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Assessment of Awareness and Practices of Biomedical Waste Management Among Nursing Staff at Al-Wahda Hospital in Derna, Libya.

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Abstract:

A healthcare worker that produces waste as part of their job is a 'waste producer'. Healthcare wastes are of great importance due to its potential environmental hazards and public health risks. The objectives of this study were to assess the awareness and practices of staff nurses related to healthcare waste management at Al-Wahda Hhospital in Derna, Libya. A descriptive cross-sectional design was used to conduct the study. The study was carried out in January 2022 and comprised all nurses who were working in the study setting, with a total number of 93 nurses. Data were collected using a questionnaire and observational check. Data were entered and analyzed using SPSS. The mean age of participants was of 27.80 ±7.97 years and more than 55.4% of them had experienced five years or less. Only 30.4% of participants attended a training on medical waste management. The results revealed that the majority of nurses' staff have unsatisfactory awareness regarding healthcare waste management and have inadequate practices in most areas of waste management. The awareness and practices about HCW management among nurses' staff at Al-Wahda Hospital were found to be very poor. This could be because the majority of the respondents were not trained on ways of handling MW since the government does not provide experts to conduct those training programs like once per year or twice to HW ensuring MW are well observed.

Keywords: Waste Producer, Nurses, Health Care Wastes, Al-Wahda Hospital, Derna, Libya.

Introduction

Hospitals are institutions providing various health care services to the community. Their activities may include curative, rehabilitative, preventive, patient care services and also promotion of health education. It is the duty of hospitals and health care establishments to look after the public health; this may be directed, through patient care, or indirectly by ensuring a clean, healthy environment for their employees and the community (Patil & Pokhrel, 2012). The healthcare services while providing services, curative, promotive or preventive inevitably create waste which may be hazardous to health. "Bio-medical waste" means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps (India Ministry of Environment, 2016). A health care worker that produces waste as part of their job is a 'waste producer' (Liza et al., 2012). Health care wastes are of great importance due to its potential environmental hazards and public health risks. World Health Organization (2003) has advocated health care wastes as special wastes and it is now commonly acknowledged that certain categories of health care wastes are among the most hazardous and potentially dangerous of all wastes arising in communities, as exposure to hazardous health care waste can result in disease or injury. (Vera & Margardiariabu, 2010). Pathogens and toxic chemicals in health care waste can pose serious health risks for waste collectors, patients and health care workers, among these health risks HIV/AIDS, viral hepatitis B (HBV) and hepatitis C (HCV). HIV, HCV and HBV have the risk of transmission 0.3%, 1.8% and 30%, respectively from one sharp injury (WHO, 2006 - Jundihaibulah, 2010).

Since majority of the persons receiving treatment in the hospital suffer from infectious diseases, the waste generated in hospital has potential to transmit infections and other hazards to hospital staff and nearby community, if not managed adequately. Adequate awareness amongst the hospital staff and practices regarding the biomedical waste management is crucial to prevent these hazards (Manoj et al., 2011). Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and the environment (Shrestha et al., 2017). The present study has been conducted with the objectives of assessing knowledge and practices of staff nurses regarding MW management of Al-Wahda Hospial in Derna City.

Material and Methods

Study Design and Setting: A descriptive cross-sectional design was used to conduct this study. It was carried out at Al-Wahda Hospital. This hospital of 120 beds is the main provider of care services in Derna City.

Participants: The population of the study comprised of all nurses who were working in the study setting with a total number (93) nurses. We visited all the major health care areas in the hospital. The study included medical, surgical and orthopaedic wards (male and female), obstetrics and gynaecology wards (labour room, postnatal ward), ENT ward and operations for the assessment.

Instrument: Data for this study was collected by using two tools:
First Tools: awareness questionnaire sheet (Appendix I): This tool was used for the purpose of assessing nurse's awareness about health care waste management. It is divided into two parts:

- First Part: (personal and job characteristics data sheet): This part aimed at collecting data about demographic and job characteristics as the respondent's age, gender, educational qualifications, and years of experience, working units, and attendance of related training courses.
- Second Part: (awareness questionnaire sheet): This part was used to assess the awareness of staff nurses regarding health care waste management. It consisted of 12 items true or false. The scoring system for the questionnaire sheet consisted of giving a score of (one) for the correct answer and (two) for the wrong answer for true or false questions. The awareness score was considered satisfactory if the score was 75% or more and unsatisfactory if it was less than 75% .

