

УДК 628.4

WASTES OF MEDICOPROPHYLACTIC INSTITUTIONS

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The basic problems concerning the treatment with hazardous waste of medicoprophyllactic institutions are highlighted, new approaches to their solution are described. Group of dangerous waste are defined and categories of persons exposed to risk of injury and infection during careless handling are specified. Methods of disinfection of decontamination, treatment and disposal of medical waste, as well as highly specialized equipment that can save hazardous properties of waste generated are exposed. *Keywords:* medical waste, decontamination technologies, environmental safety.

Відходи лікувально-профілактичних закладів. О.В. Сібилєва. Висвітлено основні проблеми щодо поводження із небезпечними відходами лікувально-профілактичних закладів, охарактеризовано сучасні підходи до їх розв'язання. Визначено групи особливо небезпечних відходів та зазначено категорії осіб, які зазнають ризику травматизму та інфікування під час необережного поводження з ними. Розкрито методи знезараження, оброблення та знищення медичних відходів, а також вузькоспеціалізованої техніки, яка може позбавити небезпечних властивостей утворюваних відходів. *Ключові слова:* медичні відходи, технології знезараження, екологічна безпека.

Отходы лечебно-профилактических заведений. Е.В. Сибилева. Освещены основные проблемы по обращению с опасными отходами лечебно-профилактических учреждений, охарактеризованы современные подходы к их решению. Определены группы особо опасных отходов и указаны категории лиц, подвергающихся риску травматизма и инфицирования при неосторожного обращения с ними. Раскрыты методы обеззараживания, обработки и уничтожения медицинских отходов, а также узкоспециализированного техники, которая может лишит опасных свойств образуемых отходов. *Ключевые слова:* медицинские отходы, технологии обеззараживания, экологическая безопасность.

All medicoprophyllactic institutions (MPI), regardless of their profile and capacity as a result of their activities form different fractional composition and the degree of hazard waste, including dangerous medical waste is about 15%, others - overall not infected waste that is removed as household, and they do not require special precautions [1-2].

According to statistics, every year in Ukraine 350-400 tons of medical wastes are formed [3]. However, these data are only statistical and do not always reflect the real figures for the volume of gener-

ated wastes and their hazardous properties of the institutions involved in medicoprophyllactic and others whose activities associated with this process.

Significant risk of infection (HIV infection, hepatitis B, C, etc.) make up not sanitized waste sharp objects, contaminated syringes, transfusion of blood, scarifiers and more. The group of particularly hazardous wastes consists of materials with trace amounts of cytotoxic/genotoxic drugs, potent, narcotic drugs, psychotropic substances, wastes disinfectants, solvents, materials and

equipment content of heavy metals, radionuclides, etc. bioactive effect of causing genetic changes and cumulative effects on humans and the environment.

Risk groups of injury and infection through contact with hazardous medical waste include all of persons who encounter them:

- doctors, nurses, employees of ambulance and personnel who cleans MPI;

- MPI patients and those who provide medical care at home;

- MPI staff of support services such as laundry, cleaning services and garbage collection, and staff of facilities for z deletion and removing waste products such incinerators, and other people who sort and recycle waste;

- accidental or careless end users, such as employees of public utilities that garbage, and workers who use medical and biomedical wastes as secondary raw materials.

Today, virtually all medical waste are transported to landfill disposal of solid urban waste, they accumulate in the form of slime storages, heap dumps (an area of over 10 hectares) without prior decontamination, let alone sort them by category of hazard. Today, virtually all medical waste transported to landfill disposal of solid urban waste, they accumulate in the form of slime storages, heap dumps (an area of over 10 hectares) without prior decontamination, let alone sort them by category of hazard. Low responsibilities of individuals and organizations (for lack of information on environmental hazards, proper training of medical and support staff and compliance officers of local authorities) during the treatment of medical waste also leads to the formation of primitive dumping sites, dumping of waste residues in ground or collecting them in containers with of solid waste. Therefore, epidemiological

and environmental hazards now pose a real threat to human health and the environment.

In Ukraine, the main problem in the system of management of medical waste is the lack of legal framework, institutional conditions and a single coherent policy between the executive agencies that work in the field of radioactive waste.

Collection, extraction, processing, decontamination and disposal of medical wastes mainly occur on the basis of regulations for handling hazardous (or household) waste documents regulating the conduct disinfection measures with the release of flows quicksilver-bearing and radioactive waste.

There is no unified recognized classification of medical waste, so each country identifies and integrates them into classes or groups according to risk: an infectious infestation, physical injury, toxic injury, radiation and environmental damage in particular. Also groups infected, toxic, radioactive, hardly changing anatomical waste, etc. are singled out, the danger of which is caused by social, legal and aesthetic and ethical reasons.

Given the danger of medical waste and the lack of legal requirements in Ukraine every MPI should develop internal administrative documents concerning identification (sorting) of the flows, their collection, temporary storage, disinfection, packaging, labeling and transportation. Order of manager should appoint responsible persons who will adopt permanently organizational leadership in the collection and removal of waste in subsection of MPI; know quantitative and structural characterization of waste, determine the place of primary and intermediate waste collection, placing racks, transport carts, determine

the monthly and annual demand for health and hygienic equipment, inventory, daily monitor the availability of supply disposable containers, disinfectants and other supplies, will conduct the appropriate records on waste management in their business unit and so on.

