Effectiveness of Education Program on Health Care Workers' Practices toward Waste Management in Primary Health Care Centers

فاعلية برنامج تثقيفي على ممارسات العاملين الصحيين تجاه ادارة النفايات في مراكز الرعاية الصحية الاولية

Hashim H. Shabib, MScN*
Mohammed F. Khalifa, PhD**

*Academic Nurse, Al-Kut Health Directorate, Ministry of Health e-mail: Hashim_8623@yahoo.com
**Professor, College of Nursing, University of Baghdad prof.khalifa.phd@gmail.com

المستخلص:

الهدف: تهدف الدراسة إلى تحديد فعالية البرنامج التثقيفي على ممارسات العاملين الصحيين تجاه إدارة النفايات في مراكز الرعاية الصحية الاولية والتعرف على العلاقة مابين هذه الممارسات والصفات الديموغرافية للعاملين الصحيين.

المنهجية: تصميم شبه تجريبي (اختبارات قبل وبعد) وقد استخدمت في هذه الدراسة للفترة من 16 تشرين الثاني 2014| لى 22 يونيو2015. العينة المخصصة في هذه الدراسة تكونت من 60 العاملين الصحين . تم تقسيم العينة عشوائيا إلى مجموعتين 30 من العاملين الصحين لكل منهما. مجموعة الدراسة مكونة 30 من العاملين الصحين الذين تعرضوا لهذا البرنامج. المجموعة التي لم تتعرض للبرنامج اعتبرت مجموعة السيطرة ويتم توزيع عشوائي لتجنب التحيز في الاختيار وللسيطرة على الخلط المحتملين. يتم جمع البيانات من خلال استخدام قائمة مراقبة الممارسات للعاملين الصحين استخدمت قبل تنفيذ البرنامج التعليمي خلال وقت العمل. وتألفت القائمة المراقبة الممارسات للعاملين الصحين من (30) فقرة. ويستخدم اختبار الممارسة قبل البرنامج وبعد البرنامج على الفور.

النتائج: اشارت نتائج الدراسة إلى جميع العاملين الصحين في مجموعة الدراسة الذين يعملون في مراكز الرعاية الصحية يمتلكون ممارسات جيدة بعد تطبيق البرنامج وأداء مبادئ ممارسات إدارة النفايات بطريقة مثالية.

التوصيات: أوصت الدراسة إلى إمكانية توفير إستخدام المجلات العلمية أو المطبوعات في اللغة العربية مع التأكيد على أهمية الدافع للعاملين في مجال الرعاية الصحية لهذه الممارسات في إدارة النفايات الطبية.

Abstract

Objective(s): The aim of this study is to determine the effectiveness of education program on Health Care Workers' practices toward Primary Health Care Centers waste management and to identify the relationship between these practices and the demographic characteristics of the health workers.

Methodology: A quasi- experimental design (pre-post tests) has been used in the present study for the period of November 16th 2014 to June 22nd 2015 .The allocated sample in the present study is consisted of (60) health care worker. The sample was randomly divided into two groups of (30) health care workers each. The study group consisted of (30) health care worker who are exposed to the program. The group that is not exposed to the program was considered the control group. The data are collected through use of A practice checklist for health care workers' was use prior to performing educational program during work time. The practice checklist for health care workers' was composed of (30) items . A practice test is used for pre- education and post-education immediately.

Results: All the health care workers in the study group work in PHCs are having good practices post the program implementation and perform principles of waste management practices in ideal way..

Recommendations: Availability of scientific using journal or books in Arabic language and emphasis on the importance of motivation for the health care workers to this practices in the medical waste management.

Keywords: Effectiveness, Health care workers, practices, Waste Management

INTRODUCTION

Great strides have been made in the field of health care system over the years. Ironically, along with restoring and maintaining community health, health care settings also threaten their well-being. The public health, patients and professionals, alike, are affected by poor waste management practices [1].

Now, years later, this has turned into a global humanitarian issue; all the waste was generated by medical activities coming under Health-care. Waste; they are involve diagnostic activities and preventive, curative and palliative treatments in both the human and veterinary fields of medicine. In short, health-care waste is all the waste produced by medical institutions (public or private), a medical research facility or laboratory [2].

