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ASSESSMENT OF MEDICAL LABORATORIES WASTES MANAGEMENT IN BANI WALEED CITY

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Abstract: Due to the infectious and dangerous nature of medical waste, which poses dangers to public health and the environment, medical waste management is a global issue. The purpose of this study is to evaluate medical staff's knowledge of and conduct regarding waste management in Bani Waleed City's private and public laboratories. This study questionnaire that was conducted for samples. The questionnaire was distributed randomly in laboratories [governmental and private] among medical laboratory technicians, workers in the administration responsible for the laboratory, and cleaning workers. The SPSS-27 program was used to analyze the data and the results of this study showed that a distinction is made between types of medical waste through illustrative drawings on each type, this study revealed an improvement in the management of medical waste in most laboratories in the city of Bani Waleed and an increase in awareness among medical personnel of the types of waste, their risks, and their disposal, no training courses are conducted for workers on the use of sterilization devices. This study recommends the need to strengthen efforts to raise awareness of the importance of proper and safe management of medical waste. It is important to organize regular awareness and training workshops for all laboratory workers. The necessary devices and equipment should be provided to sterilize and treat medical waste before its final disposal. It is also necessary to provide intensive training courses for workers on how to use sterilization devices effectively to ensure that sterilization processes are carried out correctly and safely.

Keywords: (Bani Waleed City, laboratory workers, Medical laboratory, waste management)

Introduction

While the World Health Organization (WHO) and the European Union refer to it as "healthcare waste," several other countries, like the US, South Korea, and China, use the phrase "medical waste"[1].

Waste in general is any substance [solid, liquid and gaseous] that has no direct use and is permanently disposed of and the waste is considered hazardous if it has any of the properties of being reactive, flammable, explosive, radioactive, infectious , Sensitizing or bioaccumulating waste[2]. The term of" medical waste " covers all wastes produced in healthcare or diagnostic activities [3], and the World Health Organization [WHO] defines health care waste as any waste produce by hospitals and human and animal health facilities used for diagnosis, treatment or immunization these wastes are syringes, needles, sharp objects, bandages, blood samples ,body parts, chemical, radioactive material[4]. Medical waste is restricted to hazardous, infectious, and other wastes produced by healthcare facilities, including clinics, dentist offices, and medical laboratories[5], medical waste, which includes sharps and infectious waste, makes up 35% of all waste generated in hospitals; the remaining 65% of waste is considered non-infectious[6]. Medical waste is classified as hazardous waste because improper management can have a detrimental effect on workers in healthcare facilities, society, and public health. Lack of

knowledge about the seriousness of medical waste may further exacerbate this problem[7]. Medical waste management is seen as a critical issue globally, despite the fact that it makes up a comparatively small fraction of the total trash created in a society [8].One of the many difficult and complex problems that humanity faces as the world's population grows and the need for medical services rises is medical waste management [9], and the entire risk management policy, which addresses clinical waste, should be consistent with the disposal of medical waste. Employees ought to be trained on proper waste handling, storage, segregation, and disposal techniques [10].

The World Health Organization [WHO] states that the waste generated from healthcare activities consists of about 75-80% general waste [non-hazardous] relating to food products and residues of administrative activities; in general, this type of waste is similar to household waste, and 10-25% medical waste or hazardous waste [12–13]. Due to its infectious and hazardous nature, which can pose risks to the environment and public health, medical waste management is extremely important [11]. In the past, medical waste were often mixed with household and disposed in municipal solid waste landfills [14]. Ineffective medical waste management increases the risk of blood-borne infections for medical personnel, scavengers, and municipal workers in general. There is also strong evidence that medical waste can transmit HIV, HBV, and other infections through injuries from syringe needles and other sharp objects contaminated with bodily fluids. Unsafe injection practices continued to be the cause of 315,000 HCV infections, 1.7 million HBV infections, and 33800 new HIV infections in 2010 [15]. According to World Health Organization [WHO] publications, national laws, regulations, and legislation pertaining to the management of medical waste are lacking in many developing nations. One of these countries is Libya, where the issue of medical waste in terms of definitions, collection, treatment, and disposal has not been addressed by environmental regulations; No clear guidelines were provided [16], and there is also a lack of medical supplies and inadequate oversight of waste disposal [17].

