Greening Hospital Pharmacy in BC's Lower Mainland Health Authorities

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Executive Summary

Greening hospital pharmacy in the Lower Mainland Health Organizations equips pharmacists with a course of action to demonstrate their responsibility towards the environment by ensuring that their operational activities do not hamper the sustainability of the larger ecosystem while promoting the wellbeing of their patients.

Drawing on increasing opportunities identified by Green+Leaders in the Lower Mainland to improve the environmental performance of pharmacy operations within a hospital setting, the Energy and Environmental Sustainability team at the Lower Mainland Health Organizations, through the Greening Pharmacy project, researches environmental opportunities in hospital pharmacy departments across five (5) health facilities in BC Lower Mainland with respect to helping them lower their environmental footprint and improving resource efficiencies in waste and toxicity reduction, waste diversion including recycling, product re-use and diversion from landfills.

With the use of interviews, site visits, observations and high-level waste bin audits, the research project contributes to understanding the contexts of operations in a hospital pharmacy department so as to meet the needs of staff and ultimately improve environmental performance in a way and such that can be replicated in and scaled up across other healthcare departments. The project identifies a greater need around greening procurement and general operations by identifying upstream and downstream opportunities to reduce packaging and unnecessary production of material waste.

Table 1.1.

Overview of Greening Opportunities Identified by Interviewed Staff:

1. Large zip-loc bags for antibiotics can be re-used when returned to Pharmacy Distribution Centre in good conditions.
2. Smaller zip-loc type bags for Pyxis refills and used to sort and contain ward stock can be replaced small brown paper bags which can be recycled instead of plastic ones.
3. Penta-pack and dosing bags could be re-used (A pilot is considered with SMH).
4. Purchasing units across facilities need to see waste reduction as a priority and take it up with suppliers to explore opportunities for reducing waste from packaging.
5. System changes to support electronic prescription ordering across all sites should be initiated. A copy of a patient's prescription and clinical profile can be kept electronically and made accessible to all users rather than being printed and faxed.
6. Engage upstream stakeholders and purchasing groups including BCCSS to bring an analysis waste generated from packaging into existing assessment processes and review purchasing policies and decisions to accentuate environmental consciousness.

