

Original Research / Orijinal Araştırma

## Primary Health Care Workers' Attitudes and Behaviors Toward Medical Waste Birinci Basamak Sağlık Çalışanlarının Tıbbi Atıklara Yönelik Tutum ve Davranışları

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### Abstract

**Introduction:** The attitudes and behaviors of healthcare workers towards medical waste represent a significant concern for public health. This study aimed to determine the attitudes and behaviors of primary healthcare workers towards medical waste.

**Method:** The population of this descriptive study consisted of 207 nurses, doctors, midwives, and EMTs working in 24 family health centers, 1 enhanced migrant health center, and 1 district health directorate in a district of Istanbul. The sample size was determined to be 172 using G Power. Data were collected between January and February 2025 using a "Descriptive Information Form" and the "Medical Waste Attitude and Behavior Scale" (MWABS). A total of 172 participants were reached, and the data were analyzed using SPSS. Ethics committee approval was obtained.

**Results:** 77.3% of the participants were female, 48.8% had a bachelor's degree, the mean age was 38.84±9.20, 37.2% were nurses, 37.8% were physicians, and 19.8% were midwives. 90.7% had 4 years or more of professional experience, and 14% were managers. Medical waste training was given to 63.4% of the participants. In the study, statistically significant differences were found between MWABS scores according to age, gender, professional experience, and place of work (p<0.05).

**Conclusion:** It was found that women, participants aged 30 years and older, those with more than 4 years of professional experience, and migrant health center workers had better attitudes and behaviors towards medical waste than others. It is recommended that beginner healthcare workers be given training on medical waste.

**Keywords:** Medical Waste, Attitude, Behavior, Medical Staff.

### Özet

**Giriş:** Sağlık çalışanlarının tıbbi atıklara yönelik tutum ve davranışları halk sağlığı önemli bir endişe kaynağıdır. Bu çalışmanın amacı, birinci basamak sağlık çalışanlarının tıbbi atıklara yönelik tutum ve davranışlarını belirlemektir.

**Yöntem:** Tanımlayıcı tipteki bu çalışmanın evrenini İstanbul'un bir ilçesinde bulunan 24 aile sağlığı merkezi, 1 güçlendirilmiş göçmen sağlığı merkezi ve 1 ilçe sağlık müdürlüğünde çalışan 207 hemşire, doktor, ebe ve ATT oluşturdu. Örneklem büyüklüğü G Power'da 172 olarak belirlenmiştir. Veriler Ocak-Şubat 2025 tarihleri arasında "Tanımlayıcı Bilgi Formu" ve "Tıbbi Atık Tutum ve Davranış Ölçeği" (TATDÖ) kullanılarak toplandı. 172 katılımcıya ulaşılmış ve veriler SPSS 27.0 programında analiz edildi. Etik kurul izni alındı.

**Bulgular:** Katılımcıların %77,3'ü kadın, %48,8'i lisans mezunu, yaş ortalaması 38,84±9,20, %37,2'si hemşire, %37,8'i hekim, %19,8'i ebeydi. Yüzde 90,7'si 4 yıl ve üzeri mesleki deneyime sahipti ve %14'ü yöneticiydi. Katılımcıların %63,4'ü tıbbi atık konusunda eğitim aldı. Çalışmada yaş, cinsiyet, mesleki deneyim ve çalışma yerine göre TATDÖ puanları arasında istatistiksel olarak anlamlı fark bulundu (p<0,05).

**Sonuç:** Kadınların, 30 yaş ve üzeri katılımcıların, 4 yıldan fazla mesleki deneyime sahip olanların ve göçmen sağlık merkezi çalışanlarının tıbbi atıklara yönelik tutum ve davranışlarının diğerlerinden daha iyi olduğu bulundu. İşe yeni başlayan sağlık çalışanlarına tıbbi atık konusunda eğitim verilmesi önerilmektedir.

