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MEDICAL WASTE MANAGEMENT IN THE AXIS OF RELATIONSHIP BETWEEN ENVIRONMENT AND HEALTH*

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Abstract

It aims evaluating of an existing situation by reviewing related legislation, researching the relationship of medical waste-environment in the axis of sustainability discussion, determining application by doing a field research relating to subject to inspect this relationship. The research was applied to 100 medical staffs at Beyhekim State Hospital in Konya with survey. The scale developed by Demet DOĞAN CANSARAN was used in collecting data. Raw data was acquired with the survey was transferred onto computer by the researcher. Given answers of each question and their valid percentages were reflected to tables. According to gotten information from the board of Beyhekim State Hospital, the amount of produced waste at hospital is daily about 1500 kg. Majority of amount of waste consists of household, infected, chemical and sharp wastes. Radioactive waste is minute amount. The hospital's only radioactive waste is produced by x-ray bath and it is being sold firms determined by the Health Ministry by saving them in metal barrels. In addition, liquid wastes in the hospital's operating rooms and other units are directly discharged to canalization without any processing. In this study, the problems, relating to creating a medical waste management by establishing a relationship between environmental health and medical waste, are reviewed.

Keywords:

Environmental Health,

Medical Wastes,

Sustainability,

Medical Staffs.

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1. Introduction

Human being, beginning from its existence, has directly become interaction with environment. It has continued a life for long years in compatible with environment and believed in the limitlessness of resources provided by it. However, in time, with the effect of the elements such as rapid population increase, industrialization, and urbanization, environmental problems earlier ignored and pushed into background, growing by a cumulative effect, have begun to become threatening all the world [1]. The diversity experienced in the production and consumption habits features the issue of wastes, an important part of the process, as an important issue that should be evaluated [2]. It is necessary to collect, transport and eliminate, and make harmless wastes doing a negative effect on the health of society in accordance with health rules and under technical conditions, because the effect of wastes on human health is in a scale that cannot be underestimate and is broad and continuous [3]. In classification of solid wastes, the leading method, commonly used, is classification according to the content of solid waste, which can be classified as domestic, industrial, medical, specific qualified wastes, and waste of treatment plant [4]. It is necessary to separately store, transport, and ultimately dispose medical wastes resulted from health facilities without damaging to public health and environment. The most important inconveniency of medical wastes is that it is an important factor in spread of contagious diseases[5]. Storing hospital wastes without processing or piling up and disposing them in an area excursively leads to environmental problem [6]. Waste management is an issue that should be dealt with a comprehensive approach. What is important here is dealing waste management with, besides main elements such as formation, gathering, processing, and moving away, the issues such as environmental protection, protection of resources, and productivity increase in an integrated way. Namely, this means that wastes are not moved away from the human environment but also it is made contribution to providing economic development as well as protecting and developing environment and human health [3]. In our country, in the recent years, the negative developments about environment have engendered the need for answering the question "What should be done about medical wastes? " This question will find answer by fully and accurately applying Medical Waste Control Regulations issued in accordance with international standards about management of medical wastes [7]. In Turkey, in the stages passing from production of medical wastes to their collecting, storing,

transporting, and eliminating, the duties, authorization, and responsibilities the institutes and agencies will undertake are present in Medical Waste Control Regulations, published in Official Journal, dated 22.07.2005 and numbered 25883. According to regulation, minimizing waste has primary importance. It is necessary not to mix wastes. In regulation, domestic wastes, medical wastes, dangerous wastes, and radioactive wastes are classified. Medical wastes are divided within itself into infectious wastes, pathologic wastes, and sharp object wastes [8]. The concept of sustainable development includes the environmental, economic, socio-demographic, and health elements and, the most important feature emphasized here is to meet the need of the existing population in such a way that it will not impede to meet the needs of the future generations [9]. Dealing with environmental problems as a whole and taking into account the future developments without damaging to environment, the preventive polices aiming at preventing the environment from damaging, today, developing much more in the framework of understanding based on the basis of determinative of the interaction of environment and development, have been strengthened by the policies of sustainable development [10].

