

How to Cite:

Saadoon, N. B., Ali, L. H., & Kadum, S. A. (2022). Attitudes and practices of healthcare workers regarding of medical waste management in hospitals of Al-Najaf Governorate. *International Journal of Health Sciences*, 6(S8), 3458–3472.
<https://doi.org/10.53730/ijhs.v6nS8.12859>

Attitudes and practices of healthcare workers regarding of medical waste management in hospitals of Al-Najaf Governorate

Naseem B. Saadoon

Bch. Tech. Middle Technical University, College of Health & Medical Technology, Baghdad, Iraq

Luma H. Ali

Ph.D. Middle Technical University, College of Health & Medical Technology, Baghdad, Iraq

Suha A. Kadum

M.Tech. Middle Technical University, College of Health & Medical Technology, Baghdad, Iraq

Abstract---Background: Iraq suffers from many pollutants in its environment. One of these pollutants is medical waste (MW) from hospitals, which is considered the second most dangerous waste after radioactive waste and needs to be properly managed by trained healthcare workers. Aims: This study aimed to assess the attitudes and practices of healthcare workers on medical waste management (MWM) and determine the relationship between socio-demographic characteristics of healthcare worker with their attitudes and practices. Instruments and methods: A descriptive; cross sectional study conducted at the government hospitals of Al-Najaf governorate, Iraq. The study include 443 participants (93 medical staff, 310 paramedical staff, and 40 housekeeping staff) collected through period from 2nd January until 31th March 2022 using a structured questionnaire depends on the National Guide to Infection Control in the Iraqi Health Institution and the previous studies. Findings: The study was conducted on 443 participants with the mean $\pm$ SD of their ages was 29.18 $\pm$ 7.68 years. The age group 20-29 years had the highest percentage (69.1%), female were represented (58.9%) of the studied sample compared to (41.1%) male. The highest percentage of the studied sample had Baccalaureate certification (44%) and period of experience (1-5) years (62.98%). The majority of the studied sample were paramedical staff (70%). Regarding training on MWM, majority of them (69.1%) did not undergo any training program. In general, the overall assessment attitudes about MWM, (51.9%) had good attitudes,

(46.7%) had fair attitudes and (1.4%) had poor attitudes. While about practices (38.6%) had poor practices, (38.6%) fair, (25.1) good. Conclusion: The current study concluded that about half of healthcare workers 51.9% had good attitude about MWM and only 25.1% had good practices. The good practices and attitude about paramedical staff were higher than medical and housekeeping staff.

Keywords---attitudes, practices, healthcare workers, medical waste management, hospitals.

Introduction

Hospitals are health facilities that supply health treatment, protect people's health, and save their lives. Simultaneously, they produce waste and by-products. The management of these waste is a complicated process and in order for this process to be influential, it should be understood and directed by all healthcare workers starting from the cleaners to the senior administrators (Hasan *et al.*, 2021). Hospitals generate several kinds of liquid, solid and gaseous waste in large quantities (Abd-ULSalam Awad and Bajari, 2018). Globally, each country has a generation rate of medical waste ranging from 0.5 to 3.0 Kg/bed/day (Al Naemi *et al.*, 2021) and approximately 85% of these waste is non-hazardous or general waste while the rest (15%) is hazardous wastes (Parida *et al.*, 2019). Medical Waste Management (MWM) is one of components that reflect the ability of hospital to provide a good standard of health care. Hospitals, especially in developing countries, usually face difficulties in monitoring (MWM) (Maamari *et al.*, 2019), including Iraq where the process of management is not safe and medical waste is not classified into hazardous or non-hazardous waste, which makes the actual volume of hazardous waste higher, thus poses a threat to the environment and public health (Abdulsamad, 2021). (MWM) is refers to the ways of separating, transporting, storing, treatment, and disposal of hazardous and non-hazardous waste that are generated as a result to the process of providing health care (Sarkees, 2018). The responsibility of MWM is shared between various sectors starting from health institutions down to municipality services and the major role of the environment ministry that participates in monitoring different phases of waste disposal (Al-nakkash *et al.*, 2019).

Since 2020 so far, the already unsustainable increase in the generation of medical waste was suddenly exacerbated by the COVID-19-pandemic (Singh *et al.*, 2021) and rapid utilization of masks, protective clothing, and large amounts of other medical supplies has generated large amounts of hazardous medical waste which can cause several environmental hazards, mainly pollution of the atmosphere, waters, and soil (Ye *et al.*, 2022). Healthcare workers have an great role in management of medical waste and one of the major key factors for proper (MWM) is the knowledge, attitudes, and practices (KAP) of the healthcare workers in hospitals regarding (MWM), over and above, research on this important issue has been very limited, and there is a grave need for information for planning in the future and providing data are needed to obtain a reliable picture of this situation (Soyam *et al.*, 2017).

