The Ottawa Hospital

As the third largest hospital in Canada, The Ottawa Hospital (TOH) is one of the largest generators of biomedical waste in the country. TOH's objectives are to ensure safe, compliant and cost effective disposal practices for potentially infectious waste.

Biomedical Waste Management Program

Studies of hospital waste streams in Ontario and across the United States illustrate, in general, that hospitals poorly separate their biomedical waste from the general waste stream. Furthermore, the infectious waste (requiring sterilization) and pathological waste (requiring incineration) are often unnecessarily mixed. This contamination and unnecessary treatment poses a serious health and safety liability, and adds avoidable costs and burden to the environment.

Since 1994, TOH's biomedical waste program has:

- eliminated the unnecessary on-site incineration of non-pathological biomedical waste;
- installed a state-of-the-art fluid management system;
- decommissioned its on-site incinerator; and
- planned the installation of two on-site "Hydroclave" alternative technology waste treatment systems

In April 2001, a cost-benefit analysis was conducted to see if on-site incineration with aging equipment was cost effective. Without including labour costs, the analysis showed that sending the anatomical waste off-site was more cost-effective and environmentally beneficial. As a result, the incinerator was officially decommissioned in May 2001.

In the past year, TOH has improved its management of biomedical waste through the installation of an "Eductor" fluid management system. For treatment of infectious biomedical waste, TOH replaced an ageing autoclave with an alternative treatment technology - two H-15 Hydroclave systems, scheduled for installation in October,2001.

The Eductor uses a closed-loop gravity fed flush system to efficiently empty chest drainage units without risk of splashing or clogging. The chest drainage units are transported to the Eductor using specially designed transfer baskets and carts which hold the units upright. Once the units are emptied, they are categorized as domestic waste. Fluid is discharged to the sanitary sewer, or packaged for off-site incineration, following infection control guidelines.

The Hydroclave consists of a barrel-shaped pressure vessel and a rotating arm inside allowing mechanical breakdown of bags, sharps containers and biomedical waste pails. This improves contact between the waste and high-pressure steam thus improving decontamination and reducing sterilization times. In contrast to an autoclave, the Hydroclave uses the moisture content of the waste to create the necessary steam used in the decontamination process. Once the decontamination cycle is complete, all of the moisture inside the chamber is condensed with cold water and is discharged to the sanitary sewer, resulting in a dry, decontaminated, fragmented

waste.

Benefits

Environmental: Biomedical waste incinerators are Canada's second-largest source of toxic dioxin to our air, and release mercury and other heavy metals. Conversely, non-incinerative methods of waste treatment do not pollute the atmosphere and the decontaminated waste can be disposed of at the local landfill. This prevents long distance trucking, packaging and additional handling, which is expensive and potentially hazardous. The waste, wastewater and air emissions meet all regulatory requirements for decontamination, guaranteeing 99.99% sterility (6 $\log_{10}$ reduction in *B. Stearothermophilus*).

Economic: The Eductor payback is less than one year when the costs of packaging, mass/volume of fluid (each chest drain can weigh up to 12 kg) for off-site disposal are considered. Once the chest drain has been emptied, the plastic shell is domestic waste.

Reductions in packaging costs (massive reductions = pollution prevention), utility consumption and off-site disposal costs, make the payback of the two Hydroclave systems less than two years.

Decommissioning the incinerator and using off-site disposal was cost equivalent (not including human resources). Packaging costs offset maintenance costs and off-site incineration offset utility consumption.

New federal Canada-Wide Standards have established strict emission limits on toxic dioxin and mercury from medical waste incinerators by 2006. TOH will realize the benefits of compliance and reduced health and safety costs.

Social: The Eductor Fluid Management system reduces occupational risks by eliminating splashing and spillage inside biomedical waste bags. This is a prime example of using engineering technologies for reduction of exposures to bloodborne pathogens under Occupational Health and Safety regulations.

The decision to decommission the incinerator at the Civic Campus was based primarily on promoting environmentally responsible healthcare and secondarily on a business case. The aging incinerator would be requiring increasingly costly maintenance in future years thus presenting fewer benefits to off-site disposal. Labour costs were not a factor in this case since resources were re-allocated. Since the Civic Campus is surrounded by a residential zone, neighbours responded positively to the news.

Investment in Hydroclave technology represents a commitment by TOH to promote best environmental practices by achieving the highest level of waste decontamination and waste reduction. The landfill is also pleased that the waste will be shredded and unrecognizable, which is beneficial aesthetically to local residents.

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