Classification of Biomedical Waste:

The World Health Organization's statistics criteria state that the majority of medical waste produced during healthcare operations is typical and innocuous, with only 15% of it being poisonous or dangerous [15]. The region's economic and health conditions, for example, have a big impact on the statistical standards. There is a spectrum of variation in the percentage of hazardous and toxic medical wastes. By classification, recyclable medical waste and household garbage can be separated from ordinary and innocuous medical waste.

Infusion Betties, paper packaging, noodles, scalpels, and other plastic, metal, paper, and glass items are among the recyclable medical waste items [19].Hazardous and non-hazardous wastes are two categories into which health care wastes are divided [18].

Medical waste management

Medical waste management includes all the actions required for this waste's segregation, collection, transportation, and treatment in order to recover any recyclable or valuable fraction before its final disposal at a landfill or before incineration [20]. Waste management comprises a variety of activities from the generation of waste to its final disposal [11]. Limiting the amount of waste that needs to be disposed of and creating a circular economy are two examples of how well the waste management process works [21].

Study Significance

Because medical waste can pose concerns to the environment and public health, it must be managed carefully, This study is significant since it clarifies the state of medical waste management in the city of Bani Waleed in particular on government and private laboratories and highlighting the problem of waste to reach results, recommendations and proposals that contribute to the development of awareness and awareness in the administrative leaders in those government hospitals and laboratories in particular of the importance of medical waste management in occupational health and safety and what damage it causes. This study is also considered important as it enables the use of the information and recommendations contained in the management of medical waste in health facilities, which in turn can help reduce the risks to which health care workers are exposed. The results of this study can enable health facilities and the competent authorities in the city of Bani Waleed through the Ministry Health are able to address the identified gaps and promote sound management of medical waste.

Study Objective

The purpose of this study is to evaluate medical staff's knowledge of and conduct regarding waste management in Bani Waleed City's private and public laboratories; Creating a holistic vision for the healthcare waste management system in the laboratories of Bani Waleed City was the study's specific goal.

Study Area

The city of Bani Waleed is located in the north-western part of Libya, about 180 kilometers south-east of the capital, Tripoli [66].The geographical area of Bani Waleed is approximately 19.710 square kilometers [7.610 square miles] [22], and the population of Bani Waleed is 124,000 people [23] . Bani Waleed occupies a central position within Libya. Its location along the main transport routes makes it a natural meeting point for travelers and traders traveling between the eastern, western, and southern regions of the countries.

Materials and Methods

This study was a questionnaire that was conducted with 72 samples. The questionnaire was distributed randomly in 18 laboratories (governmental and private) in the city of Bani Waleed, among medical laboratory technicians, workers in the administration responsible for the laboratory, and cleaning workers. The questionnaire was divided into seven sections. Section [1] was designed to measure waste production within the medical laboratory. Section [2] Separation of medical waste. Section [3] Collection of medical waste inside the laboratory. Section 4: Transporting waste inside and outside the city. Section [5] Occupational safety and security requirements. Section [6] Requirements for the Final Disposal of Medical. Section [7] Personal protective equipment. The questionnaire consists of 40 questions and three answers collected from those registered [yes, no, sometimes]. The questionnaire was distributed during the period from January 1 to January 20, 2024. It was analyzed by the Statistical Package for the Social Sciences [SPSS-27], and the results were expressed as numbers and percentages. Respondents to each question.