Materials and Methods

Study design and data collection

A descriptive; cross sectional study continued for the period from 2nd January to 31th March 2022 and conducted at government hospitals of Al-Najaf governorate (Al-Sadder Medical City, Al-Zahraa Teaching Hospital, Al-Hakeem General Hospital, Al-Furat Al-Awsatt Teaching Hospital, Al-Manathera General Hospital, Imam Sajjad General Hospital, Al-Haydaria General Hospital, Al-Mushkhab General Hospital and Al-Qadisiyah General Hospital). Al-Najaf located to the southwest of Baghdad, capital of Iraq, by about 160km. It surrounding by Babylon, Karbala, Al-Anbar, Al-Qadisiyah and Al-Muthanna governorates and has international borders with Saudi Arabia (Kh Alrikabi and Almosherefawi, 2021). Figure (1) explains the location of Al-Najaf in Iraq.

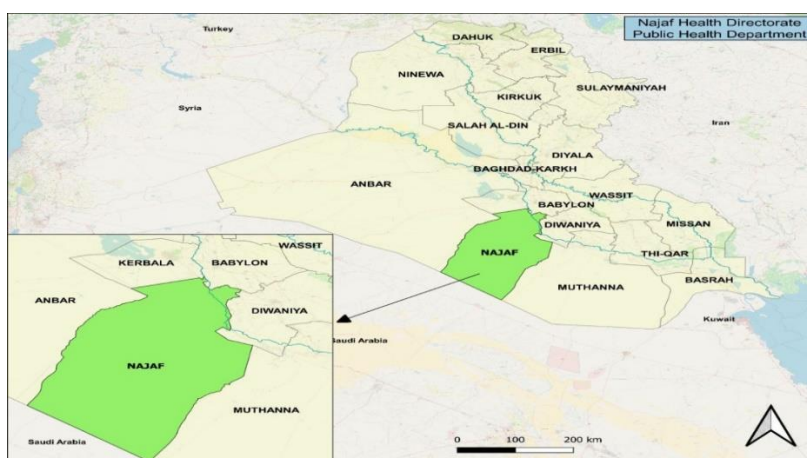


Figure (1): Al-Najaf governorate location

The study population consist of all healthcare workers who works in hospitals of Al-Najaf governorate which were 9447 person according to Al-Najaf Health Directorate/ Statistics Department. The sample size was 443 participants estimated using Steven K. Thompson sample size calculator shown done, and addition 20% for the loss or refusal to participate by some respondents:

$$n = \frac{N \times P(1-P)}{\left[(N-1) \left(\frac{d^2}{z^2} \right) + P(1-P) \right]}$$

Where: n= sample size

N= Population size

z = Confidence level at 95% (1.96)

d= Error proportion (0.05)

P= Probability (0.5)

Sampling Technique

The sampling technique was conducted in two stages, at first stage, a proportional random sampling technique (Stratified random sampling technique)

was done to select a number of participants from each of the 9 hospitals based on the number of health care workers in each hospital. This was based on the numbers of health care workers obtained from Al-Najaf Health Directorate where healthcare workers were grouped into 9 strata.

$$\frac{\text{Sample size}}{\text{population size}} \times \text{statum size}$$

At second stage (on level each hospital), a Stratified random sampling was again employed to select the participants to ensure adequate representation from all categories of healthcare workers. The healthcare workers were grouped into three strata (medical staff, paramedical staff and housekeeping staff), then participants was selected randomly by simple random sampling from each strata.

The study instrument

The researchers develop a structured questionnaire depends on the National Guide to Infection Control in the Iraqi Health Institution and the previous studies (Jalal *et al.*, 2021). The questionnaire was consist from 3 parts, the first part about demographic data. The second part about the attitudes and the third part about the practices.

Scoring of attitudes and practices

Using 3 points Likert's scale. About attitudes score, this forma of 14 questions each question had three responses (agree, disagree, neutral). The score were 3 point for accurate answer, 2 point for neutral answer and 1 point for incorrect answer. Then evaluation of attitudes categorized into: poor <28, fair 28-34, good =>35. The same for practices score, this forma of 16 questions each question had three responses (always, some of time and never). The score were 3 point for accurate answer, 2 point for some of time answer and 1 point for incorrect answer. Then evaluation of Knowledge categorized into: poor <32, fair 32-39, good =>40.

