

Hazardous medical waste and its impact on society

Prepared by

Mohammed saeed shaya alqahtani

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Abstract:

The waste produced by healthcare facilities may have negative effects on patients' health. The purpose of this study was to determine how Saudi Arabian society is affected by hazardous medical waste. Because the study addresses a social issue—the impact of medical waste on society—a qualitative method is adopted. Ten earlier studies from books and journal articles make up the study sample. The scientific literature found in well-known databases and subjected to theme analysis serves as the study tool. The study concluded that improperly handled produced waste could pose a harm to the public, the surrounding environment, and the people managing it. It can also induce serious infections. There is a severe dearth of general knowledge about the topic among trash administrators, producers, and handlers. The prevalence of single-use disposable goods has led to an increase in the quantity and type of medical waste generated in healthcare institutions. The handling of medical waste has been a significant issue because of the possible harm it poses to both the environment and human health. The study recommended with several recommendations to achieve proper medical waste management and increasing social awareness in Saudi Arabia.

Keywords: Hazardous, medical waste, impact on society.

1. Introduction

1.1 General background

The World Health Organization (WHO) states that medical and healthcare waste constitutes a significant worldwide health concern on its website. Labs, research facilities, mortuaries, autopsy centers, blood banks, and nursing homes, among other healthcare facilities, produce waste. Of this trash, around 85% is classified as general and non-hazardous, while the remaining 15% may be radioactive, poisonous, or contagious. There are several possible risks: infectious materials can

transfer infections to other patients, medical personnel, and the public. Examples of these materials include contaminated blood, human tissues, and body parts. This can be especially troublesome when it comes to hospital-acquired drug-resistant infections. Sharp items have the potential to injure individuals, particularly those who scavenge on garbage disposal sites, which is a widespread habit in low-income nations. An estimated 16 billion injections are given annually, and a portion of needles and syringes are not disposed of properly, increasing the risk of infections and injury. Pollutants including dioxins, furans, and hazardous metals can be released into the air and ground because of inadequate incineration. Cytotoxic waste may cause cancer, teratogenicity, or mutagenesis. Both immediate and long-term health effects might result from radioactive waste (Borowy, 2020).

All garbage produced at medical institutions, research facilities, and laboratories associated with medical processes is referred to as health-care waste. Furthermore, it encompasses the same kinds of waste coming from small and dispersed sources, including waste generated during home health care (home dialysis, self-administration of insulin, recuperative care, etc.). "Waste generated by healthcare operations has the potential to have harmful consequences on health. The majority of this garbage is no more hazardous than ordinary home waste. Nonetheless, there are particular forms of medical waste that pose a greater risk to health. These comprise infectious waste, which accounts for 15%–25% of all trash generated in the healthcare industry. Sharps waste, body part waste, chemical or pharmaceutical waste, radioactive and cytotoxic waste, and broken thermometers make up less than 1% of this category.

Generally referred to as "nonhazardous" or "general health-care waste," between 75 and 90 percent of the garbage generated by healthcare providers is equivalent to household waste. Waste created during facility maintenance and packing may be included. It primarily originates from the administrative, culinary, and housekeeping

departments of healthcare institutions. The remaining 10% to 25% of medical waste is classified as "hazardous," meaning it might provide a number of concerns to human health and the environment. Any of the many different types of harmful bacteria can be found in infectious waste. Infectious waste pathogens can enter the human body in a variety of ways, including skin piercings, abrasions, cuts, mucous membrane penetrations, inhalation, and ingestion. The common means of transmission are bodily fluids.

