

Reducing Environmental Impacts on Climate Change. One step at a time.

Phuong Hoang, Royal Columbian Hospital, Pharmacy Distribution Coordinator

Brandi Newby, Surrey Memorial Hospital, Pharmacy Coordinator Neonatal and Pediatric Pharmacy

March 6, 2024

Land Acknowledgment

- We would like to recognize that we are presenting on the traditional, ancestral and unceded shared territories of the q̓'wɑ:ńłəń and Qayqayt First Nations, and home to the North Fraser Métis Association.

Presenter Disclosures

- No conflicts to disclose
- No financial or in-kind support from any commercial or other organization

Objectives

- Discuss RCH and SMH initiatives to reduce environmental impact on climate change
 - Proper disposal of metered-dose inhalers
 - Reducing and/or recycling the use of plastics
 - Establishing strategic times for mixing IV's to reduce unnecessary waste
- Provide step by step information for how these changes were implemented
- Discuss changes in process

Why does it matter?

- 2019 report on 110 Canadian Hospitals
 - ~ 87,000 tonnes of waste annually
 - Has increased since COVID 19 Pandemic
- Average hospital produces 10.7 kg waste per patient bed / day
 - Mostly non-hazardous waste – cardboard, paper, and plastic
- Most of this waste ends up in our environment
 - Impacting the health of our patients and ourselves



How can we make a change?

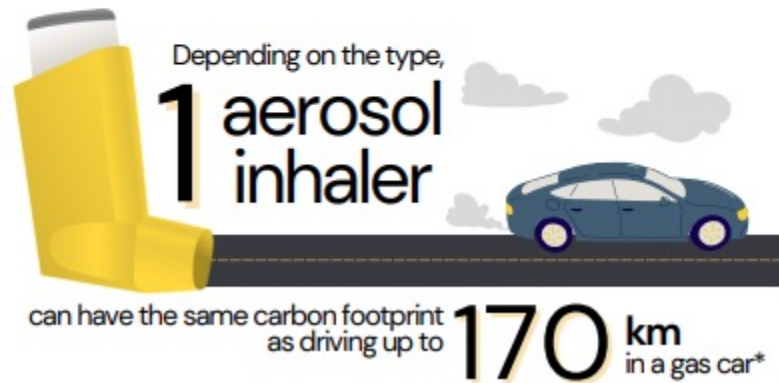
RCH Initiative – Disposal of Metered-Dose Inhalers

Implemented February 2023

Metered-dose inhalers and their impact on climate change

MDIs use HFC propellants to deliver medication.³

HFCs are artificial fluorinated gases that act as potent greenhouse gases (GHGs) when released into the atmosphere. These gases are widely used in industry, including the healthcare sector.

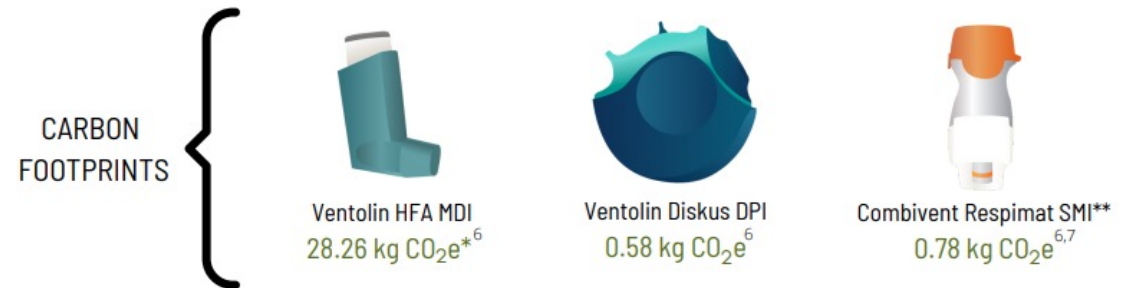


<https://cascadescanada.ca/action-areas/pharmacy-and-prescribing/>

1

ENCOURAGING MDI ALTERNATIVES

The carbon footprint of MDIs is much higher than that of dry powder inhalers (DPIs), which do not use a propellant to deliver the medication. Opting for alternative treatment options, such as DPIs and soft mist inhalers (SMIs), when appropriate, can help **reduce** the carbon footprint of inhalers (though all of these options have environmental impacts).⁵



