best practices in this regard which causes numerous health and environmental consequences not only within the catchment area but also to patients and staff. **Conclusions:** Our study highlights the lack of HCWM practices within the ten public and private hospitals in two major cities in Pakistan. There is need of trainings of hospital staff in Pakistan. We also found that such trainings are highly feasible if accompanied with incentives to participants.

Keywords: Hospital, Management, Observation, Segregation, Training, Waste

INTRODUCTION

Healthcare waste management (HCWM) is still a major challenge for health facilities in developing countries where the health care staff and surrounding population is exposed to risks due to poor handling of waste.¹ The toxic waste generated by hospitals worldwide includes used syringes, bandages, intravenous drip bottles, blood bags, biomedical waste such as organs and medical instruments. Sharp objectives have the highest rate of causing injuries to hospital staff and transmission of infections.²

About 12,000 million injections are used every year. Approximately 15% waste is anatomical with infectious and sharps constituting 1% of total health care waste globally. Waste produced in high income countries is higher than that from low income countries with production of about 6 Kg and 3 Kg per person per year.³

Globally hospital waste is regarded as a hazardous, therefore, it has to be treated accordingly.⁴ Healthcare workers, patients, waste handlers, waste pickers and the general public are all exposed to health risks from infectious waste. The improper disposal of bio-medical waste includes open dumping and uncontrolled burning. If bio-medical waste gets mixed with other waste, it contaminates all waste.²

According to a World Health Organization (WHO) assessment there were about 22 countries in 2002 which had about 64% hospitals with no proper waste disposal methods.³ Hospitals in developing

countries including Asia suffer from a lack of proper management of waste. A study from Nepal showed that it was due to the lack of waste management plan and carelessness of doctors, patients and visitors.⁵ The clinical staff in developing countries lacks knowledge about the transmission of hospital acquired infections caused by poor handling of health care waste, poor attitude of staff towards hospital discipline, and improper training of staff on HCWM.⁶⁻⁸

Studies from Pakistan show that around 1.35 Kg of waste is produced every day for each hospital bed occupied.⁹ There were about 92,000 hospital beds in Pakistan in 2006 and about 2 Kg of waste per bed produced every day. In total about 0.8 million tons of waste is produced every day.¹⁰ In Pakistan, studies suggest that, most hospitals and independently working physicians do not comply with HCWM practices exposing themselves, other staff, and patients to sharp injuries and infection.^{11,12} Hospital waste in Pakistan spreads diseases and it also becomes the target of scavengers who collect used syringes which are recycled and re-sold in the market for personal financial reasons.¹³ The janitorial staff in Pakistan, in particular, is found to be involved in selling the used syringes to the open market within a selling price of US\$ 0.06–0.2 per syringe.¹⁴ A study noted that about 52% of the doctors had received needle prick injuries more than once in their lives.¹⁵ Health workers in lower tiers of health care in Pakistan suffer from sharp injuries even worse than those in the hospitals and about 54% of health workers

had suffered at least one injury within 6 months at first level care facilities.¹⁶

Incineration is one of the final treatment options. Un-regularised incineration leads to harmful effects on health.¹⁷ A common treatment facility looks to be the most promising option along with other technological options. Private sector involvement may benefit the system.¹⁸ The mismanagement of the biomedical waste poses grave risk to people and the environment. Incineration of certain parts of the biomedical waste is necessary because this is the only accepted treatment option. Besides, a scientifically designed landfill can further strengthen the integrated healthcare waste management system whereas a poorly designed and managed landfill can also lead to ground water contamination.¹⁹ It is important to dispose off such waste properly to avoid its dangerous effects.²⁰

This study was necessitated based on unpublished data from the nationwide survey conducted by the Health Services Academy Islamabad, on healthcare waste management unveiling the gloomy picture of the issue. Some of the results show that healthcare waste was found not being managed properly and in accordance with the HCWM rules. HCWM teams and plans were not in place. Training programs had an impact over the overall management of the HCW ($p=0.004$). The reporting system was not working efficiently among the hospitals ($p=0.010$). Absence of an on-site treatment facility also resulted in a poor management of HCW ($p=0.001$) for category and for type of facility ($p=0.031$).

There was therefore need to address the issues highlighted in the survey and to document gaps and identify remedial measures in terms of trainings so that the implementation in other allied hospitals may move forward. In this regard an incinerator was installed, in a tertiary care hospital in Rawalpindi, which was provided by the WHO and the hospital was later made Combined Treatment Facility (CTF) in 2009 and ten other allied hospitals in the catchment area used this hospital for their waste disposal. Hospital staff went through phases of training and the HCWM system was put in place. Training of health care staff on waste management is said to be associated with a significant reduction in the incidence of sharp injuries to workers in the health facilities.²¹

The objectives of this study were to present the significant issues and gaps to implement the HCWM practices at these hospitals which originated from direct observations and key informant interviews with hospital staff, and to report the process of involvement of the

hospitals and their staff, and trainings given to them to implement the HCWM according to guidelines of WHO.