One cause of hazardous biological waste creation is medical waste. The creation and disposal of medical waste is a crucial issue, particularly in populous and hygienic nations. Medical facilities, such as clinics, hospitals, and locations for diagnosis and treatment, produce wastes that are extremely dangerous and increase the chance of deadly illnesses infecting individuals (Padmanabhan & Barik, 2019). Hazardous waste poses a threat to people, animals, and plants in addition to contaminating the environment. The physical, chemical, and infectious characteristics of hazardous waste, as well as the possibility of harm during handling and disposal, can be used to categorize the waste. Workers in labs and hospitals are especially vulnerable to exposure to dangerous substances. There is mounting evidence that those working in the medical field, such as physicians, nurses, and medical personnel, may be exposed to hazardous waste in many forms (Samant et al., 2018). This study aimed to identify the effects of hazardous medical waste on Saudi Arabian society. It is anticipated that the country's expanding healthcare infrastructure, which is a result of rapid population growth and urbanization will increase demand for new facilities to treat medical waste, with the country producing 2.25 kg of waste per bed per day. With more than 50% of the medical waste produced, KSA is the biggest producer of garbage in the GCC. In addition to classifying hazardous medical waste in compliance with environmental and health regulations, the Ministry of Health (MOH) has released the Acute Hazardous Medical Waste Classification Guidelines. These guidelines are intended to create an appropriate

control method for processing, sorting, storing, transporting, treating, and safely disposing of hazardous medical waste.

1.2 Problem Statement

Medical waste encompasses all trash produced by healthcare institutions, labs, pharmaceutical manufacturing facilities, vaccine production facilities, veterinary treatment facilities, research institutes, and home nursing and treatment facilities. Medical waste is a serious issue that has an adverse effect on both the environment and human health. It comprises pathological, liquid, sharp, and solid waste, and employees in healthcare facilities are especially vulnerable to exposure. Hazardous waste has grown to be a significant problem in many nations, including India, within the last 20 years. It includes potentially harmful chemicals and biological agents that are employed on a regular basis. Daily waste production by hospitals and other high-risk medical facilities amounts to millions of tons. Furthermore, a lot of trash related to healthcare is gathered and recycled without being sterilized or disinfected, including saline bottles and disposable syringes. Even at low concentrations, these wastes have a negative impact on the ecosystem, and global management of them is still in its infancy. Consequently, it is essential to implement preventative measures for the safe handling and disposal of hazardous waste, to increase public knowledge of the need for ongoing vigilance, and to offer counseling or assistance on the right management of hazardous waste in medical institutions (Samant et al., 2018).

1.3 Research Questions

- What impact does hazardous medical waste have on society?
- What steps are being taken in Saudi Arabia to enhance medical waste management in order to create a sustainable society?
- How can the hazards associated with medical wastes be better understood in Saudi Arabia?

1.4 Research Objectives

- Identify the effects of hazardous medical waste on society.
- Identify actions that contribute to improving medical waste management to achieve a sustainable society in line with Vision 2030.
- Identify ways in which awareness can be raised about the dangers of medical waste in the Kingdom of Saudi Arabia and the importance of improving its management to preserve society.

1.3 Significance of Study

Scientific study on the health business and its sustainability mostly focuses on trash disposal and recycling as crucial tactics for health systems that encourage environmentally friendly practices because of the economic and environmental implications of waste. The primary goal of the United Nations Sustainable Development Goals (UNSDGs) is to guarantee a sustainable future for all people by balancing social, economic, and environmental development and enhancing system performance by attending to stakeholder requirements both now and in the future. Environmental problems for the health sector have become more severe due to a number of causes, including the current necessity to cut back on public spending, the establishment of strict rules, and the rise in environmental consciousness. As a result, creating and executing sustainable healthcare waste management calls for a thorough strategy including a variety of stakeholders, such as society, governmental and non-governmental organizations, and policy makers. Numerous research on health care management in healthcare facilities have emphasized the use of environmental strategies to cut down on waste and resource consumption. Few studies, nonetheless, have taken a comprehensive approach that takes into account people's interpersonal, organizational, and political efforts to manage waste sustainably. The primary objective of this article is to examine the state of the United Nations Sustainable Development Goals and align the nation with its Vision

2030. It does this by focusing on the waste management system in other nations as a case study of its implementation in Saudi Arabia. The Saudi government wants to attain environmental sustainability via improving waste management efficiency and protecting natural resources. In this sense, the nation offers a superb study environment for examining the degree to which sustainability objectives are implemented. Thus, the purpose of this article is to determine the main effects of medical waste on society's sustainability, as well as ways to enhance waste management and raise public awareness of the dangers associated with medical waste.

