Research Article

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A Study of Medical Waste Disposal in Private Medical Laboratories in Hebron City –Palestine

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Abstract

Medical waste management is of great importance due to its infectious and hazardous nature that can cause widespread of disease on humans and contaminate the environment. Only minor attention has been directed to its proper handling and disposal. 34 private medical laboratories in Hebron city in the west bank of Palestine was studied to know how they manage the medical wastes produced in these laboratories.

The amount of medical waste generated was 0.190 kg/ patient. day, 77% of the laboratories studied separate the waste to its categories, 43% separate only the infectious waste, 68% of the laboratories treat the hazardous waste before disposal, Medical Laboratory Specialists have weak knowledge about proper medical waste management. They need training and technical support from MOH by employing consultants in medical waste management.

Keywords

Medical Wastes, Private Laboratories, Hebron, Palestine

Introduction

Healthcare waste is limited to infectious, hazardous, and any other wastes that are generated from health care institutions, such as hospitals, clinics, dental offices, and medical laboratories [1]. Between 75% and 90% of the waste produced by health-care providers is non-risk or general health-care waste, comparable to domestic waste. The remaining 10-25% of healthcare waste is regarded as hazardous and may create a variety of health risks [2]. It is important to point out that the term 'medical waste' has often been used interchangeably with other terms such as 'hospital waste' and 'infectious waste' around the world [3].

Medical waste separation in color coded plastic bags is the first step in medical waste management, it is internationally accepted that Human and animal tissues are placed in a red container, while pathological waste and discarded sharps are stored in a yellow container. All other wastes are placed in an orange or black container before shipment; all containers exhibit the universal biohazard sign that is commonly used in many countries [1, 3]. If no separation of wastes takes place, the whole mixed volume of health care waste needs to be considered as being infectious [2].

Several medical waste treatment methods, including incineration, steam sterilization (or sanitation), microwave sanitation, chemical disinfection, dry heat disinfection, and disinfection with superheated steam [3].

Medical wastes, if not properly handled and disposed of, carry high risks of infection and injury and may represent serious health hazards to health personnel [5]. As the volume and the complexity of healthcare waste increase, the risk of transmitting disease through unsafe handling and disposal practices also increases [6].

In order to improve medical waste management and develop a management strategy, it is important to understand and evaluate current practices in medical waste management and have accurate information on the medical waste generation rate [7].

The medical waste generation rate depends on the size and the type of the medical institution, number of tests per day and nature of these tests and economic development of the country [5, 8].

Few studies were conducted in Palestine about medical waste management in different medical centers in different cities as a partial fulfillment of the requirement for the Degree of Masters of Environmental Science and engineering at different universities (table1). These studies concluded that the management of Medical waste in Palestine was not given the proper attention, still there are lacks of legislation and defined policy regarding this issue, lack of administration of medical waste capabilities, technical and financial ability for a good and strong management of medical wastes, and lack of joint cooperation between the governmental organizations responsible for the health sector [6, 9].

Reference [10] reported that Palestinians are exposed to health and environmental risks because of improper disposal of medical waste and steps are needed to improve the situation through the establishment and enforcements of laws, provision of the necessary infrastructure for proper waste management and training of healthcare workers and cleaners.

Reference [11] in his study about assessment of medical waste from medical laboratories in Nablus, Ramallah and Albireh reported the necessity to find a system consists of onsite separation, collection and disposal of medical waste from laboratory separately from domestic waste because of the serious risk to the environment and community if these medical wastes lifted without proper management.

Reference [12] in his study about hazardous waste management in West Bank and Gaza recommends establishing of small centralized hazardous waste treatment and disposal facility, and on-site pretreatment.

The amounts of generated medical wastes reported by different studies done in Palestine were summarized in table 1.

Table 1: Summary of medical wastes studies in Palestine

Author	Study area	Year	Medical center type	Amount generated
Loay Hussein	West Bank & Gaza	2006	All types of medical centers	354 tons/year
Issam Al khatib	West Bank & Gaza	2007	All types of medical centers	512.6 Tons/ month
Majdi Abu Awwad	Jenin district	2008	Primary health care	
Majdi Abu Awwad	Jenin district	2008	Primary health care Private clinics	0.830 kg/ day 0.350 kg/ day
Abdul-Salam A. Khalaf	Jenin district	2009	Hospitals	0.78 kg/bed /day
Rami Banishamseh	Nablus, Ramallah & Al-bireh	2012	Medical laboratories (100)	86 gram/ sample. Day

The aim of this study was to assess the knowledge of medical laboratory specialists about medical waste management and to know their needs for proper management and disposal of medical waste.

