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Assessment of knowledge, attitudes, and practices of medical waste management for healthcare providers in government hospitals in Basra, southern Iraq

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***Abstract*---**Infectious waste, which is substances contaminated with blood or secretions from the patient's body (10-15%) of the total waste produced by health facilities and that requires special treatment to make it safe to dispose of because of its risks to public health. This study aims to assess the knowledge, attitudes and practices of health care providers in Basrah Governorate Hospital towards medical waste. A cross-sectional study was conducted using a questionnaire distributed to health care providers in three selected hospitals by stratiZied method. The results showed the level of knowledge, attitudes and practices of healthcare providers towards medical waste 91.6%, 85.4% and 87.8%, respectively. There is statistical signiZicance between health care providers' knowledge, attitudes and practices towards medical waste, and their educational level and training courses. In addition to the recording of the statistical signiZicance that were between attitudes, practices and years of experience. The levels can be categorized as positive but it is important to focus on increasing and improving the training of health care providers as it is the basis of the medical waste treatment process.

***Keywords*---**Basra, Iraq, knowledge, medical waste, practice.

Introductions

Medical waste includes waste from healthcare institutions, research facilities, and laboratories. In addition to waste generated from “secondary” or “scattered” sources such as those that arise in the context of home health care (dialysis, insulin injections, etc.) (Yves Chartier et al., 2014). The World Health Organization (WHO) estimates the amount of waste generated by health care activities as 85% of general non-hazardous waste and 15% of infectious waste. Infectious waste presents a major challenge due to its ability to transmit disease and cause injury from handling sharps and needles. The establishment of a health care system is a basic requirement of every society. Therefore, the problems arising from medical waste management have received great global attention, and many studies and research have been conducted on these issues (Babanyara, 2013).

Over the past two decades, most countries of the world have enacted legal regulations and legislation regulating the management of medical waste, due to it's high risk and the health and environmental problems it causes. The amount of medical waste produced by hospitals may vary for a number of factors including the type of hospital, the number of beds, occupancy rate and geographic location. All hospitals can reduce the production of medical waste through good separation and treatment (Cheng et al., 2009).

Iraq has issued many laws to protect and preserve the environment from pollution and protect people (Iraqi Ministry of Justice, 2005), In addition to the legislation and instructions issued by the Ministry of Health and Environment (Ministry of Health and Environment, 2015) regarding the management of hazardous waste, And the National Infection Control Manual, which contained instructions for Iraqi health institutions on how to handle and manage medical waste from the moment it was produced until its disposal (Iraqi Ministry of Health, 2009). However, the healthcare waste management in Iraq still needs as much adjustments and efforts as all other developing countries (Muhammad, 2011). Weak infrastructure of health institutions and lack of awareness among health care providers is the cornerstone of medical waste treatment. Health workers' awareness of the danger of medical waste is an important factor for the success of its management (Borowy, 2020).

Materials and Methods

Study Area and study design

Basrah is the third largest governorate in Iraq in terms of population (2.9 million people according to the 2018 census) and the sixth largest governorate in terms of area (19070 km2). Economically, Basrah governorate constitutes the main seaport of the Arabian Gulf. It also contains oil dields and is the main centers of agriculture and livestock. Basrah governorate is located on a mixed terrain (plain, mountain, plateau and desert). The governorate center is the city of Basrah, which includes 7 districts. It includes 19 hospitals, 139 health centers and 246 health facilities.

The type of the study is a descriptive cross-sectional. A study of (n=13) government hospitals spread across the governorate. Stratidied sampling was used to divide hospitals into specialist hospitals (n=2), general hospitals in the governorate center(n=5), and district hospitals (n=6). The HCPs sample size was (335) persons selected from a study population of 2553 HCPs at three hospitals using the Stephen Thomson equation with a margin of error of 5%, a condidence level of 95%, an effect size of 50%, and a non-response additive of 50%.