Demographic characteristics

A 443 participants with the mean $\pm$ SD of their ages was 29.18 $\pm$ 7.68 years ranging from 20 to 59 years. The age group 20-29 years had the highest percentage (69.1%), female were represented (58.9%) compared to (41.1%) male. The highest percentage had Baccalaureate certification (44%) and period of experience (1-5) years (62.98%). Majority of them were paramedical staff (70%) while medical staff (21%) and housekeeping staff (9%). About workplace, the highest percentage was (27.8%) working at wards. Regarding training on MWM, (69.1%) of them did not undergo any training program. Table (1).

Table (1): Demographic characteristics of study sample

Demographic characteristics		No.	%
Age (years)	20-29	306	69.1
	30-39	79	17.8
	40-49	48	10.8
	≥50	10	2.3
	mean ± SD	29.18 ±7.68	
Gender	Male	182	41.1
	Female	261	58.9
Years of experience	1-5	279	62.98
	6-10	91	20.54
	11-15	22	4.97
	16-20	24	5.42
	>20	27	6.09
Educational level	Secondary or less	94	21.2
	Diploma	140	31.6
	Baccalaureate	195	44.0
	Master	11	2.5
	PHD	3	0.7
Profession	Medical staff	93	21
	Paramedical staff	310	70
	housekeeping staff	40	9
Hospital name	Al-Sadder Medical City	114	25.7
	Al-Zahraa Teaching Hospital	62	14
	Al-Hakeem General Hospital	72	16.3
	Al-Furat Al-Awsatt Teaching Hospital	57	12.9
	Al-Manathera General Hospital	52	11.7
	Imam Sajjad General Hospital	40	9
	Al-Haydaria General Hospital	22	5
	Al-Mushkab General Hospital	15	3.4
Work place	Al-Qadisiyah General Hospital	9	2
	Wards	123	27.8
	Laboratory	104	23.5
	Pharmacy	57	12.9
	Emergency	55	12.4
	Public health unit	21	4.7
	Consulting clinic	13	2.9
	Resuscitation unit	12	2.7
	Infection control unit	9	2
Training	*Other	49	11.1
	Trained	137	30.9
	Non trained	306	69.1

* Other: blood drawing unit, Intensive care unit I.C.U, vaccine unit, dialysis unit, blood bank, surgery room, operation room, isolation room and delivery room.

Attitudes of healthcare worker about MWM

According to table (2), the overall assessment of participants attitudes about MWM, (51.9%) had good attitudes, (46.7%) had fair attitudes and (1.4%) had poor attitudes. The percentage of good attitudes among paramedical staff were 56.13% compared to 48.4% of medical staff and 27.5% of housekeeping staff.

Table (2): Responses of participants according to their attitudes regarding (MWM)

Items	Agree		Neutral		Disagree		Evolution
	No.	%	No.	%	No.	%	
Separation of waste at source of generation increases the risk of injury to waste handlers.	252	56.9	81	18.3	110	24.8	Fair
Safe medical waste disposal should be priority.	427	96.4	13	2.9	3	0.7	Good
MWM is a team work not a hospital responsibility.	347	78.3	39	8.8	57	12.9	Good
You are responsible for MWM in your workplace.	351	79.2	49	11.1	43	7.9	Good
Containment of sharps doesn't help in safe MWM.	157	35.4	100	22.6	186	42.0	Fair
Reporting of needle-stick injury is a burden on work.	164	37.0	207	46.7	72	16.3	Fair
Safe disposal of MW is necessary in hospital.	425	95.9	7	1.6	11	2.5	Good
MWM is creates extra burden on your work.	169	38.1	80	18.1	194	43.8	Fair
Safe disposal of MW important to prevent infection transmission.	420	94.8	15	3.4	8	1.8	Good
Separate MW into different categories is time consuming.	161	36.3	130	29.3	152	34.3	Fair
Post exposure prophylaxis should be initiated immediately	401	90.5	29	6.5	13	2.9	Good
Safe MW disposal are financial burden to the hospital.	123	27.8	111	25.1	209	47.2	Fair
PPE decreases the risk of contracting infection at the hospital.	419	94.6	14	3.2	10	2.3	Good
Training about MWM is necessary	353	79.7	52	11.7	38	8.6	Good

Practices of healthcare worker about MWM

The overall assessment of participant's practices about MWM, 38.6% which is the highest percentage of the studied sample had poor practice, 36.3% of them had fair practice and the lowest percentage 25.1% had good practices. In general, our results also showed that 30.3% of paramedical staff have good practices compared to 12.9% of medical staff and 12.5% of housekeeping staff by a slight difference.

Responses of participants according to their practices regarding (MWM) are demonstrated in the table (3), in which 63.9% of them follow the guidelines laid down by the Iraqi ministry of health and environment for medical waste management and 69.5% of them (separate hazardous medical waste from general waste at the place of generation. Approximately more than half of the studied sample 54.6% separate hazardous medical waste into different categories, while only 36.6% of them follow the color of containers according to the type of waste while disposing of medical waste.