Medical wastes are of great importance due to their potential environmental hazards and public health risks. World Health Organization (WHO) has advocated medical wastes as special wastes, and it now commonly acknowledges that certain categories of medical wastes are among the most hazardous, and potentially dangerous of all wastes arising in communities, as exposure to hazardous medical waste can result in disease or injury [3].

The hazardous nature of medical wastes may be due to one or more of the following characteristics: their pharmaceuticals, and sharps, and they are genotoxic and radioactive. Infectious medical wastes, particularly sharp ones, have been responsible for most of the accidents reported in literature [4].

Some studies have been conducted around the world to assess the medical wastes management practices; all of them referred that planning and implementation of waste management reduce health and environmental risks [5].

Medical wastes definitions and classifications taken by various countries directly affect their management For instances, Portuguese legislation settles the following four groups of medical wastes: Group I – wastes similar to municipal wastes; Group II –nonhazardous medical wastes that do not require specific treatment and can be considered similar to municipal wastes; Group III – medical wastes with, or suspicious biological hazard that must be pre-treated before elimination as municipal wastes or, otherwise must be incinerated; and Group IV – specific medical wastes with compulsory incineration [6].

In Portugal, in 2005, the production of medical wastes was approximately 54,000 t. Algarve region; in the south of Portugal, contributed with (1.6%) of the total production, which corresponded to the region that contributed with the lowest medical wastes production in Portugal. Data, from the governmental health institutions in Portugal, demonstrated that between years 1999 –2005, there was an increase in medical wastes production, especially after 2002, as well as an increase of hazardous wastes production compared to non-hazardous wastes, both in Portugal and Algarve [7].

Primary Health Care Waste Management means the management of waste produced by Primary Health Care using such techniques that will help to check the spread of diseases through [8].

The arrangement of waste poses a major problem in most countries, especially Primary Health Care waste. In recent years, medical waste disposal has posed even more difficulties with the appearance of disposable needles, syringes, and other similar items. Primary Health Care s and public health care units are supposed to safeguard the health of patients, Primary Health Care workers and the whole community [9].

However, if the waste is produced by the medical care centres, disposed of improperly, it may lead to greater threat than the original diseases themselves [10].

Prevention, segregation, handling, transport and disposal of waste must be properly managed so as to minimize the risks to the health and staffs, patients; the public's safety the as well as the environment [11].

This could only be done if the process is subjected to a continuing revision of the practice, so as to ensure that the current best practice is being followed followed[12].

METHODOLOGY

Design of the Study

In order to achieve the objectives of the study, A quasi- experimental design (pre-post test) had been used in the present study. for the period of November 16th 2014 to 22 June 2015.

Sample of the Study

A total of (77) health care workers are those who work in Primary Health Care Centers; family Medicine Clinic , Reception room , File Room (care) files family medicine ,Corridors wait ,Laboratory room, Dental clinic room, Vaccinations room, Health education room "Health Promotion Unit" . The dressing and emergency room, Administrative room and other rooms during the time of the study period have met the study criteria and agreed to participate; 10 health care workers for pilot study have been excluded from the study. Thirty have been assigned to the control group and thirty to the study group;7health care workers (3health care workers for the study group and 4health care workers for the control group) have been dropped out of the study for the following reasons ; three health care workers have refused to continue after participating in the study, and four health care workers are included in pre-test of study group to be transferred out of clinical unit or out of primary health care centers during sample selection; the total is (60) health care workers in the study.

The study instrument

A questionnaire is constructed through extensive review of relevant literature and education programs. The questionnaire is used as a tool of data collection. A draft of the instrument is reviewed by (11) experts for the determination of content validity and the reliability is estimated through the application of test-retest technique for the determination of the instrument stability. The study instrument is consisted of two major parts:

Part I: Self Administered Questionnaire Related to Demographic of the Health Care Workers:

This part is concerned with the collection of basic socio- demographic data obtained from the Health Care Workers of an interview questionnaire sheet such as age, gender, education level, specialization, number of years of service at the primary health care centers, and training program in the field of managing the disposal of medical waste .