Second Tool: observation checklist (Appendix II): It was used to assess the practice of staff nurses regarding health care waste management. It consisted of 16 items. The scoring system for the observation checklist sheet consisted of giving a score of (one) for the step done correctly, and giving (two) for the step not done. The practice was considered proper if the percent score was 75% or more and inadequate if less than 75%.

Statistical Analyses: Data from the questionnaire was transferred to SPSS. Data Editor Software version 23 was used for analysis. Descriptive statistics, including percentage, mean, range and standard deviation. Chi-square test was performed and p value ≤ 0.05 were considered statistically significant.

Results:

Table 1: Socio-demographic Characteristics of the Participants

Variables	Frequency	Percentage
Gender		
Male	60	65.2
Female	32	34.8
Age		
18 – 25	49	53.3
26 – 33	28	30.4
34 – 41	9	9.8
≤ 42	6	6.5
Level of Education		
Diploma	61	66.3
High nursing	17	18.5
Bachelor's degree	11	12
Postgraduate	3	3.3
Years of Experience		
≤ 5	51	55.4
≥ 6	41	44.6
Current Place of Work/Area		
Emergency Room	4	4.3
Department of Obstetrics and	25	27.2
Gynecology	5	5.4
Department of Medicine	24	26.1
Intensive Care Department	12	13
Department of Pediatrics	12	13
Department of Surgery	3	3.3
Orthopedic Department	1	1.1
ENT Department	1	1.1
Department of Ophthalmology	3	3.3
Dermatology Department	1	1.1
Dental Department Operations	1	1.1

Table 1 indicates 60 (65.2%) were male and 32 (34.8%) were female. 53.3% of them were in age group 18-25years old, with the mean of 27.80± 7.97 years. And 66.3% had nursing diploma. More than of them 55.4% had experienced five years or less. An analysis of nurses by department indicated that in the obstetrics and gynecology department nurses recorded 25 (27.2%) , Intensive care department had (26.1%), department of Pediatrics and Surgery were 13.0%, while departments of medicine and emergency were (5.4, 4.3% respectively).

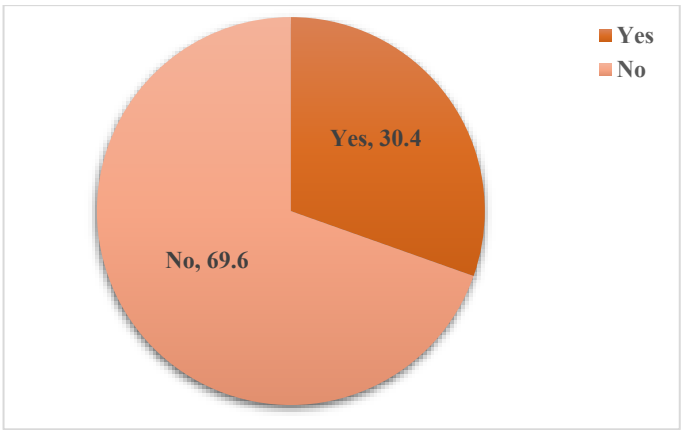

Figure 1: Attended a Training on Medical Waste Management

Figure 1 revealed that 28 (30.4%) of participants attended a training on medical waste management and 64 (69.6%) not.

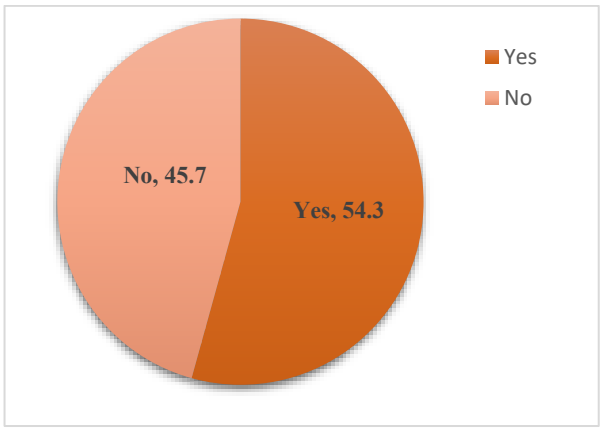

Figure 2: Received the Vaccine against Hepatitis B

Figure 2 revealed that 50 (54.3%) of participants vaccinated against hepatitis B 42 (45.7%) not.

Table 2: Awareness of Participants about Medical Waste Management.