2. Literature Review

There are several previous studies that dealt with medical waste management and its effects on society in Saudi Arabia, and in this literature review, we will cite some of them to achieve the objectives of the study.

Alharbi et al.'s study from 2021 looks at how sustainable Saudi Arabia's hospital waste management system is. The system is under-equipped despite a large financial investment, which causes the system's burden to increase. Integrating social responsibility, employee knowledge, training, and promoting both the environmental and financial advantages may lead to sustainable operations. The research employed a multi-method approach, including semi-structured interviews, focus groups, policy analysis, and observation, with Saudi Arabia as the case study. According to the report, 27,000 tons of paper, plastic, food, glass, and metal are disposed of by Saudi government hospitals each year in landfills without being recycled. The absence of a legislative framework, squandering training, stakeholder cooperation, and social responsibility are among the challenges mentioned. The goal of the study was to comprehend how organizational structure, individual activities, and policy affect the effectiveness of waste management systems.

The goal of Omer and Alsubaie's (2017) study was to evaluate how primary healthcare facilities in Al-Baha, Saudi Arabia, handled their trash. Standardized questionnaires and in-person observations were used to gather the data. The investigation discovered that all centers produced contaminated sharp and pharmaceutical pressured wastes, with live attenuated vaccine vials and blood-infected articles being generated by 93.3% and 86.7% of facilities, respectively. Vials containing live and attenuated vaccines were produced in excess of 3 kg of contaminated sharps per day by eight (53.6%) of the sites. Seven (46.7%) and eleven (73.3%) of the facilities produced hazardous wastes contaminated with excrement and blood, respectively, generating 1 to 3 kg of wastes each day. Only one health facility was not properly segregating garbage, and two (13.4%) had no means of storing waste. Five (33.5%) centers did not perform any kind of disinfection, and seven (46.7%) and nine (60.0%) centers lacked a medical waste strategy or definition for the methods by which their medical wastes were to be collected and handled. The two most popular packing techniques for medical waste were plastic containers (18.8%) and bags (68.8%). The study came to a conclusion that insufficient medical waste management in basic healthcare facilities requires comprehensive interventions. A thorough set of guidelines for the management of hazardous waste is required, and personnel members must get thorough training on waste dangers and management. To address the issue, further study is needed to examine medical waste management and related concerns.

The Kingdom of Saudi Arabia, the largest of the Gulf states and one of the richest oil-producing nations, is confronting a modernization agenda to fulfill the expectations of its 27 million inhabitants as well as foreign professionals and laborers, according to a report by Balachandran (2014). A major focus needs to be on the healthcare industry, namely on waste caused by medical procedures. In order to give stakeholders a strategic framework to ensure better handling and treatment of medical waste, this study examines the state of medical

waste management in Riyadh. The framework will assist in halting the spread of illnesses or damage brought on by improper disposal of medical waste. Developing an effective waste management system requires knowing the precise amount of medical waste generated by healthcare institutions, such as general hospitals, medical centers, operating rooms, and labs. There is potential for the proposed framework to enhance Saudi Arabia's medical waste management, and all assessors have expressed favorable opinions about it. The framework will play a major role in improving the management of medical waste.

According to Abdelkareem et al. (2022), this thorough analysis looks at several approaches to medical waste treatment within the framework of the Sustainable Development Goals (SDGs). To find out how COVID-19 affected medical waste, a bibliometric analysis was done, and the results indicated a significant rise in publications in the last several years. The best method for handling medical waste, according to the findings, is thermal treatment with energy recovery, which includes pyrolysis, gasification, oxidation, and plasma gasification. To better understand the connections between medical waste management and the SDGs, further study is necessary, as the current body of knowledge on the effects of medical waste on the SDGs is inadequate. It is emphasized how important it is for nations to work together to solve medical waste management issues, particularly in times of emergency. In order to establish sustainable solutions that are in line with the global sustainability agenda, it is imperative that one comprehends the connections between medical waste management and the SDGs. To solve the issues related to medical waste management and help accomplish the SDGs, further study and international cooperation are required.

