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# **SOLID WASTE MANAGEMENT IN VANCOUVER'S HOSPITALS**

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## **Overview**

In the 1980's, concerns surrounding the transmission of blood-borne diseases grew rampant, prompting a shift in hospital policy from reliance on reusable to single-use devices. Since then, disposable technology and the pursuit of perfect sanitation have pushed hospitals across Canada to adopt increasingly wasteful practices in operating rooms, critical care units, and on the wards. Although some of this waste may be justified, the vast majority is due to poor commercial design, improper sorting, or unnecessary overage. All in all, this entire process produces large amounts of biohazardous and solid waste, contributes 1.5% of Canada's greenhouse gas emissions, and generates 87% of carcinogenic dioxin- and furan-based compounds in our atmosphere.

This report focuses on Vancouver, a city with a strong sustainability community whose citizens value progress in healthcare and conservation, but has yet to apply these values in the domain of medical waste. In breaking down this issue and exploring potential interventions, this report will discuss the problems, gaps, and opportunities in Vancouver's management of solid medical wastes and its many players.

## **Our Research Methods**

To paint a holistic view of the issue, we utilized a variety of information-gathering techniques including:

1. Site visits to Intensive Care Units (ICUs) and Emergency Departments in Vancouver hospitals
2. In-person and phone interviews with doctors, nurses, health authority administrators, and NGOs
3. Work with partners at the Lower Mainland Health Organizations Sustainability Team (LMHOST)
4. Reading key research papers and interviewing their principle authors

## The Problem Landscape

### *In Hospitals*

- Overage, an overstocking on equipment that typically exaggerates what will be medically required, is common on wards, Critical Care Units, and operating rooms.
  - Any overage is discarded after a patient leaves their room, with most patients leaving before using more than two-thirds their room's stock.
  - Our work in the ICU of Royal Columbian Hospital revealed that between 20 and 40 pounds of solid waste is produced per discharged patient on average, and that roughly one-third of that waste is due to unused equipment.
- Waste is being incorrectly sorted. Up to 85% of hospital waste is non-hazardous, and can be recycled or reused accordingly, but between 50-92% of this waste is being incorrectly disposed of as biohazardous waste.
  - Miscategorised waste is erroneously incinerated, adding to greenhouse gas emissions, airborne carcinogens, poisons that accumulate in the food chain, and chemicals causing acid rain.
  - Hospitals pay up to ten times more to remove biohazardous waste.

### *In Private Companies*

- Health equipment producers take advantage of the public's fear of disease transmission to market single-use alternatives to reusable equipment.
  - In recent years, tools that were considered multiple-use, such as the surgical stapler, are being built in single-use models.
  - Related items are often purchased in trays or packages, with an entire tray's contents being wasted each time an individual item is needed.
- Due to wasteful and unrecyclable packaging, 80% of all waste is generated before a patient even enters the room.
  - Surgical products are often delivered in plastic containers that come double-wrapped in polypropylene plastic.
- Stericycle, a medical waste management company, controls over 75% of the North American market share and liberally incinerates waste.

## *In Health Authority, Provincial, and Federal Policy*

- There has been little attention paid to waste system management in new governmental policy.
  - The Royal Commission on the Future of Healthcare in Canada (2002) made no mention of environmental sustainability in its 47 recommendations.
  - Provincially, only Quebec has specific legislation on medical waste management
- Within the BC Health Authorities, sustainability policy is directed primarily towards conservation of electricity and natural resources, with little attention given to medical waste.
  - In interviewing a hospital manager, we learned about strict regulations preventing hospital reuse of un-opened equipment that has been stocked in a patient's room.
  - Many nurses in Vancouver hospitals dispute the efficacy of these policies. We spoke to a nurse who brought boxes of unopened equipment destined for wastage with her on humanitarian aid expeditions to developing nations.

## **The Solutions Landscape**

### *In Hospitals*

- By creating clear awareness campaigns, reducing overage, and adding infrastructure to properly sort waste, select hospitals in America, England, and Sweden have cut operating room budgets by up to 49%.
  - A pilot study done in the United Kingdom found that an average of \$465 worth of usable equipment is discarded from each bedside in their ICU.
  - Multiple US hospitals have reduced biohazardous waste to under 6% of the waste stream.
- However, large shifts in hospital policy are unlikely if a reduction on waste increases the rate of antibiotic-resistant disease.
  - A Charge Nurse we interviewed expressed disappointment towards the inevitable dominance of hospital-acquired infections as a key issue.
  - In Canadian hospitals alone, the multi-drug resistant bacterium named MRSA causes between \$33-42 million in healthcare costs
    - Yet multiple studies have found that surgical waste can be reduced by 75-93% without affecting patient outcomes.

## *In Non-Governmental Organizations*

- To date, many NGOs have been established to reduce medical waste, the majority of which can be split into three categories: innovation, activism, and donation.
- Groups that focus on innovation include the Canadian Coalition for Green Healthcare and Practice Greenhealth, which run multiple projects to reduce toxic waste, remove hazardous chemicals from hospital equipment, and promote hospital sustainability through a “Healthier Hospitals” program.
  - These groups often neglect issues with management of solid waste.
  - Progress and completion of sustainability goals are not audited, and most hospitals do not have uniform buy-in, resulting in a lack of progress
- Health Care Without Harm is an international group with strong ties to the United Nations that lobbies governments to promote safe, sustainable handling of medical waste
- Several large NGOs donate excess medical equipment collected at hospitals to developing nations.
- We interviewed the cofounder of Operation Green, a non-profit formed in 2012 at the University of Western Ontario that operated under a donation model
  - Although they had successfully sent four loads of equipment for donation, they made no revenue and all shipping costs came from temporary grants or out-of-pocket.
  - Eventually they, along with many other similar grassroots initiatives, ceased operations due to a lack of funding.
- Donations allow still-useful equipment to fill a need, but do not address the root causes of overage and raise international development concerns.