Result and discussion

Section One : Waste Production inside the Medical Laboratory

Figure.1 [Q1] ,the results obtained from the questionnaire showed that 39.71% of laboratories produce infectious medical waste, while 35.29 % of laboratories sometimes produce infectious waste and 25.00 % do not produce infectious waste , this indicates that there is insufficient knowledge of workers about this type of waste. In Figure.1 [Q2] ,the

results showed that some medical laboratories produce highly infectious pathological waste, while 79.41% do not produce this type of waste. This is due to the fact that most of the city's laboratories do not deal with human tissue samples. In Figure.1 [Q3, Q4, Q5], the results of the questionnaire showed that most laboratories produce acute medical waste and chemical and liquid waste.

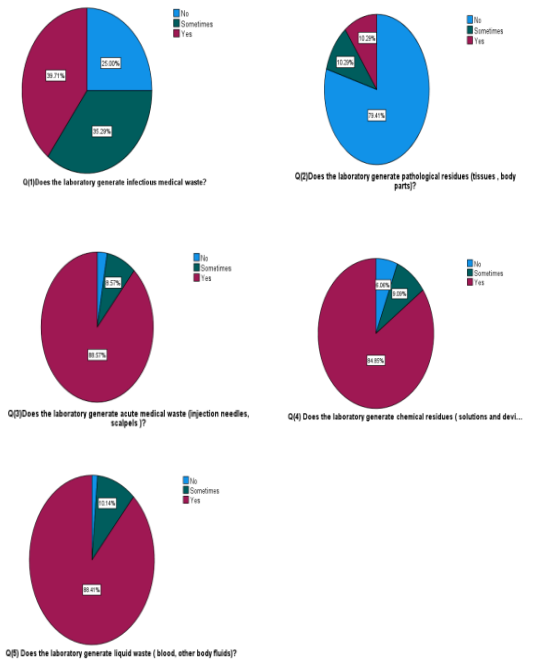
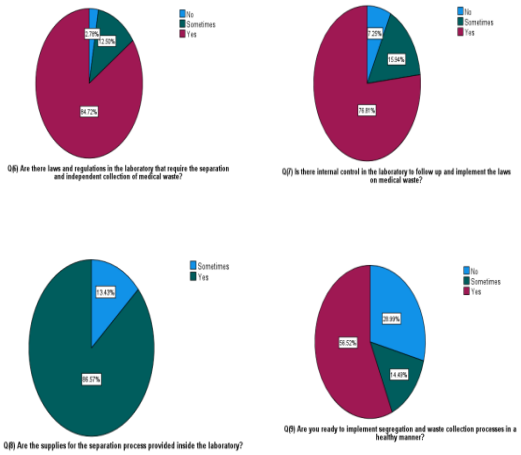


Figure.1: Waste Production inside the Medical Laboratory

Section Two : Separation of Medical Waste

Figure.2 [Q6, Q7, Q8] The results of the questionnaire showed that most laboratories have laws and regulations that require the separation of waste according to the laws of the World Health Organization and there is internal control and separation requirements are provided. Figure.2 [Q9] The results showed that most workers in laboratories apply separation processes and collect medical waste to avoid the mixing of medical waste, while there are a few who do not do the required separation process. Figure.2 [Q10] the results of the study show that 54.10 % dispose of pathological waste among human waste, while 32.79 % do not dispose of it among human waste, Figure.2 [Q11] The results of the questionnaire showed that 77.27 % of laboratories dispose of chemical residues such as solutions and device operators within medical waste, while 15.15 % of laboratories dispose of chemicals separate from medical waste. This indicates that workers do not know enough about how to dispose of such waste. Figure.2 [Q12] The results of the questionnaire showed that 57.35 % of laboratories have containers and bags for medical waste of good specifications, while 25.00 % do not have these bags and containers of specifications [puncture-resistant ,leak-proof, etc.], Figure .2 [Q13, Q14] showed the results obtained from the questionnaire 53.73 % of laboratories dispose of liquids and waste resulting from tests in the sewage network, which violates the laws of the World Health Organization, and 43.48 % of these laboratories process liquid waste before disposal in the sewage system. Because harmful contaminants and germs are released into the environment, improper handling and disposal of medical waste can have an indirect negative impact on public health.



