

# Assessment of Health Care Waste Management (HCWM) in Iraq; Effects and Control

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**Abstract:-** This study was carried out to define and assess the health care waste management (HCWM) in official and private hospitals all over Iraq, in addition to the public health centers (PHC) focusing on the development of a short and medium term plan of action and estimating the real needs of sound management. About 43% of official hospitals lack from big containers for collecting and segregating of health care wastes. All hospitals are in lack of proper unites of treatment and disposal of hazardous liquid wastes while 65% of hospitals are deficient of incinerators. Most of health institutions do not have adequate well trained staff to handle such health care wastes particularly in official hospitals. However, generated hazardous solid wastes had been studied and found to be about half a ton per month in official hospitals, 167 kg per each private hospitals and 83.3 kg of the PHC center. Accordingly, a short term and medium term plans of action have been formulated.

**Keywords:-** HCWM, PHC, Official Hospitals, Private Hospitals, Incinerators.

## I. INTRODUCTION

Health care wastes include all wastes (solid and liquid) that are generated by health care institutes and medical laboratories of both official and private sectors<sup>(1)</sup>. About 75-90 % of these produced wastes are ordinary wastes similar to municipal wastes while the remaining percentage (10-25 %) are considered as hazardous health care wastes<sup>(2)</sup>. The quantity of such wastes varies according to several variables such as management instructions, health institutes, funds, percentage of materials and the extent of daily health care provided. However, disease agents may transfer by different ways such as absorption via skin cracks, absorption through mucous membrane, via respiratory track inhalation and by ingestion where the infection can be spread by direct contact with body fluids and/or by rodents and insects<sup>(3)</sup>.

During last two decades, health services were deteriorated due to the absence of obvious and sound policies, strategies and enforcement of legislation for handling and disposing of health care wastes (HCW) which resulted in poor management of health care wastes and causing an increased exposure of patients, medical and support staffs to various hazardous wastes. However, improper management of HCW have had serious

implications on the general health and the surrounding environment<sup>(4)</sup>.

The technical aspects of the waste management such as waste handling, storage, development, financial aspects, staff responsibilities and roles, surveillance and control being essential components in sustaining the operation of HCWM system<sup>(5)</sup> have been seriously affected. It is well known that field experience of the inclusion of HCWM planning within the health care institutions is the first step towards encouraging the development of better hygienic practices and optimizing the operation of existing HCWM systems. It can also become the catalyst for the development of material HCWM plans in due course<sup>(6)</sup>.

Health waste management is part of the hospital hygiene and infection control where the efficient HCWM in health institutions is of essential importance and role towards breakage of infection chain in addition to its complementary role in infection control inside the health institute<sup>(7)</sup>.

The responsibility of HCWM is shared between different sectors starting from the health institute down to the municipalities services (transportation and proper final disposal) where together with the essential role of the ministry of environment participation in monitoring different stages of wastes disposal and legislation of laws and regulations towards better management<sup>(9)</sup>.

Infection may spread to susceptible from hazardous HCW either directly by contacts or indirectly by rodents and insects within the hospital particularly if the wastes were not handled, packed or stored properly<sup>(10)</sup>.

Improper handling and safety precautions may lead to occupational disease. It was reported that about eight cases of occupational AIDS had occurred in France in 1993 where two cases have been reported to be due to the presence of cracks in skin of cleaners<sup>(10)</sup>. Thirty-nine AIDS cases were registered in the USA in 1993 due to miss puncturing by needles<sup>(11,12)</sup>.

Hazardous HCW categories consist of various medical wastes such as infections, pathological, sharp, pharmaceutical, cytotoxic, chemical, heavy metals, radioactive, pressurized containers and used batteries and thermometers<sup>(1)</sup>.

All individuals exposed to hazardous health-care waste are potentially at risk, including those within health-care establishments that generate hazardous waste, and those outside <sup>(14)</sup>. Those sources who either handle such waste or exposed to it as a consequence of careless management. In general, the main groups at risk are medical doctors, nurses, health-care auxiliaries, patients in health-care establishments or receiving home care, visitors to health-care establishments, workers in support services allied to health-care establishments, such as laundries, waste handling, and transportation, workers in waste disposal facilities (such as landfills or incinerates), including scavengers and home-based health-care, such as dialysis, and that generated by illicit drug use (usually intravenous).

