
MEDICAL WASTE MANAGEMENT IN TURKEY AND IN THE WORLD

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Abstract

Disposal of medical wastes is one of the issues that have different approaches among the countries until today and there still has not been developed any common implementation about it across the world. Safe disposal of these wastes are very important in our country as well since they can cause large scale and irrecoverable environmental and human health problems if they are not eliminated in a proper way.

This review deals with the definition of medical waste, the amount of its output in our country, the regulations relevant to this topic, disposal practices in our country and in the world and the differences across the countries. Referring to the importance of safe disposal of medical wastes, this article aims to prepare a ground for the discussions on the necessity of developing innovative and necessary practices in our country.

Key words: Medical waste, hospital waste, Medical waste regulation, Turkey

Environmental health issues continue to exist as a hidden threat that is unfortunately ever mounting, affecting the living conditions, health, happiness and peace of the people. Inadequate or wrong precautions are being taken against these issues. The reason why environmental issues are being ignored so much is that their affects will be seen years after in the future generations and most of them do not have an immediate indicator. This article will highlight the methods of safe disposal of health care waste which can create very serious environmental health problems in our country and how these implementations in our country differ from the world and discuss what the requirements are to leave a more livable country to the posterity.

While waste is defined as any substance which is no longer needed and required to be disposed, according to WHO, waste generated by medical centers such as hospitals and other health care units, dental centers, laboratories, research institutes, blood banks and blood collection

units, animal test centers is regarded as medical waste(1).

The waste generated by health care facilities can be classified as general waste under domestic waste or as medical waste including infectious contaminated waste with blood or blood components, pathologic waste composed of human body parts, sharp and penetrating materials like bistoury, needle which are mainly responsible for the transmission of diseases when their disposal is not managed properly or as hazardous waste covering pharmaceutical waste including chemicals like solvents and disinfectants, expired medicine and vaccine, genotoxic waste like drugs used in cancer treatment or as radioactive waste produced by radiology units (2) (Table 1).

When the breakdown of this waste is analyzed, we see that 10-25% is accepted as hazardous waste and within this, 1% covers sharp and penetrating materials, 3% is radioactive and 1 % refers to waste including heavy metals (1).

CLASSIFICATION OF WASTE GENERATED BY HEALTH CARE FACILITIES (4)						
DOMESTIC WASTE		MEDICAL WASTE			HAZARDOUS WASTE	RADIOACTIVE WASTE
General Wastes	Packaging Wastes	Infectious Wastes	Pathologic Wastes	Sharp and Penetrating Wastes	Dangerous Wastes	Radioactive

The first regulations on the medical wastes in our country were issued with the Environmental Law dated 1983 and, in relation to this law, Medical Waste Control Regulation numbered 21586 and dated 20.05.1993 by the Ministry of Environment and Urban Planning whose old name was the Ministry of Environment and Forestry. This Medical Waste Control Regulation was revised and published in the Official Gazette (nr. 25883 and dated 22.07.2005) and this new version is still forming a legal basis and functioning as a guide to the all implementations to be done in this area.

According to this regulation, it is forbidden to release the wastes from health care organizations to the receiving environment directly or indirectly in such a way that they can be harmful for environmental and human health. This regulation requires that waste formation and amount should be minimized at source; medical wastes should not be mixed with the hazardous and domestic wastes and they should be collected at source, stored, transferred and disposed separately from other wastes. And in this process, the personnel of the medical waste management in the health care facilities that produce medical waste and in the municipalities/private companies that are

responsible for waste disposal should undergo training and medical examination periodically and all the activities under waste management are to be done by these personnel. As required by law, the organizations which produce, transport and

After the duties of control, license procedures and determination of policies have been assigned to the Ministry of Environment and Urban Planning, following duties and authorities have been given to the administrative chiefs: the control and periodic audit of all practices covering the management from the generation of medical wastes till their disposal, ensuring that sanctions are imposed in case of being contrary to legislation, obtaining information from the health care organizations and municipalities about the output amount of medical wastes formed, collected and disposed within the city, evaluating this information and sending a report to the Ministry at the end of the year, determining the price that will be applied on the collection, transfer and disposal of the medical wastes via local environment board, following up and auditing the activities of the licensed sterilization