Introduction

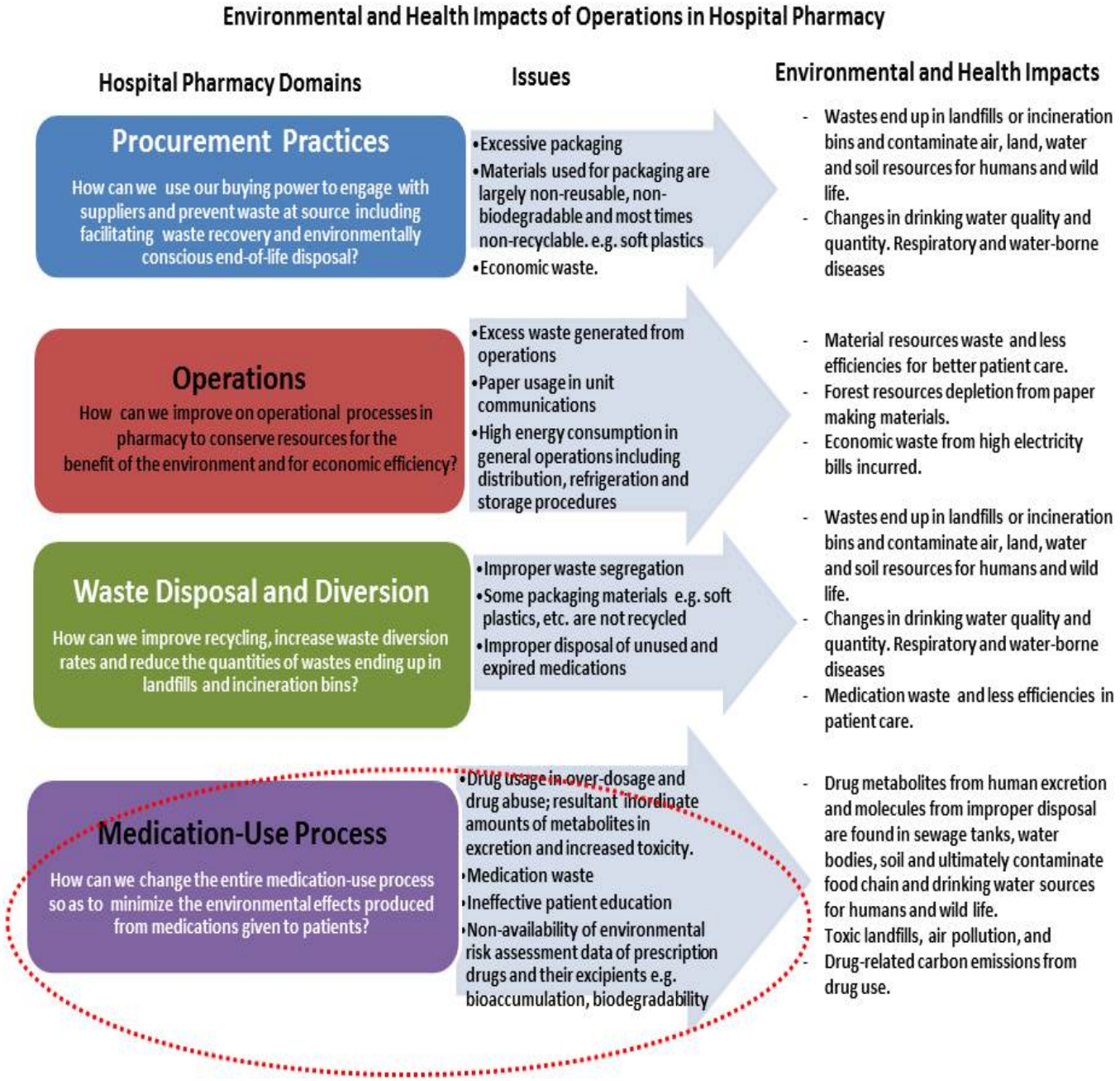
Investigating opportunities to greening hospital pharmacy operations is not only a climate-smart initiative that minimizes environmental impact, but also one that has the potential to promote health, resource and economic efficiencies.

Motivation for the Project

The work is motivated by three primary drivers:

i. Recommendations from a human factors study on the LMHOs standardized recycling program that identified the need for department-specific resources and education.

Figure 1.1.



ii. Opportunities identified by existing green champions in pharmacy and other departments in specific sites that could be leveraged and scaled out to benefit units at other sites.

iii. A growing recognition from experience within the energy and environmental sustainability team that there are opportunities to create benefits and efficiencies at a greater scale when working on department-wide initiatives that address systems-level changes.

Objectives of the Project

i. Identify environmental impacts of operational processes in hospital pharmacy in terms of the waste generated.

ii. Engage with front-line employees and management to identify existing knowledge and awareness of environmental impacts of their operations as well as attitudes towards greening the department.

iii. Identify current activities at specific sites that reduce environmental impacts and that could be shared department-wide.

iv. Identify research lessons and best practices in other hospitals and health organizations for greening Pharmacy operations.

v. Develop short, medium and long-term strategies to greening hospital pharmacy including stakeholders and partnership involvement and potential pathways to implementation.

Method

Of the 25 acute sites in the Lower Mainland Health Organizations, the project adopted 5 pharmacy departments across five (5) selected health facilities including the Pharmacy Drug Distribution Centre (PDDC), Langley. The criteria for selecting recruited pharmacy departments and respondents were based on existing contacts through the Green+Leaders programs and sites that have significant operations such as Vancouver General Hospital and Surrey Memorial Hospital. Availability of staff with demonstrated keen interests in lessening the environmental impact of their unit operations was also a considered factor.

An initial information gathering consisted of site visits, high-level visual audits of recycling and garbage bins in the departments, observations of how waste is generated and disposed of, and interviews of frontline and interested staff to identify the following key indices of focus.

