

SUSTAINABLE PERIOPERATIVE CARE

Project Charter Summary

REDUCE & MANAGE WASTE

Pharmaceutical Waste Management

The operating room (OR) is a significant source of pharmaceutical waste. There is not currently any Canadian legislation or guidance on the management of pharmaceutical waste; consequently, staff may dispose of unused pharmaceuticals in a variety of improper ways. However, **pharmaceutical waste must be incinerated**.

Improper pharmaceutical disposal is **dangerous to the environment and to human health**. Many common anesthetic drugs are harmful to groundwater. Propofol, the most widely dispensed and wasted drug, is very **toxic to aquatic organisms, does not degrade, and accumulates in fat**. Bupivacaine and ephedrine are similarly toxic to plants and fish. Other pharmaceuticals may be endocrine disruptors, carcinogenic, mutagenic, and **destructive to all forms of life**. Pharmaceutical waste therefore must be **properly segregated and incinerated**.

Simultaneously, it is important to keep non-pharmaceutical waste out of the pharmaceutical waste bin. Unnecessary incineration is expensive and (for plastics) **releases harmful toxic chemicals like dioxins and furans into the atmosphere**. There are ways to safely segregate waste produced in relation to pharmaceuticals. For example, the blunt drug draw needle can be capped and removed; the needle should then be disposed of in sharps, the drug in the pharmaceutical waste bin, and the empty container, in this case, a syringe, in the general waste or recycling bin.

In the absence of Canadian legislation, we can reference relevant legislation from elsewhere, such as the United States' **EPA-266.507 Residues of Hazardous Waste Pharmaceuticals in Empty Containers** (2019), which does not regulate residues in stock bottles, dispensing bottles, vials, or ampoules as hazardous waste. Therefore, empty stock, dispensing, and unit-dose containers can be disposed of as general waste or recycling, depending on the vendors and the material.



PROJECT CHARTER: See the full version of the project charter for more change ideas, details, and a complete list of references



GOAL: Reduce the impact of pharmaceutical waste by ensuring appropriate disposal of non-cytotoxic pharmaceuticals

PROJECT SCOPE: All non-cytotoxic pharmaceutical waste generated within perioperative care areas

EMISSIONS SCOPE: Scope 3 (emissions arise from activities or products related to health sector activities, but not owned or controlled by your organization)

ESTIMATING IMPACT

ACTIVITY/OUTCOME METRIC

- 1A. Weight of pharmaceutical waste (kg) generated per month and
- 2A. Difference in weight from previous month

- Source from a waste audit, waste hauler data, or financial data (hauler fees).
- Number of bags/bins of recycling will do if you can get average weight per bag/bin from the hauler or your own audit.

RELATED ENVIRONMENTAL METRIC

- 1B. 1.833 kg CO₂e/kg for hazardous waste (incineration) and
- 2B. 1.190 kg CO₂e/kg for regular waste (incineration) or
- 2C. 0.461 CO₂e/kg for regular waste (autoclaving/landfilling)

- All metrics are adapted from kg CO₂e/tonne, and may not precisely reflect every center (varies with factors like distance from site to waste treatment facilities).

ENVIRONMENTAL IMPACT

Estimation of total impact in kg CO₂e

- Calculation #1 will estimate environmental impacts of pharmaceutical waste. Waste removed from the pharmaceutical stream will still produce emissions (as regular waste), so environmental savings can be calculated by subtracting calculation #2 from #1.
 - This should reduce over time as waste practices improve.
- Use the [Natural Resources Canada Greenhouse Gas Equivalencies Calculator](#) to translate your results to stakeholders.

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Root Causes and Change Ideas for Pharmaceutical Waste Management



PLAYBOOK:
View the playbook for other perioperative sustainability opportunities and resources.



VIDEO:
Pharmaceutical Waste with Dr. Ali Abbass

Lack of awareness about the toxicity of drugs which should be kept out of the natural environment (e.g., by incineration rather than landfill disposal) and existence of pharmaceutical waste bins for clinical areas. Absence of government regulations defining “empty” medical containers or managing waste in practice areas.

EDUCATION & AWARENESS

- Develop an educational program (e.g., training, posters) to ensure that all perioperative personnel are aware of:
 - The impact of pharmaceutical waste on the environment (e.g., [propofol toxicity in water supplies](#)).
 - Where and how to dispose of unused medications in clinical areas.
 - What is generally considered an “empty” container that might contain trace volumes of non-cytotoxic drugs safe to dispose of in other waste bins.
 - For drug draw needles that do not enter human skin, how to cap and dispose of these in the sharps bin (and the empty syringe in the garbage bin), so that only unused drug goes into the pharmaceutical waste.

Lack of clear signage, and improper placement of bins, discourage proper waste segregation. The fast-paced clinical environment can make it difficult to segregate waste properly.

CLINICAL WORKFLOW

- Sharps and pharmaceutical waste bins should be placed next to each other in clinical areas.
- Conduct a [waste audit](#) regularly to determine the accuracy of waste segregation at your center.
- Review hospital policies on pharmaceutical waste management to ensure that practices are as sustainable as possible.
 - See this [example from the University Health Network](#) in Toronto.

Obtaining pharmaceutical waste bins in clinical areas does increase the waste disposal costs, which some hospitals may be unwilling to pay due to a lack of legislation incentivizing or coercing this.

FINANCES & PROCUREMENT

- The procurement and use of pharmaceutical waste bins in clinical areas in best practice, even though there is currently no Canadian legislation to mandate this.

Lack or absence of pharmaceutical waste bins in clinical areas makes appropriate segregation essentially impossible. There is not yet any government legislation mandating the presence of a pharmaceutical waste bin in these areas, nor are there often proper waste segregation guidelines to minimize the volume of pharmaceutical waste for appropriate incineration.

INFRASTRUCTURE

- Obtain a pharmaceutical waste bin for clinical areas and place in a location for optimal waste segregation and optimal workflow.