

Original Article

The Medical Waste Management Strategy for the Cluj-Napoca Municipality

BRAȘOVEAN Ioan¹, Ioan OROIAN¹, Antonia ODAGIU^{1*}, Camelia OROIAN², Claudia BALINT¹, Bianca BORDEANU¹, Ovidiu Daniel ȘTEFAN¹

¹University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Agriculture, 3-5 Calea Manastur, 400372, Cluj-Napoca, Romania

²University of Agricultural Sciences and Veterinary Medicine, Faculty of Horticulture, 3-5 Mănăștur Str., 400372 Cluj-Napoca, Romania

Received 30 April 2018; received and revised form 5 May 2018; accepted 12 June 2018
Available online 30 June 2018

Abstract

Medical waste is the total waste generated by health institutions, research institutes and laboratories. In addition, they include waste from "minor" or "diffuse" sources, such as those produced during home care (dialysis, insulin injections). The most common and investigated causes of the risks associated with medical waste are lesions due to injuries involving sharp objects such as needles, blades, etc. They are often in contact with pathogens. In the present paper, we will present the general aspects of medical waste, as well as the main stages of its management, according to the measures imposed by the law.

Keywords: waste, waste management, waste batteries.

1. Introduction

Waste management is one of the most important issues in terms of environmental protection. This concerns the collection, transport, treatment, recovery and disposal of waste. Responsibility for waste management activities lies with their generators, according to the "polluter pays" principle, or, as the case may be, with producers, according to the principle, producer responsibility [5]. The most widespread method of disposing of medical waste is incineration. A number of US waste incineration studies - the Environmental Protection Agency - identified the incineration of medical waste as the third largest source of airborne emissions of dioxins, with a contribution of 10% of mercury emissions from the human activities.

Several other dangerous pollutants have been identified in the emissions of medical waste incinerators. In view of the environmental impact of the incineration method, alternative non-combustible installations have been developed to remove these types of waste [1].

Hazardous medical waste is that waste resulting from medical activities presenting a real risk to human health and the environment, being generated during diagnostic, treatment, disease prevention and medical recovery activities, including medical research and production, testing, storage and distribution medicines and biological products [2,3]

Non-hazardous waste is waste that is assimilated to households, resulting from the medical, technical, medical, administrative, housing and food distribution offices; these wastes are collected and removed as household waste.

By residue is meant the by-product that has no value. From the European Union's point of view, the

* Corresponding author.
Tel: +40-264-596384
Fax: +40-264-593792
E-mail: antonia.odagiu@usamvcluj.ro

term residue is attributed to any substance, object or material resulting from a manufacturing, transformation, use, consumption or cleaning process and which the owner, intention or obligation, abandons / discards find immediate use [4].

In Romania, residues and wastes of any nature are technological, household, overdue products and materials, physically used or non-useable products.

Waste is an inevitable result of human evolution and activity [6].

Of the total amount of waste produced in a medical facility, 75-90% is non-hazardous waste, assimilable to household waste, and only 10-25% is hazardous waste. The quantities of waste produced in medical establishments are increasing, mainly due to the increasing use of disposable materials [7].

