



# Reducing the Impact of MDIs on Emergency Department Carbon Emissions

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# Disclosures

- Presenter: Candis Lepage
- Relationships with financial sponsors:
  - Grants/Research Support: Dalhousie Medicine Summer Studentship (Supervisor: Dr. Constance LeBlanc)
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  - Patents: None
  - Other: None



# Research Team

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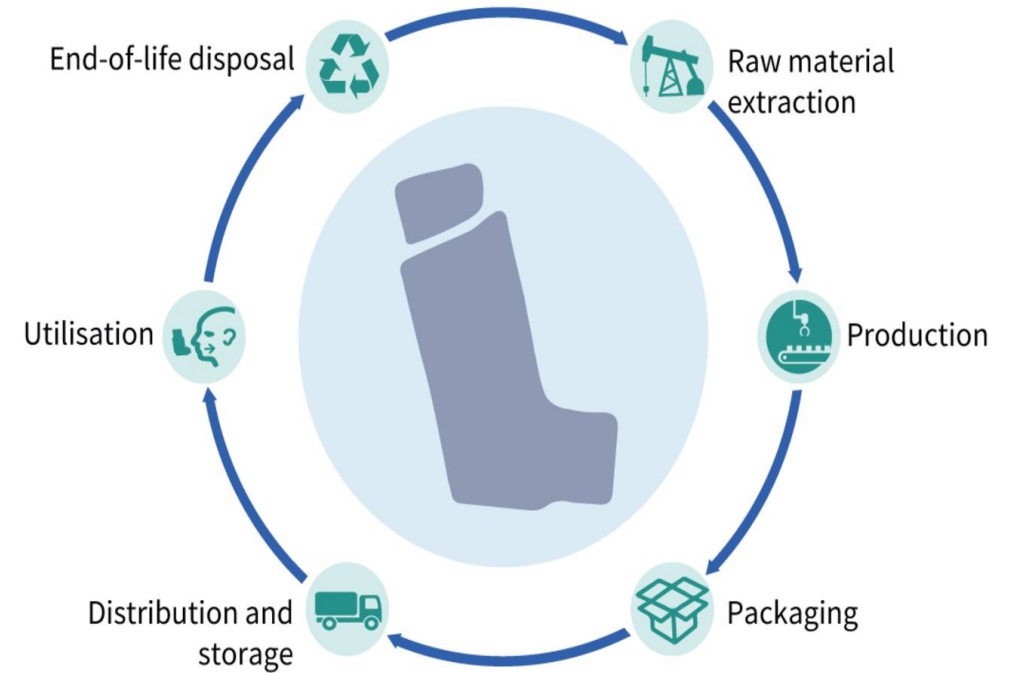
# Rationale

- 3.8 million Canadians rely on inhalers to control their asthma and COPD
- Metered-dose inhalers (MDIs) contain propellants called hydrofluoroalkanes (HFCs), which are potent greenhouse gases
- Use of one Ventolin MDI (100 doses) = driving **170km by car**



# Rationale

- Most MDIs are improperly disposed of in hospitals
  - Only 2% are properly disposed of after use
- Pressurized cartridges of MDIs must be incinerated at 1000 °C
- Improper disposal is due to a lack of patient and provider knowledge



# Research Questions

How can we reduce the environmental impact of MDIs being used within Halifax's two main academic hospitals' Emergency Departments?



# Objectives

## Primary

- Reduce MDI-related greenhouse gas emissions produced in the Emergency Department(s)

## Secondary

- Increase provider & patient awareness of
  - Environmental impact of MDIs
  - Alternative lower-emission inhalers
  - Proper MDI disposal




# Context


- Research occurring within the Emergency Departments of two major academic hospitals
  - QEII Halifax Infirmary (Adult): ~ 70K annual visits
  - IWK (Pediatric): ~ 30K annual visits



# Targeted Interventions


 **GREENER INHALER PRESCRIBING IN THE HALIFAX INFIRMARY EMERGENCY DEPT.**




**1 HOW DO MDIS IMPACT THE ENVIRONMENT?**  
MDIs contain propellants which are potent greenhouse gases that are 1000x more harmful to the environment than CO<sub>2</sub>. They account for 4% of annual healthcare greenhouse gas emissions!  
**100 DOSES MDI = DRIVING A CAR 290 KM**