2. Research Method

The study was carried out Beyhekim Public Hospital giving service in the province Konya. Due to the fact that the time is limited; that most of works realized in health enterprises concern human life, and need urgency; and, thus, that health employees heavily work to present services, as sample, of health employees, nurses, medical secretaries, emergency medical technicians (EMT) , and servants were included in the study. The study was carried out on 100 people. This study was designed by the method of quantitative study according to descriptive study model. Without making any change in the existing features of the subjects, the views of the subjects about the existent situation was tried to be received by collecting data. Descriptive method is a study approach aiming at describing the past or present situation as it exists. The frequencies of answers given to each question and their current percentages were reflected in the tables. A survey was administered to the staff participating in the study, in order to collect information in the direction of the aims of the study. The questionnaire prepared consists of 2 sections. In the first section, in order to collect the personal and vocational information about the employees, 4 questions take place prepared by the researcher

In the second section of the study, with 25 questions, the information, attitudes, and behaviors of the staff, associated with collecting and eliminating medical wastes, were tried to be identified. In the survey prepared, 21 "closed end" questions and 4 "open ended" questions were used. The necessary data for the study were obtained via the survey administered to the subjects. The raw data administered to the subjects were transferred by the researcher to the computer.

3. Results and Analysis

The demographic data belonging to the study and the frequency analyses belonging to the survey used in the study were presented below:

Table 1:Demographic Data Belonging to the Study

Duty of Participant	N	%	**Age**	N	%
Nurse	60	60	18-25	24	24
Medical secretary	26	26	26-33	39	39
EMT	8	8	34-41	26	26
Servant	6	6	42-49	11	11
Total	100	100	Toplam	100	100
Educational Status	N	%	**Cinsiyet**	N	%
Primary School	3	3	Kadın	51	51
High school	27	27	Erkek	49	49
Associate degree	27	27	Toplam	100	100
License	42	42			
Postgraduate	1	1			
Total	100	100			

When we regard to Table 1, 60% of those participating in the study were nurse; 26%, medical secretary; 8%, EMT; and 6%, servant.3% of those participating in the study graduated from the primary school; 27%, from high school; 27%, from associate degree; 42%, from license; and 1%, from postgraduate. 49% of those participating in the study was male and 51% was female. Their ages were asked in open ended and, following this, since they were distributed in a large range, they

were divided into four groups. According to this, 24% of them were in the range of age 18-25; 39%, 26-33; 26%, 34-41; and 11%, 42-49.

Table 2: The cases of protection from the effects of medical wastes toward human health and exposure frequency of staff to the health risks of medical wastes

Exposure frequency of the staff to risk	N	%	Protection Case of Staff	N	%
I was not exposed at all	20	20	Yes	99	99
Once a week	2	2	Non	1	1
Once a month	32	32	Total	100	100
One –two in a year	46	46			
Total	100	100			

When we regard to Table 2, 99% of employees replied the question of "Do you think that you are protected from the effects of medical wastes toward human health ? as "Yes" and 1% as "No".", These answers show that the staff relies on the applications of hospital regarding medical wastes and themselves. To the question of "From time to time do you expose to the risks the medical wastes form for your health?", 20% of gave the answer of "I did not expose at all", 2% of them , "I exposed once a week to them", 32% as "once a month", and 46% as once or twice a year. That the answer of "once or twice a year" forms the majority means that it is not necessarily cared to collecting and transporting medical wastes.

Table 3:Adequacy of applications of medical wastes in the hospital

Adequacy of applications of medical wastes	N	%
Yes	97	97,0
No	3	3,0
Total	100	100,0

When we look at Table 3, to the question of "For eliminating the effects of medical wastes on the human health, do you think that applications of medical waste in your hospital are adequate?", 97% of the employees gave the answer of "yes" and 3%of them "no". That the great majority ofstaff gives theanswer of "yes" is the indicator

of that hospital management behaves sensitively about medical wastes and that the staff believes that management takes necessary actions.