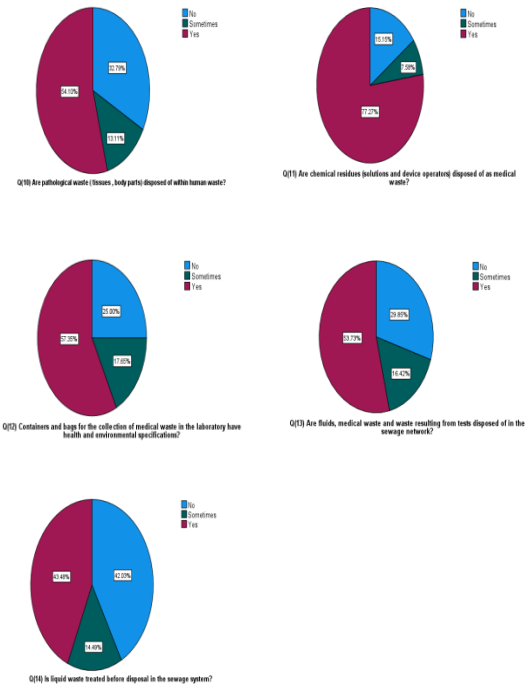
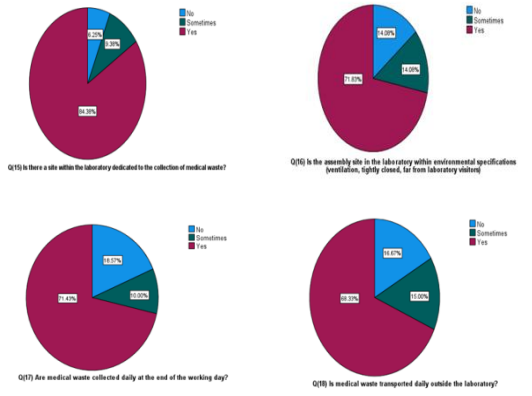


Figure.2: Separation of Medical Waste

Section Three : Collection of Medical Waste in the Laboratory

Figure.3 [Q15,Q16,Q17,Q18] The results obtained from the questionnaire showed that there are sites within the laboratory dedicated to the collection of medical waste within the environmental specifications. Medical waste is collected daily at the end of the working day. Figure.3 [Q19,Q20] The results showed that most laboratories have specialized workers to collect and transport waste within the laboratory and have knowledge and experience in the risk of medical waste.



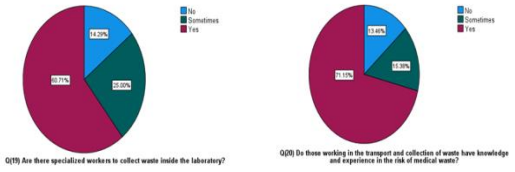


Figure.3: Collection of Medical Waste in the Laboratory

Section Four : Transporting waste inside and outside the laboratory :

Figure.4 [Q21, Q22, Q23, Q24, Q25, Q26, Q27] The results in most laboratories showed that the transfer of medical waste from the laboratory to the disposal site is not within the responsibility of the laboratory, and in most laboratories the waste is collected by a hazardous waste vehicle or a municipal car and it is collected periodically and regularly by the municipality or the private entity. A small percentage of laboratories that follow the final disposal of waste and that most of them treat the resulting infectious waste and distinguish waste through illustrative labels on each type .

Figure.4: Transporting waste inside and outside the laboratory

Section Five : Occupational Security and Safety Requirements in Medical Laboratories