Study Area

Hebron city is located in the southern part of West Bank of Palestine, 36 kilometers South of Jerusalem (Fig.1). Its population was about 208750 in mid-2015 [13].

There were about 40 private medical laboratories present in Hebron, about 6 governmental medical laboratories present within primary health centers and 4 hospital medical laboratories (3 private and one governmental).

Methodology

A questionnaire survey method were implemented to collect information about medical waste management aspects, including medical waste generation rate, segregation and collection, storage, training and education, transportation, disposal, the questionnaire was formulated to evaluate the knowledge and waste management practices, Confidentiality was ensured and all forms were anonymous. The questionnaires involved 16 variables that covered areas of medical waste management. Data analysis was done using SPSS program version 13.

Results and Discussion

As reported by the surveyed private medical laboratories in the questionnaire the amount of medical waste generated per day ranges from 0.3 – 10 kg with average 2.1kg/ day, the number of patients the laboratory receives per day ranges from 2- 45 with average 11 patients per day, so the amount of medical waste generated was 0.190 kg/ patient. day which is almost double the amount reported by [10] (0.086 kg/ patient. day). Reference [5] reported the amount of medical waste from private medical laboratories in Irbid city in Jordan were 0.034–0.102 kg/test-day.

No data available about number of tests performed by laboratories at Hebron city to calculate the amount of waste generated per test per day.

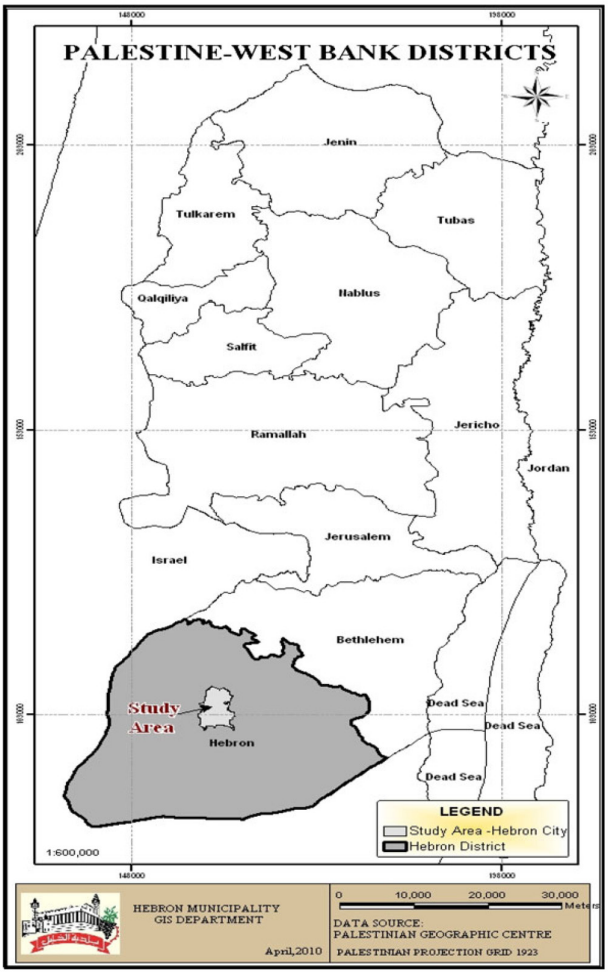

Figure 1: Palestine Map including Hebron City (Hebron Municipality, GIS Unit 2010)

Table 2: Amount of medical waste produced per day from private medical laboratories in Hebron city.

Amount produced (kg/ day)	Number of laboratories (Frequency)	Percentage
0.3	2	6%
0.5	7	23%
1	9	29%
2	7	23%
3	1	3%
4	1	3%
5	2	6%
10	2	6%

There is no official instructions (from MOH, Environment quality department, and Hebron Municipality) about medical waste management was distributed to the medical laboratories in Hebron city, the people who answered yes for receiving instruction (59 %), they stated that they know about these instructions from their supervisors or during studying in colleges, some of the people say that they receive oral instructions from laboratory accreditation department in MOH directorate in Hebron city to encourage them to use sharp boxes and surrender these boxes to them for final disposal. 48% of the medical laboratory specialist answered they apply these instructions while 52% they don't because these instructions are not clear 10 %, application of these instructions is costly 5%, they lack knowledge about these instructions 35%, and these instructions are difficult 50%. 52% of medical laboratory specialist answered that they need to employ consultant by MOH in medical waste management, 34% need technical support. The results about instructions about medical waste management are summarized in table 3, 4.