*CO₂e = Carbon Dioxide equivalent

** Combivent Respimat SMI is a ipratropium/salbutamol combination, and usually replaces two inhalers. Carbon footprint estimated from other Respimat Soft Mist inhaler devices.

- Within hospital, options available can be limited by drug formularies.

Metered-dose inhalers and their impact on climate change

ENSURING APPROPRIATE INHALER USAGE

**95-98% OF PROPELLANT EMISSIONS FROM MDIs
OCCUR AT THE USER PHASE**

This typically involves poor synchronization
of actuation with inhalation.^{8,10}



2

Adequate and ongoing patient training on inhaler technique and usage is a key part of reducing their environmental impacts.

<https://cascadescanada.ca/action-areas/pharmacy-and-prescribing/>

- In a patient's journey through hospital, there is opportunity to educate patients on how to properly use their inhaler.
- We can also prevent unnecessary waste by ensuring the patient uses the inhaler that is dispensed to them.
- Our dispensary supervisor and pharmacy residents worked with the Emergency (ED) Clinical Nurse Educators and did some huddles. QI project on minimizing medication loss within the ED and during transfers from the ED.
- ED staff are encouraged to label patient inhalers and send them with the patient upon transfer to another unit. Information also shared via newsletters.

Metered-dose inhalers and their impact on climate change

3 PRACTICING SUSTAINABLE RECOVERY AND RECYCLING OF INHALERS

THE END-OF-LIFE PHASE OF MDIs IS AN ADDITIONAL SOURCE OF PROPELLANT EMISSION

Improper MDI disposal contributes to medication wastage and increases the risk of MDI residual propellant release into the atmosphere.⁸

Once fully used, MDIs can be...



RECYCLED

Plastic and aluminum in each device can be recycled at designated pharmacies.



INCINERATED

MDI incineration causes the thermal degradation of HFC chemicals.

CO₂ emission **SAVINGS 4-18 kg**⁸
per inhaler*

*Compared to landfill disposal

CO₂ emission **SAVINGS 3-17 kg**⁸
per inhaler*

<https://cascadescanada.ca/action-areas/pharmacy-and-prescribing/>

[Patient Inhaler Disposal Poster \(cascadescanada.ca\)](https://cascadescanada.ca)

HOW TO DISPOSE OF YOUR INHALER

7 out of 10



inhalers are thrown away before being empty.¹



When thrown into the garbage for landfill, inhalers release harmful greenhouse gases into the environment.²



Ensure that you are using your inhaler correctly and dispose of it when it is empty.



Ask your clinic or pharmacy to see if they have a recycling or disposal program.*



Do NOT throw them in your household garbage or recycling.



Returning your inhaler to be recycled or incinerated can save the equivalent of up to



8 litres of gasoline²

*If you live in British Columbia, Manitoba, Ontario or Prince Edward Island, visit healthsteward.ca to find what local pharmacies take back used inhalers.