The major sources of health care waste are various hospitals, PHC and research centers, blood banks, nursing house of elderly people and mortuary and autopsy centers <sup>(15)</sup>.

## II. MATERIALS AND METHODS

This study has covered 145 official hospitals, 73 private hospitals and 1717 PHC centers all over Iraq except three Kurdish provinces.

The data collections were obtained via survey questionnaire suggested by the WHO regional office for south-East Asia <sup>(16)</sup> with minor change being adapted to the Iraqi hospitals. Also a questionnaire for PHC centers was adapted to conduct this national survey of health-care waste practices. The data were collected by carrying site observations and direct interviews with health or support workers (waste workers, cleaners, etc.). This was carried by pre-trained primary health care physicians in Baghdad and other provinces. These data were supervised and confirmed by official senior physicians in hospitals and province health directorate. Collection of data was carried during the last three months of the years 2004.

The mean generating rate of health-care wastes was calculated in general for hospitals according to the bed occupancy rate in each hospital.

## III. RESULTS AND DISCUSSION

Table 1 displays all examined provinces, total number of hospitals in each province, number of beds of each hospital and storage containers of HCW with their percentage.

It seems clearly that 44.83% of all studied hospitals had no HCW storage containers over all examined provinces. However, both Wassit and Holy Najaf provinces had the highest percentage (80%) had HCW containers followed by Baghdad province with percentage of 78% while Kirkuk province did not have any such container followed by Salahaldeen province with percentage of 12%.

Provinces	Hospitals total No.	No. of Beds	Available HCW storage container	
			No.	%
Baghdad	37	9363	29	78
Diala	9	913	2	22
Babylon	8	1249	5	62
Salahaldeen	8	1289	1	12
Wassit	9	965	3	33
Karbala	5	720	4	80
Holly Najaf	5	1185	4	80
Al- Diwanya	6	980	4	66
Al-Muthana	4	1070	2	50
Al-Anbar	11	1370	8	72
Nasiriya	7	1037	3	42
Basra	10	2864	6	60
Missan	7	773	3	42
Mosul	14	3211	9	64
Kirkuk	5	995	0	0
Total	145	36347	80	55.17

Table 1:- The Availability of HCW Big Storage Containers in Different Hospitals in Each Province

Regarding the contribution of both municipality and health services in collecting, transporting and disposing health care wastes. The studied provinces were significantly varied where in certain provinces such as Karbala and Kirkuk have showed that there was no obvious contribution of health services while the local municipal service has fully transported and discharged these health wastes from hospital to landfill sites. Other provinces such as Diala and Al-Diwanya showed very weak efforts having maximum percentage of both authorities not exceeding 44% and 16% respectively and this means that significant waste quantities were not soundly handled (Table 2).

Also, it seems that only 3 studied hospitals which form only 2% from total number of 145 hospitals had proper sewage disposal treatments, while the remaining health institutes which were about 142 hospitals had no such facilities.

Regarding incinerators, only eighty-four official (58%) and 63 private hospitals (90%) have working incinerators. However, 1462 PHC centers (86%) lack incinerators and depend on primitive ways in discharging solid health-care wastes via burning them improperly and under unhealthy environmental situation while others try to transfer their wastes to the nearest official hospital containing incinerator.

Provinces	Contribution percentage of transporting HCW %	
	Municipality contribution	Hospital contribution
Baghdad	81	15
Diala	22	22
Babylon	50	25
Salahaldeen	50	50
Wassit	34	55
Karbala	100	0
Holly Najaf	80	20
Al- Diwanya	16	0
Al-Muthana	50	50
Al-Anbar	54	27
Nasiriya	42	58
Basra	60	40
Missan	43	14
Mosul	71	29
Kirkuk	100	0
Total	81	24

Table 2:- Contribution of both Municipality and Hospital Services in Transportation Health Care Wastes from Hospitals to Landfill Sites

Also, most studied health institutions have untrained HCW personal at different stages of health-care waste management and so segregation and proper transportation is not done soundly. Furthermore, 77% of the official hospitals suffer shortage of HCWM workers and most examined health institutions don not have HCWM requirements and personal safety equipment.