Table3: Medical Laboratory Specialist's responses about medical waste management instructions.

Item	Yes	No
Presence of instruction about MWM*	59%	41%
Do you apply these instructions	48%	52%
Do these instructions distributed to laboratories	29%	71%
Do you receive training about MWM	24%	76%

*MWM = Medical Wastes Management.

WHO advised that proper training and education must be offered to all workers from doctors to ward personnel, and most healthcare workers require the same basic set of skills, information and attitudes towards good waste management [2]. Only 24% of medical laboratory specialists receive training (table 3), (not known when and the organizer of training), recently Palestinian Medical Technology Association, Hebron branch started to organize lectures about medical waste management to medical laboratory specialists.

Table 4: Medical Laboratory Specialist's responses about application of medical waste management instructions.

Reasons why you did not apply the instructions.		What do you need to apply the instructions?	
Item	**Percentage**	**Item**	**Percentage**
Instructions are not clear	10%	Technical support	34%
Application is costly	5%	Financial support	7%
Lack knowledge	35%	Employ consultant in MWM	52%
Instructions are difficult	50%	Both technical & financial support	7%

* MWM = Medical Waste Management.

77% of the laboratories studied separate the waste to its categories, 43% separate only the infectious waste (syringes, blood tubes, cotton and paper contaminated with blood), 23% separate only sharps, 34% separate the waste to all its categories. The remaining 23% collect all the wastes produced and dump it in one container and dispose it in municipality containers (table 5).

The original waste bags should be resistant to be punctured during transportation [14]. None of the laboratories studied use special plastic bags for medical wastes collection; they did not dispose the waste separately in proper colored plastic bags and not marked indicating they contain medical wastes. Inadequate waste separation will lead to inadequate treatment and final disposal of wastes, and could provide risks to healthcare workers, to the environment, and to human health [14, 15].

Table 5: Medical Laboratory Specialist's responses about medical waste separation and the bases of this separation.

Item	Percentage	
Do you separate (segregate) waste	Yes	NO
	77%	23%
Bases of separation:		
Infectious waste	43%	
Sharps	23%	
ALL	34%	

Autoclaving is an efficient wet thermal disinfection process. Typically, autoclaves are used in hospitals for the sterilization of reusable medical equipment. They allow for the treatment of only limited quantities of waste and are therefore commonly used only for highly infectious waste, such as microbial cultures or sharps [2].

68% of the laboratories treat the medical waste before disposal, 65% use autoclaving for medical waste treatment (table 6).

Table 6: Medical Laboratory Specialist's responses about medical waste treatment.

Item	Percentage	
Do you treat waste before disposal	Yes	NO
	68%	32%
Treatment procedure:		
Autoclaving	65%	
Chemical	3%	
Other	6%	

If a municipality or medical authority genuinely lacks the means to treat wastes before disposal, the use of a landfill has to be regarded as an acceptable disposal route [2]. Disposing of certain types of health-care waste (infectious waste and small quantities of pharmaceutical waste) in sanitary landfills is acceptable after autoclaving in the laboratory which produce it; sanitary landfill prevents contamination of soil and of surface water and groundwater, and limits air pollution, smells, and direct contact with the public [2]. Medical Laboratory Specialist responses about final disposal of medical waste are summarized in table 7.

Table 7: Medical Laboratory Specialist's responses about final disposal of medical waste.

How do you dispose solid waste		How do you dispose liquid waste	
Item	**Percentage**	**Item**	**Percentage**
Municipality containers	85%	Municipality sewer system	94
Special containers	15%	Special confide cesspits	3%
		Leave in container and dispose with solid waste	3%

Conclusion

Medical Laboratory Specialists have weak knowledge about proper medical waste management. They need training and technical support from MOH by employing consultants in medical waste management. They don't do proper waste separation. They request the municipality to provide special containers to collect medical waste.

Recommendations

- Ministry of health should provide official instructions about medical waste management
- Ministry of Health should provide training programs about medical waste management.
- Municipality should provide special containers for medical wastes collection.

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