Relating the use of personal protective equipment PPE, 72.9% of the study sample used PPE when handling medical waste. The majority of participants 82.4% said they collect liquid waste, blood waste and human tissue remains in bags that prevent leakage and 86.5% of them put sharp medical waste into a safety box. Only 28.9% of them said they don't recap the needle after use and 42.3% don't Experience injury by the used needle/sharps during their work, while 66.4%

informed the person in charge when injured by needle/sharps and only 8.6% of them filled accident form.

About 37.7% of participants don't dispose of liquid waste into the sewage system directly, none of them 0% maintain a register for medical waste disposal in their ward, while the majority of them 88.5% wash their hands thoroughly after contact with medical waste and 56.0% of them take the necessary vaccinations for health care worker and post-exposure prophylaxis and 40.4% educate themselves on medical waste management continuously.

Table (3): Responses of participants according to their practices regarding (MWM)

Items	Always		Some time		Never		Evolution
	No.	%	No.	%	No.	%	
Follow the guidelines laid down by Iraqi ministry of health and environment for MWM	238	63.9	104	21.2	23.5	12.6	Good
Separate hazardous MW from general (non-hazardous) waste at the place of generation.	308	69.5	83	18.7	52	11.7	Good
Separate hazardous MW into different categories	242	54.6	110	24.8	91	20.5	Good
Follow color of containers according to the type of wastes while for disposing MW.	162	36.6	131	29.6	150	33.9	Fair
Use personal protection tools when handling MW.	323	72.9	78	17.6	42	9.5	Good
Collect liquid waste, blood waste and human tissue remains in bags that prevent leakage.	365	82.4	48	10.8	30	6.8	Good
Put sharp MW into a safety boxes	383	86.5	35	7.9	25	5.6	Good
Recap needle after use.	274	61.9	41	9.3	128	28.9	Fair
Experienced injury by used needle/sharps during your work.	97	21.9	157	35.4	189	42.3	Fair
When injured by needle/sharps, informed person in charge.	294	66.4	71	16.0	78	17.6	Good
When injured by needle/sharps, filled accident form.	38	8.6	9	2.0	396	89.4	Poor
Dispose of liquid waste into the sewage system directly.	202	45.6	74	16.7	167	37.7	Fair
Maintain a register for medical waste disposal in your ward.	0.0	0.0	0.0	0.0	443	100	Poor
Wash your hands thoroughly after contact with MW	392	88.5	25	5.6	26	5.9	Fair
Take the necessary vaccinations for health care worker, such as seasonal influenza, HBV and post exposure prophylaxis.	248	56.0	95	21.4	100	22.6	Fair
Educate yourself on MWM continuously	179	40.4	70	15.8	194	43.8	Fair

Association between participant's attitudes and their demographic data

Statistically, the current study showed a significant associated between attitudes and educational level (0.013), also highly significant associated with Profession (0.003) as shown in table (5).

Table (5): Association between participant's attitudes and demographic data

Demographic characteristics		Poor		Fair		Good		Total	P. Value
		No.	%	No.	%	No.	%		
Age (years)	20-29	6	1.96	141	46.08	159	51.96	306	0.996
	30-39	-	-	39	49.37	40	50.63	79	
	40-49	-	-	22	45.83	26	54.17	48	
	≥50	-	-	5	50	5	50	10	

Total		6		207		230		443	
Gender	Male	1	0.5 5	84	46.1 5	97	53.3	182	0.447
	Female	5	1.9 1	123	47.1 3	133	50.9 6	261	
Total		6		207		230		443	
Years of experience	1-5	6	2.1 5	125	44.8	148	53.0 5	279	1.000
	6-10	-	-	51	56.0 4	40	43.9 6	91	
	11-15	-	-	7	31.8 2	15	68.1 8	22	
	16-20	-	-	12	50	12	50	24	
	>20	-	-	12	44.4 4	15	55.5 6	27	
Total		6		207		230		443	
Educational level	Secondary or less	-	-	61	64.8 9	33	35.1 1	94	0.013*
	Diploma	2	1.4 3	64	45.7 1	74	52.8 6	140	
	Baccalaureate	4	2.0 5	78	40	113	57.9 5	195	
	Master	-	-	3	27.2 7	8	72.7 3	11	
	PHD	-	-	1	33.3 3	2	66.6 7	3	
Total		6		207		230		443	
Profession	Medical staff	3	3.2 2	45	48.3 9	45	48.3 9	93	0.003* *
	Paramedical staff	3	0.9 7	133	42.9	174	56.1 3	310	
	Housekeeping staff	-	-	29	72.5	11	27.5	40	
Total		6		207		230		443	
Work place	Ward	2	1.6 3	67	54.4 7	54	43.9	123	0.134
	Lap	2	1.9 2	35	33.6 5	67	64.4 2	104	
	Pharmacy	2	3.5 1	33	57.8 9	22	38.6	57	
	Emergency	-	-	27	49.0 9	28	50.9 1	55	
	Public health unit	-	-	9	42.8 6	12	57.1 4	21	
	Counseling	-	-	6	46.1 5	7	53.8 5	13	
	Resuscitation unit	-	-	8	66.6 7	4	33.3 3	12	
	Infection control unit	-	-	1	11.1 1	8	88.8 9	9	