Medical waste presents serious hazards to patients, healthcare personnel, the environment, and public health, according to Al-Mubarak et al. (2022). To guarantee appropriate handling of medical

waste, governments have passed laws and implemented regulations. We examined the waste management strategy for Saudi Arabian primary healthcare facilities using a retrospective policy analysis. They performed a thematic analysis of documents using Walt and Gilson's framework for health policy analysis in order to examine the players, content, context, and process of the policy. The formulation of the policy was influenced by several contextual elements, such as accreditation, the Saudi Vision-2030, and the healthcare reform plan. A regional policy that was implemented around fifteen years ago served as the model for the policy. Important details pertinent to the unique setting of primary healthcare facilities were left out of the policy's wording. Stakeholder collaboration and training gaps made it difficult for the policy to be successfully implemented and, consequently, for compliance to occur. Further steps must be taken by the appropriate parties to guarantee the policy's sustainability and faithful execution.

According to this review of the literature, there is a lack of information about how to better medical waste management in order to prevent negative effects on Saudi society's health, environment, and society at large, as well as to raise public awareness of this problem.

3. Methodology

Study Type

The type of study is a qualitative study, where a qualitative narrative approach is used because the study discusses a social topic, which is the effects of medical waste on society. As well as, because of the study explores and provides deeper insights into real-world problems. Qualitative research helps generate hypotheses as well as further investigate and understand quantitative data. Qualitative research collects participants' experiences, perceptions, and behavior.

Study Approach:

The study approach is the Narrative approach. The study using secondary research method. The study is based on the analysis of ten

previous studies related to the subject of the study. These studies were obtained by searching databases using keywords.

Study sample:

The study sample is 10 previous papers from journal articles and books related to the subject of the study, obtained from popular databases such as Google Scholar, PubMed, and Science Direct.

Study instrument:

The study instrument is scientific materials published in popular databases such as Google Scholar, PubMed, and Science Direct and analyzed with thematic analysis.

4. Discussion and Findings:

Any solid or liquid waste produced during patient care in a hospital or clinic, during clinical diagnosis and pathology testing, or during medical research is referred to as medical waste. Sharps, non-sharps, blood, bodily fluids, sutures, surgically removed body parts, chemicals, medications, gadgets for medical use, and radioactive materials are all included. Worldwide, waste management is a touchy subject. Ignorance and poor management, particularly in nations with high populations, have brought about numerous environmental issues. Medical waste is produced when people or animals are treated, diagnosed, or immunized. This garbage falls into two categories: non-hazardous waste and hazardous waste.

During the management process, hazardous waste is further classified based on the possibility of infection and harm. Sharp objects (such as scalpels and tainted needles), infectious waste products tainted with blood, bodily fluids, bandages, and intravenous (IV) lines, and pathological waste consisting of blood samples, microbiological cultures, and anatomical body parts are among these categories. Radioactive garbage, polyvinyl chloride (PVC) plastic, and mercury-containing devices are examples of additional waste. The number of medical institutions, the growing global population, and the widespread

use of disposable medical equipment all contribute to the increasing amount of waste generated. Furthermore, affluent nations produce more garbage than poor nations because they utilize disposable equipment more frequently due to safety concerns and the application of cutting-edge technical methods. Because they have access to enough resources, developed nations have created appropriate rules that are simple to implement. However, because of their limited resources, developing nations are far less equipped to put these ideas into practice. One of the most important stages of waste management is trash segregation. The main cause of poor waste management is a nation's poor economic situation, as governments cannot afford to support or pay clinical waste management adequately. Moving containers or bags to temporary storage comes following healthcare waste segregation (Khan et al., 2019).