Part II: Practice Check List for Health Care Workers' Practicing Concerning Waste Management:

It is developed to evaluate health care workers' practices regarding waste management ; a practice checklist for health care workers has been given prior to performing educational program during working time; the practice checklist for health care workers is composed of (30) items. These items are rated and scored according to the Liker's scale; always (3), sometimes (2), never (1)

Data Collection

Data are collected through the use of the study instrument, and the application of the modified primary health care centers waste management education program ; the data collection process started in February 17th 2015 to the 28 of April 2015. The observational checklist which used and took about (45-60) minutes at morning shift, each health care worker was observed on an individual basis.

Data Analysis

In order to achieve the early stated objectives, the data of the study are analyzed through the use of statistical package of social sciences (SPSS) version 20 and through the application of descriptive data analysis approach that includes Frequencies and Percentages, Mean of score , Standard Deviation, Relative Sufficiency, Histogram and inferential data analysis approach that includes Chi-square test, Student t-test, Levine's test, Analysis of variance.

Results:

Table (1): Comparison significant among the three periods (pre, post and post2tests) the practices of health workers towards waste management of the study group

List	Questions Related To practices of waste management	Pre-Test		Post 1-Test		Post 2-Test		ANOVA	
		M.S.	Eva.	M.S.	Eva.	M.S.	Eva.	P_{-value}	C.S.
1	Isolate medical waste from other waste	1.70	M	2.93	H	2.87	H	0.000	HS
2	Infectious wastes segregated from other medical waste.	1.50	L	2.97	H	2.73	H	0.000	HS
3	The sharps waste separation from other waste in primary health care centers	2.37	M	2.70	H	2.80	H	0.014	S
4	Classification of toxic medical waste according to their toxicity.	1.80	M	2.33	M	2.27	H	0.017	S
5	acute infectious medical wastes are classified within the Section to be very hazardous waste.	1.83	M	2.43	H	2.40	H	0.003	HS
6	Medical waste collected from medical units as a base on a daily basis.	1.63	L	2.63	H	2.57	H	0.000	HS
7	Medical waste is collected in section separate from other wastes.	1.77	M	2.87	H	2.97	H	0.000	HS
8	acute infectious wastes are cleared within the section and transferred to storage sites.	1.00	L	1.33	L	1.53	L	0.002	HS
9	waste collection stores are available primary health care centers.	1.20	L	2.17	M	2.53	H	0.000	HS
10	The use of color to containers of contaminated waste to distinguish between waste by distinctive markings.	1.47	L	2.83	H	2.87	H	0.000	HS
11	Use bags for each type of waste with taking into consideration the size of the container with the volume of waste.	1.50	L	2.83	H	2.63	H	0.000	HS
12	The presence of two containers in each section of the center, one particular red bag medical waste and other black bag waste of food residue or paper or plastic bottles	1.67	L	2.67	H	2.90	H	0.000	HS
13	transfer bags of waste by vehicles Small to the collected place .	1.00	L	1.63	L	1.63	L	0.002	HS
14	The use of portfolios of small plastic containers or the rugged signal hazardous biological waste collection remains of needles and syringes after use directly and Jur final garbage bags.	2.67	H	2.53	H	2.67	H	0.672	NS
15	The not collection of waste by workers and put them in the corridors in front of the passers-by or visitors until transferred outside the health center.	2.63	H	2.60	H	2.83	H	0.236	NS
16	Not waste stored in open spaces exposed to rain, animals, birds,	1.13	L	2.17	M	2.50	H	0.000	HS

