Medical Waste Management in Romania and the Impact on the Urban Environment

by

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Abstract. Medical municipal waste presents a very dangerous impact on the environment when is not managed with responsibility. In Romania, even if the legislation of medical waste it is aligned to European requirements, in practice exist in a very small proportion. The purpose of the research is to know the level of efficiency with which hazardous medical waste is managed in hospital activity. The research method used is comparative analysis method between the general level of medical waste management, the level of costs involved and the level of efficiency of implemented projects. The obtained results are useful both for hospitals managers and for the economic agents involved.

Key words: management, municipal medical waste, pollution
JEL Classification: I110, I 131, I I38

1 Introduction

Romania is the largest country in Southeastern Europe and has the capital city at Bucharest. Even if it is not so well-known as other countries in Europe, does not mean it is a insignificant part of the world. In Romania we can find the largest undisturbed forests in Europe, the world's largest salt mine museum, the youngest continental land, the second largest underground glacier in Europe, the tallest rock sculpture in Europe and the oldest cave drawings in Central and Eastern Europe. (The Carpathian garden, 2014) In Romania, rational and efficient waste management must remain a priority for everyone involved, in order to ensure a high level of protection for the environment. In Romania it is estimated that there are 200 non-compliant municipal landfills and over 8000 wild dumps before the year 2009. There are 8 regional plans of waste management, 21 concepts of waste management approved at national level and 29 European directives. Waste management in Romania means 0.9 kg / day/ capita urban, 100000 tons of waste per day and over 36 of waste per year. (Petra Schneider, Vasile Pintilie, 2012). According to Accession Treaty, Romania must gradually reduce the waste that are in more than 100 non-compliant municipal landfills. Under Directive 1999/31, Romania must reduce the annual amount of biodegradable waste landfilled to 2.4 million tons. For the period of years 2007-2013, the funds for financing projects as "Developing management systems integrated waste and waste management infrastructure expansion," were approximately 991.5 million euros. (Ghidul Solicitantului, 2010).

2 Conceptual framework

2.1 Waste Classification

Municipal waste are represented by all household waste and similar to those generated in urban areas and rural households, institutions, commercial establishments and the operators, street waste collected from public spaces, streets, parks, green spaces to which is added and construction and demolition waste resulting from the interior design of the housing collected by the sanitation operators. Currently, at the level of EU municipal waste is treated in landfills (38%), incineration (22%), (25%), recycling and composting (15%). (SNGD, 2013) Waste resulting from medical activities, are all dangerous waste or non-dangerous, occurring in hospitals. Dangerous waste are the waste that presents a real risk to human health and the environment being generated during the...
hospitalization, in the activities of diagnosis, treatment, surveillance, prevention and medical rehabilitation, medical research and production, storage, testing and distribution of drugs and bioproducts.

2.2 Legislation applicable in the medical waste management at the national level

Regarding legislation in force in the area of waste management, this is in conformity with the acquis communautaire. In order to comply with EU directives, Romania has achieved in the negotiating process transitional period until 2017 for certain types of waste warehouses: warehouses for municipal waste – transitional period until 2017; temporary storage of dangerous industrial waste - 2009; non-dangerous industrial waste warehouses – transitional period until 2013. A number of 177 warehouses located in urban areas must cease the storage activity between 2017 - 2013. The principle of preventive action is one of the principles underlying the Emergency Ordinance no.195 / 2005 on the protection of the environment with subsequent amendments, Directive 2008/98 / EC on waste, transposed into national regime, presenting the waste hierarchy "is applied as a priority order in legislation and policy on the prevention of the generation and waste management, such: prevention, preparation for reuse, recycling, other recovery, eg energy recovery and, as a last option, elimination".(SNGD, 2013) Through the "Position Document of Romania Chapter 22 - Environment" Romania was obliged to implement acquis communautaire on this chapter by accession (01.01.2007) with the following exceptions, including the one related to waste management, namely:

A. Directive no. 99/31 / EC on the landfill of waste, which were requested and obtained a transitional period until 2017 and is transposed into national legislation by GD 128/2002. (SNGD, 2012).