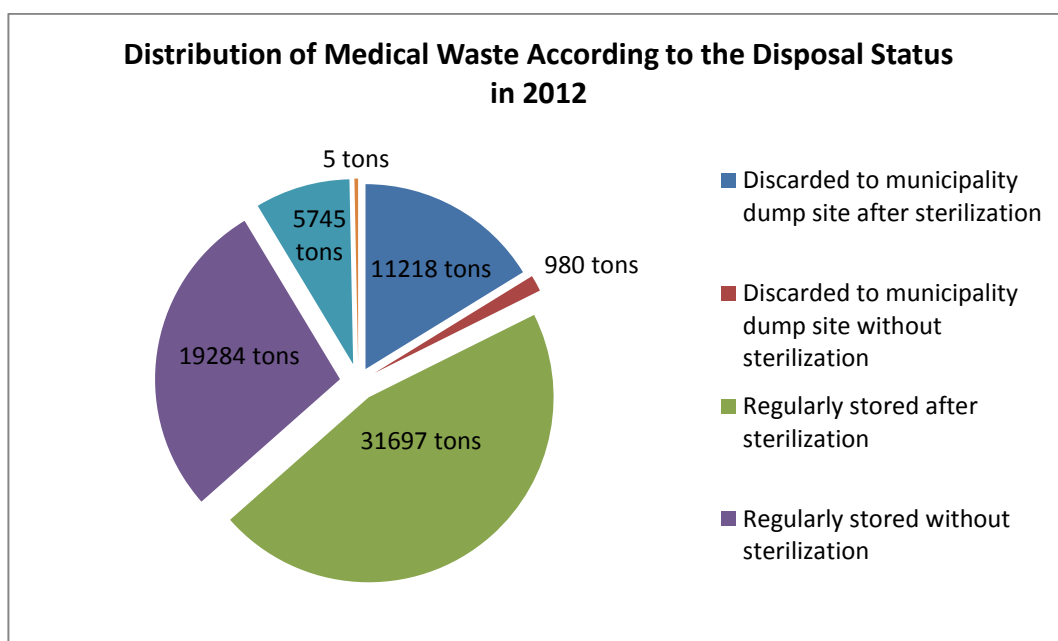
dispose medical wastes are held accountable for the losses stemming from environmental pollution and degradation caused by medical wastes and for taking the necessary precautions to decrease these detrimental effects. (3)

centers and medical waste disposal facilities and ensuring that necessary sanctions are being imposed in case of any contradiction to legislation. (3)

All legal arrangements covering the process from the units- sources of medical wastes to the disposal areas, the separate collection at source and saving, the tools and vehicles used in the collection and transport of these wastes, the amount of wastes, the frequency of collection, temporary storage systems, the cleaning and disinfection of collection equipment, the precautions and actions to be taken in the state of an accidents, the personnel responsible for the management of these wastes and their trainings, the regulations about the containers and vehicles used to transport the wastes from health care facilities to disposal areas are also stated in detail in the relevant regulation. (3)

According to the legislation, the medical wastes that have reached the disposal facilities can be disposed by being stored in regular domestic waste storage spaces after they are burned, stored in disposal areas especially reserved for medical wastes and exposed to sterilization process. The units that generate medical waste are not allowed to build their own burning units or sterilization centers. (3)

According to the “Statistics of Waste by Healthcare Facilities” done by TUIK; while in 2010, 10 facilities were not collecting their medical wastes separately from other wastes, in 2012 it is pointed out that all healthcare facilities were collecting their medical waste by separating them from other waste.



In 2012, it is reported that around 69 thousand medical wastes were collected in our country and 46% of this was disposed after sterilization, 28% was disposed in regular storage area without sterilization, 16% in municipality dump

site after sterilization, 1% in municipality dump site without sterilization and 8% was disposed by being burned.(4) That is; according to the TUIK data, the amount of waste disposed without sterilization is around 21000 tons and the amount of

waste disposed by being burned in the burning facilities is 5745 tons. (4)

Another study shows that 33 cities (40.7%) store their medical waste in municipality dump site, 32 cities (39.5%) in the garbage site in the suburbs, only 5 cities (6.2%) in the dumpsite reserved for especially medical waste, 2 cities (2.5%) store in the private companies or private burning facilities. 40 cities are reported to dispose their medical waste by burying (12 of this by being limed) and 22 cities by the method of burning. (5,6)

In the researches done on the management of medical waste in Turkey with the purpose of identifying the physical composition of the garbage generated by state and private hospitals, it is found out that within state hospitals, in total 2.39 kg waste comes out daily per each bed- 1.92 kg of this is medical; 0.38 kg is domestic solid waste and 0.09 kg is recyclable. On the other hand, in private hospitals, it is seen that 4.39 kg waste is generated daily per bed in total – 2.01 kg of this is medical, 1.35 kg is domestic solid waste and 0.98 kg is recyclable. And daily medical solid waste amount per polyclinic has been found to be 0.05 kg in state

hospitals and 0.18 kg in private hospitals (5, 7).