**Anahtar kelimeler:** Tıbbi Atık, Tutum, Davranış, Sağlık Çalışanı.

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## Introduction

Waste management is a crucial factor affecting environmental and public health. One of the critical components of waste management is medical waste. Medical waste (MW) is defined by the World Health Organization (WHO) as any waste produced by healthcare services, including used needles, blood, body fluids, contaminated injectors, wound care waste, and dressing waste.<sup>1</sup> According to the Medical Waste Bulletin of the Republic of Türkiye, Ministry of Environment, Urbanization and Climate Change, 130,401 tons of medical waste were collected across Türkiye in 2022.<sup>2</sup> Inappropriate management of medical waste, which is a result of healthcare services, can cause some problems. These problems may include injuries to workers or the spread of infectious diseases in the community.<sup>1,3</sup> In this context, healthcare workers are at higher risk compared to other groups.<sup>4</sup> Additionally, medical waste can cause environmental pollution, may hinder environmental sustainability.<sup>1</sup> In the literature, there are studies on attitudes and behaviors related to this critical issue. However, they mostly focused on healthcare workers in secondary and tertiary health centers.<sup>5-9</sup> Nonetheless, a wide range of healthcare treatments, such as vaccinations, health screenings, laboratory testing, wound care, and bandages, are also offered in basic healthcare settings.<sup>10</sup> Therefore, primary healthcare organizations are also among the organizations that generate MW, and this is written in the legal regulation.<sup>11</sup>

Research has examined the medical waste management practices, attitudes, and knowledge of primary healthcare workers.<sup>12,13</sup> However, studies conducted in primary healthcare centers in Türkiye are few. This study aims to examine the attitudes and behaviors of primary healthcare workers regarding medical waste management.

## Materials and Methods

### *Design and sample*

This study was planned as a descriptive study. The study consisted of 207 nurses, doctors, midwives, and emergency medical technicians (EMTs) working in primary care in a district of Istanbul. The sample size was calculated as 172 for an independent groups t-test, 0.5% effect size, 5% margin of error, and 90% power in G Power. A purposive sampling method was used to reach 172 participants. The participation rate in the study was 83%.

### *Research Questions*

1. What are the mean attitude and behavior scores of primary healthcare workers towards MW?
2. Is there a difference between the mean attitude and behavior scores of primary healthcare workers towards MW and their features, such as age, gender, education level, and professional experience?
3. Is there a difference between the mean attitude and behavior scores of primary healthcare workers towards MW and their descriptive features, such as the unit they work in, and their managerial positions?

### *Data collection tools*

Data were collected with the “Introductory Information Form” and “Medical Waste Attitude and Behavior Scale” (MWAS).

*Descriptive Information Form:* This form, prepared by the researchers in line with the literature, consists of a total of 10 questions, including age, gender, occupation, education level, professional experience, managerial position, place of employment, MW training status, and MW processes.<sup>9,14,15</sup>

*MWABS:* This scale, developed by Uskun et al. in 2023 for healthcare workers, consists of 24 questions. “It is a 5-point Likert-type scale evaluated as *Strongly agree* and *Strongly disagree*. The scale consists of 4 sub-dimensions: awareness, behavioral, cognitive, and attention. Scores between 24 and 120 can be obtained from the scale. Cronbach's Alpha reliability score of the scale is 0.94. For this study, Cronbach's Alpha value was calculated as 0.98. A high score on the scale indicates that attitudes and behaviors towards MW are positive.<sup>16</sup>

### *Data collection process*

This study was conducted between January and February 2025 at 24 family health centers, one enhanced migrant health center, and one district health directorate, which are primary healthcare facilities in a district on the Anatolian side of Istanbul, Türkiye. Volunteer nurses, doctors, midwives, or EMTs working in primary care were included in the study. Employees working outside primary care, cleaning, and support staff were excluded from the study. The survey link created with “Google Forms” was shared with the participants by informing them via WhatsApp groups. The study included 172 participants, representing an 83% participation rate. Data was collected anonymously and stored in a password-protected folder accessible exclusively to the authors. The survey was restricted to single-entry participation. These procedures have been taken to provide data security and for ethical considerations.