- High volume clinical garbage and recycling items.
- Packaging materials and operations that generate the most waste and their corresponding sources.
- Existing good practice(s) that can be shared to other sites.
- Opportunities for improved waste reduction and waste disposal (resulting in increased waste diversion or a reduction in total waste).

Aside from researching waste reduction opportunities, interviews also uncovered waste diversion challenges as well as opportunities around improved culture of re-use and recycling practices as well as medication and waste disposal practices. Through these processes, interview respondents identified opportunities that could be ‘low-hanging-fruit’ pilot projects to be tested for their replicability and scalability across facilities. Upstream considerations, which entail working with product manufacturers and distribution centers, purchasing groups and others involved in procurement processes, were also identified. These are noted in the recommendations listed below in table 1.4.

Figure 1.2.

Site Visits and Interviews

Table 1.2. Facilities Visited and Interview Respondents in Pharmacy

Health Authority	Facility Site	Name of Respondent	Job Title	Unit	Nature of Contact
VCH	**Lion Gates Hospital**	**Sally Chai**	Pharmacist	Medication Safety	T-con
FH	**Surrey Memorial Hospital**	**Cloe Boton and Ray Yang**	Pharmacy Technician and Pharmacist respectively	Pharmacy	Site Visit
FH	**VGH**	**Eric Sletmoen**	Pharmacy Technician	Pharmacy	Site visit
PHC	**St. Paul's Hospital**	**Yonette Harrod, Lily Cheng**	Pharmacists	Pharmacy	Site Visit
FH	**Pharmacy Drug Distribution Centre (PDDC), Langley**	**Gigi Wong, Carlos Estrada and Bal Dhillon**	Pharmacists	Quality Assurance	Site visit and T-con
FH	**Pharmacy Drug Distribution Centre (PDDC), Langley**	**Debra O'Connor**	Manager, Pharmaceutical Purchasing and inventory management	Pharmaceutical Procurement	T-con
VCH	**Lower Mainland Pharmacy Services**	**Neil Braun**	Project Coordinator/ Manager, Medication/Narcotic Disposal Program	Medication waste and narcotic waste disposal	One-on-one meeting
FH	**Pharmacy Drug Distribution Centre (PDDC), Langley**	**Debra O'Connor**	Manager, Pharmaceutical Purchasing and inventory management	Pharmaceutical Procurement	T-con
VCH	**Lower Mainland Pharmacy Services**	**Neil Braun**	Project Coordinator/ Manager, Medication/Narcotic Disposal Program	medication waste and narcotic waste disposal	One-on-one meeting

Findings and Discussions

Site-Specific Biggest Sources of Waste and Recommendations by Respondents

Each of the respondents interviewed identified top waste items (See figures 1.3. and 1.4. below) in their units and the biggest source of waste either from high-volume items used on a daily basis or packaging materials that generate the most waste and their corresponding sources.

Opportunities for Efficiencies Identified By Staff (Respondents)

Recommendations, which are based on identified opportunities for initiatives around waste reduction, improved waste diversion and recycling, were also made by the respondents. Table 1.3. below itemizes site-specific sources of waste in pharmacy departments along with recommendations collated from interview respondents.

Figure 1.3.

Figure 1.4. **A Word Cloud Representation of High-Volume Waste Items in Pharmacy**