The mean generating rate of hazardous solid health-care wastes in different institutions was calculated in general for hospitals according to the bed occupancy rate in each hospital and the mean is given in Table 3.

The mean health-care solid wastes generating rate per bed was calculated and found range from 1.4 to 1.7 kg/bed/day. However, such medical solid wastes are within the range of various hospitals around the world (Table 4).

Provision of requirements for managing different stages of HCWM is the most important requirements to achieve sound and proper management that is to say from providing bags of different colors to segregate hazardous HCW down to big containers for storage and transportation to areas of treatment or dumping site.

Health Institute	Mean generated health wastes Kg	
	Monthly	Annually
Official hospitals	500	6000
Private hospitals	167	2004
Primary health centers	83	996
Total	750	9000

Table 3:- The Mean Monthly and Annually Generated Health Wastes in Different Health Institutions

Country	Generating rate of HCW Kg/bed/day
North America	7.0 – 10.0
Latin America	3.0
Western Europe	3.0 – 6.0
Eastern Europe	1.4 – 2.0
Middle East	1.3 – 3.0
East Asia(High Income)	2.5 – 4.0
East Asia(low income)	1.8 - 2.2
Jordanian Kingdome	0.5
Hungary	0.16

Table 4:- Generated Rate of Health-Care Wastes in Different Hospitals in World Countries

The first stage of HCW is disturbed; step of segregation of hazardous wastes at the level of their first production site; and that is because of lack of monitoring and awareness of the hazardous effect of HC wastes. There is an essential need for a training program being carried in all health institutes in order to prepare the working personnel to bear responsibility accordingly. Lack of big storage containers in hospitals disturbs the HCWM at the storage step of the task reflects negatively on the transportation step.

Obviously, health care wastes are transported by non-competent cars which add to the possibility of contamination and spread of infection due to disuse and misuse of carriage. Also, about 98% of hospitals have no waste-water disposal treatment units. Several hospitals drain their liquid sewage without any treatment directly to the river which may cause biological & chemical pollution and hazards and form serious threat to people living around.

The lack of incinerators in most health institutions (official and private) led to the accumulation of wastes within and around the hospital or PHC center which are already not segregated and carry much hazards of contamination due to misuse and segregation that take place outside the institution by children living on this task.

The task of transfer of health-care wastes from some institutions to others which do have incinerators is not regular and carry some hazards since they are beyond the capacity of incinerators so some are neglected or being burned locally by firing them inside non-working incinerators or in barrels which carry the risk of air pollution in addition to misuse of wastes which fall around.

Lack of training of HCWM personnel necessitate a continuous training and educating program to all hospital staff concerned with HCWM. In addition, the shortage of HCWM personnel should be managed by motivation or by contracting with private companies concerned with HCWM.

HCWM in hospital and PHC centers is incompetent and lack fixed responsibility and accordingly improperly monitored and managed. However, it needs several

measures be more controlled such as monitoring, coordinative and collaborative task and responsibility of HCWM, the cooperation of infection control committee in each hospital with the public health department, supplying proper equipment of locally managed medical wastes and implementing a water waste disposal treatment unit in every health institute.

To handle proper health care waste management, two obvious actions may be recommended in short and medium terms where:

➤ *Short Term Actions Consist of the Following:*

- Providing new suitable incinerators to cover all health institutes.
- Securing a safe transportation of hazardous health-care solid wastes from hospital and PHCs.
- Minimizing misdischarging by proper waste separation and waste audit. <sup>(17)</sup>
- Minimizing wastes generating. <sup>(18)</sup>

➤ *Medium Term Should Cover the Following Actions <sup>(19)</sup>:*

- Strengthen the cooperation, integration between concerned institution at governorate and strict levels.
- Implementing waste-water treatment plants at hospitals and PHCs.
- Finding laws and regulations in coordination with the ministry of environment.
- Carrying studies to assess the HCWM and strengthen research work in different aspects of the subject.
- Proper handling hazardous liquid wastes prior to their drainage into the public sewage system, with special priority to hospital draining liquid wastes directly to the river.
- Minimizing health care wastes by reducing generating sources, recycling wastes either on-site or off-site, Following clear management instructions and finally segregating such wastes to control hazardous materials.

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