

NEUTRALIZING DANGEROUS MEDICAL WASTE FROM HOSPITALS

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Abstract

Dangerous waste constitutes a real risk for human health as well as the environment, being generated through diagnostic, treatment, supervision, disease prevention and medical recovery activities, including medical research and producing, testing, storing and distributing drugs and biological products (Popescu Anisoara, 2005)

The existence of a sterilization and waste management unit for dangerous medical waste at the Emergency Clinical County Hospital in Oradea, Romania, necessitates close monitoring of the medical waste disposal activity.

Key words: hospitals, medical waste, neutralization

INTRODUCTION

In a medical unit, approximately 25% of the total quantity of produced waste is represented by dangerous medical waste. The quantity of waste resulting from medical activity is experiencing a continuous trend of growth following the increase in the possibility of acquiring one-time use materials within medical centers. The European Union's strategy is today oriented towards a new type of waste management, which entails a reduction in the quantity of waste being stored and also the recovery of more compost and energy from waste and improving the quantity and quality of overall recycling (INS, 2005, Baldwin, A., Kristiansen T., 2008).

The main goal of this paper is to analyze the benefits of using the waste management unit at hospital level.

MATERIAL AND METHOD

The functionality and usage of the Dangerous Medical Waste Shredding and Sterilizing Unit (henceforth known as ISDM-1) from the Emergency Clinical County Hospital of Oradea was assessed, ranging between January 2013 and August 2014 and based on the legislative requirements pertaining to waste management: OMH nr. 219/2012 regarding norms of collecting, storing and eliminating waste resulting from medical activities; OMH nr. 1226/2012 regarding technical norms of handling waste resulting from medical activities; OMH 2179/2012 regarding the functioning and monitoring of low-temperature termic

decontamination equipment; Law 132/2010 regarding selective collection of waste from public institutions.

RESULTS AND DISCUSSIONS

In the analyzed period, at the level of the Emergency Clinical County Hospital of Oradea, a certain quantity (kg) of dangerous medical waste was generated and eliminated, while respecting GD 856/2002 regarding the registration/inventory of waste management and approval of a waste list, including dangerous waste, as per Table 1,2:

Table 1

Quantity of dangerous waste resulting from medical activities at ECCHO, 2013

Year 2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Sharp Objects	270	254	279	298	255	269	328	281	295	290	279	253
Human Organs & Fragments, Including Blood & Containers	416	398	443	486	443	370	539	419	454	470	439	441
Infectious Waste* - ISDM-1	1718	1719	2395	1714	1373	381	1918	1690	1455	0	1541	1634
Incinerated Infectious Waste*	2045	1968	2292	2340	2566	3405	2418	2179	2627	4473	2463	2286
Chemicals Which Are Or Contain Dangerous Substances	397	216	125	233	153	171	224	178	145	192	223	87

Table 2

Quantity of dangerous waste resulting from medical activities at ECCHO, Jan 14-Aug 14

Year 2014	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Sharp Objects	342	305	394	371	432	511	513	567
Human Organs & Fragments, Including Blood & Containers	524	443	493	410	507	542	523	598
Infectious Waste* - ISDM-1	1472	1642	1750	627	0	0	0	0
Incinerated Infectious Waste*	2761	2309	2411	3365	4311	5070	4991	4634
Chemicals Which Are Or Contain Dangerous Substances	206	214	200	208	71	263	120	232

* = waste which necessitates special measures for disease prevention when collected and eliminated

The medical waste treatment equipment which is part of the Emergency Clinical County Hospital in Oradea was acquired in 2009 and has a capacity of 15-40 kg/cycle and a quantity of processed waste of 1455 kg/month. The cost per kilogram of neutralized waste using this equipment is 4.32 RON/kg. Using this equipment represents a solution for eliminating dangerous hospital waste and a neutralizing method through procedures

which are accepted at EU level, with minimum impact on the environment: autoclaving and shredding (including neutralizing fluids resulting from the process) with the compacting of resulted waste (Bara A., 2007, Cadariu A., et al, 2006, Jones R.H., 2003). The quantity of neutralized waste per month is approximately 1500-2000 kg/month (Figure 1-2).



Fig. 1. Quantity of infectious waste neutralized by ISDM-1 within ECCHO, 2013-August 2014

The waste management equipment only neutralizes dangerous medical waste with the code 18.01.03* (waste which necessitates special measures for disease prevention when collected and eliminated), which is strictly selected. Keeping in mind the fact that the waste which can produce cuts or punctures is not neutralized at all, the ECCHO has a separate contract with a company specialized in incinerating infectious waste.

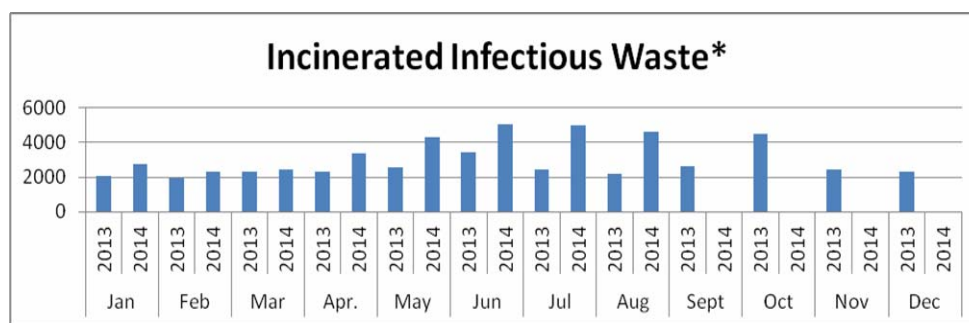


Fig. 2. Quantity of infectious waste neutralized through incineration within ECCHO, 2013 - August 2014

Environmental Emissions:

The used water which results from the process through the purges from the conditioning phase is evacuated to a collection vessel where they are neutralized at a temperature of 147 degrees Celsius before being evacuated. The autoclave and fluid collection and neutralizing vessel are fitted with a HEPA filter in order to avoid the elimination of air from the autoclave. The entire process is monitored through the display of data

relating to the parameters of the current state of the process on the screen of the operating panel.

The aeromicroflora is measured before sterilization and does not increase significantly during sterilization, with the obtained results being firmly within the boundaries of the law (OMH nr. 976/1998).

From a noise perspective, the registered level from the space where the neutralizing equipment is situated is below 70dB.

From a microbiological point of view, the neutralizing equipment accomplishes an effective sterilization, reaching level IV of microbial inactivation. The treated waste is not dangerous and can be stored at waste deposit sites in the region.

The termic sterilization and shredding equipment uses saturated steam produced by its own generator to function and has a total processing and shredding capacity of 15-40 kg/cycle, depending on the type of waste being treated and the packaging. The duration of a neutralizing cycle is of maximum 35 minutes.

CONCLUSIONS

The benefits of using ISDM-1 are an increase in both efficiency and yield due to the great importance being placed on environmental impact, cost reduction and proper recycling, as well as a reduction of pollution caused by waste, especially gas emissions with a greenhouse effect.

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