We know that laboratories have several risks from the waste produced or from the errors of laboratory workers, as the results of the questionnaire were shown in figure.5 [Q28] 32.31 % of the waste collection team applies occupational safety conditions such as wearing protective clothing , while 32.31% do not apply occupational safety conditions. This may lead to infection and many diseases .In Figure.5 [Q29] , the results of the questionnaire showed that some medical laboratories use warning signs for containers and waste collection places. In Figure 3.1.5 [Q30] , the results of the questionnaire showed that40.85 % of laboratory workers were exposed to the risk of medical waste [needle sticks, wounds, infections] as a result of not separating the waste or having sufficient experience, while 40.85 % of workers were not exposed to this risk. In figure.5 [Q31], the results of the questionnaire showed 60.87 % of workers received training or educational courses on how to deal with medical waste, while33.33 % of workers did not receive any training or educational courses. In figure.5 [Q32, Q33], the results of the questionnaire showed that most workers in medical laboratories believe that imposing binding laws to deal with medical waste is unnecessary and that it is a problem that must be taken care of, while there are some workers who believe that it is necessary to impose binding laws to deal with medical waste. In figure.5 [Q34], the results showed that 54.93 % of workers consider the process of awareness and training of workers in the field of medical waste treatment to be necessary, while 33.80 % of workers do not consider the awareness process necessary .

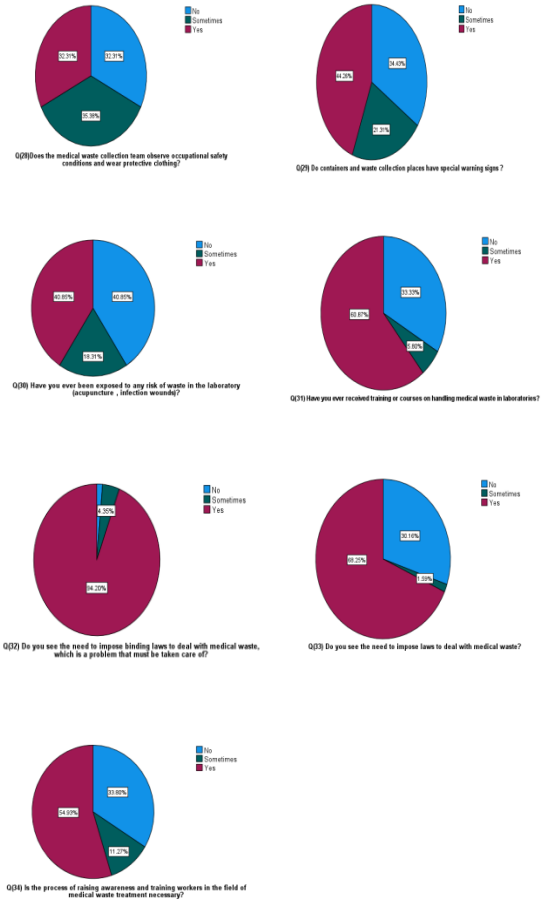
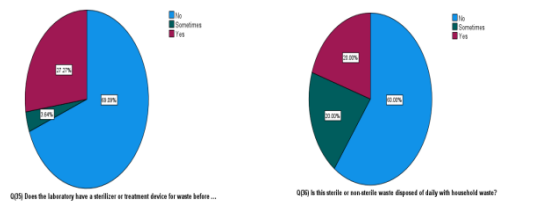


Figure.5: Occupational Security and Safety Requirements in Medical Laboratories

Section Six : Requirements for the Final Disposal of Medical Waste

Figure.6 [Q35, Q36, Q37] The results showed that most laboratories do not have sterilization or waste treatment devices, while a small percentage have such devices, but workers have not been trained on how to use them and these sterile or non-sterile wastes have not been disposed of as household waste.



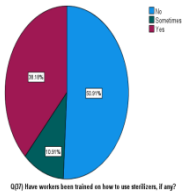


Figure.6: Requirements for the Final Disposal of Medical Waste

Section Seven : Personal Protective Tools

Figure.7 [Q38, Q39, Q40] The study showed that most laboratories have a policy for standard precautions and the provision of adequate supplies of personal protective equipment and are committed to using them to reduce and control infection.