Parameters	Yes No (%)	No No (%)
Have you ever heard about medical waste?	59 (64.1)	33 (35.9)
Are you aware of regulation on medical waste management?	50 (54.3)	42 (45.7)
Do you know about the biohazard symbol Q?	32 (34.8)	60 (65.2)
Can you name eight categories of medical waste?	33 (35.9)	59 (64.1)
Can you list down the guidelines provided for color-coding in workplace?	45 (48.9)	47 (51.1)
HIV/AIDS can be transmitted through medical waste.	73 (79.3)	19 (20.7)
Hepatitis B and C can be transmitted through medical waste.	79 (85.9)	13 (14.1)
Personal protective measures are necessary while handing medical waste	87 (94.6)	5 (5.4)
Do you know about methods for medical waste treatment?	46 (50.0)	46 (50.0)
Disinfection of medical waste is necessary.	66 (71.7)	26 (28.3)
Bleaching solution 0.5% is used for disinfection of infection medical waste.	33 (35.9)	59 (64.1)
The maximum time for medical waste to be kept in hospital premises is 48 hrs.	26 (28.3)	66 (71.7)

Table 2 shows awareness of participants about medical waste management. The findings shows that the majority of the respondents from various departments were not aware concerning medical waste management (77.4%). As the table shows that 60 (65.2%) of participants said they do not know about the biohazard symbol. Only 26 (28.3%) of the respondents knew that the waste can be stored for a maximum period of 48 hrs.

Table 3: Observation Checklist for Medical Waste Management Practices at Al-Wahda Hospital.

Items	Frequency	%
Is waste separation carried out inside the hospital?		
No	4	100
Does color-coding of waste are practiced in the hospital?		
No	4	100
Are there pictograms for users next to the trash?		
Yes	1	25
No	3	75
What type of waste storage containers are used at the waste generation point?		
plastic garbage bin	1	25
Yellow box and plastic garbage bin	1	25
Yellow box, plastic garbage bin and Water Gallon	2	50
What is the container used for sharp tools?		
Yellow box and plastic garbage bin	4	100
What is the correct bag for intravenous set, catheters, and tubes?		
Yellow box and plastic garbage bin	4	100
What do you discard medical waste from the bin?		
Immediately when full	4	100
Type/design of the vehicle used to collect and transport waste from the source.		
Black trash bag	3	75
Plastic trolley and Black trash bag	1	25
Is the transfer of medical waste done during times other than work in the department?		
Yes	1	25
No	3	75
Is the transport of general and infectious waste transported separately? (separate)		
No	4	100
Is personal protective equipment provided to waste handlers		
Yes	1	25
No	3	75
If yes; What kind of Provided personal protective equipment is provided?		
No	3	75
Heavy Duty Gloves	1	25
The waste separated before it is treated?		
No	4	100
Is a waste treatment methods used?		
No	4	100
Is there an incinerator inside the hospital building?		
No	4	100
The appropriate waste disposal option within the health institution complex:		
Neither of these (private car collectors)	4	100

According to Table 3, observation checklist was used to document the status of medical waste management practices within departments and determine the extent to which they adhere to guidelines.

The table noticed that all staff nurses didn't separation of waste out inside hospital (100%). Regarding color coding of waste, color coding of waste was not practiced in all departments (100%), concerning type of waste storage containers are used at the waste generation point, the table revealed that 50% of departments used Yellow box, plastic garbage bin and Water Gallon. Regarding the container used for sharp tools and the correct bag for intravenous set, catheters, and tubes, all departments use Yellow box and plastic garbage bin (100%). Also noticed all departments (100%) discarded medical waste from the bin immediately when full. As regards type/design of the vehicle used to collect and transport waste from the source, 75% of departments use black trash bag. Only 25% transfer of medical waste during times other than work in the department. Regarding personal protective measures, we asked type of personal protection equipment they provide for their waste handlers and a checklist was used to confirm their availability and use by the waste handlers. 25% were found to provide personal protective measures (e.g. Heavy Duty Gloves). Concerning waste treatment and disposal, all departments (100%) have no an incinerator inside the hospital building, and no treat their wastes prior to disposal, also have their wastes collected by private collectors without any treatment.

