

## REVIEW ON ENVIRONMENTAL EFFECTS OF HEALTH WASTE IN HOSPITALS

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### ABSTRACT

*This review involved effect of health waste in hospitals on environment, Non-hazardous waste is generally 85% of the total amount of waste from healthcare activities. The remaining 15% are hazardous materials that can transmit infection or be toxic or radioactive. An estimated 16 billion syringes are given each year worldwide, but not all syringes and needles are disposed of properly after their use. Healthcare waste is sometimes burned, and this incineration may produce emissions in the form of dioxins, furans, and other toxic air pollutants. There is no doubt that the problem of environmental pollution is closely related to the means of development. Environmental pollution is one of its biggest complications despite the maximum benefit that is achieved for everyone from technological development, and what is meant by environmental pollution in general is that change that may occur in the natural, chemical and biological characteristics of the environment in which a person lives, which causes very harmful effects on human health.*

**Keywords:** *medical pollution, chemical pollution, toxic, contamination, environment, waste.*

### I. INTRODUCTION

Health care activities protect and recover health and save lives. But what about the waste and by-products that it produces? of the total amount of waste from health care activities, the percentage of general non-hazardous waste is 85%, compared to household waste. The remaining 15% are hazardous materials that can transmit infection or be toxic or radioactive. Among the modern means of development, of course, is medical progress in all fields in order to preserve human health, fight various diseases, first aid and other means of modern medicine, and the development of surgery, radiology and other medical fields, and no one denies all of the above. But there is a negative side to progress in medicine and its procedures, which is pollution of the environment with various medical pollutants that may lead to serious and fatal damage to humans in most cases.

**Health Pollution:**

Inside health institutions with facilities and during the care of patients staying in the accommodation departments and patients visiting outpatient clinics, all this results daily in very large quantities of waste, which contain: Medical waste such as needles, syringes, cotton, gauze, and the remains of samples contaminated with fluids and blood of patients, pharmaceutical and chemical wastes, and sometimes radioactive waste And the waste from operations of human and other organs by 20%, and the rest 80%, it is waste and general garbage from the remains of food, food, cans, papers and others produced by patients, medical staff and health facility workers.

**Biological Waste**

This type of waste is known to be more dangerous than any other type of waste because it may cause harm to individuals and the environment in general., Since these wastes come from the patient, they may contain pathogens such as bacteria, viruses, fungi, etc.

**Medical waste**

All materials used for diagnosis or for patient care inside or outside the health facility, and in the event that they are contaminated with the blood and body fluids of the patient, directly or indirectly, and in the event that the patient has a contagious disease or not and is intended to be disposed of and disposed of as waste is considered among the dangerous medical waste and must be disposed of by means The food and papers that patients consume during their periods of care are excluded from this.



**Fig(1): Medical Waste**

## Health damage to medical waste

Health damage to medical waste varies with the different types of medical waste, and we will mention the damages of each type of medical waste separately in the following paragraphs:

**1- Health damage to infectious and acute waste:** Infectious and acute medical wastes may contain various and large quantities of disease microbes.

**2- Chemical and pharmaceutical waste:**

Many of the chemical and pharmaceutical wastes used in health institutions are among the sources of harm to workers and workers and the surrounding environment, some of them are toxic chemical substances and substances that are new to cancers and mutations in the human cell and wildlife, in addition to the presence of other chemical substances that are incendiary, inflammable and explosive.

Quantities of chemical and pharmaceutical materials may be small when used, but large quantities indicate the presence of materials whose expiration date has expired or have not been used due to the desire to use them.

**3- The remnants of some chemicals:** cause toxicity due to exposure to them in large quantities in a short period of time, such as disinfection and sterilization materials, or when exposed in small quantities to them for long periods of time, such as mercury. Exposure may be due to absorption of the skin or mucous membranes, or by inhalation or swallowing. Wounds of the skin, eyes, or mucous membranes of the respiratory system may be challenged by the scattering of incendiary, flammable and highly explosive chemicals (such as the compounds of formaldehyde used in sterilization and preserving tissue samples. One of the most common wounds that challenge the skin due to these residues is the burning.

The disposal of chemical residues into the public sewage network (sewage) may lead to vital environmental damage due to the inability of sewage treatment plants to eliminate and dispose of these materials compared to the ease with which microbes are disposed of. Of the antibiotics and drugs used to treat cancerous diseases, cytotoxic drugs, which have the ability to kill the existing microorganisms necessary for these systems. As well as the possibility of mutations and distortions of the surrounding organisms, and the presence of large quantities of liquid medical wastes resulting from hospitals mixed with heavy metals remnants such as mercury, phenol compounds and its toxic derivatives and some products of sterilization and disinfection materials, which also contribute to destabilizing these systems.