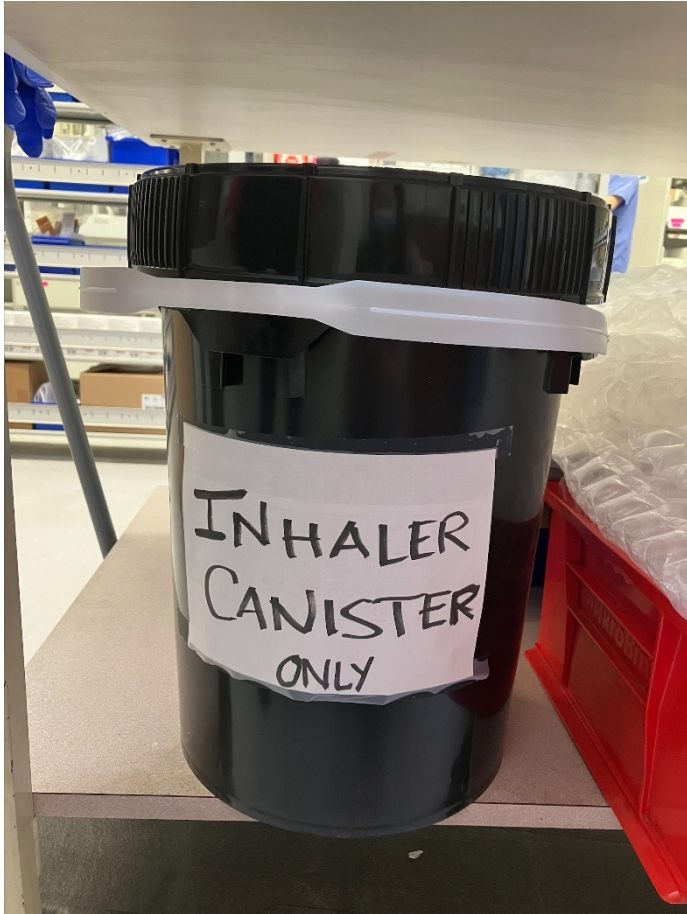
1. Roome C, Bush G, Steinbach I, et al. (2023). 562 Reducing the environmental impact of inhaler use and disposal within paediatrics and the local community. Archives of Disease in Childhood, 106: A41-A42.

2. Wilkinson AJ, Braggins R, Steinbach I, Smith J. (2018). Costs of switching to low global warming potential inhalers. An economic and carbon footprint analysis of NHS prescription data in England. BMJ Open, 9(10).

Adapted with permission from Justin O'Connor-Cook, PharmD student, and Brenda Chang, Clinical Pharmacy Coordinator, at Unity Health.



Proper Disposal of Metered-Dose Inhalers



- Current vendor, Secure Energy
- In pharmacy aerosol wastes are collected in the black bucket for disposal. When $\frac{3}{4}$ full, we call the vendor for pick up.
- Aerosol wastes in these buckets are collected and stored at their transfer station in Richmond, BC.
- They are ultimately routed to a 3rd party facility in Alberta called Recycle Systems, where the liquids are drained and incinerated, and the metals recycled.
- Also, implemented in our Pulmonary Function lab by Respiratory.

Share and collaborate with your teams

- Create or join a local working group
- It takes a team to do this work
- Involve other stakeholders:
 - Respiratory therapists
 - Emergency physicians
 - Respirologists
 - Nursing leads/educators
 - Pharmacy staff
- Be aware of strategies and conversations happening in your own Health Authority

Additional Resources

- [Climate Resilient, Low Carbon Sustainable Pharmacy Playbook - CASCADES Canada](#)
- [BC Inhalers](#)
- [Our Planetary Health strategy - Fraser Health Authority](#)
- [Climate impact of inhaler therapy in the Fraser Health region, 2016–2021 | British Columbia Medical Journal \(bcmj.org\)](#)
- CSHP New Taskforce on Sustainability

How can we make a change?

RCH Initiative – Recycling, Reusing and Reducing Soft Plastics

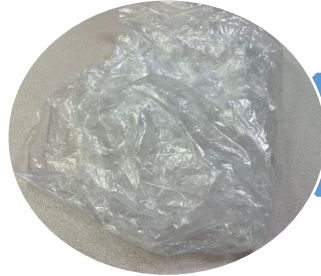
Implemented April 2022

Recycling Soft Plastics in Pharmacy

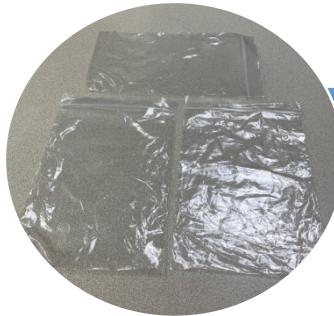
- Grass root initiative from one of our pharmacy technicians
- Current vendor: GFL Soft Plastics Recycling
- Our technician would deliver the plastics to our receiving and shipping area of our hospital and add to the container
- Housekeeping services now helps us to pick up the plastics directly from pharmacy and drops them off to the receiving and shipping area.
- At the same time, we found out the OR was also initiating plastic recycling.