### *Data analysis*

SPSS 27.0 was used for analysis. Descriptive data are presented as count, percent, mean, and standard deviation. Normal distributions were evaluated according to Skewness-Kurtosis values of  $\pm 1.5$ . In normal distributions,  $p > 0.05$  was accepted as a normal distribution. An Independent Sample T-test was used for the difference between

two groups, and a One-Way ANOVA test was used for the difference between more than two groups. Chi-square test was used to evaluate the correlation between two categorical variables. In the explanation of the test results,  $p < 0.05$  was considered statistically significant.

#### **Ethical considerations**

Ethics committee permission was obtained from the ethics committee of Maltepe University (Decision no:2024/23-18, Date:12.12.2024). Healthcare workers were informed, and their consent was taken. Scale use permission was taken.

#### **Results**

The mean age of the participants was  $38.84 \pm 9.20$  years, 77.3% were female, and 48.8% had a bachelor's degree. 37.2% of the participants were nurses, and 37.8% were physicians. 90.7% had more than 4 years of professional experience, and 61% worked in family health centers. 14% of participants were managers, 36.6% had no training on MW management, and 11% reported needlestick injuries as occupational accidents related to MW. It was found that 57% of the participants knew the MW management process, and 77.3% of them collected their MW regularly (Table 1).

**Table 1.** *Distribution of Participants' Descriptive Information*

Variables	Mean $\pm$ SD		Min-Max
Age	38.84 $\pm$ 9.20		24-68
		Count	Percent
Gender	Female	133	77.3
	Male	39	22.7
Education	High School	17	9.9
	Associate's degree	14	8.1
	Bachelor's	84	48.8
	MSc	34	19.8
	PhD	6	3.5
	Specialty in Medicine	17	9.9
Profession	Nurse	64	37.2
	Physician	65	37.8
	Midwife	34	19.8
	EMT	9	5.2
Experience in the profession	$\leq 4$ years	16	9.3
	$> 4$ years	156	90.7
Workplace	Family Health Center	105	61
	District Directorate of Health	40	23.3
	Migrant Health Center	27	15.7
Managerial Role	Yes	24	14
	No	148	86
Training on MW	No training	63	36.6
	From the hospital	51	29.7
	From the university	22	12.8
	From the District Directorate of Health	18	10.5
	Other (Online, congress, etc)	18	10.5
Occupational Accidents caused by MW	Yes (Needlestick injuries)	19	11
	No	153	89
Do You Know the MW Management Process?	Yes	98	57
	No	74	43
Are your medical waste collected regularly?	Yes	133	77.3
	I do not know	16	9.3
	In case of need	19	11
	No MW generated	4	2.3

SD: Standard Deviation, Min: Minimum, Max: Maximum

The sub-dimension scores were 45.29±12.77 for awareness, 19.02±6.22 for behavioral, 18.29±5.96 for cognitive, and 11.86±4.07 for attention. The mean MWABS score was 94.47±27.24 (Table 2).

**Table 2.** *Distribution of MWABS Total and Subdimensions Score Means and Min-Max Values*

Scale and Subdimensions	Mean±SD	Min-Max
Awareness	45.29±12.77	7-55
Behavioral	19.02±6.22	5-25
Cognitive	18.29±5.96	5-25
Attention	11.86±4.07	3-15
<b>MWABS</b>	94.47±27.24	24-120

**SD:** Standard Deviation, **MWABS:** Medical Waste Attitude and Behavior Scale, **Min:** Minimum, **Max:** Maximum

A statistically significant difference was found between age, gender, and working time in the profession and the mean scores of MWABS ( $p<0.05$ ). Participants aged 30 years and older, women, and participants with more than 4 years of professional experience had higher mean scores on the MWABS than the others. There was no statistically significant difference between the mean scores with managerial position, MW training, occupational accidents, and knowing the MW management process and the mean of MWABS ( $p>0.05$ ) (Table 3).