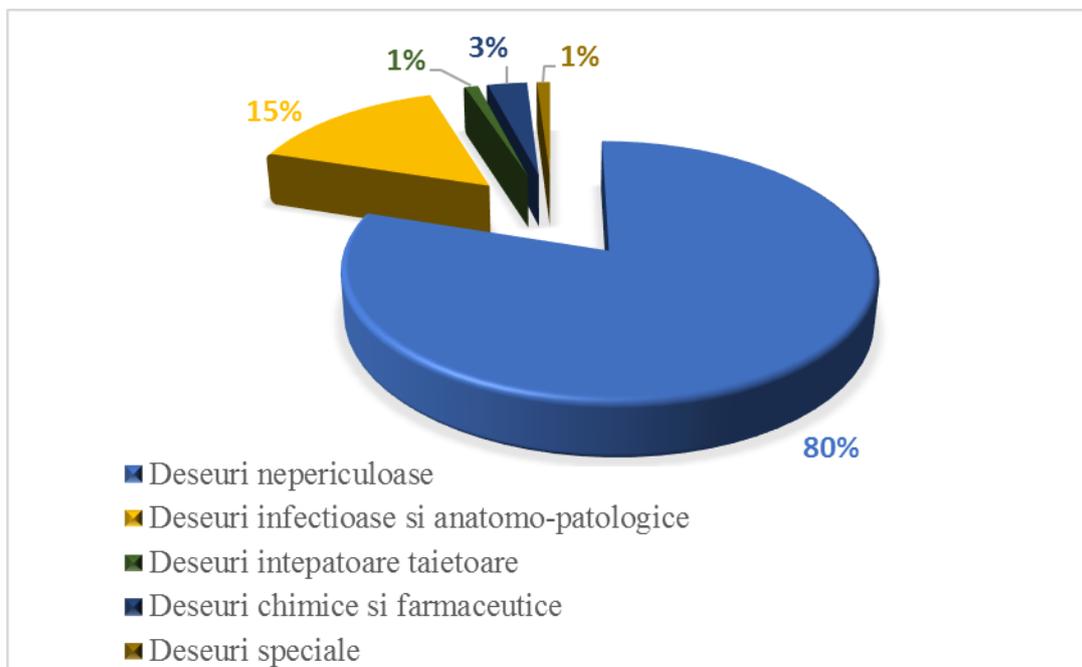


Figure 1. Structure of Waste from Medical Activity [9]

2. Material and Method

In order to carry out the study on the waste management resulted from the medical activities, both the bibliographic references and the data provided in the National Strategy and the National Waste Management Plan resulted from medical

activities at national level as well as at the local level were used. Also, in order to better outline the way of waste management at the level of Cluj-Napoca, the internal circuit was exemplified in Cluj-Napoca Children's Emergency Clinical Hospital, Pediatric Section 1 (Fig. 2).



Figure 2. Location of the Children's Emergency Clinical Hospital [8]

The aim of the paper is to achieve the best performance and results in medical waste management, as well as the protection and safety of the environment and of the employees of the sanitary institutions. Performance appraisal reflects how employees perform their job duties in line with required standards and laws.

Pediatric I Clinical Section with a capacity of 85 beds including Intensive Care, Hematology, Sugar Diabetes, Cardiology, Gastroenterology, Endocrinology

The 15-Bed Genetic Disease Compartment uses the following structures:

- Genetics;
- Emergency examinations;
- Radiology and General Ultrasound;
- Doppler echocardiography and electrocardiography;
- Digestive endoscopy, esophageal pH metrics;
- Welding test - with the Nanoduct machine;
- Spirometry;
- Pharmacy;
- Library equipped with: books and medical journals (subscriptions to specialized magazines in the country and abroad);
- The course room (80 seats, air conditioning) is equipped with modern projection equipment (video-projector, lookomat, overhead projector).

The hospital is organized on 5 levels as follows:

- In the basement there are the emergency room, the ambulatory and the hospitalization office;
- On the ground floor there is a pharmacy;
- At the 1st, 2nd, 2nd - Pediatric section.

3. Results and Discussions

Specific legislative framework. Waste management at the Children's Hospital is based on the following documents:

- Ordin M.S. no. 219 / 2002 for the approval of the Technical Guidelines for the Management of Waste from Medical Activities and the Methodology of Data Collection for the National Databank on Waste from Medical Activities.