Methods of measurement

The questionnaire was prepared by the researcher to be used in collecting data and information based on previous studies, the Iraqi National Infection Control Manual and the instructions of the Iraqi Ministry of Health (Iraqi Ministry of Health, 2009; Khalaf and Abdul-Salam, 2009; Akkajit et al., 2020). Cronbach's alpha scale was used to assess the reliability of the questionnaires, and a score of 78.9% was achieved, which is considered good. The questionnaire was divided into four parts as follows:

The Airst part: includes socio-demographic characteristics.
The second part: relates to the knowledge and information of HCPs on medical waste management. This part includes 12 items that are answered with yes, no, or I don't know scoring 3, 2, and 1 respectively.
The third part: adopts the attitudes of HCPs on medical waste management and consists of 12 items that have been answered with agree, neutral, or disagree scoring 3, 2, and 1 respectively.
The fourth part: includes the practice of HCPs on medical waste management and consists of 12 items that are answered always, sometimes, or never scoring 3, 2, and 1 respectively.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 23. A three-point Likert scale (Table 1) was used to assess the response of the questionnaire samples. Chi-square analysis (X^2) was performed to dind differences between questionnaire groups related to socio-demographic characteristics ($P < 0.05$). Spearman's test was used to dind the correlation between participants' knowledge and attitudes in the questionnaire ($P < 0.01$).

Table 1: Three-point Likert scale used to assess samples response and level adjustment

Likert scale	Score interval (mean)	Evaluation criteria
1	1-1.66	Low
2	1.67-2.33	Medium
3	2.34-3	High

Results

Socio-Demographic Characteristics

Out of a total of 500 questionnaires, 335 (67%) of healthcare providers responded to the questionnaires in all of the hospitals studied. (Table 2)represents the social and demographic characteristics of the respondents. The highest number of respondents was 247 (73.7%) females, and the lowest number was 88 (26.3%) males.The highest number of respondents was within the age group 21-29 years old 165 (49.3%), followed by 30-39 years old (92) (27.5%), 40-49 years old (59) (17.6%), >49 years old (10) (3%) and >20 years old (9) (2.7%), respectively. The largest number of respondents were diploma holders 137 (40.9%), followed by Bachelor's holders (125) (37.3%) and preparatory school holders (69) (20.6%), respectively. The lowest number of respondents was postgraduate students (MSc and PhD) 4 (1.2%).

Most of the respondents 156 (46.6%) were nursing, followed by health staff (143) (42.7%) and doctors (36) (10.7%) respectively. The highest number of respondents were married 222 (66.3%), followed by singles (109) (32.5%), and divorced (3) (0.9%), respectively, and the lowest number of respondents were widows (1) (0.3%). The largest number of respondents were those with >5 years of professional experience 182 (54.3%), followed by 5-14 years of professional experience (83) (24.8%), 15-24 years of professional experience (55) (16.4%) and >25 years of professional experience (15) (4.5%) respectively. The number of respondents who were trained in medical waste management was 176 (52.5%), and the number of those who were not trained in medical waste management was 159 (47.5%).

Table 2: Socio-demographic characteristics of the respondents

Character		Frequency (n=335)	%
Gender	Male	88	26.3
	Female	247	73.7
Age	< 20 year old	9	2.7
	21-29 year old	165	49.3
	30-39 year old	92	27.5
	40-49 year old	59	17.6
	> 49 year old	10	3.0
Educational level	Preparatory school	69	20.6
	Diploma	137	40.9
	Bachelor's	125	37.3
	Postgraduate students	4	1.2
Occupation	Doctors	36	10.7
	Health staff	143	42.7
	Nursing	156	46.6
Marital status	Married	222	66.3
	Single	109	32.5
	Divorce	3	0.9

	Widower	1	0.3
Years of experience	< 5	182	54.3
	5-14	83	24.8
	15-24	55	16.4
	> 25	15	4.5
Training courses	Yes	176	52.5
	No	159	47.5

Respondents' Knowledge of Medical Waste Management

Table 3 shows respondents' knowledge of medical waste management. The response to all questions was yes, except for question 6, the response was “don't know”.