METHODOLOGY

We interviewed a total of 117 staff in 10 hospitals in Rawalpindi/Islamabad, 6 in public and 4 in private sector through a semi-structured questionnaire. We interviewed similar groups of staff in each of the 10 hospitals. Also issues they raised in the implementation of the HCWM were noted and probing was done to elaborate on themes.

The health care workers were trained by using the guidelines provided by WHO on HCWM and 'Hospital Waste Management Rules 2005' of Ministry of Environment, Government of Pakistan.²² These training programs started in the month of June 2010 at the CTF and then at all 9 allied hospitals. The objectives of these trainings were:

1. To provide informative and on-hand training to the hospital staff for disposal of waste generated from private and public sector hospitals which are using the CTF for waste disposal.
2. To provide hospital staff training on hospital waste management practices according to the WHO guidelines on HCWM.
3. To train the hospital staff about risks cause to catchment population through healthcare waste disposal.

All the 10 public and private sector hospitals were visited on the first day for observations, interviews and discussions with the staff about the HCWM. On the next day of training workshops, research team and facilitators visited the hospital buildings including inpatient and outpatient departments with the staff. All facilities within the hospitals were visited to see the onsite situation of waste handling and collection, procedures of storage, transportation and disposal.

Furthermore, the facilitators demonstrated the proper labelling and coding of the waste bins to the staff and iterated its implementation in the leadership of the Medical Superintendents who were also the heads of the healthcare waste management teams of the hospitals. Proper destruction of the sharps and needles along with the syringe parts was aptly demonstrated and practiced by the staff (doctors, nurses and paramedics present in the ward). The superintendents also ensured the regular monitoring and refresher of the training on fortnightly basis in the hospitals.

RESULTS

Details of the interviewed staff are given in Table-1.

Table-1: Number of interviews conducted with various staff of the public and private hospitals

Hospital	Doctors	Nurses	Sanitary workers	Ward servants	Admin Staff	Medical Superintendents	Total
Private sector	5	20	11	2	2	5	45
Public sector	8	28	18	8	5	5	72
Total	13	48	29	10	7	10	117

Segregation was not properly followed, in almost all of the 9 allied public and private hospitals, as per WHO guidelines on HCWM, and Pakistan Biosafety Rules 2005 which recommend that hospital waste be separated in distinct groups with regard to the requirements of disposal and treatment.

Very few of the hospital departments were applying proper waste management practices. They were not fully aware of proper segregation at the point of collection. Primarily they lacked proper segregation and infection control practices. Contents aimed for various coloured baskets were found to be mixed in one container. General waste collected from each facility was dumped along with municipal solid waste for further disposal. Only the CTF practiced proper waste collection coded bins for disposal of waste (Table-2).

Table-2: Segregation of Hospital Waste in the CTF

Colour Coding	Type of Waste material Collected
Red	Blood stained waste like drip sets, blood bags, tissues, organs and infected swabs etc
Yellow	For sharp objects like needles, scissors, blades etc.
Black	For general waste

Participants acknowledged that waste segregation issues were due to lack of training of medical and other staff including sweepers and ward servants. Hospital staff especially medical doctors were not following the proper steps during primary segregation of the waste because they were not interested, cooperative and complying with the procedures. The administration was least interested in directing staff to segregate the waste and there was no proper supervision for waste management practices in all of the hospitals.

There were no proper waste collecting bins, and if there were any, they were insufficient in number. Majority of the public and private hospitals were not maintaining appropriate shifting of waste from smaller bins to large containers. They were also not using the plastic bags to line the bins.

The private sector hospitals were not practicing the needle cutter techniques. However 4 public sector hospitals were using the technique of needle cutter and the trainees were fully aware on the practical use of the needle cutters. Resource constraints were the main reason behind unavailability and lack of use of the needle cutters or safety boxes. At some places syringes were being cut together in leisure time but not as a sole responsibility of the medical staff that produced them. Therefore a large portion of syringes along with other plastic refuse was not transported to the CTF. This practice when explored further revealed that the practice led to pilferage of used syringes and sharps to the black market.

There was no proper availability of trolleys and colour coded bags for waste transport in both private and public sector hospitals. The waste was being

collected in open trolleys once a day in the morning without using the proper standard operating procedures of waste transport to CTF for treatment and disposal. The private hospitals did not have permanent vehicles for transporting the waste to the CTF hence they were using different kinds of locally used transport for this purpose. This also posed risk to the general public as the waste remained exposed during shifting to the CTF. In most government hospitals the transport mechanism was also lacking and they were using other vehicles such as ambulances for transporting the waste.

Another important reason behind poor HCWM in both private and public hospitals was reported to be poor remuneration paid to staff. Therefore the staff was not keen on obliging the standards of the HCWM in their departments. Majority of the staff did not consider proper and responsible waste handling as one of their important job at hospitals. For instance, doctors believed this as an extra burden on them as they only considered patient related work as their only job.

Staff in the hospitals was handling the waste without using the impervious gloves and face masks and was not aware of the potential hazards as per the WHO guidelines. This carelessness in wearing Personal Protection Equipment (PPE) was due to lack of their intensive training. There was poor ownership by the administration regarding the PPE equipments provision to the staff in private as well as public hospitals.