**Table 3.** *Distribution of MWABS Scores of Healthcare Workers According to Some Descriptive Features*

Values		Count	Percent	Mean±SD	t	p
<b>Age</b>	≤ 30 years	30	17.4	83.63±32.11	-2.103	<b>0.042</b>
	> 30 years	142	82.6	96.76±25.65		
<b>Gender</b>	Female	133	77.3	97.07±25.93	2.159	<b>0.035</b>
	Male	39	22.7	85.61±30.02		
<b>Experience in the profession</b>	≤ 4 years	16	9.3	78.37±32.46	-2.520	<b>0.013</b>
	> 4 years	156	90.7	96.12±26.22		
<b>Managerial Role</b>	Yes	24	14.0	91.20±28.24	-0.632	0.528
	No	148	86.0	95.00±27.14		
<b>Training on MW</b>	Yes	109	63.4	97.00±26.65	-1.585	0.116
	No	63	36.6	90.11±27.92		
<b>Occupational Accidents caused by MW</b>	Yes	19	11.0	89.52±28.89	-0.839	0.403
	No	153	89.0	95.09±27.07		
<b>Knowing the MW Management Process</b>	Yes	98	57.0	97.90±26.58	1.915	0.057
	No	74	43.0	89.93±27.63		

**SD:** Standard Deviation      **t:** Independent sample t

A statistically significant difference was found between the mean scores of healthcare workers working in primary care and the units they worked in ( $p<0.01$ ). There was no statistically significant difference between the scores of healthcare workers according to their educational status and occupation ( $p>0.05$ ). As a result of the Post Hoc analysis, it was observed that the mean MWABS score of the health workers in the migrant health center was the highest ( $p<0.01$ ) (Table 4).

**Table 4.** *Distribution of MWABS Scores of Healthcare Workers According to Educational Status, Profession and Workplace*

Values		Count	Percent	Mean±SD	F	p	Post-Hoc
<b>Education</b>	High School	17	9.9	83.23±34.39	1.990	0.083	-
	Associate's degree	14	8.1	88.64±29.78			
	Bachelor's	84	48.8	97.47±26.16			
	MSc	34	19.8	92.91±27.34			
	PhD	6	3.5	77.00±30.01			
	Specialty in Medicine	17	9.9	105.0±14.38			
<b>Profession</b>	Nurse	64	37.2	97.25±26.75	1.301	0.276	-
	Physician	65	37.8	90.70±28.49			
	Midwife	34	19.8	98.94±21.07			
	EMT	9	5.2	85.11±39.32			
<b>Workplace</b>	<sup>a</sup> Family Health Center	105	61	96.70±28.23	7.258	<b>0.001</b>	c>a p=0.009 c>b p=0.002
	<sup>b</sup> District Directorate of Health	40	23.3	77.11±29.01			
	<sup>c</sup> Migrant Health Center	27	15.7	100.35±17.62			

**SD:** Standard Deviation      **F:** One-Way Anova

Healthcare professionals in administrative roles did not differ significantly in their understanding of medical waste procedures ( $p>0.05$ ). It was determined that 37.5% of the participants working as managers did not know the medical waste management process (Table 5).

**Table 5.** *Knowing the Medical Waste Management Process according to the Managerial Position*

Variables		MW Management Process		Total N (%)	$\chi^2$	p
		Yes	No			
		N (%)	N (%)			
Managerial Role	Yes (N:24)	15 (62.5)	9 (37.5)	24 (100)	0.347	0.556
	No (N:148)	83 (56.1)	65 (43.9)	148 (100)		
	Total (N:172)	98 (57)	74 (43)	172 (100)		

N: Count    %: Percent     $\chi^2$ : Chi square

## Discussion

Management of MW is an important process that can cause serious negative public health consequences. One of the critical components of this process is the attitudes and behaviors of healthcare professionals towards medical waste.<sup>17-19</sup> Studies examining attitudes and behaviors towards MW have mostly been conducted in secondary and tertiary healthcare centers. Studies examining the attitudes and behaviors of healthcare professionals in primary care are limited. This study is important in terms of contributing to the literature on the attitudes and behaviors of primary healthcare workers towards MW.