Table 3: Respondents' knowledge of medical waste management

No.	Questions	Yes	No	Don't know	Mean	SD*	Response
1	Is the color code used in medical waste sorting bags?	268 (80%)	27 (8.1%)	40 (11.9%)	2.72	0.603	Yes
2	Is general waste placed in black bags?	323 (96.4%)	9 (2.7%)	3 (0.9%)	2.94	0.336	Yes
3	Is infectious waste mixed with general waste?	280 (83.6%)	36 (10.7%)	19 (5.7%)	2.73	0.643	Yes
4	Is it better to give a specific vaccine to medical waste workers?	280 (83.6%)	15 (10.7%)	40 (5.7%)	2.79	0.506	Yes
5	Is expired medicine considered medical waste?	209 (62.4%)	53 (15.8%)	73 (21.8%)	2.47	0.753	Yes
6	Is pharmaceutical waste placed in brown bags?	77 (23%)	74 (22.1%)	184 (54.9%)	2.01	0.672	Don't know
7	Do you know the dangers of medical waste?	266 (79.4%)	42 (12.5%)	27 (8.1%)	2.67	0.688	Yes
8	Is sick waste placed in yellow bags?	162 (48.4%)	47 (14%)	126 (37.6%)	2.34	0.712	Yes
9	Is the maximum packing capacity of containers up to 3/4 of a container?	162 (72.2%)	47 (9%)	126 (18.8%)	2.63	0.642	Yes
10	Is medical waste segregated immediately after their production?	242 (72.2%)	31 (9.3%)	62 (18.5%)	2.63	0.648	Yes
11	Is AIDS transmitted through medical waste?	254 (75.8%)	33 (9.9%)	48 (14.3%)	2.66	0.650	Yes
12	Do you have information about acupuncture-related injury procedures?	272 (81.2%)	35 (10.4%)	28 (8.4%)	2.71	0.646	Yes

*DS= Standard deviation

Respondents' attitude of Medical Waste Management

Table 3 shows respondents' attitude of medical waste management. The response to questions, 1, 2, 4, 6, 7 and 8 were agree, whereas the response to questions, 3, 5, 9, 10, 11 and 12 were neutral.

Table 4: Respondents' attitudes of medical waste management

No.	Questions	Agree	Neutral	Disagree	Mean	SD	Response
1	Is medical waste management important?	320 (95.5%)	8 (2.4%)	7 (2.1%)	2.93	0.322	Agree
2	Is the use of color codes in segregating medical waste important?	292 (87.2%)	29 (8.9%)	14 (4.2%)	2.83	0.475	Agree
3	Does the management of medical waste have a serious impact on the public and the environment?	96 (28.7)	121 (36.1)	118 (35.2)	1.93	0.798	Neutral
4	Is it your duty to segregate medical waste?	244 (72.8%)	35 (10.4%)	56 (16.7%)	2.56	0.763	Agree
5	Do all health workers segregate medical waste?	101 (30.1%)	123 (36.7%)	111 (33.1%)	1.97	0.796	Neutral
6	Should health care providers have special training in medical waste management?	252 (75.2%)	56 (16.7%)	27 (8.1%)	2.67	0.619	Agree
7	Should a specialized and trained team be formed to manage medical waste in hospitals?	284 (84.8%)	34 (10.1%)	17 (5.1%)	2.80	0.514	Agree
8	Should those who do not follow the instructions of medical waste management be held accountable?	255 (76.1%)	40 (11.9%)	40 (11.9%)	2.64	0.686	Agree
9	Does the hospital have good medical waste management procedures?	164 (49%)	102 (30.4%)	69 (20.6%)	2.28	0.785	Neutral
10	Are there injuries from medical waste management in your hospital?	74 (22.1%)	92 (27.5%)	169 (50.4%)	1.72	0.804	Neutral
11	Is there a gap between the procedures followed in Iraq and those followed in developed countries in the management of medical waste?	110 (32.8%)	95 (28.4%)	130 (38.8%)	1.94	0.846	Neutral
12	Is there a need to implement new policies for medical waste management in Iraqi hospitals?	79 (23.6%)	109 (32.5%)	147 (43.9%)	1.80	0.797	Neutral
*DS= Standard deviation							

Respondents' Practices to Medical Waste Management

Table 5 shows respondents' practices of medical waste management. The response to questions, 1, 2, 3, 5, 6, 11 and 12 were always, whereas the response to questions, 4, 7, 8, 9 and 10 were sometimes.