Continues…

Table (1) to be Continues…

	insects and disease-carrying rodents.								
17	Waste storage preferably in closed places with an adequate ventilation.	1.07	**L**	2.00	**M**	2.27	**M**	0.000	**HS**
18	A sufficient number of containers with wheels to transport medical waste within primary health-care centers	1.07	**L**	2.00	**M**	2.60	**H**	0.000	**HS**
19	There is a source of water to clean the floor, conduct an appropriate.	1.80	**M**	2.77	**H**	2.83	**H**	0.000	**HS**
20	Move away temporary waste collection centers for food, restaurant and kitchen stores.	2.30	**M**	2.80	**H**	2.80	**H**	0.001	**HS**
21	Immunization of all workers in the circulation of medical waste against hepatitis (b), tetanus, tuberculosis and other infectious diseases that may be deployed or suspected.	2.90	**H**	2.97	**H**	2.87	**H**	0.391	**NS**
22	Wear gloves protective coats for workers assigned to transfer of medical waste for fear of any acupuncture or leakage of some Contaminated fluids	1.53	**L**	2.73	**H**	2.80	**H**	0.000	**HS**
23	There is fixed time to transfer garbage from health facility, at least once a day	1.10	**L**	2.30	**M**	2.30	**M**	0.000	**HS**
24	regular garbage collection of black sacks in a time different from the time the collection bags red medical waste so as not to confuse,	1.03	**L**	2.50	**H**	2.43	**H**	0.000	**HS**
25	Take into account the full garbage bags more than three-quarters of the bag so easily closed and deal with them and even not torn apart by "full.	1.27	**L**	2.67	**H**	2.30	**M**	0.000	**HS**
26	The heavy water drainage in health centers to the drainage network	2.73	**H**	2.83	**H**	2.80	**H**	0.762	**NS**
27	The presence of an official of medical waste in health centers and whether they had been trained.	2.27	**H**	2.60	**H**	3.00	**H**	0.001	**HS**
28	Get rid primary health-care centers of waste drilling location health.	2.97	**H**	3.00	**H**	3.00	**H**	0.372	**NS**
29	Health care centers has a holocaust to get rid of medical waste.	1.07	**L**	1.00	**L**	1.00	**L**	0.372	**NS**
30	Primary health-care centers develop medical waste management plan.	1.07	**L**	2.20	**H**	2.40	**H**	0.000	**HS**

M.S. =Mean of score , SD = Standard Deviation , Eva= evaluation ,p: probability, C.S. : Comparison, Significant ,List= Number of item , ,NS : Non Significant at $P \geq 0.05$, S : Significant at $P < 0.05$, HS : Highly Significant at $P < 0.01$, Level of evaluation: (1-1.67) = Low ;(1.68-2.33) = Moderate; (2.34-3.00) = High, L= Low; M = Moderate, H= High

Table (2): Comparison significant among the three periods (pre, post-1 and post-2 tests)) the practices of health workers towards waste management of the control group

List	Questions Related To practices of waste management	Pre-Test		Post 1-Test		Post2-Test		ANOVA	
		M.S.	Eva.	M.S.	Eva.	M.S.	Eva	P_{-value}	C.S.
1	Isolate medical waste from other waste	1.97	M	1.77	M	2.03	M	0.466	NS
2	Infectious wastes segregated from other medical waste.	1.73	M	1.70	M	1.97	M	0.359	NS
3	The sharps waste separation from other waste in primary health care centers	2.27	H	1.80	M	2.07	M	0.093	NS
4	Classification of toxic medical waste according to their toxicity.	1.73	M	1.60	M	1.87	M	0.340	NS
5	acute infectious medical wastes are classified within the Section to be very hazardous waste.	1.80	M	1.70	M	2.00	M	0.361	NS
6	Medical waste collected from medical units as a base on a daily basis.	1.73	M	1.73	M	2.03	M	0.292	NS
7	Medical waste is collected in section separate from other wastes.	1.77	M	1.73	M	2.10	M	0.212	NS
8	acute infectious wastes are cleared within the section and transferred to storage sites.	1.00	L	1.00[a]	L	1.07	L	0.372	NS
9	waste collection stores are available primary health care centers.	1.20	L	2.20	M	2.33	M	0.000	HS
10	The use of color to containers of contaminated waste to distinguish between waste by distinctive markings.	1.60	L	2.20	M	2.43	H	0.001	HS
11	Use bags for each type of waste with taking into consideration the size of the container with the volume of waste.	1.73	M	2.00	M	2.27	M	0.055	NS
12	The presence of two containers in each section of the center, one particular red bag medical waste and other black bag waste of food residue or paper or plastic bottles	1.63	L	2.03	M	2.33	M	0.005	HS
13	transfer bags of waste by vehicles Small to the collected place .	1.17	L	1.10	L	1.03	L	0.312	NS
14	The use of portfolios of small plastic containers or the rugged signal hazardous biological waste collection remains of needles and syringes after use directly and Jur final garbage bags.	2.73	H	2.60	H	2.70	H	0.715	NS
15	The not collection of waste by workers and put them in the corridors in front of the passers-by or visitors until transferred outside the health center.	2.70	H	2.67	H	2.73	H	0.904	NS
16	Not waste stored in open spaces exposed to rain, animals, birds, insects and disease-carrying	1.10	L	1.80	M	1.97	M	0.000	HS