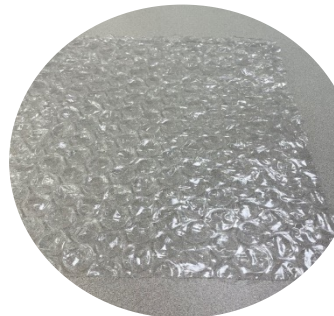
Recycling Soft Plastics in Pharmacy



Plastic wrappings from skids/wooden pallet deliveries



Plastic bags for dispensing patient specific meds



Bubble wrap



Plastics from PPE



Drug/Diluent plastic outer wraps

Recycling/Reusing Soft Plastics

The company does not accept colored plastics, so our technician takes these to her own local recycling depot.



We also reuse plastics where possible (e.g., using bubble wrap to protect items sent via pneumatic tube).

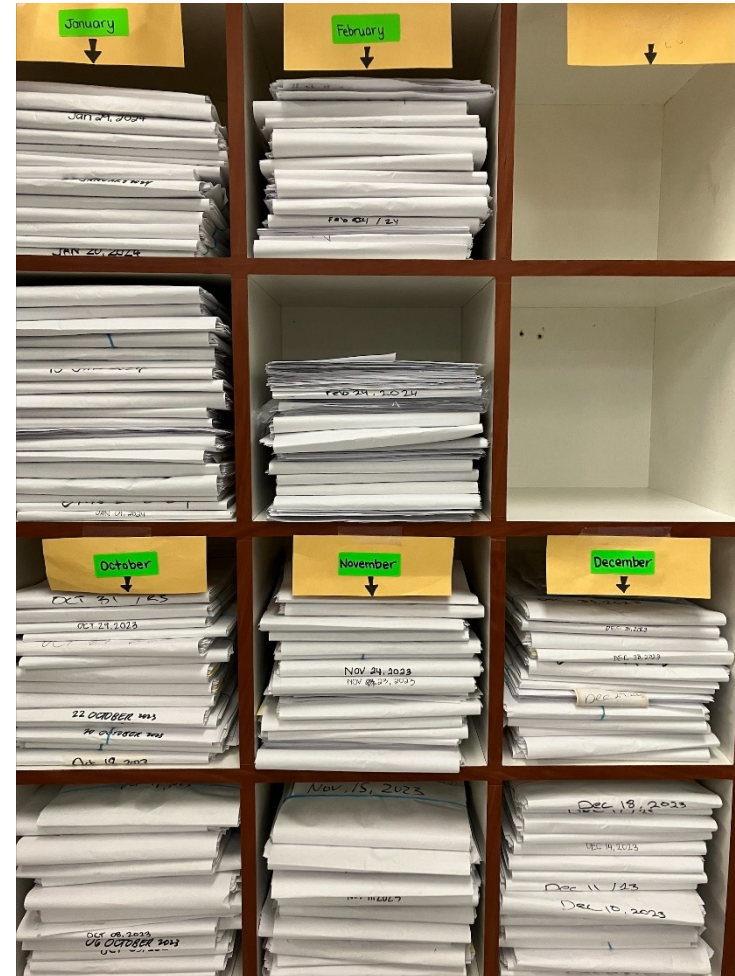


Soft Plastics Recycling Process

- 1 to 2 blue bins of plastic fills up everyday in Pharmacy
- Collection: process starts at the hospital shipping/receiving department where the soft plastics are collected into megabags provided by the vendor (GFL).
- Transportation: the megabags are transported to their warehouse. Proper handling during transportation is important to prevent spillage and maintain cleanliness.
- Sorting and Compaction: at the warehouse, an employee will thoroughly sort through the contents and remove any non-recyclable items and contaminants. The sorted plastics go into a compactor to reduce volume and be compacted into bales.
- Once in secured bales, the soft plastics are loaded onto a transportation bin.