Table 4: The cases of that the employees have training about medical wastes and the cases of whether or not they find adequate the training they have about this subject

The case of that the employees have training	N	%	The case of whether or not they find training they have	N	%
Yes, I had it	78	78,0	Yes, adequate	77	98,7
No, I did not have it	22	22,0	No, not adequate	1	1,3
Total	100	100,0	Total	78	100,0

When we regard to Table 4, 78% of the employees replied as "Yes, I had it" and 22% as "No, I did not have it" the question of "Did you have training about medical wastes?". That most of the employees give the answer of "Yes" supports the expression of "We have training once a quarter " hospital staff states during the pre-interview made before application. On an issue such as medical wastes including threat in an important dimension for the environmental and human health, under heavy working conditions of hospital, training once a quarter will enable the information of the staff about medical wastes to be kept fresh, and the work to continue in accordance with the regulations. To 78 people replying this question as "yes", the question of "Is the training you have adequate?" was asked, 98.% replied it as "adequate" and 1,3% as "inadequate". That the number of those replying it as adequate is high shows that staff finds adequate the training given to them.

Table 5: The thoughts of staff about medical waste manager

The thoughts of staff about medical waste manager	N	%
Chief Physician	20	20,0
Hospital Manager	52	52,0
Chief Nurse	25	25,0
Cleaning Officer	1	1,0
Other	2	2,0
Total	100	100,0
No answer	0	0

When we regard to Table 5, among 100 employees answering the question of "In your opinion, who is the medical waste officer of your hospital ?", 20% replied this question as Chief Physician, 52% as hospital manager, 25% as chief nurse, 1% as cleaning officer, and 2% as other. According to the regulation, medical waste officer of hospital is chief physician and somebody responsible for medical wastes should be present in hospitals. According to the information obtained from hospital management, there is a unit subjecting to hospital manager. The presence of this unit that is responsible for orderly collecting and transporting medical wastes and training staff is in accordance with the regulations.

Table 6: Rating the importance the staff gives to separately collecting and eliminating the medical wastes from the other wastes and its reasons

The importance of separately collecting medical wastes	N	%
Very important	93	93
Important	7	7
I don't know	0	0
Not important	0	0
Total	100	100
The reason for separately collecting medical wastes	N	%
Due to damaging to the health of hospital staff	42	42
Due to damaging to the patients	1	1
Due to damaging to the public health	32	32
Due to damaging to physical environment	21	21
No answer	4	4
Total	100	100

When we regard to Table 6, to the question of "How much important to separately collect and eliminate the medical wastes from the other wastes in your opinion?", while 93% of the employees gave answer as "very important", 7% replied it as "important". There was nobody replying it as "I don't know" or "important". That the staff living together with the medical wastes replied this question as "very important" is an expected situation. This situation can be deemed as the indicator of that they have awareness about the necessity of behaving careful and taking the

necessary actions regarding medical wastes. To the question of "if separately collecting and eliminating the medical wastes from the other wastes are important in your opinion, what is the reason for this? " , 4% of the employees did not give any answer and 42% of them ticked the due to probability of damaging to hospital staff; 1%, due to the probability of damaging to the patients; 32%, due to damaging to the public health; 21%, due to damaging to physical environment. That the staff living together with medical wastes and is directly affected from the wastes mostly replied this question as "due to the probability of damaging to hospital staff " is an expected situation. The cause of that the staff views the probability of damaging to the environment in significance of third degree results from the thought that the wastes in hospital will first impact the near environment of the hospital. Another cause is that the people deal with the environment from a human-oriented viewpoint in terms of human health- environmental health.