In the document "Waste management in hospitals" published in March 2004 under the auspices of the World Health Organization, stated that OMS Member related at long-term goal would be: “Promoting effective technologies for the final resolution of the problem non-incinerated waste from health care facilities to prevent: a) illness caused by inadequate management of medical waste and b) avoid public exposure to dioxins and furans”. (Balan Gabriela, 2009) In 2000, the EU countries were introduced stricter emission limits for medical waste incinerators. This caused the closure of many incinerators and increased inactivation non-incinerated units for dangerous medical waste. However, the rate of introduction of alternative treatments is much slower than in the US and incineration remains the favorite method of treating medical waste in Europe. In Romania, regulation for the management of MSW is in its early stages. Romania’s accession to the European Union in 2007 has put the Romanian waste management under the regulative influence of various European Directives. In Romania the organization of collection, transport and treatment of municipal waste is under the responsibility of the local public administration, who then decides to either place it under their own management or outsource to private operators. There are approximately 400 authorized operators for waste management services, with the largest 10 holding more than 80 % of the market share. The market is currently undergoing a consolidation process through mergers, market exits and take-overs. The market for selective waste collection services is also quite fragmented, with more than 1 000 companies having been licensed nationally for the collection of packaging waste. (Almasi Alexandra, Almut Reichel, 2013) In Europe although cremation (Balan Gabriela, 2009) is widely used, non-incinerator technologies gaining ground as well:

A. In Slovenia, since 1995, all infectious medical waste were treated using steam systems.
B. Portugal has closed most incinerators and promoted inactivation of medical waste in autoclaves.
C. In France, since 1993, more than 50 operators introduced through the inactivation of medical waste shredding / steam / drying.
D. Subsequently, another 12 new countries joined the EU. Incinerators in these countries are the mostly old and do not meet the emission limits for EU incinerators. For example, in the Czech Republic and Poland, the vast majority of medical waste incinerators dioxin emissions exceeded 0.1 ng / m3 TEQ.
In Romania, until 2005 there were no regulations on work inactivation dangerous medical technologies using alternative, non-incinerated. To compensate for this lack, the relevant authorities have issued Order no. 940 / 07.09.2005 and respectively no. 698 / 10.08.2005 regarding the approval criteria for evaluating equipment neutralization of waste heat sterilization of medical activity, issued jointly by the Ministry of Health and Ministry of Environment and Water Management of Romania, published in the Official Gazette of Romania, Part I, no. 858 / 23.IX.2005. Our country's accession to the EU in 2007 has led to the need to implement EU legislation in the field. (Balan Gabriela, 2009).

3 The need to approach the problem

Management of dangerous waste is a global problem and certainly by definition these wastes have a great impact on human health and the environment. Dangerous waste, besides that it represents a lost resource may have one or more properties (ex.: flammability, corrosiveness, toxicity, etc.), requiring rigorous management. The current state of municipal waste in Romania (in this category included medical waste) shows that waste disposal takes place in through storage by 95%. At the end of 2012 there were 79 warehouses in operation of which 30 were compliant warehouses and 49 warehouses were inconsistent. Also there for municipal waste incineration and according to National Waste Management Plan (NWMP) this option will not be technically and economically effective until after 2017. Until 2020 it is aimed to obtain a minimum of 50% recycling and preparation for reuse under Directive 2008/98 but aims and development of integrated waste management systems at county level and 65 landfills for dangerous after 2017. (Faca Mihail, 2013).
One of the most widespread streams of dangerous waste is the waste in the health system. Contact with dangerous medical waste can cause disease or injury. All individuals who come into contact with dangerous medical waste presents a potential risk of disease. The optimal solution identified for elimination of such dangerous waste incineration incinerator is built specifically for dangerous waste disposal. Although in Romania are in operation ten incinerators for disposal of dangerous waste, it was found that they cannot fully solve the problem of medical waste, some difficult issues such being transport dangerous waste, and the high costs required by firms incineration. The introduction of technology to neutralize dangerous waste and can be placed at their workplace, hospitals, may be the best solution for the management of this waste, in accordance with the principle of proximity and self-sufficiency. Eco-rational management of medical waste must consider, first, the waste hierarchy. (Popescu Anisoara, Iordan Catalina)