- Once the bin is full of bales, it is transported to its final destination, which is Merlin Plastics where the bales undergo further processing for recycling.

Reducing the use of soft plastics

- Previously, we used large plastic bags to store our daily paperwork in the department (e.g. refill lists, checking documentation, controlled drugs paperwork)
- These are now stored without the use of plastic and the stacks are now filed with a paper divider instead.



How can we make a change?

SMH Initiative – No more plastic bags
for Non-Hazardous Medications

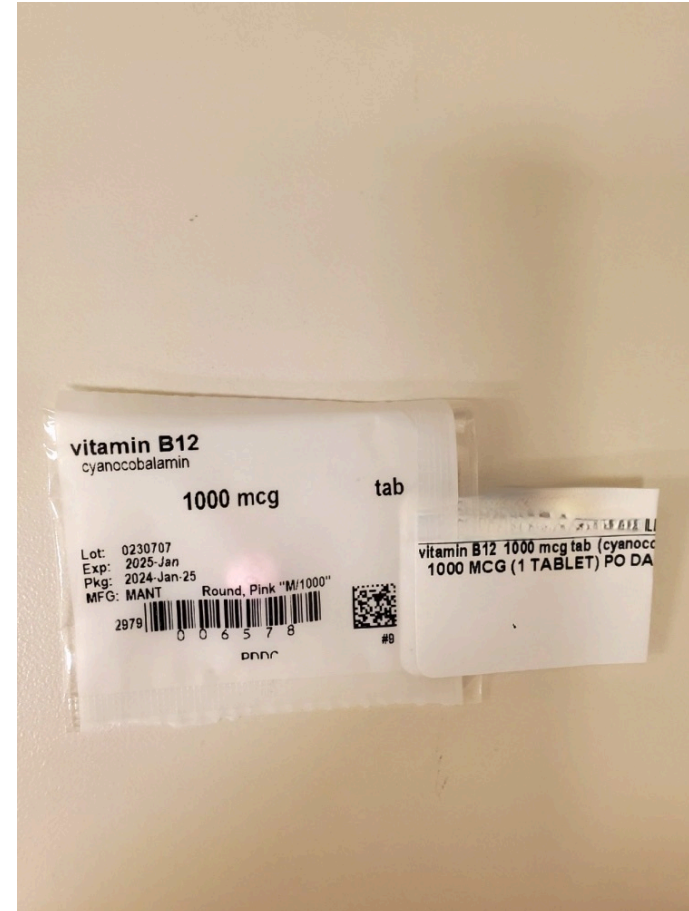
Implemented February 2022

What led to this change?

- Challenged by nursing staff to assess plastic bag use
- First needed to determine: What is plastic bag for
 - Sterility? – No, the bags are not sterile
 - Label and keep patient specific medications together? – Yes
 - Are plastic bags required for this function? – No
 - Initially, we changed to paper bags, as we were told we could re-use them
 - Later infection control changed to no re-use, so we stopped using paper bags too
- Needed to discuss with both Pharmacy and Nursing Staff

Changes to the process

- Tablets/capsules – place patient specific label directly on package
 - Improved patient safety – as sometimes things appeared in labelled bags that were not on the label – not clear at which step the wrong item was placed in the bag