Table 5: Respondents' practices of medical waste management

No.	Questions	Always	Sometime	Never	Mean	SD	Response
1	Do you segregate medical waste?	236 (70.4%)	76 (22.7%)	23 (6.9%)	2.64	0.608	Always
2	Are gloves worn when handling medical waste?	270 (80.6%)	(15.8%)	12 (3.6%)	2.77	0.499	Always
3	Are hands washed after handling medical waste?	287 (85.7%)	42 (12.5%)	6 (1.8%)	2.84	0.414	Always
4	Do you correct the error in separating medical waste if it occurs?	141 (42.1%)	125 (37.3%)	69 (20.6%)	2.21	0.763	Sometime
5	Do you put sharp medical waste in solid containers?	291 (86.9%)	18 (5.4%)	26 (7.8%)	2.79	0.567	Always
6	Are sharps medical waste disposal containers reused?	182 (54.3%)	86 (25.7%)	67 (20%)	2.34	0.792	Always
7	Do you return the needle cap after using it?	130 (38.8%)	93 (27.8%)	112 (33.4%)	2.05	0.850	Sometime
8	Do you get needle stings while dealingwith medical waste?	88 (26.3%)	184 (54.9%)	63 (18.8%)	2.07	0.668	Sometime
9	Do you report injuries resulting from the management of medical waste?	158 (47.2%)	106 (31.6%)	71 (21.2%)	7.86	0.786	Sometime
10	Do you Zill medical waste bags or containers more than their capacity?	154 (46%)	139 (41.5%)	42 (12.5%)	2.33	0.689	Sometime
11	Are medical waste bags closed well before transportation?	191 (57%)	134 (40%)	10 (3%)	2.54	0.556	Always
12	Is a method used to transport medicalwaste from the places where it is generated?	188 (56.1%)	126 (37.6%)	21 (6.3%)	2.50	0.614	Always
*DS= Standard deviation							

Respondents' Knowledge, attitude and practice of Medical Waste Management

(Figure 1) shows the levels of knowledge responses, attitudes and practices of health care providers towards medical waste management in the studied hospitals. (91.6%) of the respondents scored a high level of knowledge of medical waste management and (8.4%) of the respondents had a medium level of knowledge of medical waste management. No low level of knowledge of medical waste management was recorded for the respondents. And n=286(85.4%) of the respondents scored a high level of attitudes to medical waste management, n=46 (13.7%) of the respondents recorded a medium level of attitudes to medical waste management and n=3 (0.9%) of the respondents had a low level of attitudes to medical waste management. And n=294(87.8%) respondents recorded a high level of practices in medical waste management and n=41 (12.2%) respondents scored a medium level of practices in medical waste management. No low level of practices in medical waste managementwas recorded for the respondents.

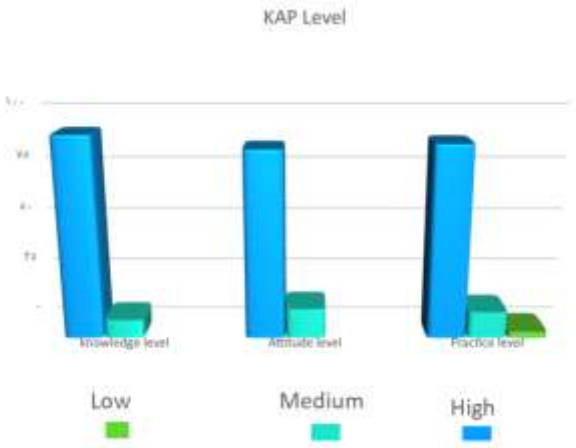

Figure 1: Scores of the responses of healthcare providers on 12 items of knowledge, attitude and practice of medical waste management in the studied hospitals

Relationship between the level of respondents' knowledge, attitudes and practices in medical waste management and their social-demographic characteristics

(Table 6)shows the of results that there were no statistically significant differences between the respondents' level of knowledge in medical waste management and their social-demographic characteristics with regard to workplace (hospital), gender, marital status and years of experience at the significance level of (P< 0.05). The results showed that there were statistically significant differences between the level of knowledge of the respondents in the management of medical waste and their social-demographic characteristics with regard to age, educational level, occupations and training in medical waste management at the significance level of (P < 0.05). The highest level of knowledge in medical waste management was for the age group >49 years, followed by the age groups >20 years, 30-39 years, 40-49 years, 21-29 years, respectively (P= 0.009)**.**

The postgraduate students have the highest level of knowledge in the medical waste management, followed by preparatory school, Bachelor's and diploma degrees, respectively (P= 0.013). Nursing showed the highest level of knowledge in medical waste management, followed by health staff and doctors, respectively (p=0.00). The highest level of knowledge in medical waste management was for healthcare providers who had training in medical waste management compared to those who had no training in medical waste management (p= 0.00).