The mean MWABS score of the healthcare workers who participated in the study was  $94.47 \pm 27.24$ . A min of 24 and a maximum of 120 scores can be obtained from the scale. It can be concluded that primary care healthcare personnel have good mean MWABS scores when the participants' mean scores are interpreted based on min-max values. The findings were found to be at a good level, similar to the results of studies conducted in secondary and tertiary care.<sup>20-22</sup> However, some studies found that healthcare workers' attitudes and behaviors towards MW are at medium and low levels.<sup>5,12,13,23,24</sup> It is thought that the reason for the different results is due to the differences in health service standards and education between countries.

Participants with female gender and participants older than 30 years of age were found to have higher mean MWABS scores than the others. The findings are similar to the literature.<sup>15,23,25,26</sup> However, some studies found that men have better knowledge and attitudes towards medical waste than women.<sup>7,26</sup> This may be due to differences in education and sample.

The mean scores of participants with professional experience of more than 4 years were found to be higher than others. Similar to the literature, other studies have also shown that healthcare professionals with more professional experience have better attitudes towards MW.<sup>15,26,27</sup>

The rate of healthcare workers receiving training on MW management was found to be 63.4% in this study. In the literature, the rate of healthcare workers receiving training on medical waste management varies between 23-52%.<sup>13,15,27-29</sup> The findings are different from the literature. It was observed that the training rates of healthcare workers in primary care were better. This may be due to the in-service training plans of managers.

No difference was found between the MWABS mean according to education status and professions. In the literature, some studies did not find a difference parallel to these results.<sup>14,23,26,28</sup> Unlike these results, there are also studies finding that there is a positive correlation between education status and MW attitudes and that knowledge levels differ according to professions.<sup>8,9,21,23,25</sup> This may be a result of the different education standards of healthcare workers.

There was a difference between the MWABS scores according to the place of work. The mean score of healthcare workers working in migrant health centers was found to be higher than those working in other places. In literature, unlike this result, there are studies that did not find a difference between the knowledge and attitudes towards MW according to the place of work.<sup>23,30</sup> This may be a result of healthcare workers in healthcare centers not being systematically distributed according to their experiences.

There was no difference between the participants' knowledge of the medical waste management process and their MWABS score mean. The findings are similar to the literature.<sup>30</sup> Healthcare workers who know the medical waste management process have better medical waste attitudes and behaviors.

Another important finding of this study is that there is no difference between having a managerial position and knowing the MW management process. 37.5% of healthcare professionals who are managers in primary healthcare centers stated that they do not know the MW management process. No similar finding has been found in the literature. However, the position of manager in primary healthcare centers in Türkiye is not a permanent role and

changes periodically. Therefore, people who were not managers during the study period may have held these positions at other times. This is thought to be the reason why no difference was found.

## Conclusion

As a result, participants who were female, aged 30 years and older, with more experience and in migrant health centers had better attitudes and behaviors towards MW. It was found that 37.5% of the managers in primary healthcare centers did not know the MW management process. In line with the findings, it is recommended to provide training on MW management in orientation programs for novice healthcare professionals. It is also recommended to provide periodic in-service training on MW and to provide training on the MW management process to managers.

## Limitations

Data collected through the self-reporting method may not reflect real attitudes and behaviors due to social desirability bias.

**Financial Support:** This study did not receive any grants from any funding organization/sector.

**Ethical Statement:** This study was approved by Maltepe University Ethics Committee (Decision number:2024/23-18, Date:12.12.2024).

**Conflict of Interest:** The authors declare that there is no conflict of interest.

**Additional Information:** This study was presented as an abstract OP at the 2nd National Primary Healthcare Congress on February 28, 2025 in Istanbul, Türkiye with the title “Attitudes and Behaviors of Healthcare Workers in Primary Healthcare Organizations Towards Medical Waste”.

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