The most serious problems regarding the protection of the environment are the quantity of municipal waste and their inefficient management. In Romania, the management of municipal waste (in this category are also the medical waste) can be summarized (Atudorei Alexei, 2007) in several clear ideas:
1. Low level of interest from local authorities in managing and monitoring efficiently and constantly, the municipal waste;
2. The lack of civic sense of population to keep clean the environment;
3. The difficulty to apply the European directives.
According to the report by the EU in 2012, municipal waste management in Romania is translated mainly by high capacity storage and management of municipal waste in terms of
reduced capacity incineration, recycling and composting of waste being on the last places in Europe with Bulgaria, Latvia, Lithuania and Cyprus. (UE Report, 2012). Regarding the responsibility of European Producers of waste product is a worrying situation only France and Belgium having a clear management in this regard. (UE Report, 2012).

It is well known that medical waste incinerators emit in the atmosphere dioxins, furans, heavy metals, fine particles of dust, hydrogen chloride, sulfur dioxide, carbon monoxide, soot, produced by incomplete combustion and other pollutants. These compounds have a significant negative impact on workers’ health in incinerators, public health and the environment. International Agency for Research on Cancer (IARC) has classified -2, 3, 7, 8 dioxin - TCDD in the group I of products human carcinogens (like most toxic), although other dioxins are the considered to be potentially carcinogenic substances to humans. Also, dioxins affect the endocrine system, weaken the body's resistance and genetic aberrations are associated with diabetes, endometriosis and a wide range of diseases. In accordance with European Union Directive (EU). 2000/76 / EC on the incineration of waste, medical waste incinerators must meet the maximum permissible limit of 0.1 ng TEQ emission / m3 for dioxins and furans. It was found that the vast majority of medical waste incinerators in some Western European countries and in the new states, states, including Romania, could not meet this standard limits. In many cases, to meet this deadline, incinerators had to be rebuilt and equipped with effective filters. (Balan Gabriela, 2009)

4 Objectives of the research paper

The purpose of the entire research work is to know the level of efficiency with which hazardous medical waste is managed in the hospital activity. The first objective is to identify at what level the dangerous medical waste management is found and what steps have been taken in this regard. The second objective of the research paper is to know which are the factors that influence the absence of an effective management plan in medical waste collection at the national level, analyzed in relation to health facilities and the impact on the environment.

5 Research methodology

The research method chosen is the method of comparative analysis made between for levels of dangerous medical waste management interest, respectively:
5.1 General level (such as medical waste managed at national level);
5.2 Level of costs involved;
5.3 Project level (stage implementation and development of integrated waste management systems at level particular, reported in more than 10 county emergency hospitals.);
5.4 Particular level (which hospitals have started the procedures necessary for the effective management of medical waste);
5.1 General level

Analyzing the official data provided by the Ministry of Environment and Climate Change has been identified for 2013 a worryingly small number of authorized economic operators that manages at the national level treatment by low temperature thermal decontamination of dangerous medical waste. Although at the national level there are 8 regions (NUTS II) in Region 2 (Southeast of Dobrogea) and Region 4 (South-West of Oltenia) there is no authorized economic operator to handle the decontamination of waste heat at low temperatures dangerous medical and Region 5 (Timisoara) environmental permit the economic operator is in the review procedure and for Region 6 (Cluj-Napoca) environmental permit single operator is in the regulatory procedure. (MECC, Operators of medical waste, 2013) as shown in table 1.
Tabel 1 Authorized economic operators for decontamination of waste by Regions

<table>
<thead>
<tr>
<th>Region</th>
<th>Authorized economic operator for decontamination</th>
<th>Environmental permit (for the economic operator) is in the regulatory procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 2 South-East Dobrogea</td>
<td>Region 5 Timisoara</td>
<td>Region 6 Cluj Napoca</td>
</tr>
<tr>
<td>Region 4 South-West Oltenia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Made by author

According to information provided by the project that contains the Results of Documentary Analysis of Sector Environment and Climate Change " (2013), project co-financed by the European Regional Development Fund through POAT, it follows that in 2011 the amount of waste generated from medical activities was over 30,000 tons / year of which a percentage of over 20% was dangerous infectious waste. Quantity of dangerous medical waste incinerated in 2011, was over 5000 tons / year and that was treated by heat sterilization of over 2000 tons. Final disposal of dangerous waste from medical activity is achieved by incineration or disposal in municipal warehouse for infectious and stinging waste. (Project co-financed through POAT, 2013).