Table 7: The levels of staff to know about the bags, in which the domestic, medical, and radioactive wastes

Domestic Waste	N	%	Medical Waste	N	%	Radioactive waste	N	%
Blue	16	16,0	Blue	0	0	Blue	0	0
Red	1	1,0	Red	87	87,0	Red	33	33,0
Black	77	77,0	Black	0	0	Black	1	1,0
No answer	6	6,0	No answer	13	13,0	No answer	66	66,0
Total	100	100,0	Total	100	100,0	Total	100	100,0

When we regard to Table 7, to the question of "In which color of bags do you put the wastes in your hospital? ", for domestic wastes, 6% of the employees did not give any answer, 16% of them replied this question as "blue"; 1%, as red; and 77% as black. According to the regulation, domestic bags must be put in the black colored bags. The medical wastes are processed to the colors of bags, in which they are accumulated. Therefore, carrying these wastes in the bags in right color is important in terms of their processing in accordance with the rule. For the medical wastes, 13% of the employees did not give any answer, 87% answered as red.

According to the regulation, medical wastes must be in the red colored bags. When considering that the first and most important process before transporting and eliminating is to accumulate them in the right place, that the majority of hospital staff knows in which color of bags the medical wastes must be accumulated is an obligatory case. For radioactive wastes, 66% of employees did not give any answer, while 33% of them replied this question as red, 1% as black. In Beyhekim Public Hospital, radioactive wastes are minute amount. Therefore, the staff does not live together with radioactive wastes. In spite of this, that the majority of the answers of those replying is correct is important.

Table 8: The level of staff to know where wastes of sharp object are accumulated and thoughts of staff related to the place, in which the wastes are gathered.

Where the wastes of sharp object are accumulated?	N	%
In bags	3	3
In cardboard boxes	18	18
In plastic boxes	79	79
In double layered bags	0	0
Other	0	0
TOTAL	100	100
Where are the wastes of sharp objects accumulated?	N	%
In bags	3	3
In cardboard boxes	18	18
In plastic boxes	79	79
In double layered bags	0	0
Other	0	0
TOTAL	100	100

When we regard to Table 8, to the question of "Where are wastes of sharp objects are accumulated? ", 3% of staff gave an answer as "in bags"; 18%, in cardboard boxes; 79%, in plastic boxes. According to the regulation, what is correct is to accumulate in plastic boxes. At the moment that the wastes of sharp objects prick to any place of the body, they contact with blood and have the feature of direct communication of disease. Therefore, it is very important to carry the wastes of

sharp objects in high quality boxes without overhanging out of box. It is necessary not to forget that the kind of wastes of sharp objects is s kind of communicating disease the most. To the question of " In your opinion, where are the wastes in the bags collected? ", 49% of the staff gave an answer as in temporary waste storage; 29%, in containers; and 22% told "I don't know". According to the information obtained from hospital management, wastes are daily collected in a certain route by contractor company and kept in cold storage until coming into sterilization unit. That the majority of hospital staff knows the answer of temporary waste storage is the outcome of the training given.

Table 9: The level of staff to know who carries out the works of collecting, transporting, and storing the medical wastes between the departments of hospital and the identification of whether or not these people have the other responsibilities

Who are responsible for the works related to the medical wastes?	N	%	Do they have another responsibilities?	N	%
Special cleaning staff	51	51,0	Yes	25	25,0
Hospital cleaning staff	49	49,0	No	55	55,0
Caregivers	0	0	I don't know	20	20,0
Nurses	0	0	Total	100	100,0
Total	100	100			

When we regard to Table 9, to the question of "Who carries out the works of collecting, transporting, and storing the medical wastes between the departments of hospital?", among 100 employees, 51 % gave the answer of special cleaning staff, 49%, hospital cleaning staff. There was nobody answering as caregivers and nurses. According to information obtained from hospital management, the works of collecting, transporting, and storing are carried out by the special cleaning staff. To the question of "Are those being responsible for the works of collecting waste for other works?". 55% gave the answer of "no"; 25%, "yes", and 20%, "I don't know". For making the work correctly and in reliable way, those being responsible for collecting and transporting should not be responsible for the other works.