Discussion:

The generator/incinerator of a hospital is responsible for ensuring proper disposal. Hospitals are ethically obliged to maintain a clean environment and proper handling of wastes in order to prevent pollution and infection within and near the hospital (Hayashi, 2000). In this context, the results of the present study revealed that most nurses were male, 53.3% of them were in age group 18-25years old, with the mean of 27.80± 7.97 years. 66.3% had nursing diploma. More than of them had experienced five years or less. 28 (30.4%) of participants attended a training on medical waste management. Regarding staff nurse's awareness level, the results of the present study showed that the majority of nurses have no awareness regarding health care waste management. This finding in disagreement with Wasee, Hassan, and Baba (2010) who reported that the better knowledge of the nurses could be attributed to the fact that they are being more involvement of nurses in hospital waste management by appointing infection control nurse who was responsible for health care waste management (Wasee et al., 2010). More than half of participants from various departments were aware concerning medical waste management. This result disagreement with Sehgal R. K. (2015) who report that awareness regarding the correct medical waste management were good among all the nurses' staff. The reason of that may be because provide frequent training programs to HW to enable them to be aware with HCWM. Our findings showed that, the good awareness regarding HIV/AIDS and Hepatitis B and C can be transmitted through medical waste among participants. this result in harmony with Sehgal R. K. (2015) who indicates that nurses have good awareness about the diseases spread by medical waste (Sehgal et al., 2015). The results indicate that less than half of respondents' equivalent to lack awareness concerning the guidelines provided for color-coding in workplace. These results are in contrast with Sehgal R. K. (2015) and Mathur V. (2011) Which revealed that correct color coding was known to a majority of respondents (Sehgal et al., 2015 - Mathur et al., 2011). Regarding the different practices conducted at Al-Wahda Hospital on Medical Wastes Management Practices. The findings of the present study revealed that all the nurses had inadequate practices in most area of waste management. These results are in contrast with studies done by Mathur V. (2011) and Sobah D. R. (2018). Which stated that majority of nurses had adequate practices in medical waste management. This may be due to that all nurses were practicing health care waste according to the rules. Regarding waste separation carried out inside the hospital, in present study, practices of separation of waste at point of generation were poor. This finding disagreement with study done by Bariya B. R. in India at 2017 revealed that 72.73% of visited health care settings in their study were practice of segregation of BMW at the site of BMW generation. The present study revealed that the hospital don't practices color coding properly. This finding in contrast with study done by Ngari W. N. in Kenya at 2009 revealed that color coding of wastes was practiced in all facilities. Regarding type of waste storage containers are used at the waste generation point, The findings shows that in different departments there are containers for handling medical wastes since half of nurses prove the availability of yellow box, plastic garbage bin and water gallon, and only 25% said there are plastic garbage bin. These results disagreement with study done by Ngari W. N. in Kenya at 2009 revealed that facilities used yellow paper bags for sharps and infectious wastes. This different may be because there was lack of harmony in the allocation of color codes for the different waste categories. Concerning type/design of the vehicle used to collect and transport waste, in our study the majority of departments had their wastes transported manually, while other 25% provided the waste handlers with vehicle to transport wastes.

This finding in harmony with study done by Ngari W. N. in Kenya at 2009 revealed that 12% of facilities provided the waste handlers with wheelbarrows to transport wastes, while 87.5% of facilities transported their wastes manually and putting the waste handlers at great risk of injury. Regarding the transport of general and infectious waste transported separately, in this study we observed that the infectious and noninfectious waste were found filled in same bins. These results agreement with study done by Bariya B. R. in India at 2017 revealed that there was mixing of different kinds of waste into the same BMW container. In our study, the majority of participant used personal protective equipment provided to waste handlers such as gloves and masks. Such result agreed with the findings of a study conducted in India at 2017. In the same line, our findings indicate that Al-Wahda Hospital does not treat its medical waste before disposal, and that it does not have an incinerator inside its building. These results in contrast with study done by Ngari W. N. in Kenya at 2009. It indicated that 54.2% of health care facilities treat their wastes prior to disposal and incineration was the only waste treatment method in use. In addition, we observed in our study that Al-Wahda Hospital collected their wastes by private collectors without any treatment. This agreement with study done by Ngari W. N. in Kenya at 2009. It indicated that facilities use the services of private collectors to dispose of the wastes and ash outside the institution's premises.

Conclusion and Recommendations

This study concluded that the awareness and practices about HCW management among nurses' staff in Al-Wahda Hospital was found to be very poor. This could be the majority of the respondents were not trained on ways of handling MW since the government do not provide experts to conduct those training programs like once per year or twice to HW ensuring MW are well observed. Based on the study results and conclusion drawn, the following recommendations were developed;

1) There is a need of health care personnel to be aware of the government medical waste management plan and handling procedures and implementing them. Since the awareness of HW can helps to educate patients and visitors of health facility hence better management of medical wastes.
2) Regular training programs and education to all employees to ensure the proper medical waste management practices. Since proper and frequent training develop awareness to health, safety and environmental issues, also it is important as it helps health workers to be familiar with the risks linked with poor management of medical wastes.
3) It is recommended that there is a need to separate wastes according to their types and identification of them by using symbols, like sharps needles separated from infectious and chemical wastes. In addition, ways for proper treatment of wastes to avoid side effects to the environment and community at large should be adopted.