5.2 Level of investment costs for implementing an integrated management of medical waste.

In Romania, the investment costs for integrated waste management in the the period 2008-2015 as table 2 shows, are estimated at 762 million euros (Atudorei, 2007). The most obvious need to invest it is in Region 5 (West), followed by Region 4 (South-West). Of the 762 million euros, 264 million euros are for building new landfills, followed by the 204 million euros for closure the existing landfills.

Table 2 The investment costs for integrated waste management in the the period 2008-2015

<table>
<thead>
<tr>
<th>Region</th>
<th>Collection/Transportation</th>
<th>Treatment and Recovery Plants</th>
<th>New Landfills</th>
<th>Closure of existing landfills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 1 – North East</td>
<td>41.257.000</td>
<td>23.400.000</td>
<td>43.524.000</td>
<td>11.910.000</td>
<td>120.091.000</td>
</tr>
<tr>
<td>Region 2 – South East</td>
<td>30.075.000</td>
<td>4.843.000</td>
<td>40.395.000</td>
<td>4.410.000</td>
<td>79.723.000</td>
</tr>
<tr>
<td>Region 3 – South Muntenia</td>
<td>30.464.000</td>
<td>9.980.000</td>
<td>4.557.000</td>
<td>6.488.000</td>
<td>51.498.000</td>
</tr>
<tr>
<td>Region 4 – South – West Oltenia</td>
<td>29.965.000</td>
<td>49.433.000</td>
<td>39.969.000</td>
<td>8.775.000</td>
<td>129.142.000</td>
</tr>
<tr>
<td>Region 5 - West</td>
<td>24.796.000</td>
<td>45.436.000</td>
<td>38.169.000</td>
<td>21.333.000</td>
<td>130.534.000</td>
</tr>
<tr>
<td>Region 6 – North -West</td>
<td>7.221.000</td>
<td>23.200.000</td>
<td>44.640.000</td>
<td>21.750.000</td>
<td>96.811.000</td>
</tr>
<tr>
<td>Region 7 - Center</td>
<td>10.798.000</td>
<td>18.999.000</td>
<td>51.150.000</td>
<td>20.400.000</td>
<td>101.347.000</td>
</tr>
<tr>
<td>Region 8 – Bucharest – Ilfov</td>
<td>10.422.000</td>
<td>29.615.000</td>
<td>7.500.000</td>
<td>5.950.000</td>
<td>53.492.000</td>
</tr>
<tr>
<td>Total</td>
<td>184.998.000</td>
<td>204.906.000</td>
<td>264.904.000</td>
<td>102.821.000</td>
<td>762.629.000</td>
</tr>
</tbody>
</table>

5.3 Project level (stage implementation and development of integrated waste management systems).

In the Ministry of Health functions Programme Coordination and Implementation Unit, which manage the project regarding "Neutralization of dangerous medical waste, resulted from the hospital activity" project that is proposed for financing Operational Programme POS-Environment, Priority Axis 2 Major Area of Intervention 2.1. In order to be implemented this project, you need to be respected technical documentation regarding the acquisition of consulting services proposed by the Ministry of Health. The main objective is at this stage grant application preparation and documentation related guideline beneficiaries of POS-Environment, such as: feasibility study, cost-benefit analysis, institutional analysis and study on environmental impact assessment. Developing this grant application shall mainly have to take account of the Law no. 211/2011, on waste regime, Order of the Ministry of Health 1226/2012, specific legislation for environmental projects, and specific documents Axis 2 POS-Environment (Technical documentation, 2013).