**4- Geno-toxic Waste:** Exposure to drugs used for chemotherapy treatment of cancerous diseases when preparing them, giving them to patients, or when disposing and disposing of them may cause harm to health workers due to the ability of these substances to kill human cells or cause deformities in them.

The methods of exposure differ from them through inhalation of gas or the flying dust of those drugs, direct skin absorption, or ingestion of foodstuffs contaminated with these medicines or their residues, or due to both handling and the weakness of the process, such as using the mouth to withdraw fluids by a burette, the exposure is created by contamination with fluids and secretions of the body of treated patients. With these medicines, there are large quantities of these medicines in the urine and stool of patients during the first days of treatment.

**5- Radioactive residues from chemotherapy:** The toxicity of drugs used in chemotherapy is very high. Most of them affect the DNA of cells. Experiments have demonstrated the ability of these substances to form arcinogenic carcinomas and strange mutageni. These drugs are considered to be irritating to local cells and tissues after exposure to them in the skin and eyes and may cause other symptoms such as headache, nausea, and some skin changes and abnormalities.

The severity and severity of diseases caused by exposure to radioactive medical waste depends on the type and amount of radiation exposed to it, ranging from simple symptoms such as headache, dizziness and vomiting to the most serious symptoms, and there is a great similarity between pharmaceutical medical waste from cancer treatment drugs and radioactive medical waste due to the effect of the two on the content. The genetic genetic of cells, as dealing with sources of active radioactive materials in the diagnosis and treatment of some diseases may cause greater damage than expected from the destruction of human tissues and cells, so caution and extreme care when dealing with these materials is very necessary.

As for the damage of less active radioactive waste, it may arise due to contamination of the external surfaces of the tools used, or due to poor storage of these materials. As for the people most vulnerable to this type, they are technicians of the radiology departments and do not forget the cleaning workers and workers in these departments.

### **Infectious and acute waste in community health:**

Health workers, especially nursing staff, are the most vulnerable to infectious blood viruses such as HIV / AIDS through needles and syringes contaminated with the blood of patients. Also, technicians and medical staff assisting and those working in collecting, transporting and disposing of waste in hospital are vulnerable to these infections and workers in public garbage dumps.

### **Types of medical waste:**

#### **1- Radioactive chemical waste:**

It includes the remnants of x-ray rooms, specialized laboratories, and radioactive solutions used in medical analyzes in X-rays, especially radioactive iodine, etc., and these residues may be radioactive materials with a short half-life and may have a long half-life and are of great danger to human health and the surrounding environment. with it.

**2- Ordinary waste:**

It is a type of waste that does not pose any danger to human health, it is the waste consumed in hospitals such as papers and empty bottles containing non-hazardous materials, some plastic materials, empty cans, some remnants of ordinary non-dangerous medicines and the remnants of disinfectants, for example, all of which are waste Ordinary, non-toxic or harmful, these are no environmental fear.

**3- Hazardous and Toxic Waste:**

It is extremely dangerous as it includes the remnants of surgical operating rooms from surgeries and includes excised human organs that contain disease of course, body fluids from the impact of operations as well, and blood resulting from operations as well, which may contain many diseases, and this also includes laboratory residues of analysis fluids and the remains of samples that are used In analyzes

**4- Materials and Chemical Waste:**

In addition to the products of chemical reactions that are received after the results of the analyzes are known, all of them are extremely dangerous wastes, and such wastes should not be treated as ordinary wastes, but rather they must be placed in special sealed containers and a special treatment is treated for disposal. This is a good medium for the growth of germs or as a special farm for their reproduction and then spreading various diseases to the innocent outside world from a place that seeks to eliminate these diseases in particular. One of the dangers of laboratory and medicinal materials also if they are thrown with regular waste is to change their composition by changing the environment in which they are, which leads to a change in their composition and their transformation from ordinary materials to toxic substances that are very dangerous to human health and the environment. Therefore, care must be taken in treating it in ways that limit its spread to the external environment.

**5- Contaminated waste:**

They are the waste produced from surgical supplies, such as contaminated dressings that have been consumed and must be disposed of, and the clothes belonging to patients that are worn in operating rooms, for example, and the doctors' gloves that they use in surgery and then received after that, contaminated cotton, plastic needles, enemas and other contaminated wastes in themselves that are contaminated. It may constitute a source of infection in the event that a normal healthy person is exposed to it in one way or another, and thus it is a source of severe danger if it is not handled with great care.