Table 1.3. Greening Opportunities Identified in Hospital Pharmacy Department

Waste Items	Sites implicated	Opportunities Identified by Pharmacy Staff on Initiatives for waste reduction and improved recycling
Overwraps for IV bags, normal saline, Large zip-loc bags for antibiotics and ward stocks	SMH, PDDC	1. Large zip-loc bags for antibiotics stocks can be re-used when returned to Pharmacy Distribution Centre in good conditions. 2. Penta-pack and dosing bags could be re-used (Could pilot this with Cloe at SMH?) 3. IV bags could be sent in larger overwrap bags to reduce waste.
Pyxis refills sent in smaller zip-loc type bags used to sort and contain ward stock	All sites	Use small brown paper bags which can be recycled instead of plastic ones for storing ward stock (may not work for patient-specific supplies and may bring potential costs increase.)
Foil and hard plastic around tablets		Upstream opportunities with manufacturer or seek recyclable or biodegradable alternatives
Paper	SMH, VGH, LGH, PDDC	System changes to support electronic prescription ordering- a copy of a patients' prescription and clinical profiles can be kept electronically and made accessible to all users rather than printed and faxed and filed.
Expired or unused drugs - Mode of Disposal: Incineration, but when not completely removed from containers, some are thrown into garbage	SMH	Drugs to be completely emptied from containers before being thrown in the garbage or recycled
Soft Plastic waste from packaging - Mode of Disposal: Thrown into Garbage	All sites	1. Engage upstream stakeholders and purchasing groups including BCCSS to bring an analysis waste generated from packaging into existing assessment processes and review purchasing policies and decisions to accentuate environmental consciousness. 2. Purchasing units across facilities need to see waste reduction as a priority and take it up with suppliers to explore opportunities for reducing waste from packaging.
Styrofoam Coolers, Ice packs	SPH, PDDC,	Styrofoam coolers and ice packs are re-used or returned to distributors. Logistics challenges can be resolved with St. Paul's Hospital and PDDC
Soft plastics from the medication rolls used in the pacmed machine	PDDC	Pacmed calibration wastes a lot of plastic and medication. Newer / improved machines would reduce this.
Syringes, tubing, packages of needles (plastic and paper together),	PDDC	Syringes can be taken apart to remove rubber part of plunger. This is unlikely due to workload and risk of repetitive strain).
Cardboard packaging	All sites	Work with manufacturers to explore alternative packaging options
Disposable gowns (made of polyester fibre). Manu used in a day	PDDC	Seek alternative re-usable options

Good Practices Snapshots

In the course of the interviews, some of the respondents shared good practices in their units and these are collated as stories to be shared on the GreenCare website. See figures 1.5. and 1.6. below.

Figure 1.5.

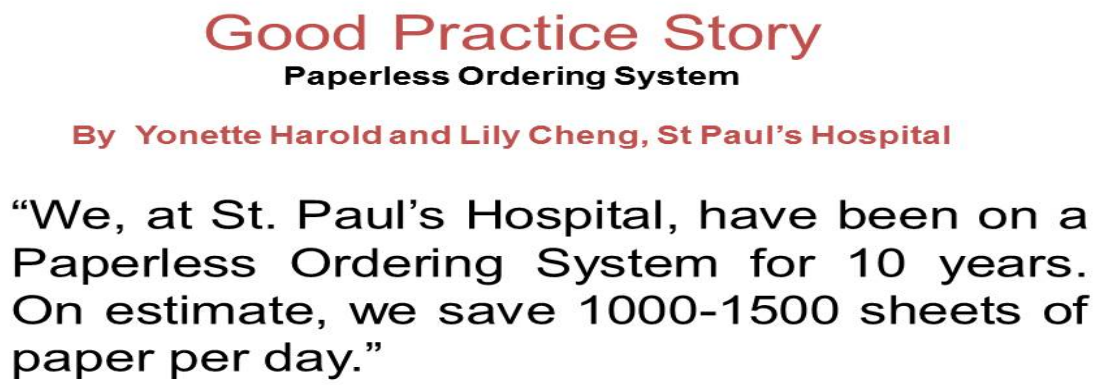


Figure 1.6.