Table 10: Supervision frequencies of the officers to collect and transport and variation frequency

Supervision frequency	N	%	Changing frequency	N	%
Daily	13	13,0	Not changing	88	88,0
Weekly	7	7,0	Daily	0	0
Monthly	66	66,0	Weekly	0	0
Other	14	14,0	Monthly	8	8,0
Total	100	100,0	Other	4	4,0
			Total	100	100,0

When we regard to Table 10, to the question of "At what frequency are the officers of waste collecting and transporting supervised? ", 13% gave the answer of as "daily", 7%, "weekly"; 66%, monthly. To the question of "At what frequencies do attendants carrying out the work of waste collecting change ? ", 88% gave the answer of "not changing"; 8%, monthly; and 4 %, "other". There was nobody giving the answer of "daily" or "weekly". That the majority give the answer of "not changing" is the indicator of that this duty was carried out by the experienced people.

Table 11: The cases of training the attendants of waste collecting and transporting and the cases of their wearing special clothes

Cases of Training	N	%	Cases of wearing special	N	%
Yes	82	82,0	Yes	89	89,0
Non	0	0	Non	0	0
I don't know	18	18,0	I don't know	11	11,0
Total	100	10,0	Total	100	100,0

When we regard to Table 11, to the question of "Are these attendants trained in certain intervals?", 82% gave the answer of "yes" and 18%, "I don't know". There was nobody giving the answer of "No". That the majority gives the answer of "yes" is the indicator of that hospital management gives importance to this issue. Education is important in terms of keeping information fresh and learning the new developments. To the question of "Are the staff of collecting and transporting the

medical wastes wearing special clothes?", 89% of the staff gave the answer of "Yes" and 11%, "I don't know". There was nobody the answer of "No". According to the rules, it is obligatory for the staff of collecting and transporting the wastes to wear special clothes. That the majority gives the answer of yes is the indicator of that they act in accordance with regulation. That there is clothe only used for collecting and transporting the medical wastes will prevent the substances infected by the wastes from communicating disease to the person himself/herself and his/her environment.

Table 12: The determination of the agency transporting the medical wastes and the cases of regularly taking the medical wastes by municipal crews

Agency transporting the wastes	N	%	The case of regularly	N	%
The vehicle belonging to the agency itself	16	16	Yes	83	83,0
Municipal vehicle	14	14	No	3	3,0
Private company vehicle	70	70	I don't know	14	14,0
Total	100	100	Total	100	100,0

When we regard to Table, to the question of "By the vehicles of which agency your medical wastes are transported ?, 16% of the staff gave the answer of "by the vehicle belonging to the agency itself "; 14% , by municipal vehicle; and 70%, by private company vehicle. According to the regulation, municipalities are responsible for transporting the medical wastes: But, in Beyhekim Public Hospital, the works of collecting, storing, and transporting medical wastes are carried out by the special cleaning staff and private company vehicle. That the majority becomes knowing this is a plus point in favor of the training given. To the question of "Are your medical wastes regularly taken by the municipal crews ?", 83% of the staff gave an answer of "yes"; 3%, "no", and 14%, "I don't know". In Beyhekim Public Hospital, medical wastes are received by the crews of private company. We infer from here that the staff has no information about this.