	Other	-	-	21	42.8 6	28	57.1 4	49	
Total		6		207		230		443	
Training	Trained	1	0.7 3	59	43.0 7	77	56.2	137	0.398
	Non trained	5	1.6 3	148	48.3 7	153	50	306	
Total		6		207		230		443	
*Significant difference between proportions using Pearson Chi-square test at 0.05 level. **Highly Significant at P<0.01									

Association between participant's practices and their demographic data

Statistically, the current study showed the association between practices of participants with (gender and years of experience) (0.029 and 0.026) respectively, and highly significant associated with (Profession, workplace and training) (0.001) as shown in table (4).

Table (4): Association between participant's practices and their demographic data

Demographic characteristics		Poor		Fair		Good		Total	P. Value
		No.	%	No.	%	No.	%		
Age (years)	20-29	129	42.1 6	111	36.2 7	66	21.5 7	306	0.682
	30-39	27	34.1 8	32	40.5 1	20	25.3 2	79	
	40-49	13	27.0 3	15	31.2 5	20	41.6 7	48	
	≥50	2	20	3	30	5	50	10	
Total		171		161		111		443	
Gender	Male	68	37.3 6	57	31.3 2	57	31.3 2	182	0.029*
	Female	103	39.4 6	104	39.8 5	54	20.6 9	261	
Total		171		161		111		443	
Years of experience	1-5	121	43.3 7	102	36.5 6	56	20.0 7	279	0.026*
	6-10	34	37.3 6	37	40.6 6	20	21.9 8	91	
	11-15	4	18.1 8	5	22.7 3	13	59.0 9	22	
	16-20	6	25	7	29.1 7	11	45.8 3	24	
	>20	6	22.2 2	10	37.0 4	11	40.7 4	27	
Total		171		161		111		443	
Education level	Secondary or less	43	45.7 4	33	35.1 1	18	19.1 5	94	0.092
	Diploma	46	32.8	56	40	38	27.1	140	

			6				4		
	Baccalaureate	81	41.5 4	66	33.8 5	48	24.6 1	195	
	Master	1	9.09	4	36.3 6	6	54.5 5	11	
	PHD	-	-	2	66.6 7	1	33.3 3	3	
Total		171		161		111		443	
Profession	Medical staff	54	58.1	27	29	12	12.9	93	0.001* *
	Paramedical staff	94	30.3	122	39.4	94	30.3	310	
	Housekeeping staff	23	57.5	12	30	5	12.5	40	
Total		171		161		111		443	
Work place	Ward	60	48.7 8	43	34.9 6	20	16.2 6	123	0.001* *
	Lap	33	31.7 3	37	35.5 8	34	32.6 9	104	
	Pharmacy	32	65.1 4	15	26.3 2	10	17.5 4	57	
	Emergency	25	45.4 5	20	36.3 6	10	18.1 8	55	
	Public health unit	5	23.8	8	38.1	8	38.1	21	
	Counseling	3	23.1	7	53.8	3	23.1	13	
	Resuscitation unit	1	8.33	8	66.6 7	3	25	12	
	Infection control unit	-	-	2	22.2 2	7	77.7 8	9	
	Other	12	24.4 9	21	42.8 6	16	32.6 5	49	
Total		171		161		111		443	
*Significant difference between proportions using Pearson Chi-square test at 0.05 level. **Highly Significant at P<0.01									

Discussion

When talk on the attitudes generally, the present study showed that Just over half (51.9%) of studied sample were considered to have a good attitude towards MWM which agree with (Govender *et al.*, 2018) in India that show 54%, and (Mohamed *et al.*, 2019) in Mansoura/ Egypt that showed 57.5%, but lower than reported in Oman by (Al Balushi *et al.*, 2018) that showed 91.2%. This is somewhat of a surprise and needs further investigation. A good attitude towards MWM in the hospitals is an important finding with the WHO stating that with regard to safe MWM A good attitude towards MWM in the hospitals is an important finding in accordance with the WHO stating, "the human element is more important than the technology. Almost any system of treatment and disposal that is operated by well-trained, and well-motivated staff can provide more protection for staff, patients and the community than an expensive or

sophisticated system that is managed by staff who do not understand the risks, and the importance of their contribution" (Rudraswamy *et al.*, 2012).