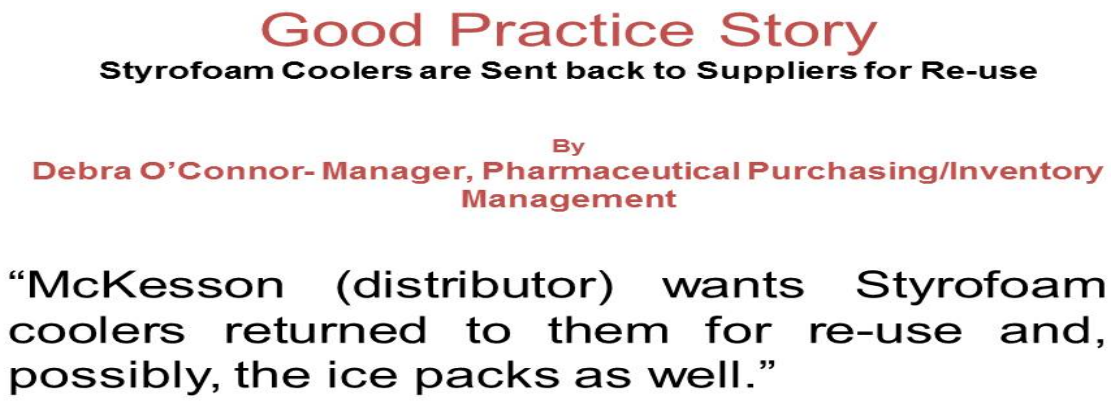


Table 1.4.

	Use a Digital System of Reporting	Set green goals and measure them	Deploy a Consolidated Use of Assets	Green Operations
Green Operations	Make entire pharmacy operations paper-lite or thoroughly paper-less. ***[Environmental Advisory Group ("Greening your Pharmacy"), 2012.***	Reinforce green practices in all departmental communications e.g. Pharmacy newsletters [[***[Environmental Advisory Group ("Greening your Pharmacy"), 2012]***.	Asset-sharing across units in a pharmacy department. ***[Environmental Advisory Group ("Greening your Pharmacy"), 2012]***.	Use of biodegradable products ***(Chawla, 2017).***
	Patient information should be digitally accessed by physicians, pharmacist and other healthcare professionals without printing on paper and faxing ***[Environmental Advisory Group ("Greening your Pharmacy"), 2012.]***	Establish, monitor and measure and green goals in operations e.g. waste reduction goals, energy-saving goals, equipment 're-purpose' goals ***[Environmental Advisory Group ("Greening your Pharmacy"), 2012]***.		Use eco-friendly cleaning supplies/products ***[Environmental Advisory Group ("Greening your Pharmacy"), 2012]***.
	Inculcate green and environmentally-responsible goals into procurement and operational policies e.g. emission- ***[Environmental Advisory Group ("Greening your Pharmacy"), 2012]***.			Encourage staff to use washable and reusable personal cutleries and plates (***Campbell, 2008).***

Environmental Advisory Group (EAG). Greening Your Pharmacy. J Pharmacy Practice. [Cited 2012 June 22] CanadianHealthcareNetwork.ca. Available from: https://www.ecolopharm.com/medias/iw/PPR_JulyAug_Green_openers.pdf

Campbell J. Creating an environmentally friendly pharmacy. J Pharmacy Practice. 2008 April. pharmacygateway.ca Available from http://www.algonquin-eco-watch.com/reference-material/Pharmaceuticals%20in%20Water.pdf

Chawla A, Chinchure D, Marchinkow LO, Munk PL, Peh WC. Greening the Radiology Department: Not a Big Mountain to Climb. Can Assoc Radiol J 68 (3), 234-236. 2017 May 11. Available from http://www.carjonline.org/article/S0846-5371(16)30155-3/fulltext

Green Procurement (Materials used in Packaging, energy used in transportation, distribution and storage).	**Explore opportunities for waste reduction and product re-use with Suppliers**	**Adopt Green Purchasing Policies and Groups**	**Demand for Reusable and Recyclable Products and Packaging**
	a. Engage suppliers to explore opportunities for waste reduction and re-use around sustainable packaging of products made from biodegradable and reusable materials (**Reed and Bahr, 2015**) **b.** Instead of Soft plastics, packaging materials can be made from biodegradable materials (***Cowbell, 2008***; ***Environmental Advisory Group ("Greening your Pharmacy"), 2012.***)	a. Have an environmental purchasing guide/policy ***(Campbell, 2008)*** b. Check with your manufacturer/suppliers to ensure they have environmental policies ***(Campbell, 2008)*** ***c.*** Bring together purchasing groups and distribution vendors in green purchasing workshops to deliberate on green purchasing initiatives for medications, packaging materials, transportation and storage processes and unit operational equipment ***(Campbell, 2008).***	a. Purchase biodegradable materials for use in the department in order to reduce prevent or minimize waste generated (***Environmental Advisory Group ("Greening your Pharmacy"), 2012).*** b. Demand from product manufacturers/suppliers for low-waste and lightweight packaging materials that use less volume and use renewable, recyclable and compostable materials. E.g. rolls of paper used for procedures can also be made from biodegradable materials. ***(Owen, 2015)***