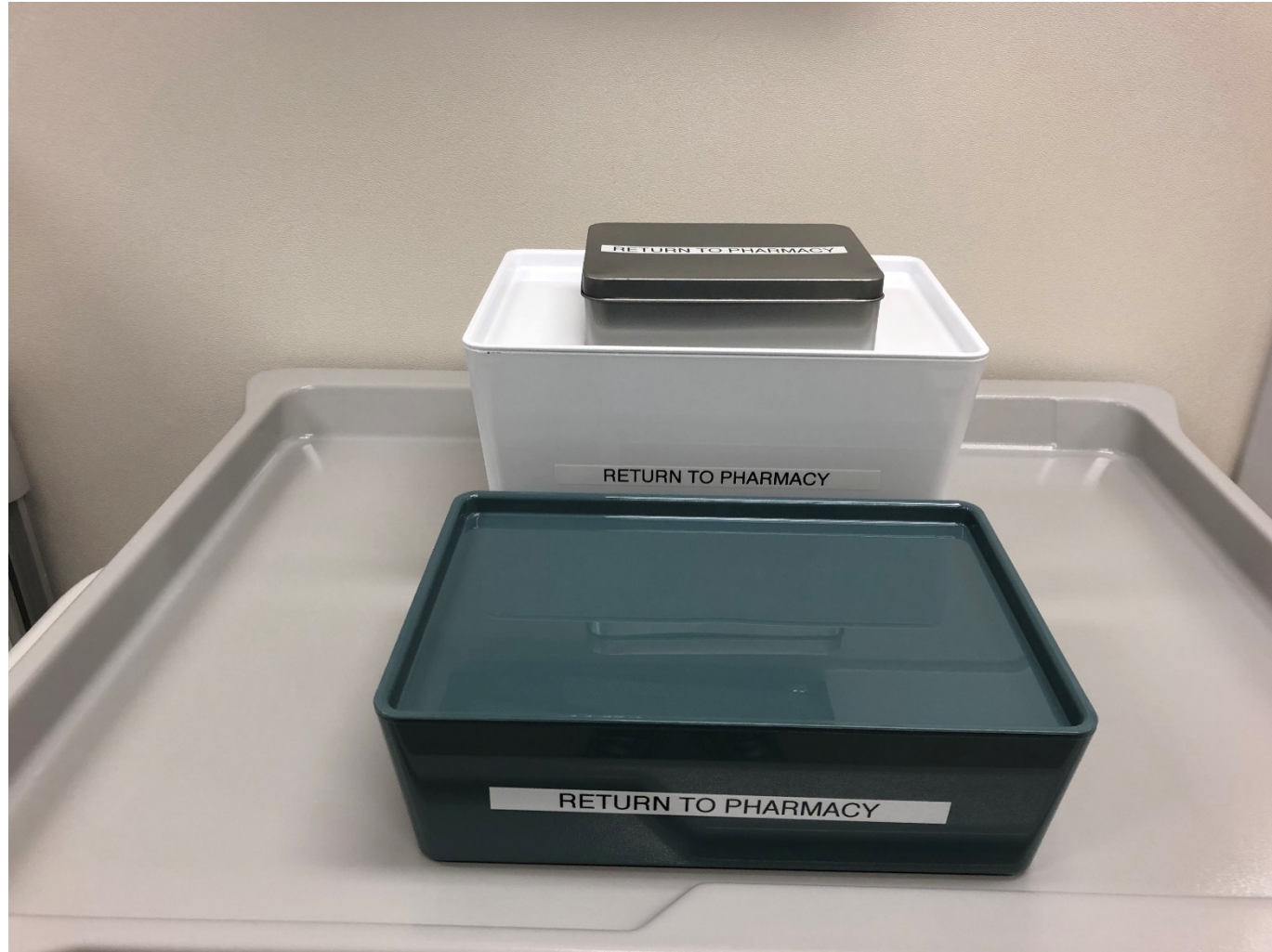
How do we keep meds together?