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4. Conclusion (10pt)

According to the information from hospital management, the amount of daily produced waste in the hospital is 1500 kg. The large majority of amount of waste

consists of the wastes in domestic, infected, chemical, and sharp quality. The amount of radioactive waste remains at very minimal level. Within the borders of Konya Metropolitan Municipality also including the hospital, in order to collect, transport, and eliminate medical wastes resulted from all health institutes in such a way that they will not damage to the human health and environment, on the date of 22.05.2007, Medical Waste Sterilization Plant was established and bidding of renting the work of Right of Collecting and Business Management was realized according to State Bidding law, numbered 2886. In the scope of bidding, Medical Waste Sterilization Plant, established by the contractor company, was put into operation on the date of 22.07.2008 and the work of collecting and transporting medical wastes was transferred to the contractor. In the scope of bidding, the medical wastes are daily collected from the health institutes by means of licensed vehicles in the direction of the route determined and brought into sterilization plant. The waste brought into the plant are kept in cold storage until entering sterilization unit. After sterilization, bringing them in the quality of domestic waste, they are eliminated in Astım Solid Waste Storage Area.

As a result of survey study, carried out in Beyhekim Public Hospital, when health staff are asked the exposure frequency to the risks impacting the health of medical wastes, the answer of "once or twice a year " received the highest score with 46%. According to the study by Cansaran, D.D.(2010), the answer of "I never expose to it" had the highest score. In the thought of staff regarding medical waste officer of hospital, the answer of "Hospital Manager" had the highest score with 52%. The reason for this is that medical waste unit subjects to hospital manager. According to the study by Cansaran, D.D.(2010), the highest rate is the answer of "other" with 38%. The reasons for this is that in the study, where Cansaran studied, infection unit is engaged in the medical wastes. The level of staff to know that the medical wastes are accumulated in red bags is 87%, while according to the study by Cansaran, D.D.(2010), this value was 82%. At the level of staff to know who carries out the works of collecting, transporting, and storing, special cleaning staff had the highest rate with 51%. According to the study by Cansaran, D.D.(2010), , this value was 69.7% for again cleaning staff. In both hospitals, the works of collecting, transporting, and storing the medical wastes belonged to special cleaning staff. In our study, it was concluded that the

medical wastes were regularly taken by the responsible crews in the rate of 83%. In the study by Cansaran, D.D.(2010), the conclusion that the medical wastes were regularly taken in the rate of 76 % takes place

As a result of the study carried out, it can be said that Beyhekim Public Hospital acts in the applications of medical wastes in accordance with Medical Waste Control Regulation. The study carried out shows that especially hospital staff is conscious and sensitive about especially medical wastes. The decisiveness of hospital management about applying the provision of regulation creates an impression that a reliable waste management can be applied by completing the other deficiencies. During survey administration, in the questions measuring the level of staff to know the bags, in which wastes are put, that the large majority knows the answer that are compatible to the regulations can be accepted as consciousness and sensitivity.

That the staff gives the answer of "very important " with a remarkable majority about that the medical wastes should be separately collected and eliminated from the other wastes reveals that the importance they give importance to separately collecting and eliminating the medical wastes from the other wastes. As the requirement of elimination in this form, we can evaluate that that staff shows the causes regarding public health of hospital staff and public health in the first orders as that they accept the wastes as a threat in terms of personal health. That is, the environmental health is viewed in the background. For being able to eliminate this problem, training can be given.

In the interviews made with the hospital. It was seen that there was an unit that is specifically responsible for the medical wastes. This unit performs a supervision duty in a process going from collecting the medical wastes in the hospital to the cleaning crews and is directly engaged in the staff training. In many countries in Turkey, there are units that are responsible for only medical wastes. That these units are existent in all hospitals is an important detail in terms of forming the true and trustable medical waste management. The training and health controls of staff working in the collection and elimination of medical wastes are regularly realized . Sorting is made in the source of wastes produced in the hospital and medical wastes are daily collected from health institutes by means of licensed

vehicle in the direction of a determined route and brought into sterilization unit. During working, the staff uses special protective clothe, face mask, helmet, gloves, and boot. For the wastes received from the health institutes by weighing, follow up forms are arranged. After sterilization, bringing the medical wastes in the quality of domestic waste, they are eliminated in Astım Solid Waste Storage Area are eliminated.

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