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JUSTIFICATION OF MEASURES FOR THE MANAGEMENT OF HOSPITAL WASTE

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Abstract
Medical waste management is an important component of the healthcare system aimed at ensuring the sanitary and epidemiological safety of the population and protecting the environment. Medical waste includes a wide range of materials, from used dressings and syringes to remnants of medicines and biological samples. Their improper handling can lead to the spread of infections, chemical contamination and injury. The abstract discusses the main categories of medical waste, the regulatory framework, and the stages of its collection, storage, transportation, neutralization, and disposal. Special attention is paid to modern recycling methods, the role of personnel and training requirements in the field of safe waste management. An effective medical waste management system is the key to the safe and sustainable operation of medical institutions.

Keywords: Medical waste, disposal, neutralization, sanitary safety, infectious materials, collection and storage, waste recycling, ecology, health protection, waste management.

The relevance of the topic. Medical waste management is one of the most acute and socially significant problems of modern healthcare. Every year, a huge amount of waste is generated in medical institutions, a significant part of which belongs to the class of dangerous — infectious, toxic, traumatic or radioactive. Improper disposal of such waste can lead to serious consequences: the spread of infectious diseases, contamination of soil, water and air, as well as threats to the he alth of medical personnel and the public [1,2].

This problem is becoming particularly relevant in the context of an increasing number of medical institutions, an increase in the volume of diagnostics, treatment and vaccination, as well as in connection with global challenges such as pandemics. In these conditions, the burden on waste disposal systems is increasing, gaps in the regulatory framework and the need for infrastructure modernization are being identified [3,4].

In addition, effective and safe medical waste management is not only a matter of sanitary and epidemiological well—being, but also a component of sustainable development, environmental responsibility and compliance with international obligations in the field of environmental protection [5].

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Thus, the study of issues related to the organization of collection, storage, transportation, disposal and neutralization of medical waste is extremely important for ensuring sanitary safety, environmental protection and the sustainable functioning of the healthcare system as a whole [6].

The problems of collecting, The problems of collecting, eliminating, neutralizing, and disposing of various types of waste, protecting the population and the environment from their harmful effects, should occupy one of the most significant places in the strategic development plans of any city. This fully applies, in addition to household and industrial waste, to medical and preventive institutions (MPI), the management of which remains a rather imperfect sphere of urban economy, especially in countries with economies in transition, which include Uzbekistan [7].

The assessment of the medical and environmental significance of medical waste consists of the impact of such waste on the health of staff and patients in a healthcare facility; the health hazards of occupational groups associated with the transportation, neutralization and disposal of waste; the consequences of using various waste disposal methods [8].

Sanitary rules and regulations for the collection, storage and disposal of waste in medical institutions of the Republic of Uzbekistan 0317-15 entered into force in early 2015, but their implementation is somewhat hampered by the lack of funding for activities aimed at the implementation of this document. There are other objective reasons that make it difficult to comply with these rules. First of all, there is no noticeable use of thermal waste disposal methods in Uzbekistan. In other words, neutralization technologies, which are actively used abroad, can currently be implemented only in certain regions of Uzbekistan and only with the financial support of the local administration. Obviously, in the absence of effective, primarily thermal, decontamination measures, the introduction of a waste collection system in accordance with the classification will lead to an additional financial burden on MPI, and the real effects will be insignificant. Therefore, it seems advisable to first select and implement a modern waste recycling technology, and then create a waste management system in MPI. In any case, these processes must be synchronized [9].

Nevertheless, sanitary rules are in force and the centers of the state centers for Sanitary and Epidemiological Welfare have the right to require MPI to introduce appropriate waste disposal systems. Therefore, we will focus on the priority measures in MPI aimed at introducing a new waste management system.

One of the first such events is the issuance of an order by the chief physician of MPI on the introduction of a new waste management system and on the appointment of officials of four levels of responsibility: 1-the person responsible for organizing work in the institution as a whole; 2- persons responsible for organizing work in departments, 3-persons directly involved in waste collection in 4 – persons who are directly involved in the transportation of waste on the territory of MPI [10].

The next step is staff training in specialized training centers. At a minimum, one person from the health care facility who heads the waste management work at the facility must

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complete the training. As a rule, this is a hospital epidemiologist, an assistant epidemiologist, a chief nurse, or a deputy chief physician for administrative management. After that, the trained employee develops standard job descriptions for his subordinates in the field of waste management and trains field personnel in accordance with them. Staff training in strict compliance with the rules of waste separation in accordance with classes, the desire to reduce the scale of accumulation of waste of classes B and C (all potentially infected and infected waste – classifications are given in the Sanitary Rules and Regulations for waste collection, storage and disposal in medical institutions of the Republic of Uzbekistan) due to competent separation into streams will minimize the risk of not only the volume of waste of classes B and C, but also the objects of the means used for their chemical disinfection in the case of using this method of waste disinfection.

The calculation and justification of the amount of waste by class for a specific MPI, the development of a draft maximum permissible waste disposal (MPWD) in accordance with the requirements of environmental legislation are the next stage. If there is a method of centralized thermal disinfection of waste in the region, the development and approval of the MPWD is mandatory. In the absence of centralized waste processing, it is possible to limit ourselves to compiling a list of waste by class and coordinating it with the territorial SEW and PHC. To implement this measure, it is necessary to have approved standards for the accumulation of hospital waste by classes, which are currently absent in Uzbekistan, and sanitary regulations also do not offer such reasons. Waste generation standards by class in MPI represent average accumulation values, taking into account the influence of a number of factors:

- the profile of the medical institution (in infectious, tuberculosis and mycological medical institutions, the actual volume of waste significantly exceeds the approximate standard for general hospitals due to the fact that all waste from patients belongs to the category of infected);

-the structure of the medical institution and the type of medical care provided (if there are some specialized units in the medical facility, there is an increase in the volume of individual waste fractions);

Table 1

№	Region	The amount of healthcare waste, kg per 1 bed per day
1.	North America	8,0
2.	Latin America	4,0
3.	Western Europe	5,0
4.	Eastern Europe	1,9
5.	The Middle East	2,5
6.	East Asia (developed countries)	3,1
7.	East Asia (undeveloped countries)	2,0

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- financial capabilities of the medical institution (for example, the possibility of using disposable surgical underwear, disposable test tubes, etc. leads to an increase in the proportion of plastic in hospital waste).