## *In Government and Research*

- The EU has designated medical waste management policies that they review and update every few years
  - Unfortunately, these policies are not uniformly enforced in the entire union
- The UK healthcare system sets general targets for waste reduction goals, and utilizes the knowledge of Clinical Commissioning Groups, made up of physicians and nurses, to develop unique solutions
  - Hospital systems with the best solutions are rewarded financially and their results are studied and published for the rest of the UK

- Swedish research on medical waste focuses on creating tools and models that help inform purchasing decisions
  - ◉ These tools include a “life cycle assessment” that calculates total financial and environmental costs of a product from its resource extraction stage to eventual disposal

### *In Private Companies*

- Hospitals can create green purchasing catalogues such as GreenHealth Exchange: a marketplace that leverages the purchasing power of 54 Californian hospitals to drive down prices of green products.
- Stryker, a medical device manufacturer, has a medical equipment reprocessing system in Canadian hospitals.
  - ◉ But our interviews with the LMHOST highlighted multiple problems with reprocessing, including a loss of manufacturer’s warranty on reprocessed items, and distrust amongst physicians towards to quality of these items.
- In Sweden, medical waste disposal companies are based locally, and often partner with hospitals to sort waste effectively and reduce the amount incinerated

### **Gaps**

Based on the problem and solution landscape, we’ve identified the following gaps:

- Vancouver’s medical waste management suffers from a lack of detailed data.
  - ◉ Canadian research is needed to shift Canadian policies and practices
- Slow creation and hospital uptake of new software, tools, research, and knowledge
- here is little industry change despite a strong business case to take collective action in reducing medical overage and waste.
  - ◉ Cost is the determining factor to hospital purchasing policy
  - ◉ Few sustainable social enterprises working in the space
- The current network of non-profits doesn’t collaborate with public agencies like health authorities
  - ◉ Vancouver health authorities currently do not have a donation program for equipment under \$5,000.

- The public has a fear of blood-borne disease and infections that does not parallel with factual evidence
  - Leads to misinformed policy

*We compiled these gaps into the 5 actionable areas, each involving their own general lever of change. Although there is no simple solution to this complex problem, within this structure, individuals in various sectors can contribute and collaborate to drive mutually beneficial progress.*

	Hospitals	NGOs	Government and Policy	Private Companies
<b>Lever of Change:</b> Research and Discovery  <b>Gap:</b> Insufficient local research	Perform a detailed survey of what is currently being stocked and wasted in Vancouver hospitals.	Build tools and models that hospitals and governments can use to better inform purchasing decisions; independently audit hospital sustainability progress.	Look internationally at best practices and nationally for positive deviants to model new laws and decisions, and also as example cases in public education programs.	Perform materials and industry research on new sustainable products and practices that may offer market advantages over competitors.
<b>Lever of Change:</b> Legitimation  <b>Gap:</b> Research is not backed by credible sources or lacks onus to be actionable.	Disseminate research and best practices through the hospital with “Champion Physicians”, improving internal credibility and hospital sustainability culture.	Establish local branches or representatives to work closely with individual health authorities and hospitals in reaching sustainability goals.	Set mandatory challenges to hospitals around medical waste reduction. Educate the public on facts around blood-borne disease. Subsidize sustainable medical equipment.	Reach out to established NGOs for voluntary audits on their products, and offer said products at a discounted price initially to disrupt the market.
<b>Lever of Change:</b> Acquirement of Resources  <b>Gap:</b> Lack of both financial and human resources to enact change.	Create voluntary clinician groups and recruit additional community volunteers for basic recycling. Consider “life cycle costs” in purchasing decisions.	Look for social enterprise opportunities, including repurposing or reclaiming waste for sale to plastics industries, or creation of green purchasing catalogues to facilitate hospital decision-making.	Consider environmental outcomes and potential long-term productivity gain to determine sizes of new budgets or grants. Shift part of the international aid budget to include donations of reclaimed waste.	Establish a certified reclamation process to reduce costs of raw materials. Promote corporate vision of sustainability among employees to improve employee satisfaction and productivity.
<b>Lever of Change:</b> Iteration and Improvement  <b>Gap:</b> Imperfect systems are currently never improved.	Create an in-hospital sustainability fund through partnering with companies, NGOs, or hospital foundations that will support idea incubation and development.	Test new programs or opportunities with hospitals and clinicians, building trust while collecting feedback. Take inspiration from waste reclamation projects in other sectors.	Create feedback groups consisting of clinicians, NGOs, and industry members to consistently discover areas for new initiatives and how to improve on old ones.	Build relationships with forward thinking hospitals that will give feedback on your sustainably-designed products. There is also wealth of great business ideas in the lived experiences of clinicians.
<b>Lever of Change:</b> Dissemination  <b>Gap:</b> Current best practices are not quickly taken up by different hospitals or accepted by the public.	Build friendly competition between units and hospitals in sustainability campaigns around sustainability targets. Publish savings records or key progress in academic literature. Educate the public through outreach campaigns.	Develop skeleton tools or software that can be open source or tailored to different hospitals. Partner with physician associations and private corporations to introduce holistic solution packages.	Reward and feature top-performing hospitals publicly. Create policy and guiding materials around national best practices, and set up a formal hospital-to-hospital mentorship program.	Start slow and build strong relationships with beachhead markets (single hospitals, private clinics), marketing sustainable values to the public, eventually growing in market share through references.