Continues…

Table (1) to be Continues

	rodents.								
Table (1) to be Continues…									
17	Waste storage preferably in closed places with an adequate ventilation.	1.10	**L**	1.77	**M**	1.93	**M**	0.000	**HS**
18	A sufficient number of containers with wheels to transport medical waste within primary health-care centers	1.00	**L**	1.20	**L**	1.60	**L**	0.002	**HS**
19	There is a source of water to clean the floor, conduct an appropriate.	1.87	**M**	1.97	**M**	2.17	**M**	0.107	**NS**
20`	Move away temporary waste collection centers for food, restaurant and kitchen stores.	2.33	**M**	2.47	**H**	2.43	**H**	0.294	**NS**
21	Immunization of all workers in the circulation of medical waste against hepatitis (b), tetanus, tuberculosis and other infectious diseases that may be deployed or suspected.	2.87	**H**	3.00	**H**	2.70	**H**	0.132	**NS**
22	Wear gloves protective coats for workers assigned to transfer of medical waste for fear of any acupuncture or leakage of some Contaminated fluids	1.67	**L**	1.53	**L**	1.87	**M**	0.264	**NS**
23	There is fixed time to transfer garbage from health facility, at least once a day	1.10	**L**	1.10	**L**	1.43	**L**	0.036	**S**
24	regular garbage collection of black sacks in a time different from the time the collection bags red medical waste so as not to confuse,	1.00	**L**	1.10	**L**	1.43	**L**	0.003	**HS**
25	Take into account the full garbage bags more than three-quarters of the bag so easily closed and deal with them and even not torn apart by "full.	1.17	**L**	1.13	**L**	1.50	**L**	0.017	**S**
26	The heavy water drainage in health centers to the drainage network	2.90	**H**	2.93	**H**	2.70	**H**	0.594	**NS**
27	The presence of an official of medical waste in health centers and whether they had been trained.	2.40	**H**	2.40	**H**	2.43	**H**	0.599	**NS**
28	Get rid primary health-care centers of waste drilling location health.	2.97	**H**	3.00	**H**	2.67	**H**	0.372	**NS**
29	Health care centers has a holocaust to get rid of medical waste.	1.00	**L**	1.10	**L**	1.27	**L**	0.045	**S**
30	Primary health-care centers develop medical waste management plan.	1.00	**L**	1.67	**L**	1.93	**M**	0.000	**HS**

M.S. =Mean of score , SD = Standard Deviation , Eva= evaluation ,p: probability, C.S. : Comparison, Significant ,List= Number of item , ,NS : Non Significant at P ≥ 0.05 , S : Significant at P < 0.05 , HS : Highly Significant at P < 0.01, Level of evaluation: (1-1.67) = Low ;(1.68-2.33) = Moderate; (2.34-3.00) = High, L= Low; M = Moderate, H= High

Table (3): Effectiveness of Demographical Characteristics and Some Related Variables Distributions for overall Evaluations of the all items related to the Practices of health Workers toward Waste Management for the Study and Control Groups at pre-post tests

Samples and Periods	Overall Items	Gender	Age	Education level	Years of Experience	Training
Pre – Study	Percentile of Practice	NS	NS	NS	NS	NS
Post–Study	Percentile of Practice	NS	NS	NS	NS	NS
Pre-Control	Percentile of Practice	NS	NS	NS	NS	NS
Post–Control	Percentile of Practice	NS	NS	NS	NS	NS

NS : None Significant at P ≥ 0.05

Discussion

The results of table (1, 2) show that the health workers practices are moderate at the pre test at both study and control groups. In addition, the study results show that there are highly significant differences between three periods (pre, post-1 and post-2 tests) at the study group responses to the practices regarding waste management. Supportive evidence to such finding who have conducted to assess the knowledge and practice on bio-medical waste management among health care providers working in primary health care centers of Bagepalli Taluk. And they concluded that the health workers knowledge and practices were moderate (13).Another Supportive evidence , find that there is a deficient in the health workers practices concerning waste management. While regarding control group practices, the study results show that there are a no significant differences between three periods (pre, post one, and post two tests) at more of items related to the practices of health workers regarding waste management (14).