- Ordin M.S. no. 997/2004 amending and supplementing the M.S. no. 219/2002

- Ordin M.S. no. 1029/2004 for the modification and completion of the M.S. no. 219/2002

- Law no. 132/2010 on the selective collection of waste in public institutions

- Decision no. 856/2002 on waste management records and on the approval of the list of wastes, including hazardous wastes

- Decision no. 247 of March 17, 2011 for the modification and completion of H.G. no. 621/2005 on the management of packaging and packaging waste

- Law no. 101 of 15 June 2011 for the prevention and sanctioning of deeds related to environmental degradation

- Law no. 211 of 15 November 2011 on the waste regime

To prevent contamination of the environment and damage to the health of staff and hospital patients, all waste generated from medical activities is collected selectively, packaged and transported in the specially designated area for temporary storage and final disposal of waste. All categories of staff need to know and apply internal regulations and specific waste management procedures.

Establishing activities and responsibilities for the collection, packaging, transport and temporary storage of waste generated during medical activities is intended to prevent contamination of the environment and damage to the health of staff and patients.

Collection and packaging of medical waste.

The generation and separation of waste by category are the first steps in waste management. The collection is done in the appropriate packaging at the place of production by the proper separation of the waste by categories: waste assimilated to domestic waste, infectious waste, stinging waste, etc.

Infectious wastes are wastes containing or coming into contact with blood or other fluids, eg syringes, catheters, tubing infusions, containers containing blood or other biological fluids, gloves, probes, compresses, buffers, etc.

They are collected at the place of production, that is, the treatment rooms at each level of the consulting room/booth, in pedestal buckets and lids provided with a yellow PVC bag with the "Biological Danger" icon. When filling the bag, it is linked and marked on it with the black or colored marker, the floor, the section where it comes from, the person who removes the waste.

Stinging-cutting waste is represented by needles, loops, disposable scalpel blades, laboratory test tubes or other broken or unsealed glassware that have come into contact with infectious material and are collected at the place of production, that is, treatment rooms at each level of the consulting room / cabinet, in yellow box caps and walls, marked with "Biological Danger" icon.

The medical waste circuit within the sanitary unit. Infectious wastes are collected at the

place of production, ie treatment rooms at each level of the consulting room/booth, in pedestal buckets and lids provided with a yellow PVC bag with the "Biological Danger" icon. When filling the bag, it is linked and marked on it with the black or colored marker, the floor, the section where it comes from, the person who removes the waste.

Stinging-cut wastes are collected at the place of production, that is, the treatment rooms at each level of the consultation section/cabinets, in yellow box caps and walls marked with the "Biological Danger" icon.

After the boxes have been filled, they are hermetically sealed and marked with a black or colored marker, the date, the floor, the department where they come from, the person who removes the waste.

Sacks and boxes with hazardous waste are transported by the nurse (in the absence of the caregiver) or the caregiver from each level of the section to the ramp arranged inside the hospital courtyard three times a day or whenever needed by means of the lift for the transport of waste within the timeframe for this process, namely 8.00-8.30, 13.30-14.00, 20.00-20.30.

Within the unit, hazardous waste transport is carried out with the elevator on the section, and from the basement of the building with the trolley.

Hazardous waste is transported in a container on a special trolley designed for this purpose, made of a material resistant to cleaning and disinfection procedures, has no sharp edges and intermediate dimensions in order not to create obstructions on the corridors. After removal of the waste, the lift is disinfected by wiping with surfactant solution, prepared according to the working solution table. The protective equipment of the person transporting the waste consists of disposable latex gloves and a gown. Domestic waste is eliminated in an hourly time on the same route.

Temporary storage. Hazardous waste is temporarily stored in a closed space, functionally separate from the rest of the construction, and is provided by lock-in systems with controlled access, based on a card owned only by persons responsible for the transport of waste, within the hospital.

It is provided with floor siphon for drainage of waste water resulting from cleaning and disinfection into the sewage system. It is also provided with natural ventilation to ensure low temperatures that do not allow the decomposition of organic material from the hazardous waste composition. It is ensured the disinsection and pest control of the storage space in order to prevent the occurrence of vectors (rodents, insects).