Waste Diversion and Disposal	**Appropriate Waste Segregation**	**Appropriate Disposal of Waste**
	a. Segregate biodegradable from biodegradable as compost formation will take longer when mixed. ***(Campbell, 2008).***	b. Medication-return programs and continuous education of patients on proper disposal of unused or expired drugs ***(Campbell, 2008).***
		a. Include a label on medication given to patients that says 'return unused medication to the pharmacy" ***(Campbell, 2008).***

Reed C, Bahr M. Sustainable Pharmaceutical Packaging. Supplement to Pharmaceutical Engineering. 2016 August. Available from: http://www.mgsmachine.com/wp content/uploads/2016/08/SO13_Pkg_Suppl_Reed.pdf

Campbell J. Creating an environmentally friendly pharmacy. J Pharmacy Practice. 2008 April. pharmacygateway.ca Available from http://www.algonquin-eco-watch.com/reference-material/Pharmaceuticals%20in%20Water.pdf

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Owen B. Pharmaceuticals in the environment: a growing problem. The Pharmaceutical Journal. 2015 February. Available from: http://www.pharmaceutical-journal.com/news-and-analysis/features/pharmaceuticals-in-the-environment-a-growing-problem/20067898.article

Sustainable Prescription Practices	**Physicians engaged on green prescription practices**	**Establish environmental risk data provision for every prescribed drug**
	a. Limit initial prescription size to minimize waste. Physicians should be made aware of the effects of their prescribing practices on the environment in cases of over-prescription ***(Campbell, 2008; Owens, 2015).*** b. Include environmental awareness in all activities of prescription and dispensing ***(Campbell, 2008).***	Availability of well-researched information on the toxicities and environmental hazard assessment of all marketed pharmaceuticals e.g. their biodegradability or persistence properties. In Sweden, drugs are graded on their environmental effects, and doctors are required to prescribe a less damaging drug where the option exists ***(Campbell, 2008; Owens, 2015).***

Campbell J. Creating an environmentally friendly pharmacy. J Pharmacy Practice. 2008 April. pharmacygateway.ca Available from http://www.algonquin-eco-watch.com/reference-material/Pharmaceuticals%20in%20Water.pdf