In the current study, only 25.1% of the studied sample had good practices regarding MWM which is similar to (Erigene *et al.*, 2019) in Rwanda and lower than (Doylo *et al.*, 2019) in Eastern Ethiopia which was 42.3% had good practices. In general, our study also shows (30.3%) of paramedical staff have good practices compared to (12.9%) of medical staff and (12.5%) for housekeeping staff which disagrees with (Khan *et al.*, 2017) in Pakistan that shows housekeeping staff has good practices higher than medical and paramedical staff. The Poor practices among housekeeping staff in our study may be interpreted due to workload, shortage of staff relative to patients, and lack of strict supervision and training, while relating to medical staff, there is a tendency among medical staff in Iraq to overlook MWM because of the common perception that dealing with the issues of medical waste is not a medical staff's responsibility; therefore, most of the time they neglect this issue.

According to the fact that the guideline laid down by Iraqi ministry of health is an old guideline and has not updated since 2009, as well as the lack of hospitals color-coding containers, this led to that 63.9% of the studied sample in the present study were always following the guideline as well as only 36.6% of them followed color of containers according to the type of wastes which were lower than (Jalal *et al.*, 2021) in Saudi Arabia and (Dalui *et al.*, 2021) in India that showed higher results

In the same context of waste separation, the current study shows 69.5% of the studied sample which is lower than 92.9% a study done in Ethiopia by (Deress *et al.*, 2018) that were always separate hazardous medical waste from general waste at the place of generation, as well as 54.6% of our studied sample which it also lower than (Abrol *et al.*, 2019) in India that shows 91.7% and (Musa *et al.*, 2020) in Qatar that shows 99.4% about the separation hazardous medical waste into different categories. These lower results of our study may be attributed to the unavailability color-coding containers for different categories of medical waste in Iraqi hospitals.

Concerning the participants' prevention practices, 72.9% and 88.5% which is better and higher results than (Dalui *et al.*, 2021) in West Bengal confirmed that they always use PPE when handling medical waste and wash their hands thoroughly after contact with medical waste respectively, this may be attributed to that present hospitals were provided with disposable PPE continuously and also reflection the clean habit of the Iraqi person.

About the dealing of participants with sharp medical waste, 86.5% of studied sample which agree with Iraqi previous study (Mohammed *et al.*, 2017) confirmed putting sharp medical waste into a safety boxes always. This may be because of the safety boxes were available in adequate number in hospitals to ensure the safe disposal of sharps waste, but regarding the recapping of used needle practice, only 28.9% of our studied sample confirmed that they don't do this wrong practice, which disagree with (Al Balushi *et al.*, 2018) in Sultanate of Oman that showed 65.6%. It is a wrong practice lead to exposure of healthcare workers

to risks, so our results may attributed to the majority of studied sample were not undergo to any training program on dealing with medical waste and they continuation of an old habit.

About the accidents of needle and sharps waste, the current study showed similar results with (Mohammed *et al.*, 2017) in Iraq where 42.3% of studied sample protected themselves from experiencing injury by used needle or sharps during their work, but only 8.6% of them filled the accident form if the injury occur .This result may be due to the recapping needle practices by majority of studied sample make them experience the injury. In the same context, and because the importance of reporting any such injuries to the authorities and in order to provide treatment and support needed for injured healthcare workers, the present study showed 66.4% of the studied sample inform person in charge when injury by sharps waste, but this result disagree with (Alwabr and Al-Salehi, 2020) in Yemen that showed only 10.8% were reporting this injuries to supervisor perhaps due to their lack of treatments in their country..

In relation to practices of our studied sample about liquid waste disposal, current study shows only 37.7% of them which is dissimilar with (Akkajit *et al.*, 2020) in Thailand that shows 86.3% confirmed that they don't dispose liquid waste into the sewage system directly. A possible explanation of this difference in result might be explain by (Al-nakkash *et al.*, 2019) that mention about 98% of hospitals in Iraq have no liquid waste treatment units, and it drain their liquid waste without any treatment, as well as supported by (KHAN and ALSHUKRI, 2020) that shows the chemicals used in Al-Najaf hospitals laboratories were disposed into general sewers.

When asked about documentation records of medical waste, it was found the concept about the maintenance of records related to medical waste is not prevailing, where none of studied sample which was the opposite of (Jalal *et al.*, 2021) in Saudi Arabia 70.7%, (Chudasama *et al.*, 2013), (Indupalli *et al.*, 2015) and (Dudi *et al.*, 2016) in India 74.5%, 57% and 93.18 % respectively maintained a medical waste records. This results may be come back to the failure that falls on hospitals administrations in Iraq by not paying attention to providing records for medical waste and training staff on it.