In the temporary storage space there is a second package in which the sacks and boxes for

hazardous waste are deposited as rigid wall mobile containers. Containers for infectious and stinging waste are marked yellow with the inscription "medical waste" and bear the "biological hazard" icon. Containers are made of materials resistant to mechanical action and action of disinfectants; cleaned and disinfected after each disposal, or replaced with other disinfected. It is sealed and fitted with a clamping system adapted to the automatic take-off system of the transport vehicle. The duration of temporary storage does not exceed 48 hours within the unit.

Domestic waste is temporarily stored in a space other than the storage of hazardous waste in containers in the hospital yard.

Final elimination. The activity of the dismantled incinerators is supplemented by six economic agents with authorized firing installations, respectively SC. Mondeco, SC. Eco Fire Systems, SC. Guardian, SC.Pro Air Clean, SC. If Technologies and Iridex Group Import Export. Romania has been divided into six regions, each company awarding one area of the medical waste market. These companies operate in: Suceava, Constanta, Craiova, Timisoara, Cluj-Napoca and Bucharest.

Thus, in the county of Cluj, there is a single ecological incinerator, owned by If Technologies, located on Muncii Boulevard, no. 16, in Cluj-Napoca.

Education and training of staff on waste management. Waste management courses are held by people from the Public Health Directorate and the hospital epidemiologist as follows:

- With nurses, twice a year;
- With nurses, once a year.

The personnel involved in the hazardous waste management system must be aware of:

- a) the type of waste produced in the hospital within the departments/laboratories/pharmacies;
- b) the risks to the environment and human health at each stage of the remediation cycle;
- c) the waste management plan generated by medical activities, the internal regulations and the current procedure for the collection and storage of medical waste.

4. Conclusions

An important aspect in the management of waste resulting from medical activities is the reduction of the amount of waste generated.

The risks of medical waste of greatest concern are the possibility of contacting diseases such as hepatitis B or C, or AIDS, following needle sticking or contact with blood or other fluids containing contaminated blood from open wounds, or mucous membranes.

The elimination of hazardous waste resulting from medical activity from hospitals within the county is done in accordance with the regulations in force regarding this category of waste.

Hazardous waste produced by sanitary facilities must be specifically disposed of by each type of waste through authorized procedures.

It is further recommended to observe the functional and hygienic-sanitary conditions of the temporary storage of waste resulting from medical activity.

References

- [1] Bengtsson L., P.O.Seman, 1996. Waste management and recovery. Landfilling. First edition. Editor. William Hogland, LTH, Lund
- [2] Dumitrescu, A., M. Nicorici, S. Sandu, C. Lupașcu, 1996. Descrierea modului de gestionare a deșeurilor rezultate din activități medicale în România, Sesiunea Științifică a Institutului de Igienă, Sănătate Publică, Servicii de Sănătate și de Conducere București.
- [3] Dumitrescu, A., M. Văcărel, A. Qaramah, 1997. Metode de gestionare a deșeurilor rezultate din activitatea de îngrijire medicală”, Conferința anuală a Institutului de Igienă, Sănătate Publică, Servicii de Sănătate și de Conducere București.
- [4] Iftodi M., T. Tugui, V. Garaba, ABC-ul deșeurilor, Chișinău, 2000,
- [5] Negulescu M, L. Vaicum, C. Patru, 1995. Protecția mediului înconjurător, Editura tehnică, București.
Pascu R.V., 2009. Managementul deșeurilor, Editura Universității "Lucian Blaga" din Sibiu, ISBN 978-973-739-717-1
- [6] Vasilescu E., L. Gheorghieș, C. Papadatu, 2006. Tratarea valorificarea depozitarea și eliminarea deșeurilor toxice și radioactive, Îndrumar de laborator, Editura Fundației Universitare "Dunărea de jos" din Galați.
- [7] ***, 2007, Managementul deșeurilor rezultate din activitatea medicală, Institutul de Sănătate Publică București,
- [8] ***, <http://www.googlemaps.com>
- [9] ***,<http://www.stericycle.com>

”This is an open-access article distributed under the terms of the Creative Commons attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.”