Studies show that as the development level of countries increase, the amount of medical waste daily per bed is also increasing. While in US daily amount of waste in hospital is 5.8kg/bed/day, in Holland, this amount is 4.2 kg/bed/day. While in Cambodia, this number is below 0.5 kg/bed/day, in Vietnam it is seen as 1 kg/bed/day.

According to the “Annual Health Statistics – 2012” published by the Ministry of Health, the number of beds in Turkey was 200,072 in the year of 2012. The occupancy rate of the beds were calculated as 65.1% when all the sectors are included. (9)

In the light of this information, even if the amount of medical waste generated daily per bed is taken as 2 kg/bed/day, the annual expected waste amount is expected to be around 96.000 tons/year only in the bedded health institutions. And this makes us think about the possibility of some missing in the records kept in our country.

As seen in the practices in our country, medical waste generators are to pay per kg, which might cause them to save by reducing the amounts of medical waste and might lead some wastes to be regarded as domestic waste due to the lack of strict audits. On the other hand, private companies who issue invoice to the medical waste generators per kg do not object to the other wastes than medical within the waste bags. In our country, disposal fees are determined by the rules of local city environment board. With reference to this, the rates range between 2- 3 TL /Kg + VAT in 2013 and the average is rated as 2.25 TL/kg, which is

While the developed countries deliberate over collection at optimum level and disposal of the several volumes of medical wastes generated by home care patients, our country is unfortunately still dealing with the problems such as lack of sufficient awareness on the collection and disposal of medical wastes, insufficient audits and legal proceedings due to the lack of trained personnel related to this issue, untrusted data, predominance of cost concern over the priority of environment and health, wrong separation and collection practices, the waste carrier

observed to be at the same level with the disposal fees in European countries.

When we assess the operations concerning the collection of medical wastes in our country, it is obvious that when the wastes generated by the districts at 60-80km far from the city are collected once or twice per week via the medical waste transporters, the costs are hard to be met. In most of the facilities that produce less waste or located far from the town, the medical wastes are piled up for 1 month or sometimes for more or sometimes in winter months they are disposed by the units in the heating boilers.

personnel's not wearing suitable clothes, gloves etc., non-conforming temporary storage sites for most of the facilities, inability to prevent the contamination of the drainage directly or the environment by infectious liquids, lack of deterrent force in the punishments, the inadequate frequency in collection and the absence of tracking in the small clinics. (8)

On the other hand, with reference to the "The Medical Waste Control Regulation" revised in Official Gazette No.

28131 and dated December 3, 2011; it has been made compulsory to discharge the medical waste by burning when over 10 tons of medical wastes are generated per day in the areas of responsibility of the metropolitan municipalities. Although burning is one of the safe methods of waste disposal, many destructors in Europe has been closed down today because of the difficulties faced during the refinement of chimney gases such as dioxin and furan coming out after burning, high investment and operating costs of the burning facilities that have necessary refinery chimneys, high expense and advance technology requirement for the measurement, analysis and the purification of these gases.

For instance, while 554 incinerators were being used in Germany in 1984, in 1987 this number decreased to 218 and in 1996, 10 incinerators were in use. In US, while the number of incinerators was 6200 in 1988, it fell below 100 in the recent years. In Canada, other technologies than incinerators have started to be preferred lately. In addition, in US, infectious wastes are never allowed to be buried under earth without being processed first. (8, 12, 13)

US Environmental Protection Agency (EPA) suggests that infectious wastes are to be processed before disposal and that the infectious wastes which are exposed to processes effectively become no longer biologically hazardous and thus can be discharged by mixing with the normal wastes. (13)

In the time of making a decision concerning the discharge of medical wastes, two important issues including the size of service areas and the disposal methods should be determined. Accordingly, one of the disposal methods including at source (decentralized- on site), cluster or central (off site) can be chosen. Disposal at source refers to the discharge at the health facility, having an important advantage of low risk during the transportation of wastes. It also brings together many additional problems such as maintenance of the system in a small unit, its operational management, meeting the national liabilities, taking precautions for labor health and safety and being ready for any possible accidents. (11,14)