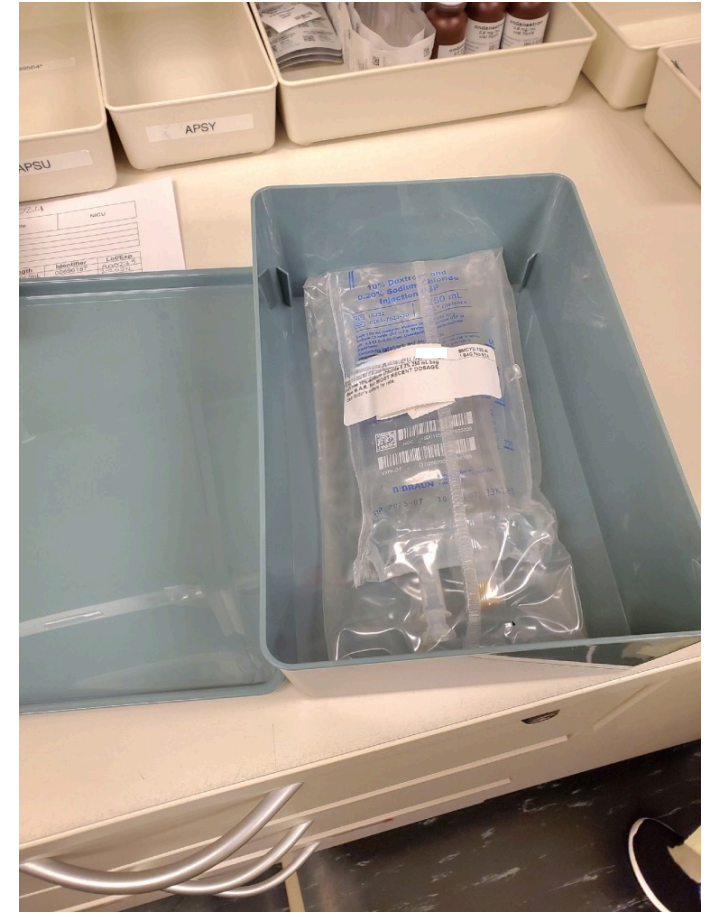
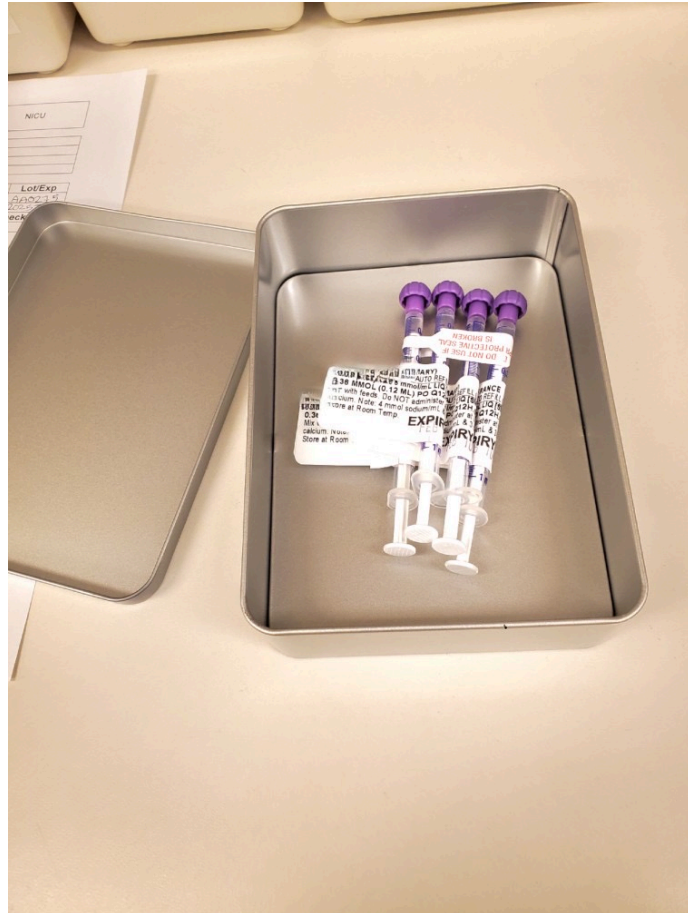
Safe delivery?