Working at a hospital has a considerable risk. Apart from the hazards inherent in every organizational structure, there are also dangers associated with the core of its operations, such as the existence of viruses, the usage of delicate technology or gadgets, and managing stress, pain, and death. Waste from healthcare operations poses different risks to patients, employees, and the environment. During exceptional circumstances, such as during epidemics, the output of healthcare wastes (HCWs) increases. Hospitals play a significant social and economic function. Waste from healthcare operations poses different risks to patients, employees, and the environment. HCWs are produced throughout the healthcare delivery process; a significant portion of them is incorporated into household garbage (packaging, kitchen waste, green waste, etc.) and another category that, according to its nature and typology, may pose a risk to public health and the environment. Waste at danger of infection, such as stinging waste, sharp waste (such as needles, blades, scalpels, etc.), and garbage at risk from chemicals are all included in this category. We can list 16,000 hepatitis C (HCV) infections, 66,000 hepatitis B (HBV) infections, and roughly 1,000 human immunodeficiency virus (HIV) infections as

among the health effects of HCW mismanagement on a global scale. These infections result in about 1,100 deaths and significant disability. In terms of environmental concerns, they include air pollution from biological and hazardous sources both within and outside the healthcare facility. Heavy metals like mercury, cadmium, and other biomedical wastes that pose a threat to the food chain can contaminate water supplies and soil. As a result, the hospital is a complex building that produces a wide range of dangers; it is a universe where risks and care are coproduced. Because of the nature of this waste, the process of managing medical waste aims to create a path for the management, mitigation, and eradication of biological and chemical issues. At every stage of its disposal, HCW may be the cause of various dangers.

Infectious or biological, traumatic or physical, chemical or poisonous, or psycho-emotional are the primary dangers. People who treat HCWs are exposed to infectious pathogens through a variety of channels, including air, direct skin contact, and skin penetration, according to the review conducted by Hossain et al. *Pseudomonas* spp., *Lactobacillus* spp., *Staphylococcus* spp., *Micrococcus* spp., *Kocuria* spp., *Brevibacillus* spp., *Micro bacterium oxydans*, and *Propionibacterium acnes* were among the microorganisms found in various HCWs, according to a study done in South Korea to look into the types of microorganisms in these wastes and describe their survival rates.

Health concerns were created by poorly managed HCW for patients, medical staff, the public, and the environment. Indeed, the destruction of flora and fauna as well as infection and contamination of groundwater may result from this mismanagement. Sharps disposal systems were among the insufficiently designed and poorly maintained systems, and HCW disposal facilities were not readily available or of high quality. The risk is higher when HCW is disposed of alongside regular trash since waste pickers, waste recyclers, cleaners, and waste collectors might all contract diseases from this practice. Sharps were a

big problem in the community since they caused harm to health care workers both inside and outside the home. A number of illnesses that fall under the category of infectious risk are caused by HCW. This danger is thought to pose the greatest threat to the environment and the community, according to many research. People who felt at danger for diseases brought on by HCW were more likely to report an unfavorable incident. Other major challenges would be connected to medical and care expenditures, lack of focus, anxiety and emotions before and after laboratory testing, and the likelihood of pathogen transfer through wounds as a result of inoculation.

One major issue was injuries caused by used needles and syringes discovered in public places. Since the user is often unknown, parents and medical professionals were worried that someone who carried an infectious disease would have thrown away the needle. The parents were rather anxious because they believed there was a chance of infection, even though there was actually very little of one from such an accident. In this case, the main pathogens to take into account are HIV, HBV, and HCV. Despite the grave health concerns, it is typical for the impoverished in some developing nations to gather some trash (such as syringe needles, saline bags, and blood bags) to sell. Research has indicated that the frequency of disease is higher among garbage workers than among hospital staff. Because of their careless handling, waste handlers contracted common diseases like cholera, typhoid fever, hepatitis, TB, pneumonia, diarrhea, and skin infections.

One-two percent of reports at home and in the community were related to broken medicine bottles, which are regarded as troublesome by the community and belong to the HCW. Broken glassware created cuts that made it possible for microorganisms to enter through the non-intact skin, increasing the risk of illnesses like tetanus. Respondents selected it as one of the illnesses they associated with HCW. Despite the tiny number of individuals impacted, removing avoidable risks from HCWs should be the goal of guaranteeing a safe and healthy

atmosphere. In health facilities, all of the load is regarded as contaminated or possibly infectious when HCW is combined with ordinary garbage. Therefore, before being disposed of in the ultimate manner, these wastes should be treated to reduce environmental concerns.

