

Podcast: Waste management - incineration

Welcome to the Difäm Health community. My name is XXX and here with me is XXX. Today we'll continue on how to deal with the leftovers of medical treatment and hospital waste. Last time we heard about different types of waste. We learned about three categories: infectious waste, sharps and general waste and how to differentiate and separate them. Moreover, we learned that good waste management is very much a leadership and management task, because lots of different fields and workers are involved. Today we will learn more about how to finally get rid of the stuff, right?

Yes, today we'll be mainly talking about incineration, as this is still the gold standard of dealing with medical waste in most countries. It is the most widely used method for the disposal of healthcare waste in resource-limited settings. Incinerators are devices that burn waste at high temperatures, converting it into ash and gases. To really reduce matter to ash and gases, a temperature of at least 600° Centigrade is necessary, 1000° is even better.

Okay, that is much hotter than an open cooking fire.

Yes, you are right. That is why medical waste should never be burned in an open fireplace. The temperatures to destroy the dangerous items are not high enough. It must be burnt in a closed incinerator. With temperatures between 600 and 1000° Centigrade, even metal will melt and so needles, blades and other sharps will be rendered harmless. For proper incineration, normally a 2-chamber system is used.

Once collected, the medical waste is transported to the incinerator and loaded into the combustion chamber. The combustion chamber is preheated to a high temperature, typically between 800 -1,200 degrees Celsius, using natural gas or other fuels. In this preheating period also non-medical waste can be burnt like paper, wood etc.

Once the 600° is reached, medical waste can be burnt. In those high temperatures, the medical waste ignites, what is called combustion, and so the combustion process begins. As the waste burns, it releases heat, which further fuels the combustion process. The high temperature of the combustion chamber helps to break down the waste and destroy any pathogens or other hazardous substances present in the waste.

As for the quantity of waste that can be burnt, for a normal Montfort incinerator – which is the most commonly used incinerator in sub-Saharan Africa, about 6 kg of waste can be burnt in an hour. This means approximately one box of sharps every 8 minutes. While burning, it helps to keep watch over the temperature: if it falls close to 600° centigrade, more waste is

needed to raise the temperature again. If the temperature rises over 900°centigrade, burning material should be reduced by creating larger time intervals before entering the next batch. With less material to burn, the temperature will come down again. It is important to keep the temperature in this range because only then optimal combustion is guaranteed. Outside this temperature range, there is a danger smoke development and toxic emissions.

Okay, temperature handling by careful loading is important, but it sounds feasible. What happens once I have added my last piece of medical waste? Can I just go home?

No, not yet. About 8-10 minutes after the last loading of medical waste, load again some non-medical waste to make sure the temperature stays up long enough to completely burn the last batch of medical waste. Continue this until you have burnt about 1-2 additional non-medical waste batches. Once the combustion process has been completed and the incinerator has cooled down, the remaining ash and residue are collected and disposed of in a landfill or other appropriate disposal sites. The ash may contain small amounts of hazardous materials, so it must be handled and disposed of in a manner that is compliant with local regulations. In order to limit emissions to a reasonable level, it is advisable not to carry out waste incineration for more than two hours a day.

You mention an important issue that I have also thought about: the environmental aspect. As we burn practically everything there must be a lot of fumes and emissions. How do we deal with them and how can we keep emissions to a minimum?

Difficult topic. Incineration comes at a cost. From an environmental perspective, incineration of health care waste is not the ideal solution for health care waste disposal. Nevertheless, it is often the most viable option for developing and transitional countries. In these countries especially, there is a significant disease burden associated with poor management of health care wastes, since options for waste disposal are limited.

Incineration of medical waste can generate air pollutants such as dioxins, furans, and heavy metals. To prevent these pollutants from escaping into the environment, incinerators should be equipped with air pollution control systems. However, things like filters are mostly not available in resource-limited settings or quite expensive.

However, there are ways to improve incineration and make it as safe as possible.

Build the incinerator NOT close to patients' wards and other occupied or planned buildings. There should be low public presence or passage of people. Before you build, check for the directions of the wind. The prevailing winds should blow smoke away from buildings and NOT across cultivated land. This is important, as especially burning plastics will lead to poisonous substances that can be taken up with the food again if the wind blows them on fields and crops. It is also important to make sure that the incinerator is always in good shape, that chimney and chambers are not blocked or dirty and that the correct temperature is maintained during the incineration process. Never burn wet waste and if possible, do not burn PVC plastics; they are very toxic. Unfortunately this is the most widely used plastic waste like IV-bags, plastic bags etc. PVC plastic sinks in water while all other plastic floats. If at all possible, bring PVC plastic to a facility where it can be properly disposed of.

Okay, I get it, incineration is not the perfect solution of our medical waste problem but in many places, the best and only solution we have. Therefore, we have to be prudent in using it in order to not contaminating the environment more than unavoidable.

Yes, if you build new, you could even think of using the heat of the incinerator to create energy or heat water for other purposes. However, this needs quite some planning and experts for advice. Using the incinerator not only for burning waste but also for creating power would be a good thing in the end.

I am glad for our talk today. It sheds some light on a topic, which clinicians normally only know from the front end. Janitors, cleaning staff and technicians handle the back end and we should be very happy to have these people, who take the responsibility for the very important task of getting rid of our waste.

I think next week we'll have another talk about yet some more aspects of infection prevention and control. I hope that you will tune in again. Maybe you want to look at the game on waste separation that we are going to post later this week. Who is going to be our champion? I have a go myself and see how I will be doing as soon as it is up.

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