In the method of central disposal, cluster or regional/national disposal is preferred. In the cluster disposal method, a

group of health care centers in a small area or region send their wastes to a larger healthcare unit. If a regional hospital becomes the center of cluster disposal, this means that it serves to the small hospitals and polyclinics, private clinics, dental centers and public health centers. (15)

Within the scope of health campuses/city hospitals being established in some cities, the medical wastes are disposed on site with the method of clustering. Establishing this common medical waste sterilization centers can be considered as a cost effective and beneficial practice in terms of ecology and environmental health since it prevents the transportation of large volume wastes to the faraway areas.

As for the Regional/National disposal method which is implemented in our country as a central disposal method, choosing a central disposal facility apart from the health center has some advantages in terms of finance, technics and legal conformity. A central unit is easier for operating, maintenance and conforming to environmental norms in terms of human source. Any change or expansions that might be necessary in the

future can be done with less cost. In most cases, central disposal has many economic advantages thanks to scale economics. As can be seen in the example of IZAYDAS which is the single disposal facility in the management of hazardous waste, our country implements the hazardous waste management at a national level. (11)

For the central disposal solutions of wastes in many countries, alternative finance models such as “build-own-operate” or build-operate-transfer” might be among the practices to be used more in the management of medical waste. (16)

In a research done by Johnson and his friends concerning the re-separation of infectious medical wastes in US, it is found out that 61% of these wastes are general wastes. After the personnel are trained about it, it is seen that correct implementations have increased by 44% and the removal rate of infectious medical waste in the hospital have decreased by 48%. (11,17,18). The research shows that 36,4 % of the workers responsible for the medical waste collection mentioned that they have been at least for once injured by a sharp object contaminated with patient liquid. Also the observations refer to the

fact that only 51 % of them washed their hands after collecting the medical wastes. (19)

Based on a research done in our country, 24.1% of the healthcare staff do not know if their organization has a special dump area for the collection of medical wastes, 32.8% of them if the medical wastes are disposed by their own institution or not, 20.4% of them if there is any personnel charged with the collection, storage and disposal of the medical wastes and 28.6% of them do not have any information whether their organization has a waste management plan or not. In addition, while it is economically of great significance to collect the medical wastes in bags or boxes in accordance with their classifications, to separate them at source, to minimize and to recycle, 37.2% of the healthcare staff participating in the research do not know that domestic wastes should be collected in black bags and 38.8% of them do not know recyclable wastes should be in the blue bags and 11.7% of them do not have any knowledge if there is any color separation in the bags of medical waste/ trash containers or not. This highlights the necessity and

significance of studies to raise awareness of this matter. (20)

All in all, it is a common knowledge that the number of health centers whose aim is to **heal** (make people healthy), their bed numbers and the medical waste amounts generated are increasing at the same rate. If the necessary precautions are not taken today, these medical wastes can cause large scale health and environmental problems in the future. Therefore, new models are needed to be developed in compliance with the cultural, geographical, physical and economic conditions of our country.

The fact that there are different types of wastes generated in the health facilities such as domestic, medical, hazardous, sharp-penetrating, liquid and radioactive wastes requires a cross-sectoral cooperation between the Ministry of Environment and Urban Planning, Ministry of Health, Municipalities and Administrative Chiefs. It also calls for the development of good implementation guides and detailed national basic guidelines and the tracking of field practices in a good harmony.

Accordingly, the awareness of the public and healthcare staff should be raised, incentive practices and sanctions should be imposed to minimize the wastes at source and to separate them. Concerning the approach of recycling which is not present in our country in spite of being very cost effective, new policies should be improved. Information systems and the records related to the medical wastes are required to be correct, measurements should be taken to protect environment and human health and they should be applied. The legislations regarding the medical wastes, the country's own conditions and EU directives and applications should be taken into account, re-evaluated.

Concerning the follow-up of the legislation, effective audits should be done by trained and conscious staff.

It should also be noted that while developing regulation and control systems for the medical wastes, it is fair to set aside the contributions to the country's economy and the reductions in its financial burden. In other words, the financial return of these practices should not be of our first priority. Instead, our approach should focus on the practices that enable the sustainability of the ecological balance and of the health of our people and at the same time we should set forth with **“people oriented service mentality” which puts the human health in the very center.**

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