References

Bariya B. R., Chauhan G.D., Jadeja A., Jain M. (2017). Assessment of Biomedical Waste Management Practices of Staff Nurses According to Newer Guidelines in a Teaching Hospital of Rural Vadodara, Gujarat. International Journal of Community Medicine and Public Health: 4 (10); 3922-26.

Baveja, G., Muralidhar, S. and Aggarwal, P. (2000), Hospital Waste Management – An Overview, Hospital Today, 5(9), 485-486.

Hayashi Y. (2000). Proper Disposal of Medical Wastes - Infection Prevention and Waste Management at Hiroshima city, Asa Hospital, Rinsho Byori;112:26-31.

India Ministry of Environment (2016). Bio-Medical Waste (Management and Handling) Rules. Government of India, New Delhi. Forest and Climate Change Notification. 1–37.

Jundihaibulah K. (2010). Managing the Health Care Solid Waste in Selected Districts of Punjab Pakistan, 26 (4): 795-04.

Liza E, Kim S, Rose G, Stephen B. (2012). Essential practice for infection prevention and control guidance for nursing staff. UK; Royal college of nursing, 20 Cavendish square, London W1G 0RN.

Manoj B, Mishra A, Gautam P, Changulani R, Shrivastava D, Neeraj S. (2011). Management of Biomedical Waste: Awareness and Practices in a District of Gujarat. National J Community Med.; 2 (3):452-6.

Shrestha D, Gokhe SB, Dhoundiyal A, Bothe P. (2017). A Case Study to Review Compliance to Biomedical Waste Management Rules in a Tertiary Care Hospital. Int J Community Med Public Health; 4:511-5.
Matee, V.E. and Manyele, S.V. (2016). Assessment of Sharps Waste Management Practices in a Referral Hospital. African Journal of Environmental Science and Technology (AJEST), 10, 86-95.
http://dx.doi.org/10.5897/AJEST2015.1939.
Mathur, V., Dwivedi, S., Hassan, M.A. and Misra, R.P. (2011). Knowledge, Attitude, and Practices about Biomedical Waste Management among Medical Personnel: A Cross-Sectional Study. Indian Journal of Community Medicine, 36, No. 2, 143-145. http://dx.doi.org/10.4103/0970- 0218.84135.

Ngari W. N. (2009). Assessment of Health Care Wastes in Nongovernment Health Care Facilities in Nairobi Province. Thesis, MPHsc. University of Nirobi. 1-82

Patil, G.V. and K. Pokhrel, (2012): Biomedical Solid Waste Management in an Indian Hospital: A case study. Waste Management, 25 (6):592-599.

Sehgal R., K., Garg. R., Dhot. P.S., Singhal. P. (2015). A Study of Knowledge, Attitude, and Practices Regarding Biomedical Waste Management among the Health-Care Workers in a Multispecialty Teaching Hospital at Delhi. International Journal of Medical Science and Public Health: 4;1540-44.

Silva, C. E., Hoppe, A. E., Ravanello, M. M. and Mello, N. (2005), Medical Waste Management in the South of Brazil, Waste Management, 25, 600 – 605.

Sobah D. R., Fakhry S. F., Mohamed H. A. (2018). Knowledge and Practice of Staff Nurses Related to Health Care Waste Management. Port said scientific journal of nursing: 5; 20-24.

Vera F. and Margardiariabu T. (2010). Assessing the Medical Waste Management Practices and Associated Risk Perception in Algarve Hospital Portugal.

Wasee, Q., Hassan, G., Baba, A., Kadri., S.M. and Nazi, K. (2010): Awareness of Biomedical Waste Management among Staff of the Government SMHS Hospital, Srinagar a Tertiary level hospital in Kashmir valley.14 (1):60-66.

World Health Organization (2006). Management of Waste from Injection Activities at the District Level: Guidelines for District Health Managers. Geneva, Switzerland.

World Health Organization (1999). Safe Management of Wastes from Healthcare Activities, Geneva: World Health Organization.

World Health Organization (2003). Newsletter; Health Care Waste Management, Geneva, Switzerland, (www.who.int).