Another result in Table (3) indicates that there is no significant effect among the gender, age, level of education, and years of experience and training sessions on the practices of health workers toward waste management independently for the study and control groups at pre-post tests. Supportive evidence to such finding show that the calculated chi square values for age, gender, education, and designation were less than table values hence there was no significant association found for any of the socio-demographic variables (15). Another Supportive evidence, also, has conducted a study to assess the knowledge on Biomedical Waste Disposal among the Group D health workers in Sri Ramakrishna Hospital, Coimbatore; the findings indicate that there is non significant relationship between the health workers' practices, their educational status and years of experience (16)

Recommendation:

1. Provide on of opportunity for health care workers to be enrolled in training sessions and conferences, to improve their practices and skills; and to assist them to update practices concerning medical waste management.
2. Waste management practices standards that should be issued for best practices.
3. The education program should be presented to health care workers on a regular base for, the benefit of knowledge and practices improvement.
4. Economically and environmentally, sustainable technological options for waste treatment can be well operated and maintained , as well as it should be specific to medical waste management only .

REFERENCES

1. Shinee, E.; Gombojav, A.; Nishimura, N. ; Hamajima, N. and Ito, K. : Healthcare waste management in the capital city of Mongolia, *Journal of Waste Management*, 2008, 28, 435–441.
2. Graikos, A. Et al. (2010); Composition and production rate of medical waste from a small producer in Greece. *Waste Management*, v. 30, n.8-9, p.1683-1689.
3. Sawalem, M.; Selic, E. and Herbell, J.: Hospital waste management in Libya: A case study. *Journal of Waste Management*, 2009,29, 1370-1375.
4. Pruss,A.; Giroult, E.; Rushbrook, P : Safer management of wastes from health care activities. *World Health Organization*, Geneva1999.
5. Silva, C.; Hoppe, A.; Ravanello, M. and Mello, N. : Waste Management. 25(6), *Medical wastes management in the south of Brazil* ,2004, 600-605.
6. Gonçalves, M. :Medical waste management: Knowledge, options and perceptions of health professionals. *PhD Dissertation, New University of Lisbon, Portugal*, 2005 .
7. DGS.: Medical waste - Report. Directorate General of Health, *Division of Environmental Health from*, 2006 to 2005.
8. Blenkharn, J.: Standards of clinical waste management in hospitals – Second look, *Journal of Hospital Infection*, 2007, 121: 540-545.
9. Serb, C. : Think green. Hosp Health Netw; 2008,82(8):22-6, 35, 1.
10. Armbruster, D. : Hazardous waste disposal and the clinical laboratory. *Clinical Lab Manage Rev*, 1990 , 4(3): (160-6).
11. Hall, A. :Greening healthcare: 21st century and beyond. *Front Health Service Manage*, 2008, 25(1): (37-43).
12. Baillie, J.: Watch your waste or pay the price. *Health Estate*, 2008 ,62(4):47-51.
13. Nagaraju, B.; Padmavathi, G.; Puranik, D.; Shantharaj, M.;and Sampulatha, S.: Department of Community Health Nursing, SB College of Nursing, , *India Biomedical waste management and health care providers*, 2013, 2(1):28-35.
14. Andrea Spence, A.:: The Development of a Model Program for the Effective

Management of Biomedical Waste in the Caribbean. *A Review of Barriers within Public Hospitals in the Caribbean*, 2000.

15. Khala, A.:: Assessment of Medical Waste Management in Jenin District Hospitals MSc. *Thesis, An-Najah National University, Palestine*,2009.
16. Manoranjini, A.:: A study to assess the knowledge on Biomedical Waste Disposal among the Group D health workers in Sri RamakrishnaHospital, Coimbatore. *Journal of Health Sciences,* 2014, 1(4): 465-470.