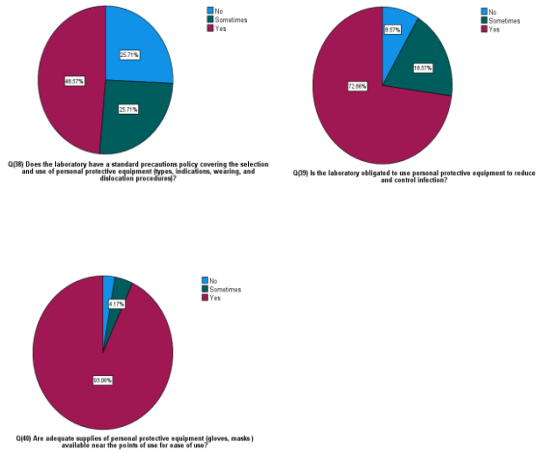


Figure.7: Personal Protective Tools

Conclusion

This study revealed an improvement in medical waste management in most Bani Waleed City laboratories, the results showed an increase in awareness among medical staff of the types of waste, their risks and how to dispose of them, in addition to providing the necessary bags and containers for the safe separation and collection of waste in most laboratories. It was also found that most workers have become committed to preventive measures, as well the system of transporting medical waste has proven its effectiveness and regularity in collecting it appropriately. According to the result of the questionnaire, workers received training and awareness courses in dealing with medical waste, However, the study showed that most laboratories do not have sterilization or waste treatment devices before the final disposal process, and no training courses were conducted for workers on the use of sterilization devices. In addition, it was found that the risk of exposure to medical waste such as acupuncture and others is still increasing despite the fact that they received training and awareness courses according to the result of the questionnaire.

Accordingly, healthcare institutions should pay more attention to policies related to the final disposal of medical waste, Proper management and handling of medical waste must be integrated into the regular training of workers in order to increase awareness more, reduce the risk of medical waste and achieve sustainable improvement in medical waste management.

Arabic section:

تقييم إدارة مخلفات المختبرات الطبية في مدينة بني وليد

علي اغنية ، هديل حسن، نسرين صلاح، مروه السريتي، إبراهيم الزيداني، فاطمة منصور

الملخص

تعتبر إدارة النفايات الطبية قضية مهمة في جميع أنحاء العالم نظرا لطبيعتها المعدية والخطرة التي يمكن أن تسبب مخاطر على البيئة والصحة العامة وتهدف هذه الدراسة إلى تقييم وعي وسلوك الموظفين الطبيين تجاه إدارة النفايات في مدينة بني وليد في المختبرات الخاصة والعامة و كانت هذه الدراسة عبارة عن استبيان تم إجراؤه لي72 عينة ، تم توزيع الاستبيان بشكل عشوائي في (18) مختبراً (الحكومي والخاص) بين فنيي المختبرات الطبية والعاملين في الإدارة المسؤولين عن المختبر وعمال النظافة.

وتم استخدام برنامج SPSS-27 لتحليل البيانات وأظهرت نتائج هده الدراسة أنه يتم التمييز بين أنواع النفايات الطبية عن طريق رسومات توضيحية على كل نوع وكشفت هذه الدراسة عن تحسن في إدارة المخلفات الطبية في معظم المختبرات في مدينة بني وليد وزيادة في الوعي لدى الكوادر الطبية بأنواع المخلفات ومخاطرها والتخلص منها وأنه لا يتم عمل أي دورات تدريبية للعاملين حول استخدام أجهزة التعقيم و أوصت هذه الدراسة بضرورة تعزيز الجهود لرفع مستوى الوعي بأهمية الإدارة السليمة

والآمنة للنفايات الطبية ومن المهم تنظيم ورش عمل توعوية و ورش تدريبية منتظمة لجميع العاملين في المختبرات و ينبغي توفير الأجهزة والمعدات اللازمة لتعقيم ومعالجة النفايات الطبية قبل التخلص النهائي منها و من الضروري أيضًا تقديم دورات تدريبية مكثفة للعاملين حول كيفية استخدام أجهزة التعقيم بفعالية لضمان أن تتم عمليات التعقيم بشكل صحيح وآمن.

Abbreviations and Acronyms

WHO: World Health Organization
SPSS: Statistical Package for the Social Sciences
HIV: Human Immunodeficiency Virus
HBV: Hepatitis B Virus
HCV: Hepatitis C virus

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