After analyzing the information provided on the progress of projects approved and under preparation in the Sectorial Operational Programme (POS Environment) – Priority Axis 2 - “Development of integrated waste management systems”, only 3 projects (Giurgiu, Bistrita, Vrancea) were approved in 2009 and 35 applications for grant are in preparation. Regarding the project on " Neutralization of dangerous medical waste resulted from the hospital " proposed through funding under the Operational Programme POS Environment, Priority Axis 2 Major area of Intervention 2.1, in the year 2013 it was necessary to be equipped in this regard over existing 300 hospitals at the national level and to mitigate the 50,000 euros spent annually / hospital. This project represents a continuation of the actually initiated by the Ministry of Health in 2008 and implemented in 2009 with the object of a total of 28 plants neutralizing. (Solga I, 2013).

5.4 Particular level (county emergency hospitals that have implemented effective measures for managing medical waste).

We choose for observation, county emergency hospitals, because are representative for the social structure, the served area but also for the large number of treated patients.

In a simple analysis of a total of 461 existing hospitals on national territory only 88 of these hospitals are the benefiting from the project " Neutralization of dangerous medical waste resulted from the hospital”, according to Annex 1, retrieved the Health ministry's official address online. From the 88 hospitals benefiting from the project, about 22 county emergency hospitals can access financing, with this project. (Annex no. 1, 2013).

The information presented below, are quite recent, as there is no official statistics to document them in the form of a well-organized / structured document. Information was carefully extracted and analyzed either in existing media, online newspapers or newspapers specializing representative at the regional level, decisions of county councils are approved or pending approval but existing specialty publications in PDF format in online environment. The general trend will be for total closing crematory still existing and reducing costs estimated at 50,000 per year / hospital as specified by the Ministry of Health considering that 1000 kg of medical waste are produced monthly.

In the following we chose to introduce compressed only hospitals are important and representative at the county level, which were made requests for change, as follows: Emergency hospitals that began building (equipment, fittings, expansion) neutralizing a medical waste incinerator are: Slobozia (independent newspaper, 2014), Oradea (Local Council Decision, 2014), Suceava (County Council Decision, 2014), Deva (Independent Newspaper, 2014), Teleorman (Online Daily Newspaper, 2014) Zalau (Online Newspaper, 2014) Slatina (County Gazette, 2014), Valcea (County Council Decision, 2014) Focsani (Vrancea Newspapaer, 2014), Giurgiu (Regional Publication, 2014), Targu-Jiu (Gorj Exclusive
Necessary steps were made in the early months of 2014, the funds allocated are in a high percentage of European source through the Sectorial Operational Programme Environment-POS environment, and some of the funds are allocated from the state budget. The costs of implementing such a project varies from a few thousand euros, reaching tens of millions of euros. To support the smooth running of things, there are several steps required, in addition to the feasibility study necessary approval from local and county councils sometimes hampers the allocation of land required to build and location of such stations and technical equipment, and a good involvement of the hospital manager.

It is interesting to note that there is no specialized information, formal structured in this respect, access to such information is very restrictive. Information was also obtained from carefully selected from local newspapers, online address. Even if the information is public, obtaining data is difficult, sometimes impossible.

Hospitals afore said, which provides emergency medical services at county level through participation in such projects shall comply with the procedures at European level, reduce the level of pollution, waste management and monthly expenses not least try to respect the content of reform Romanian health system.

There are hospitals, county-level representative who recorded a series of irregularities in the management of hazardous medical waste, as well:

- lack of performed analyzes on residues produced during incineration;
- lack of properly designed storage spaces;
- lack of neutralizing materials;
- the present of infectious waste mixed with household waste;
- the existence of differences between the reported and taught medical waste;
- installation inoperable for medical waste sterilization;
- forms of delivery / transport medical waste incorrectly completed without specifying the quantities of waste shipped or transported waste code;
- Device deprecated used in the treatment of low temperature thermal decontamination.

Irregularities occurred mainly due to inefficient contracts held with private companies that handle medical waste management, observing the provisions of Law 211/2011 on waste regime. Irregularities uncovered generated a series of actions by the authorities, the imposition of fines between 1,000 and 20,000 euros to raise temporary operating permit. The irregularities were discovered and punished to the level of 2013 and mainly mentioned in articles in the local press.