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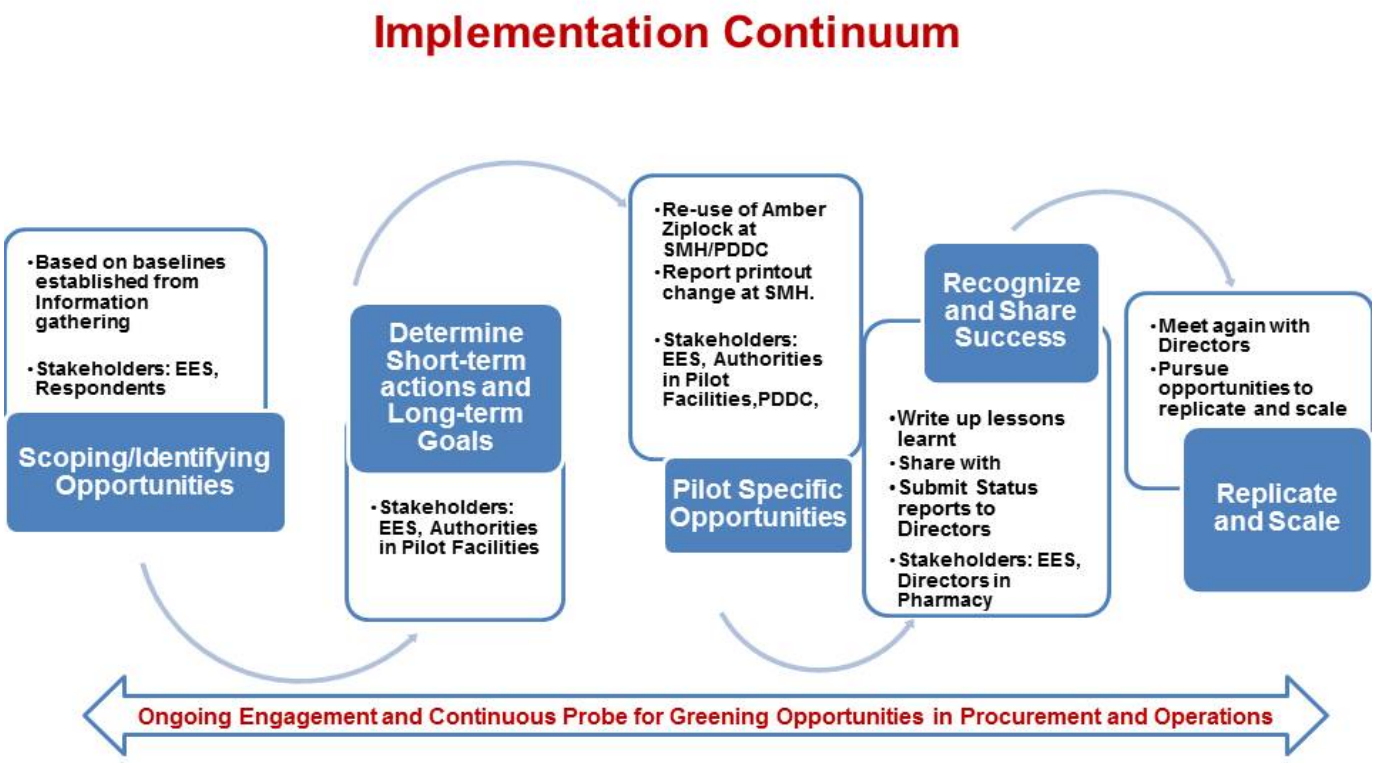
Next Steps and Conclusion

Implementation Continuum

As the information gathering phase of this project pans out, the respondents interviewed in pharmacy departments across the enrolled facilities are fed back with identified opportunities and reports on the project and feedback on possible pilot projects worth exploring are collated. A few low-hanging projects have been identified already. Examples are 're-use of amber zip-lock bags.' This is expected to be piloted in Surrey Memorial Hospital (SMH) in collaboration with the Pharmacy Distribution Centre (PDDC). Another is a department-wide system transition from paper print-out to digital communications of patients' files and reports in the Pharmacy department at Surrey General Hospital.

Figure 1.7. below shows an implementation continuum which represents the way forward on this project and consists of ongoing engagements and continuous probe for greening opportunities in procurement and operations in pharmacy departments in BC Lower Mainland Health Organizations.

Figure 1.7.