Since hospitals and other healthcare facilities are typically located in the middle of cities, medical wastes might pose a risk to the public. The environment and human health will suffer as a result of improper garbage management. Improper management of the produced waste can lead to serious infections and pose a harm to the public, handling personnel, and surrounding environment. Medical trash used to be often disposed of in municipal solid waste dumps together with domestic garbage. The PME in Saudi Arabia and the Ministry of Health have been pushing for more systematic and strict waste regulations in response to growing public concerns about the inappropriate disposal of medical waste. Recycling and waste minimization are currently underappreciated. There hasn't been a prior or continuing program on waste minimization, which leads to the disposal of large volumes of medical waste. Prior to final disposal, efforts must be done to minimize and recycle medical waste, particularly the large number of medical PVC wastes and plastics that are not contaminated or sick. In the near future, other conventional waste treatment methods will no longer be accessible, therefore incineration combined with emission control and microwave irradiation will become the main approach for treating medical waste. Thus, it is important to keep a constant eye on hazardous materials like dioxin emissions from medical waste incinerators in order to minimize dangers to people and the environment. To handle medical waste at Riyadh's hospitals more effectively, alternate treatment options like plasma arc should be investigated as alternatives to burning. Almost all of the medical institutions under investigation support Group D waste segregation, particularly with regard to sharp wastes. Nevertheless, the other categories of waste—which are often gathered via the municipal

collection system and treated without regard for recycling—get little attention. Workers manually gather all garbage, which is subsequently moved to the on-site storage area utilizing open carts. Patients and visitors may be contaminated as a result of this practice. Because of their location and circumstances, all clinics' on-site storage containers are in terrible condition. Within the medical facility buildings, these containers are positioned close to the main thoroughfares. In addition, all bodily waste should be disposed of improperly as hazardous waste. A thorough analysis of the amount of body parts produced at medical institutions must also be conducted.

The entirety of the garbage produced by healthcare institutions throughout the provision of healthcare is referred to as medical waste. It is produced as a result of animal or human immunizations, patient diagnosis and/or treatment. Potentially dangerous germs that might infect hospital patients, medical personnel, and the general public are present in health care waste. The subset of medical waste that potentially could transmit an infectious disease is termed infectious waste. The following waste should be classified as infectious waste: sharps (needles, scalpels, etc.), laboratory cultures and stocks, blood and blood products, pathological wastes, and wastes generated from patients in isolation. Medical wastes can also include chemicals and other hazardous materials used in patient diagnosis and treatment. The bulk of the waste generated by most health care facilities, however, include; municipal solid waste as paper, cardboard, plastics, metals, glass, food waste, and wood. Medical waste is special concern because of the potential hazards from pathogens that may be present or from hazardous chemicals.

There are over 32 million people living in Saudi Arabia, and the amount of garbage produced by medical institutions is constantly rising. An essential first step in medical waste management and disposal systems is the assessment of medical waste (MW) generating rates in hospitals. In the Eastern Province (EP), the average MW output

per hospital was determined to be 640.74 (± 0.59) tons/year. According to the study's findings, each health facility produced an average of 0.598 (± 0.119) tons annually. Furthermore, the average daily production of milliwatt-hours (MW) per patient is 1.66 kg/patient, and the computed average MW generation rate is 0.51 kg/bed/day. The EP's estimated daily MW production is 5781.9 tons. Furthermore, it is standard procedure at all hospitals and healthcare facilities in the Saudi Arabia to separate solid waste from municipal wastewater (MW) and then gather it all for ultimate disposal in a non-engineered landfill run by privately owned and permitted businesses. Research suggests that the plastic portion of medical waste be autoclaved at the collection location and then used as fuel in waste-to-energy plants or as an alternative fuel in the cement industry.