Table 6: Relationship between the level of the respondents' knowledge in medical waste management and their social-demographic

Variables		Knowledge level		Ch-square	P-value
		Medium	High		
	I	14 (9.5%)	133 (90.5%)		
	II	10 (10.2%)	86 (89.8%)		

Hospitals	III	4 (4.4%)	88 (95.6%)	2.496	0.287
Gender	Male	7 (8%)	81 (92%)	0.025	0.873
	Female	21 (8.5%)	226 (91.5%)		
Age	< 20 year old	0 (0%)	9 (100%)	7"#$%	0.103
	21-29 year old	17 (10.3%)	148 (89.7%)		
	30-39 year old	3 (3.3%)	89 (96.7%)		
	40-49 year old	2 (3.4%)	57 (96.6%)		
	> 49 year old	0 (0%)	10 (100%)		
Educational level	Preparatory school	1 (1.4%)	68 (98.6%)	10.722	0.013*
	Diploma	(13.9%)	118 (86.1%)		
	Bachelor's	8 (6.4%)	117 (93.6%)		
	Postgraduate students	0 (0%)	4 (100%)		
Occupation	Doctors	6 (16.7%)	30 (83.3%)	23.007	0.000*
	Health staff	22 (14.1%)	134 (85.9%)		
	Nursing	0 (0%)	143 (100%)		
Marital status	Married	22 (9.9%)	200 (90.1%)	2.221	0.528
	Single	6 (5.5%)	103 (94.5%)		
	Divorce	0 (0%)	3 (100%)		
	Widower	0 (0%)	1 (100%)		
Years of Experience	< 5	16 (8.8%)	166 (91.2%)	1.675	0.643
	5-14	8 (9.6%)	75 (90.4%)		
	15-24	4 (7.3%)	51 (92.7%)		
	> 25	0 (0%)	15 (100%)		
Training course	Yes	1 (0.6%)	175 (99.4%)	29.379	0.000*
	No	27 (17%)	132 (83%)		

*P value is significant at level < 0.05

Table 7: Relationship between the level of the respondents' attitudes to medical waste management and their social-demographic

Variables		Attitudes level			Ch-square	P-value
		Low	Medium	High		
Hospitals	I	3 (2%)	26 (17.7%)	118 (80.3%)	8.067	0.089
	II	0 (0%)	12 (12.2%)	86 (87.8%)		
	III	0 (0%)	8 (8.9%)	82 (9.1%)		
Gender	Male	0 (0%)	8 (9.1%)	80 (9.0%)	3.369	0.186
	Female	3 (1.2%)	38 (15.4%)	206 (83.4%)		
Age	< 20 year old	0 (0%)	3 (33.3%)	6 (66.7%)	14.017	0.081
	21-29 year old	3 (1.8%)	29 (17.6%)	133 (80.6%)		
	30-39 year old	0 (0%)	6 (6.5%)	86 (9.3%)		
	40-49 year old	0 (0%)	8 (13.6%)	51 (86.4%)		
	> 49 year old	0 (0%)	0 (0%)	10 (100%)		
Educational level	Preparatory school	3 (4.3%)	8 (11.6%)	58 (84.1%)	14.510	0.24*
	Diploma	0 (0%)	16 (11.7%)	121 (88.3%)		
	Bachelor's	0 (0%)	22 (17.6%)	103 (82.4%)		
	Postgraduate					

	students	0 (0%)	0 (0%)	4 (100%)		
Occupation	Doctors	0 (0%)	7 (19.4%)	29 (80.6%)	5.363	2.52
	Health staff	0 (0%)	22 (14.1%)	134 (85.9%)		
	Nursing	3 (2.1%)	17 (11.9%)	123 (86%)		
Marital Status	Married	0 (0%)	22 (9.9%)	19 (8.8%)	10.981	0.89
	Single	0 (0%)	24 (22%)	85 (78%)		
	Divorce	0 (0%)	0 (0%)	3 (100%)		
	Widower	3 (1.6%)	0 (0%)	1 (100%)		
Years of Experience	< 5	0 (0%)	37 (20.3%)	142 (78%)	18.254	0.06*
	5-14	0 (0%)	6 (7.2%)	77 (9.2%)		
	15-24	0 (0%)	3 (5.5%)	52 (9.4%)		
	> 25	0 (0%)	0 (0%)	15 (100%)		
Training course	Yes	0 (0%)	11 (6.3%)	16 (9.3%)	21.484	0.00*
	No	3 (1.9%)	35 (22%)	12 (7.6%)		

*P value is significant at level < 0.05

(Table 7) shows the relationship between the level of the respondents' attitudes to medical waste management and their social-demographic characteristics. The results showed that there were no statistically significant differences between the level of the respondents' attitudes to medical waste management and their socio-demographic characteristics with regard to the workplace (hospital), hospitals, gender, age, occupation and marital status at the significance level of (P< 0.05). The results showed that there were statistically significant differences between the level of respondents' attitudes to medical waste management and their socio-demographic characteristics with regard to educational level, years of experience and training in medical waste management at the significance level of (P< 0.05).