**Fig(2): Biological Waste**

#### **Treatment Methods of hospital waste :**

Medical waste needs special methods in its treatment, as the state cannot benefit from it and recycle it as is the case with regular waste, as it is in fact a problem in developed countries, and treatment methods differ according to the type and quantity of these wastes, and from these methods:

- 1- **Burial:** It is considered one of the temporary methods that the third world countries use in disposing of medical waste. It is a good method that has its advantages in keeping these toxic and dangerous wastes away from all aspects of life.
- 2- **Incineration:** This is the second method used to get rid of waste, and it is the most difficult, but more successful. This method also has many drawbacks such as the rise of pollutant fumes and the difficulty of maintaining incinerators. In addition to not putting strict control on incinerators, incineration is either central in the sense that the responsible authorities are the ones who choose a site for waste disposal, which has the benefit of controlling and monitoring it well, but at the same time it has its detriments in the delay in the burning process and the length of the distance until it reaches Residues to the central crematorium as well as polluting neighboring areas, although it has some negative effects such as spoiling the soil, escalating fumes, and polluting ground and agricultural water, and there is also difficulty in choosing the appropriate place for such burial and not controlling the burial dates. It is a reason to leave it on the surface for a period of time and so on.

- 3- Thermal disposal:** It is one of the most advanced methods of waste disposal, and it depends on focusing the rays on the waste to get rid of it, which is very useful, for example the microwave thermal methods. Among the waste is what is very dangerous, as we have already mentioned, and this type of waste is first preserved in molds or dumps that are sealed so as not to pollute the surrounding environment such as infectious or radioactive waste or others, and then it is disposed of by taking it directly from the source to the place of disposal. Without emptying into large bulk containers to ensure final and proper disposal of that waste.



**Fig(3): Radioactive Waste**

### **Spread of Waste:**

The number of injuries with this type of waste for patients and visitors is much less than for workers due to lack of direct contact and for shorter periods of time, and this is if this type of waste is not tampered with by them. But there is a risk of transmission of some diseases in cases of neglect and unregulated and proper drainage of hospital sewage, especially the departments of communicable diseases. Some studies have found that there are some epidemics such as cholera in Latin America that were due to unsanitary drainage of these departments' sewers. Individual cases of infection as a result of medical waste are many and numerous, but it is difficult to quantify them due to several factors, especially in the developing countries of the world. Exposure to medical waste due to negligence and lack of knowledge or technical weakness in disposing of it leads to multiple and varied injuries due to the diversity of the pathogens. In 1992 there were eight cases of HIV infection in France due to occupational injuries to health workers. Two of them were due to a wound resulting from transporting medical waste, and in 1994, 39 cases of infection with

the same virus were recorded in the United States of America. 32 cases of infection due to contaminated needle pricks, one case due to a contaminated scalpel wound, one case due to a wound from a broken tube in which the blood of an infected patient was present, and one other case was due to a blunt substance, and four cases were due to contamination of the skin or mucous membranes with blood contaminated with the virus and with In 1996 cases increased to 51 cases. Most of them were nurses, doctors, and laboratory technicians. As for hepatitis viruses, the situation is much worse, the report of the US Environmental Protection Agency indicated that annually there are between 162 to 321 cases of infection with the hepatitis B- virus due to acute medical waste.

The pathogens of infection are transmitted in health care centers in various ways and from a variety of sources such as air, water, food, insects, rodents and possibly animals such as cats, patients themselves, medical personnel, visitors, cleaners, surfaces, tools and devices. Tools and surfaces are a main source of infection transmission. A recent study published in the proceedings of the Fifth Batinah Conference in Gaza City - Palestine showed a large percentage of the phones of health sector workers showed the presence of pathogenic bacteria on the surfaces of their phones (96%) and the percentage of resistance to methicillin was Staphylococcus. MRSA is high, at 28.3%. Other studies indicate that doctors and health sector workers pens

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It also contains a high level of microbes. Medical keyboards, touchscreens and many more devices that cannot be disinfected easily are a great place for germs to stick and potentially multiply. These surfaces are a source for the transport of microbes, but there must be a mechanism for their access to patients. Among the most important vectors of infection in hospitals: workers in the health field, including nurses, doctors and cleaners, by not adhering to the rules of prevention of infection. The types of microbes in health institutions differ according to the nature of their work, the extent of adherence to infection prevention rules, and the sterilization and disinfection methods used. The most common types of bacterial infections that infect patients while they are in the hospital are urinary and respiratory tract infections, blood poisoning, surgical wound infections and other infections.



### III. CONCLUSIONS

**Environment and** The water may also be polluted with sewage water and chemical with medical waste, which may contain many diseases, bacteria and viruses from the urine and stool of patients, for example, and here polluted sewage has a major role in the transmission of disease

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