In spite of availability all necessary vaccines for healthcare workers in Iraq, 56% of our studied which lower than (Soyam *et al.*, 2017) in India taken the vaccines. The low vaccination coverage of our studied sample might be attributed to a lack of awareness about the high effectiveness of these vaccines to prevent the disease.

Conclusion

The current study concluded that only 25.1% of healthcare worker had good practices on MWM, and about half of them 51.9% had good attitude. The good practices and attitudes about paramedical staff were higher than medical and housekeeping staff.

Ethical Permissions

Firstly, ethical approval and all administrative agreements were obtained from the College of Health and Medical Technology/ Baghdad/ Community Health Department and the research committee at Middle Technical University. Secondly, followed by a formal agreement from AL-Najaf Health Directorate/ Human Development Training Center that in turn provided official permissions directed to all hospitals of the study. Finally, the researcher obtained orally agreement from participants to participate voluntarily in the study.

References

- Abd-ULSalam Awad, A. and Bajari, F. Al (2018) 'Environmental impacts of medical waste treatment and management by burning inside health facilities', *International Journal of Civil Engineering and Technology*, 9(5), pp. 41–53.
- Abdulsamad, Q. (2021) 'Evaluation of Hospitals Waste Management Process, The Case Study of Duhok City', *The Journal of the University of Duhok*, 24(1), pp. 88–106. doi: 10.26682/sjuod.2021.24.1.11.
- Abrol, A. *et al.* (2019) 'Awareness and practices regarding biomedical waste management among health care workers in a tertiary care hospital in Himachal Pradesh', *Indian Journal of Microbiology Research*, 6(1), pp. 92–96.
- Akkajit, P., Romin, H. and Assawadithalerd, M. (2020) 'Assessment of knowledge, attitude, and practice in respect of medical waste management among healthcare workers in clinics', *Journal of Environmental and Public Health*, 2020.
- Al Balushi, A. Y. *et al.* (2018) 'Knowledge, attitude and practice of biomedical waste management among health care personnel in a secondary care hospital of Al Buraimi Governorate, Sultanate of Oman', *Global Journal of Health Science*, 10(3), p. 70.
- Al Naemi, H. *et al.* (2021) 'Quantitative Assessment of Medical Waste Management in Hamad Medical Corporation—Qatar', *Occupational Diseases and Environmental Medicine*, 9(3), pp. 112–126.
- Al-nakkash, I. A. H. *et al.* (2019) 'Assessment of Health Care Waste Management (HCWM) in Iraq ; Effects and Control', (May).
- Alwabr, G. M. A. and Al-Salehi, K. A. S. (2020) 'Knowledge, Attitudes and Practices of Medical Waste Management among Healthcare Staff in Dental Clinics of Sana'a City, Yemen', *Journal of Health Science Research*, pp. 84–90.
- Chudasama, R. K. *et al.* (2013) 'Biomedical Waste Management: A study of knowledge, attitude and practice among health care personnel at tertiary care hospital in Rajkot', *Journal of Research in Medical and Dental Science*, 1(1), pp. 17–22.
- Dalui, A., Banerjee, S. and Roy, R. (2021) 'Assessment of knowledge, attitude, and practice about biomedical waste management among healthcare workers during COVID-19 pandemic in a health district of West Bengal', *Indian journal of public health*, 65(4), p. 345.
- Deress, T. *et al.* (2018) 'Assessment of knowledge, attitude, and practice about biomedical waste management and associated factors among the healthcare professionals at Debre Markos Town Healthcare Facilities, Northwest Ethiopia', *Journal of environmental and public health*, 2018.
- Doylo, T., Alemayehu, T. and Baraki, N. (2019) 'Knowledge and practice of health