The postgraduate students have the highest level of attitudes to the medical waste management, followed by diploma degrees, preparatory school and Bachelor's degrees, respectively (P= 0.024). The highest level of attitudes to the medical waste management was for respondents with >25 years of experience, followed by those with 15-24 years, 5-14 years, and <5 years of experience, respectively (P = 0.006). The highest level of attitudes to medical waste management was for healthcare providers who had training in medical waste management compared to those who had no training in medical waste management (p= 0.00).

(Table 8) shows the relationship between the level of the respondents' practices to medical waste management and their social-demographic characteristics. The results showed that there were no statistically significant differences between the level of the respondents' practices to medical waste management and their socio-demographic characteristics with regard to the workplace (hospital), age, occupation and marital status at the significance level of (P< 0.05). The results showed that there were statistically significant differences between the level of respondents' practices to medical waste management and their socio-demographic characteristics with regard to gender, educational level, years of experience and training in medical waste management at the significance level of (P< 0.05).

The postgraduate students have the highest level of practices to medical waste management, followed by preparatory school, diploma and Bachelor's degrees, respectively (P= 0.001). The highest level of practices to the medical waste management was for respondents with >25 years of experience, followed by those with 15-24 years, 5-14 years, and <5 years of experience, respectively (P = 0.046). The highest level of practices to medical waste management was for healthcare providers who had training in medical waste management compared to those who had no training in medical waste management (p= 0.00).

Table 8: Relationship between the level of the respondents' practices to medical waste management and their social-demographic

Variables		Practices level		Ch-square	P-value
		Medium	High		
Hospitals	I	18 (12.2%)	12 (87.8%)	1.799	4.07
	II	15 (15.3%)	83 (84.7%)		
	III	8 (8.9%)	82 (91.1%)		
Gender	Male	2 (2.3%)	86 (97.7%)	11.037	0.01*
	Female	39 (15.8%)	20 (84.2%)		
Age	< 20 year old	0 (0%)	9 (100%)	8.520	0.74
	21-29 year old	24 (14.5%)	14 (85.5%)		
	30-39 year old	6 (6.5%)	86 (93.5%)		
	40-49 year old	11 (18.4%)	48 (81.4%)		
	> 49 year old	0 (0%)	10 (100%)		
Educational level	Preparatory school	3 (4.3%)	66 (95.7%)	17.017	0.01*
	Diploma	11 (8%)	12 (92%)		
	Bachelor's	27 (21.6%)	98 (78.4%)		
	Postgraduate students	0 (0%)	4 (100%)		
Occupation	Doctors	7 (19.4%)	29 (87.8%)	5.403	0.67
	Health staff	23 (14.7%)	13 (85.3%)		
	Nursing	11 (7.7%)	13 (92.3%)		
Marital Status	Married	28 (12.6%)	19 (87.4%)	0.597	8.97
	Single	13 (11.9%)	96 (88.1%)		
	Divorce	0 (0%)	3 (100%)		
	Widower	0 (0%)	1 (100%)		
Years of Experience	< 5	30 (16.5%)	15 (83.5%)	8.024	0.046*
	5-14	8 (9.6%)	75 (90.4%)		
	15-24	3 (5.5%)	52 (94.5%)		
	> 25	0 (0%)	15 (100%)		
Training course	Yes	9 (5.1%)	16 (94.9%)	17.527	0.000*
	No	32 (20.1%)	12 (79.9%)		

*P value is significant at level < 0.05

(Table 9) shows spearman correlation between the respondents' knowledge, attitudes and practices to medical waste management. The correlation between respondents' knowledge and attitudes to medical waste management was 0.027, with a statistical significance of (p= 0.627) at level of (p< 0.01). The correlation

between respondents' knowledge and practices to medical waste management was 0.209, with a statistical significance of (p= 0.000) at level of (p< 0.01). While the correlation between respondents' attitudes and practices to medical waste management was 0.278, with a statistical significance of (p= 0.000) at level of (p< 0.01).