Conclusion

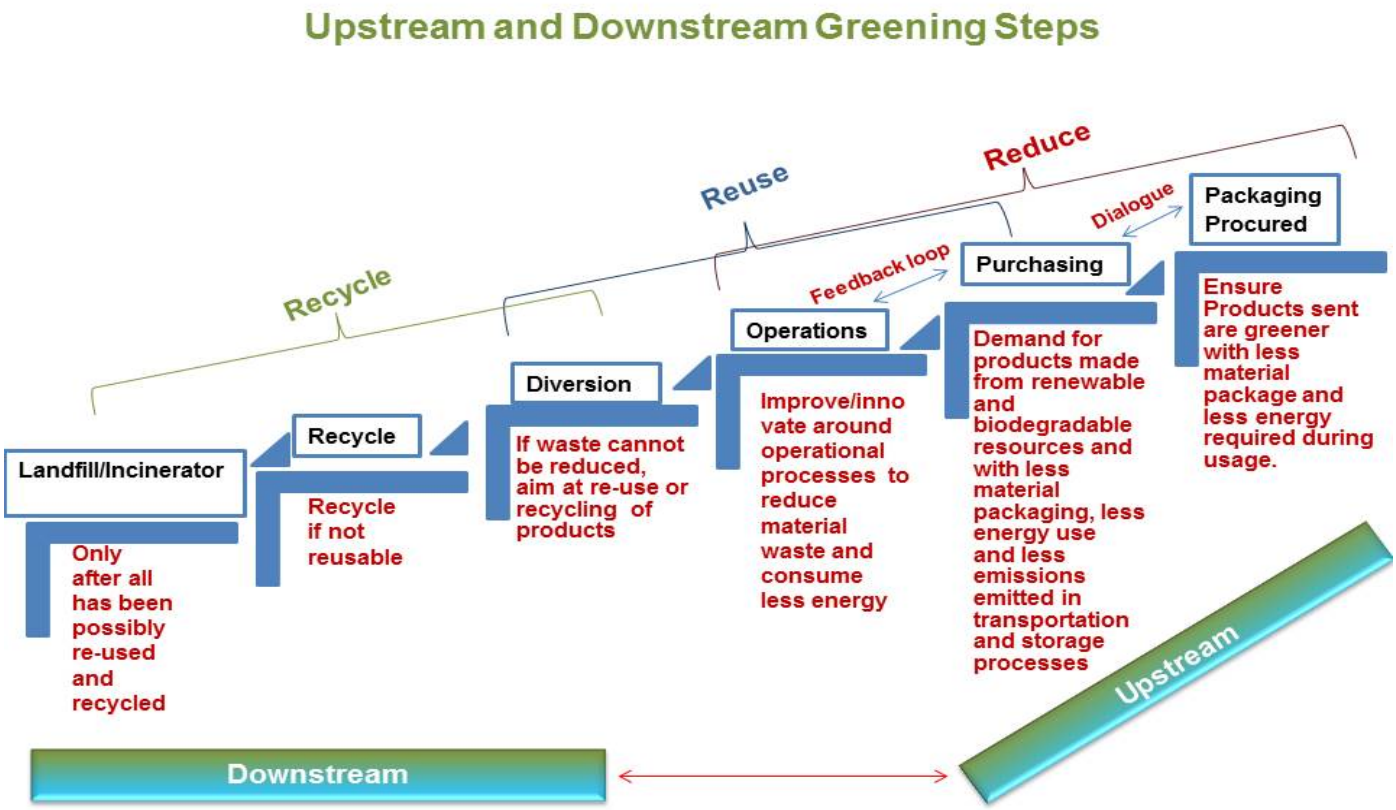
This project brings to light the potential to reduce material and energy waste generated from operations in hospital pharmacy departments. It presents a rationale for action in reducing the risks to human health and protecting the wider environment from the impact of operations in hospital pharmacy.

The findings revealed gaps and challenges in current practices and uncharted environmental opportunities that can be explored in greening procurement and operations as well as waste diversion and disposal practices in hospital pharmacy. Moreover, it was gleaned that there is a need to focus on reducing packaging waste, especially, from procurement since the bulk of the material waste generated in pharmacy is from packaging. This places a great emphasis on intervening on the supplier-engagement angle which may have to be done through a high-level administration involvement.

One next step could include a workshop that brings together purchasing groups, product vendors and waste disposal vendors including recyclers and waste-end users to deliberate on green purchasing opportunities and generate feedback for manufacturers and procurement stakeholders.

Figure 1.8 below highlights additional upstream and downstream actions that could be taken by stakeholders in a hospital pharmacy greening efforts.

Figure 1.8.



Furthermore, the project presents a call for environmental consciousness to be integrated into procurement and operational policies across pharmacy departments in the Lower Mainland Health Organizations. It offers a number of lessons; one of which is the depth of green opportunities and measures shared by staff in the pharmacy departments and which speak to their positive attitudes and behaviours to advancing environmental consciousness in their unit operations if such initiatives are provided a system-facilitated platform to thrive.

References

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