- workers about healthcare waste management in public health facilities in Eastern Ethiopia', *Journal of community health*, 44(2), pp. 284–291.
- Dudi, M. *et al.* (2016) 'Assessment of the knowledge, attitude and practices regarding biomedical waste management amongst paramedical staff in a tertiary level health care facility', *Int J Med Sci Public Health*, 5, pp. 615–619.
- Erigene, R., Jean, A. N. and Michael, H. (2019) 'Knowledge and Practice for Bio-Medical Waste Management among Healthcare Personnel at Kabgayi District Hospital, Rwanda'.
- Govender, R. D., Olaifa, A. and Ross, A. J. (2018) 'Knowledge, attitudes and practices of healthcare workers about healthcare waste management at a district hospital in KwaZulu-Natal', *South African Family Practice*, 60(5), pp. 137–145.
- Hasan, Z. A., Abdul-wahid, S. A. and Al-musawi, A. A. (2021) 'Assessment of Health Care Staff Knowledge Regarding Medical Waste Management in Basrah Hospitals Assessment of Health Care Staff Knowledge Regarding Medical Waste Management in Basrah Hospitals Introduction Health-care activities protect health and restor', (December).
- Indupalli, A. S. *et al.* (2015) 'Knowledge, attitude & practices regarding biomedical waste management amongst nursing staff of Khaja Banda Nawaz Institute of Medical Sciences, Kalburgi, Karnataka', *Natl J Community Med*, 6(4), pp. 562–565.
- Jalal, S. M. *et al.* (2021) 'Assessment of knowledge, practice and attitude about biomedical waste management among healthcare professionals during COVID-19 crises in Al-Ahsa', in *Healthcare. Multidisciplinary Digital Publishing Institute*, p. 747.
- Kh Alrikabi, N. and Almosherefawi, O. J. (2021) 'Reality analysis of the state of spatial distribution of green areas using geographic information systems (GIS) - The holy city of Najaf as a case study', *IOP Conference Series: Earth and Environmental Science*, 754(1). doi: 10.1088/1755-1315/754/1/012009.
- KHAN, H. A. A. L. I. and ALSHUKRI, A. S. (2020) 'EVALUATION OF ENVIRONMENTAL AND HEALTH RISKS RELATED WITH THE MANAGEMENT OF MEDICAL WASTE IN AL NAJAF CITY', *Journal of Engineering Science and Technology*, 15(6), pp. 4383–4391.
- Khan, M. J. *et al.* (2017) 'Knowledge, attitude and practices of health care staff regarding hospital waste handling in tertiary care hospitals of Muzaffarabad, AJK, Pakistan', *Int J Sci Reports*, 3(7), p. 220.
- Maamari, O. *et al.* (2019) 'Health Care Waste generation rates and patterns : The case of Lebanon To cite this version: HAL Id: hal-02042720'. doi: 10.1016/j.wasman.2015.05.005.
- Mohamed, H. H., Abd El-Kader, R. G. and Ibrahim, A. A. W. (2019) 'Knowledge, Attitude and Practice of Health Care Personnel about Medical Waste Management in Selected Family Health Centers in Mansoura, Egypt', *Int J Innov Res Med Sci*, 4(06), p. 349.
- Mohammed, S. M. *et al.* (2017) 'Knowledge, Attitude and Practice of Health Care Workers in Sulaimani Health Facilities in Relation to Medical Waste Management', *Kurdistan Journal of Applied Research*, 2(2), pp. 143–150. doi: 10.24017/science.2017.2.21.
- Musa, F., Mohamed, A. and Selim, N. (2020) 'Assessment of Nurses' Practice and Potential Barriers Regarding the Medical Waste Management at Hamad Medical Corporation in Qatar: A Cross-Sectional Study', *Cureus*, 12(5).

- Parida, A., Capoor, M. R. and Hospital, S. (2019) 'Knowledge, attitude, and practices of Bio-medical Waste Management (principle) rules, 2016; Bio-medical Waste Management (amendment) rules, 2018; and Solid Waste Rules, 2016, among...', (December 2020). doi: 10.4103/JLP.JLP.
- Rudraswamy, S., Sampath, N. and Doggalli, N. (2012) 'Staff's attitude regarding hospital waste management in the dental college hospitals of Bangalore city, India', *Indian journal of occupational and environmental medicine*, 16(2), p. 75.
- Sarkees, A. N. (2018) 'The ASSESSMENT OF NURSES'KNOWLEDGE ABOUT HEALTH CARE WASTE MANAGEMENT', *Polytechnic Journal*, 8(2), pp. 35–43.
- Singh, N., Ogunseitan, O. A. and Tang, Y. (2021) 'Medical waste: Current challenges and future opportunities for sustainable management', *Critical Reviews in Environmental Science and Technology*, 0(0), pp. 1–23. doi: 10.1080/10643389.2021.1885325.
- Soyam, Gajanan C *et al.* (2017) 'KAP study of bio-medical waste management among health care workers in Delhi', *Int J Community Med Public Health*, 4, pp. 3332–3337.
- Soyam, Gajanan C. *et al.* (2017) 'KAP study of bio-medical waste management among health care workers in Delhi', *International Journal Of Community Medicine And Public Health*, 4(9), p. 3332. doi: 10.18203/2394-6040.ijcmph20173840.
- Ye, J. *et al.* (2022) 'Assessment of medical waste generation, associated environmental impact, and management issues after the outbreak of COVID-19: A case study of the Hubei Province in China', *PLoS ONE*, 17(1 1), pp. 1–17. doi: 10.1371/journal.pone.0259207.