- Confidentiality
- Multiple medications for one patient
- Light protection
- Searched for options:
 - Pharmsystems
 - Grand and Toy
 - Google
- Tried a few options
 - Feedback from Pharmacy and Nursing staff

Current Bins



Current Bins



The metal and plastic bins

- Reusable
- Light protection
- Confidentiality
- Can be written on – ie room number
- Cleaned by pharmacy staff each time
 - NICU – high risk population

How did this change plastic use?

- Reduced single use plastic bags
 - ~41,000 per year for one area
- These bags are no longer stocked or purchased for our department
- Reduce production and waste streams

Health Impact?

- Microplastics found in human blood, breastmilk, placentas...
 - Effects on health – to be determined
 - Concerns for reproductive and developmental toxicity....
- All tested placentas contained microplastics
 - Most prevalent polymer ~54% was polyethylene
 - Used to make plastic bags and bottles
 - ~10% polyvinyl chloride (PVC)
 - ~10% nylon
 - The remainder consisting of nine other polymers
- Polyethylene 10 x higher in infant feces compared to adults

2024 doi: 10.1093/toxsci/kfae021; Environ Health 2023, 1,249-257.

How can we make a change?

SMH Initiative – Reducing waste

Implemented starting in 2019-2020

What led to this change?

- Noticed that babies were receiving unnecessary doses of antibiotics
- We were preparing doses of antibiotics in pharmacy and then discarding them
 - Medication waste
 - Syringe waste

Change to the Process

- In NICU – common to start antibiotics and rule out infection
- Previous Order – antibiotics x 48 if blood culture negative
 - Lab processes positive culture results first, calls within 30 minutes if positive
 - Can lead to delays for reporting negative cultures
- Changed how we write order for antibiotic stop:
 - Antibiotics x 48 hours unless culture positive
 - Antibiotics are stopped before 48 hours
 - Extra doses not given to patient AND pharmacy does not make extra doses
- Improved antimicrobial stewardship
- Reduced medication and syringe waste

Newby B, Mok S, Sun Y. American Journal of Infection Control 2021

What led to this change?

- With drug shortages - became very aware of medication waste
- As almost all of our medications are patient specific
 - Noticed we were making then discarding a large number of IV medications
- Many medications were being changed during patient care rounds
 - Mostly involving parenteral medications

Changes to the process

- Make oral medications in the morning
 - Less likely to change
 - Even if changes, less 'waste' of medication
 - Can usually adjust dose within syringe, and not waste plastic syringe
- Make ongoing IV medications starting at ~ noon
 - Allows patient care rounds to occur and changes to be sent to pharmacy
 - Changes are incorporated before mixing
 - Reducing medication waste
 - Reducing plastic syringe/plastic bag waste
- Also streamlines work for technicians/pharmacy staff
 - Less time remaking items

Further reduction of waste

- Consider selection of syringes or other products based on amount of waste generated
- Monoject syringes have an extra plastic container
 - Extra waste compared to other brands



Conclusions

- Opportunities exist in hospital pharmacy processes
 - To reduce the impact of metered dose-inhalers
 - To reduce or recycle single use plastics
 - To reduce waste
- Small steps and changes have big impacts on climate change and the health of our patients and planet

Next Steps: Projects In Process

- Reduce plastic bottle use
 - Desire from nursing and pharmacy staff
 - Currently use over 100 single use bottles per week for one unit
- Reuse glass bottles
 - Looking at disinfection options
- If anyone has any suggestions, please let me know



Questions?

Phuong.Hoang@fraserhealth.ca

Brandi.Newby@fraserhealth.ca



fraserhealth

Better health. Best in health care.



[fraserhealth.ca](https://www.fraserhealth.ca)