Comparative analysis of the four levels of interest in which is reflected hazardous medical waste management, the situation is worrisome. The causes that generate negative results in this are multiple, respectively:

a) there are a very small number of authorized economic operator and two of the eight regions there is no authorized economic operator;

b) difficult access and lack of transparency for obtaining European funding dangerous waste management hospital activity;

c) high number of hospitals that require massive financial investment in this area;

d) some county hospitals either do not meet European environmental standards are not initiated any action to effectively manage future medical waste they generate.

The information obtained can be inferred that the situation is unsatisfactory and requires rapid intervention. It is also difficult to be implemented successfully a medical waste management plan, even if some emergency hospitals were analyzed applying measures to reduce the level of contamination and pollution. Basically you need to be effectively and not declarative proposed European standards.

It requires commitment at both ministerial and institutional European level. It requires collaboration in three directions to correct the discrepancies found in the four levels analyzed comparatively.
6 General recommendations

The main responsible for the effective management of dangerous medical waste must remain medical unit manager. Medical unit manager must handle medical waste management strategy and participate in the creation of a medical waste management plan, documentation describing the program actually waste management from generation to disposal. For a waste management plan to succeed, it is necessary to determine the actions to be clear to be carried out and monitored for that purpose. As provided by art. 10 of Ministerial Order no. 219/2002, the plan must be reviewed annually and included in the documentation necessary for authorizing health units where the medical activities. In 2004 the first steps were made in this respect being approved National Waste Management Strategy and National Waste Management Plan with provisions including medical waste management. With these tools, has imposed the separate collection of waste from health care facilities both infectious and dangerous waste, as well as the household. Another issue was the prohibition of the final disposal of dangerous waste and bringing European standards of existing incinerators, crematories and closing. (SNGD, 2013) The correct implementation of a national strategy for the management of medical waste in Romania is aimed both progressive decrease in the amount of dangerous waste and the following requirements:

- A, until 2015, reducing the number of historically contaminated sites in at least 30 counties;
- B, until 2015, creation of 30 integrated waste management systems at regional / county; closure of 1,500 small waste in rural areas and 150 old deposits in urban areas; implement 5 pilot projects for the rehabilitation of historically contaminated sites; provide improved sanitation and waste management for a total of 8 million inhabitants. (SNCD, 2013).

Along with these general recommendations should be considered and these aspects:

- develop the ability of awareness, information and hazardous medical waste management;
- develop the ability of hospitals to create plans to reduce and eliminate medical waste generated;
- increasing the involvement in the development and implementation of projects needed in this area;
- increasing the number of unannounced checks within medical units;
- creation of a specialized department in hazardous medical waste management;
- capacity development activity reports online publication created for medical waste management;
- reorganization sections of public information online system addresses found in official medical units.

7 Conclusions

Romania is in a early stage of managing the hazardous medical waste in accordance with European standards and directives. At the present, most of hospital units does not handle the hazardous waste in their units. Most health units have contracted the services of a private provider whose methods and processes are not under the control of hospital unit. Even if there are positive examples, most of them are only in a project stage. The level of implementation it is very low. Exist will and in some cases there is initiative but are required continued efforts in order to apply and to materialize what has been established. At a general level, it should be monitored the involved costs for investments. It is imperative to manage the data in a centralized system and increase the availability and the transparency of them.

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References


Balan Gabriela, (2009), *Ghid privind implementarea tehnologiilor neincinerante de inactivare a deșeurilor medicale din România*, Institutul de Sanatate Publica Bucuresti, Romania, p.5-p.10


Ghidul Solicitantului, (2010), *Axa Prioritară 2- POS Medi, Dezvoltarea sistemelor de management integrat al deșeurilor și reabilitarea siturilor istorice contaminate*, Domenul major de intervenție 1, p.11-p.14


Proiect „Rezultate Analizei Documentare Sector Mediul si Schimbari Climatice” (2013), proiect cofinantat din Fondul European de Dezvoltare Regionala prin POAT, p.27-p.28


Strategia Nationala de gestionare a deșeurilor, (2013) Ministerului Mediului și Schimbărilor Climatice, Bucuresti, Romania, p.4-p.13


rezultate-din-activitatea-spitaliceasca\>, Accessed March 2014


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