Table 9: spearman correlation between the respondents' knowledge, attitudes and practices to medical waste management

Correlation	Respondents' knowledge level	Respondents' attitudes level	Respondents' practices level
Respondents' knowledge level	1.000	0.27 (p=6.27)	2.09 (p= 0.00)
Respondents' attitudes level	0.27 (p= 6.27)	1.000	2.78 (p= 0.00)
Respondents' practices level	2.09 (p= 0.00)	2.78 (p= 0.00)	1.000
*P value is significant at level < 0.01			

Discussion

Socio-Demographic Characteristics

The results showed that most of the study participants (73.7%) were female, because the number of female health care workers is much greater compared to males. The hospital administration also confirmed that most of the new appointments currently constitute a large proportion of female, and this may put hospitals in front of a problem in the future due to both sexes have a necessary presence in hospitals . (Mohammed et al., 2017) found that the ratio of females to males in hospitals in Sulaymaniyah Governorate, Iraq is (1:1.8). The current study found that (47.5%) of the respondents did not receive training. As hospital officials said, there are no training courses for new employees, and the lack of periodic training courses for dealing with medical waste according to specific timetables, and this is done as needed.

The questionnaire was distributed equally to all groups, but the most responsive group (49.3%) were the ages between (21-29) ,These results are consistent with (Das and Biswas, 2016) who found that the age group of 21-30 years constitutes the majority of the HCPs population, and the mean age of all health care workers is 31.80 years . This was also the case for occupation of respondents, where the percentage of doctors participating in the study was few, because their number is less compared to the rest of other occupations in health institutions, so we faced difficulty in reaching large numbers of them.

Respondents' knowledge towards MWM

According to (Vaught, 2018) one of the basic things for dealing with medical waste is the knowledge of health workers. The results of the study showed, by evaluating the knowledge related to the segregation of medical waste by HCPs,

that a large percentage of the participants have a high understanding of dealing with medical waste in terms of using color code (80%) segregating general wastes (96.4%), and infectious waste (83.6%) , and this is agree with (Abdullah and Al Mukhtar, 2013) where they found In a study conducted at Mosul Hospital, Iraq, 79.2% of the participants used the color code well. But knowledge of pharmaceutical waste was poor with only (23%) knowing how to segregate. It was found through died visits to hospital pharmacies that they do not use brown bags according to the instructions of the Iraqi Ministry of Health, but rather use yellow or black bags, and when talking to them, the answer was that the hospital does not provide these bags which is the same also for pathological waste, as only (48.4%) their answers were correct. This might be due to the fact that not all departments in the hospital deal with this type of waste, as well as a lack of medical waste training courses, which focus on segregation general waste from infectious waste rather than the rest of medical waste. The knowledge of HCPs was also good about the risks of medical waste in terms of needle puncture procedures, diseases that can be transmitted through them, safety procedures and vaccines that are administered. In general, the knowledge of health providers in these hospitals is considered good, as it was (91.6%) the level of knowledge about all questions.

Respondents' attitudes towards MWM

One of the most important skills in dealing with medical waste that affects the quality of the process is the self-awareness of health care providers (A & Eshwar, 2015). Respondents in the study had an overall attitude level (85.4%) classidied as high. This is in agreement with (Rudraswamy et al., 2012) in a study conducted in Bangalore India, HCPs had a positive attitude towards dealing with MW. Despite the positive attitude of the respondents, there are some points that need clarification, as (95.5%) answered the importance of dealing with medical waste and (87.2%) using the color code. At the same time, we see that (30.1 %) said that health care providers in their hospitals are committed to segregation medical waste. Through in-depth interviews, health care providers asked a question, since the hospital does not handle and dial disposal of medical waste appropriately, so what is the point of them carrying out the waste segregation process?

The dissatisfaction was clear as (49%) of those who believe that procedures in hospitals are good in dealing with medical waste, and (32.8%) do not see a gap between the procedures followed in Iraq and developed countries, and (23.6%) see that The current laws and procedures for dealing with medical waste are good and do not need to be amended. The failure of health care providers to feel the feasibility of their work in dealing with medical waste is a problem for the concerned authorities to dined a solution because monitoring and imposing sanctions will not solve the problem, but needs to improve medical waste treatment processes in a practical and tangible way and not only on paper. However, (Sylvain et al., 2020) explained the negative attitude of health care providers is due to the work environment, as the working conditions in developing countries are not as favorable as in developed countries.

Respondents' Practice towards MWM

Practice scores (87.8%) are considered good and correspond to level of knowledge and attitude. It is similar to the results of (Akkajit, 2020b) and do not agree with (Sylvan et al., 2020) who stated that health workers have a poor level of practice. Whether this practice is due to a sense of responsibility or due to supervision of infection control or public health teams, following good practices is good for a safe working system. As it is known, health care providers are at a high risk of infection with medical waste as a result of the nature of their work, so when the answer is (80.6%) that they wear gloves while handling medical waste, and (85.7%) wash their hands, these practices, despite their simplicity, are an important factor in preventing infection in hospitals and protecting health workers and patients.