The facility of incinerator was available and functional at CTF at only one public sector hospital. The others nine allied hospital were sending their waste to this hospital for final disposal. Due to the issue of segregation, the un-segregated waste from these all facilities was collected at CTF for their disposal where the waste sharps and other plastic items were separated and shredded and remaining waste were incinerated at 800 °C for a period of 6–9 hours. It was observed that the incinerator suffered damages many times due to presence of drips and vials with remains of fluid. Observation of a few of the private hospitals also showed that they were frequently practicing open dumping of waste around their vicinities. Most hospitals were sending only infectious and biological waste to incinerator at CTF and plastic waste was usually being sold which would be later recycled. Ash generated at the incinerator unit at CTF was being dumped properly in a 4–5 feet trench for deep burial.

A total 414 hospital staff were trained in 10 public and private sector hospitals, of which 5 hospitals were major tertiary care settings and 5 were private hospitals. Additionally medical superintendent from all the 10 hospitals also participated in the trainings. About 42% trainees were females and the rest were males (Table-3). They were all trained in HCWM practices. Each participant was paid an incentive of Rs. 680 *per diem* and workshops were for two days.

Tabel-3: Characteristics of the participants in the trainings on HCWM in 10 hospitals

	Frequency	%
Gender		
Males	241	58
Females	173	42
Cadre of Participants		
Doctors	102	25
Nurse	109	26
Administration	29	7
Technician	28	7
Sanitary Workers	111	27
Paramedics	35	8
Departments of the Participants		
Administration	95	23
Pathology/Laboratory	24	6
ER/ICU	46	11
Medicine	132	32
Surgery	64	15
OPD	15	4
Ophthalmology	7	2
Gynaecology	31	7

DISCUSSION

Our study described the results of the key informants interviews and observations of the staff made during the visits to these hospitals with regard to the HCWM practices. It also highlighted the need and feasibility of the training of the staff at ten private and public hospitals in an urban setting of Pakistan.

Our observations and interactions with the hospital staff pointed to some important factors which are hurdles in ensuring that public and private sector hospitals implement HCWM practices. Staff was not appropriately aware and therefore was not practicing waste segregation. There was minimal supervision and guidance from the hospital management for implementing the HCWM practices. We found that collection, storage, handling by the staff, transportation for disposal and final disposal of hospital waste was not up to the national and WHO guidelines.

It was convenient and acceptable for the hospital staff to attend and actively participate in the trainings on HCWM practices. Staff was more cooperative to attend such trainings if the later are coupled with some financial incentives which attract active participation of all cadres of the staff and is highly financially feasible.

Studies from similar resource limited situations also reveal that trainings of hospital staff can with proper follow up can lead to improved HCWM practices within the health facilities.²³⁻²⁵ Our results are consistent with other supporting studies which have also highlighted importance of knowledge and awareness of HCWM among hospital staff. Surveys from hospitals from major tertiary care hospitals in Karachi suggested that hospital staff was not aware about the HCWM practices especially collection storage and disposal.²⁶ Studies from neighbouring countries also show that

hospital staff lacks awareness and attitude to deal effectively with the waste generated.²⁷⁻²⁹

Studies from other developing countries are also consistent in that there was no concern among hospital staff about segregation of waste into different groups for proper disposal.¹ One such study reported that waste was inappropriately stored and processed for disposal in all the hospitals surveyed.³⁰

Other studies from Pakistan reveal similar situation in major hospitals of the country. One study reported that most of the hospitals did not have infection control and waste management teams in place. Also only half of the hospitals had temporary and central storage areas.¹³ Healthcare waste has already been reported to be irrationally and illegally recycled which may have dire consequences to the human and animal health in the surrounding environment.³¹

The effects of mismanaged hospital waste are said to be enormous and drastic.⁴ A poor HCWM system affects the health care staff and increases their risk of injuries most importantly the needle stick injury. There is also evidence of environmental and population effects of a poorly managed hospital waste.³²

CONCLUSION & RECOMMENDATIONS

Hospitals in Pakistan whether private or public do not follow and oblige HCWM guidelines of WHO and do not practice Pakistan bio-safety rules 2005. The trainings which we conducted in 10 major hospitals are financially feasible to be replicated in other hospitals of the country. We recommend that:

1. Continuous supervision and monitoring mechanisms should be developed for effective implementation of HCWM in hospitals.
2. A dedicated committee on HCWM should be formulated and regularly meetings should be organised at facility level.
3. A separate head should be created in hospital for financial needs in HCWM equipments.
4. Continuous training of Health Care workers need to be organised for better results in HCWM.
5. A continuous supply of PPE and HCWM consumables should be provided to the public sector hospitals on the basis of needs.
6. Evidence based research should be conducted in the field of HCWM in Pakistan.
7. Dedicated and motivated staff should be deployed for this activity in each hospital.
8. Remuneration for hospital workers should be given priority.
9. Catchment area should be declared and proper transportation mechanism of waste for treatment and disposal be ensured.
10. Proper segregation should be performed at each hospital before incineration or treatment of waste.

11. All medical graduates including paramedics and nurses should have extensive basic training on HCWM.

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