Today, according to Art. 34 Law of Ukraine "On Waste" № 187/98 - BP from 01.08.2012 to handling of dangerous waste permit only those persons who are trained, validated by certificate for work with hazardous substances and have no medical contraindications. This legal requirement is mandatory for all citizens, entrepreneurs and legal entities owned or using them where there is at least one dangerous object behavior with which may harm the life, human health and environment [4].

During the handling of hazardous medical waste it is prohibited to mix them without authorization to collect and display. Such waste is allowed to bury in landfill only after decontamination and change their type (pressing, grinding, etc..) concerning impossibility of reusing [4-5].

It should be noted that in every department of MPI special facilities for the collection and temporary storage of waste, water and air supply ventilation system should be allocated. Head of the institution shall define requirements for disinfection regime dressings, disposable syringes and systems, operating units and waste treatment and diagnostic facilities, collection and temporary storage of undisinfected medical waste safe transport network within the offices MPI to prevent contamination with infected waste management personnel and patients. It should also be determined disinfection methods (centralized or decentralized) and the direction of the de-

struction of hazardous waste (recovery, at landfills, incineration, etc.).

Choosing methods for purification and disinfection of medical waste in MPI that reduce all the unwanted consequences of their harmful effect, to work out scheme for collection and disposal it should be taken into account: epidemiology (biological) safety (degree of neutralization of hazardous components); chemical safety (degree of neutralization of toxic components output and their residual concentration of gaseous emissions and solid and liquid waste disposal process residues), flexibility, maintainability, ease of maintenance and serviceability (table). Also it should be focused on technological, financial, health, environmental and aesthetic aspects.

In view of particularly dangerous medical waste, availability of safe methods and tools when handling them is essential for the health of people and the environment.

Implementation of waste sorting of MPI reduce the amount of waste that require the use of special methods of treatment and thus reduce the costs of such activities. And the use of new technologies that are able to disinfect medical waste by 100%, in the end will help bring them to recycling (plastic, metal, glass, etc) or securely delete them by burying in landfills.

The most important thing now at the state level is to identify a body that would be responsible for the formulation and implementation of public policies at all stages of handling of hazardous medical waste, developed or improved the existing regulatory framework, introduced a clear identification and classification of waste streams MPI; defined indicators (ratios of formation)

and criteria for evaluating hazards of medical waste and improved statistical reporting form under the regulatory framework, implemented in all institutions of a single unified system of accounting, controlling movement of waste from places to places of their formation to recovery, deactivation sites, removing to a further single database, created specialized enterprise in the local administration of the functions of coordination of work on the treatment of medical waste in the regions of

Ukraine; identified financial issues financial mechanisms and technological modernization of methods of treating hazardous and especially hazardous waste and developed a plan, program implementation decentralized (centralized) method of waste management and industrial control given the power and specificity of MPI up to modern standards, international standards, nomenclature and waste technologies recovery or destruction of others.

Table

Methods of waste destruction of medicoprophylactic institutions

Method	Principle of the method	Used equipment
Physical (thermal destruction) a) low-temperature (temperature from 180 to 400°C) b) high-temperature (temperature over 800°) Irradiation	Effect of temperature (heat), which destroys pathogenic and conditionally pathogenic microorganisms; thermal processes as a result of chemical and physical transformations lead to the destruction and decomposition of both organic and inorganic fractions comprising the waste; influence of ionization radiation, which leads to disruption of DNA in the cell nucleus and its demise	Autoclaves, retorts, microwave systems, based on the use of dry heat incinerator, pyrolysis, plasma technology and others combustion installations radiation, electromagnetic irradiator
Chemical a) "manual" destruction b) machine destruction	Effect of disinfectant solution with bactericidal (antituberculous), antiviral, fungicidal (sporadic) action in appropriate conditions; Immersion of waste in labeled containers with disinfectants in places of formation (if there is no units); use the settings with the use of disinfectants	Disinfectants: "Aminotsyd", "Biohlor", "Deskatsyd", "Di-Chloro", "FD 312", "Ahdez", "Chlorella", "Astradez-NUS", "Petroksyn", "Sabisept M" "Di-Chloro-Extra ", "Heksakvar forte; Sterimed-1, Newster and others
Mechanical	Grinding and / or pressing to change the type of waste, improved heat and mass transfer, reducing the amount of processed waste	Shredders, crushers, hammer crushers, mixers, compactors
The use of highly specialized equipment	Technics that can save hazardous properties of waste, but is unable to provide a safe product	Standard sterilizer, destructors injection needles, installation for and disinfection and processing of diapers, water-absorbing diaper

Only through a systematic approach to waste management and dissemination of information about the dangers and effectiveness of different methods of dis-

infection and destruction can provide epidemiological and environmental safety at all stages of handling of hazardous medical waste in the country.

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