On September 15, 2021, Saudi Arabia released a new waste management law. The purpose of this regulation is to control the safe disposal of trash as well as other associated operations, including import, export, transportation, segregation, and storage. The Municipal Solid Waste Management legislation, which was adopted by Royal Decree No. M/48 of 2013 is replaced by this legislation. To improve the environment and save costs, all parties involved must recycle, recover resources, and guarantee safe disposal.

5. Conclusion

Medical waste is any solid waste that is produced from healthcare industries, such as hospitals, emergency rooms, laboratories, dental clinics, and pharmacies. Medical waste produced by healthcare facilities includes a wide range of substances such as sharp objects, syringes, human tissues, blood and urine waste samples, medical waste, chemical waste, radioactive waste, plastics, and disposable devices used in research and diagnostics.

The current waste generation rate of medical waste in the eastern region is approximately 2.1 million tons per year. The expected

medical waste generation is forecasted to reach more than 3.3 million tons per year by 2030. Improper waste management will result in negative impacts on both human health and the environment. The generated waste, if not properly managed, can cause dangerous infection and poses a potential threat to the surrounding environment, persons handling it as well as to the public. The general awareness on the subject is very much lacking on part of managers, producers, and handlers of waste.

The generation of medical waste in health care facilities has been increasing in quantity and variety, due to the wide acceptance of single-use disposable items (e.g. gloves, plastic syringes, medical packages, bedding, tubing, IV bad and containers). The management of medical waste has been a major concern due to potentially high risks to human health and the environment. In the past, medical waste was often mixed with household waste and disposed off in municipal solid waste landfills. In recent years, increased public concerns over the improper disposal of medical waste have led to a movement to regulate the waste more systematically and stringently by the ministry of health and the PME on Saudi Arabia.

6. Recommendations

Waste segregation systems that are both effective and efficient have to be created and put into place. Clear standards, strict enforcement, and training are necessary to establish proper segregation.

All healthcare institutions should implement an appropriate sharps management program. This would mitigate much of the danger of disease transmission via clinical waste. The first objective for medical waste management in hospitals is the appropriate isolation of these items in stiff, puncture-proof containers that are then closely watched for safe handling and disposal.

Waste must be collected and transported securely both internally and externally if the benefits of segregation are to be realized. Any management plan should also take into consideration the very genuine concern of hospital managers and municipal officials to prohibit the reuse of clinical devices, containers, and equipment after disposal.

Health care facilities should have explicit plans and policies for the appropriate management and disposal of wastes in order to guarantee consistency and clarity in these management practices. They must be included into regular staff training, ongoing education programs, and hospital management assessment procedures for staff and systems. By providing appropriate personal protection equipment, knowledge, and training, you can guarantee worker safety. To guarantee that workers, physicians, laborers, and rag pickers all understand the hazards that wastes represent, how to protect themselves, and how to handle wastes (particularly how to properly separate), sufficient education and training must be provided to all personnel. Provide a system for the secure disposal of waste in both public and private hospitals.

Ensure that the Ministry of Health, PME, and other relevant organizations work together effectively to manage and dispose of medical waste. use social media to raise public awareness of the dangers of hazardous medical waste because it is widely used in Saudi Arabia.

An effective method for determining the origins, components, and rates of creation of waste in a medical facility is a medical waste audit. Information on waste reduction and handling procedures, effective segregation, "over classification," regulatory compliance, and expenses can also be obtained through an audit. A separate location distant from the public should be set up for the storage of clinical waste. Information on the dangers associated with healthcare waste management procedures must be shared with the general public.

The haste with which clinical waste is being burned as the final answer to an ill-defined problem is unfair to the environment, public health, and poor nations. Other treatment processes, including as autoclaving, hydroclaving, microwaving, and chemical disinfection, carry less danger when treating segregated wastes. However, these treatments primarily impact employees and, if not done correctly, can contaminate water sources rather than the air. Selecting treatment technologies should be based on a thorough understanding of the waste stream that has to be controlled and the intended outcome of the treatment process. In order to accomplish the ultimate aim, technology should be integrated into the management system and tailored to the specific circumstances, not used to replace it. An alternative to burning should be investigated: plasma arc technology.

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