However, the results showed some bad practices, as only (42.1%) of the respondents do not correct the wrong segregation of medical waste if it occurs. (38.8%) do not re-cap the needle after using it. These practices are considered extremely dangerous for HCPs, where (54.9%) of the respondents reported that they sometimes suffer from injuries caused by needles. Through in-depth interviews, health workers were aware of the danger of medical waste and the diseases it can cause, especially sharps, but after all, some health care providers were not aware that these practices should not be carried out, and they are doing them to avoid accountability due to the wrong segregation of waste from the teams supervising this process. Therefore, the responsible authorities in hospitals must educate HCPs about the seriousness of this act and the importance of developing informational materials for staff and patients in poster form. Be persistent to remind HCPs especially in sharp waste management.

Influence of socioeconomic and occupational characteristics on the level of knowledge, Attitude and practice (KAP) of the HCP

There is no statistical significance for hospital type or location, age, or marital status on PHCs knowledge, attitude, and practices (KAP). This is due to the fact that all hospitals follow the same protocols and instructions, and many HCPs also stated that they obtained training outside of the hospital by the Basra Public Health Department or the Basra Health Department, therefore there are no obvious variations among hospitals.

Postgraduates have achieved an excellent level of KAP as a result of their extensive knowledge. Understanding components of medical waste management requires a high level of education. This is followed by a preparatory education for nursing students, with the dindings revealing that nurses had the highest KAP level of all occupation groups when compared to the occupational level where the lowest percentage are obtained by the doctors (83.3%). (Mathur et al., 2011) found in the study conducted in Allahabad city to assess the knowledge of healthcare providers, where it was found that the level of knowledge of nurses and laboratories is better compared to doctors in terms of dealing with medical waste. As it was noticed through the distribution of the questionnaire that some of them tended to believe that segregating medical waste is the duties of nurses, and this is undoubtedly a misconception. Everyone working in the healthcare

dield is responsible for handling medical waste. According to our interview with the responsible authorities in hospitals, it was found that most training courses for dealing with medical waste are conducted for health and nursing staff only, without medical staff, and this may be the reason for their belief in this.

The findings revealed a relationship between the participants' level of attitude and practice and their years of experience. These findings are consistent with those obtained by (Woromogo et al., 2020) in a study conducted in Dakar, Senegal, where the findings are explained by the fact that professional experience allows HCPs to experience and confront different situations. On the other hand, there was no relationship between respondents level of knowledge and their years of experience. This suggests that workers should take refresher training to increase their understanding of MWM. It also found that the KAP and HCPs training courses have a statistically signidicant relationship. In the results of a study conducted in Brazzaville, Congo (Mouankie et al., 2015), it was found that a lack of training leads to a negative attitude among responders. Good HCPs training leads to good KAP, as demonstrated by (Chudasama et al., 2013), who found that good training at regular intervals leads to improved HCPs knowledge and practices.

Correlations among KAP and MW management

In general, the correlation data revealed that there is no association between the level of knowledge and the attitude of the HCPs. This can be explained by the fact that there were questions related to medical waste management in hospital procedures and regulations regarding attitude items, and the most respondents showed a negative attitude towards these items. As it is known, the more one knows about a subject, the more desires he has, and he will not be satisfied with a few measures. The HCPs with good knowledge and attitude demonstrated favorable waste management practices. This finding is consistent with the "planned behavior" idea, which holds that adopting a good practice is dependent on the individual's self-efdicacy, which is reinforced by knowledge (Paul et al., 2017).

Conclusion

Healthcare providers have a high level of knowledge, attitude, and practices about medical waste. Despite this, there is dissatisfaction with medical waste policies and hospital waste management. There is no statistical significance in HCP knowledge, attitudes, and practices with respect to hospital type or location, age, and marital status. In addition, there is no statistical significance between gender in terms of knowledge and attitude, while males showed superiority compared to females in terms of practice.

While there was statistical significance between educational level and occupation, with nursing occupations having the largest percentage among the other groups, there was no significance between the participants' knowledge and years of experience, and it showed between the HCPs' attitude and practices. It is critical to design a continuous training program for healthcare personnel in all departments on MW management. According to the findings of this study, there is

no association between medical waste knowledge and attitudes toward hospital medical waste management. On the other hand, there was a significant influence of HCPs' knowledge and attitudes at the practice level.

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