San R and R 0365-19 "Sanitary rules and regulations for waste collection, storage and disposal in medical institutions of the Republic of Uzbekistan" should be considered as the current standard for waste accumulation in medical institutions of the Republic of Uzbekistan.

According to this document, the standards for waste accumulation in medical institutions are 192 kg (or 0.7 m3) per 1 bed per year or 0.65 kg per 1 bed per day for inpatient medical institutions, 0.01 (or 0.04liters) per 1 room for outpatient clinics.

The average density of waste from medical institutions is 280 kg/m3 for inpatient medical facilities, and 230 kg/m3 for outpatient clinics.

According to I.I.Ilyinsky (1980), in Uzbekistan, the accumulation of solid waste in a hospital is 0.450 kg per 1 bed per day. Over the past 20 years, these standards have not been revised.

An analysis of foreign materials shows that in different countries, the rate of accumulation of medical waste ranges from 1.1 to 9.0 kg per 1 bed per day, which naturally depends on the level of health development.

According to T.I.Iskandarov, the accumulation of solid waste in hospitals in the Tashkent region per 1 bed per day is 0.98 kg, including infected (i.e. waste of classes B and C), which accounts for a total of 30.5%. Thus, according to 1999 data, the total amount of hospital waste in the Irkutsk region was 1922.2 m3/day, of which infected (i.e. classes B and C) – 443.1 m3/day.

Thus, based on the analysis of foreign materials, data from P.S.Oparin and his own research, values that are quite close to each other have been obtained, which can be recommended as general indicative standards for waste generation depending on the capacity of MPI: for stationary medical facilities, 475 kg per 1 bed per year, which is 1.3 kg per 1 bed per day, for outpatient clinics – 0.153 kg per 1 visit.

The average density of waste from medical institutions is 330 kg/m3 for inpatient medical facilities and 250 kg/m3 for outpatient clinics.

An estimate of the percentage of hazardous waste content in relation to the total amount of medical treatment waste in Tashkent indicates that Class B waste accounts for about 10% of the total amount. Based on this assessment, as well as the experience of hazardous waste processing in Tashkent, it is recommended to adopt the following indicative standards for the generation of Class B hazardous waste: for inpatient general medical institutions – 47 kg per 1 bed per year, which is 0.155 kg per 1 bed per day for outpatient clinics – 0.040 kg per 1 visit.

The approximate standard for the formation of class B hazardous waste is: for inpatient TB and mycological MPI – 232 kg per 1 bed per year, which is 0.88 kg per 1 bed per day, for tuberculosis dispensary–type medical facilities - 0.103 kg per 1 visit.

The average density of waste of classes B and C, specified as a result of experiments, was 90 kg/m3. During the testing of the system in Tashkent, it became obvious that the

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waste collected in plastic bags does not condense during transportation and its density remains about 90 kg/m3, which is 3 times lower than the previously used value. After substantiation and calculation of waste generation values by class, the necessary number of packages is calculated in the medical facility, based on the needs of the institution – one package per day for each waste generation site and their purchase in sufficient quantities. Persons responsible for waste collection in the departments should also be provided with tags for bags with collected waste, sealing material, and stickers for rigid containers for collecting sharp, piercing, and cutting objects before dumping them into a bag.

The optimal solution to the problem of the introduction of a new waste management system for MPI is to use certified technology for thermal disinfection of waste and a system for waste collection, storage and transportation that is safe from an epidemic point of view.

The latest WHO recommendations are based on the rejection of the use of technologies related to chemical disinfection, thermal disinfection technologies are considered optimal in this case, emphasizing autoclaving methods.

The use of these technologies makes it possible to fulfill two main environmental and hygienic requirements for the treatment of hospital waste, namely: to prevent the spread of infection and to ensure the impossibility of recycling individual waste components.

The technologies of encapsulation and cementing of hospital waste are little known in our country, although the use of the encapsulation method is justified and mastered for toxic waste of the 1st hazard class, if there is no information about other methods of their processing. Cementing is used in the disposal of radioactive waste.

The disposal of hospital waste can be considered safe only conditionally, since when performing this technology by hospital staff, there is no information about the environmental safety of a spontaneously selected burial site, which is reflected in the prohibitive nature of the requirements of the regulatory framework on this issue.

One of the significant stages in the implementation of the health care waste management system should be considered the creation of a specialized enterprise under the local administration, which will take over the function of coordinating work on the management of medical waste in the region.

Of no small importance is the creation of a waste transportation system on a special transport with a sanitary passport for the transportation of hazardous waste. Transportation must be carried out in containers that meet the requirements for containers for the transportation of hazardous waste.

Thus, based on the experience gained in Tashkent in establishing a regulated hospital waste management system, it is necessary to emphasize three limiting points in this process: the lack of targeted financing for this sector of urban economy in the regions, the lack of approved waste generation standards, including by class, as well as coordination of actions in the implementation of this range of tasks by all interested structures are the administration of the region. Life dictates that in the interests of preserving public health, these deficits will have to be overcome sooner or later.

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