**2 WHAT GREENER INHALERS ARE AVAILABLE?** 

Ventolin pMDI	-----	✓	Symbicort Turbuhaler or Ventolin Diskus
Flovent pMDI	-----	✓	Pulmicort Turbuhaler or Flovent Diskus
Advair pMDI	-----	✓	Symbicort Turbuhaler

**3 HOW DO I KNOW IF MY PATIENT CAN USE DPIS?**  
If the patient is capable of the following, consider using a DPI:  
• Deep, quick voluntary inhalation  
• Generating sufficient inspiratory flow (20 - 60 L/min)  
• Activating their inhaler while inhaling over 3 - 5 seconds

**4 HOW DO YOU RECYCLE MDIS?**   
To properly recycle MDIs in the Emergency Department:  
• Dispose of the pressurized canister and plastic cartridge in the [yellow garbage](#) for incineration

REB File # 1029908. Version 2.0. Jan 7th, 2014

- Multi-pronged intervention approach targeting two populations
  - Patients (adult & pediatric)
  - ED care providers

## Interventions:

- Infographics (patient and provider)
- Educational Video (providers)
- Pre-Populated Prescription Pads



# Provider Surveys

19 question online survey distributed to ED staff

Metrics capture:

- MDI vs. DPI dispensing
- Knowledge of MDI environmental impact
- MDI disposal practices
- Frequency and comfort with patient counselling on lower-emission inhaler alternatives and MDI disposal

Circulated at baseline and 12-months



# Inhaler Dispensing

- Baseline ED PYXIS data extracted from IWK and Halifax Infirmary
  - Type and count of all inhalers dispensed between September 2021 – August 2023
- Limitations:
  - Does not capture discharge prescriptions dispensed outside of hospital, inhalers dispensed from pharmacy, or indications for inhaler



# Assessing Impact

## Primary Outcome

- Type and quantity of MDIs dispensed from ED PYXIS systems
  - Measured at 3, 6, 9, and 12-months
  - Calculate percentage change

## Secondary Outcome

- Measure change in provider knowledge and dispensing practices using pre-post provider survey data
- Cost benefit & carbon footprint analysis



# Preliminary Findings

# Current Dispensing Practices

- Between September 2021 and August 2023, a total of **7,903** inhalers were dispensed between the IWK & Halifax Infirmary ED
- Dispensing practices contributed to a carbon footprint of **188 tonnes of CO2**

**95%**

**of dispensed inhalers were MDIs**

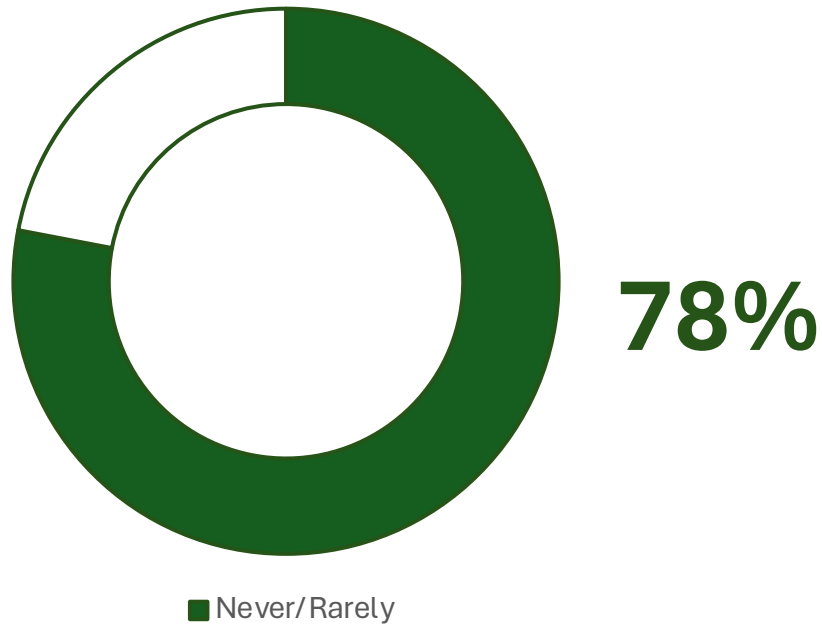


# ED Provider - Baseline Knowledge

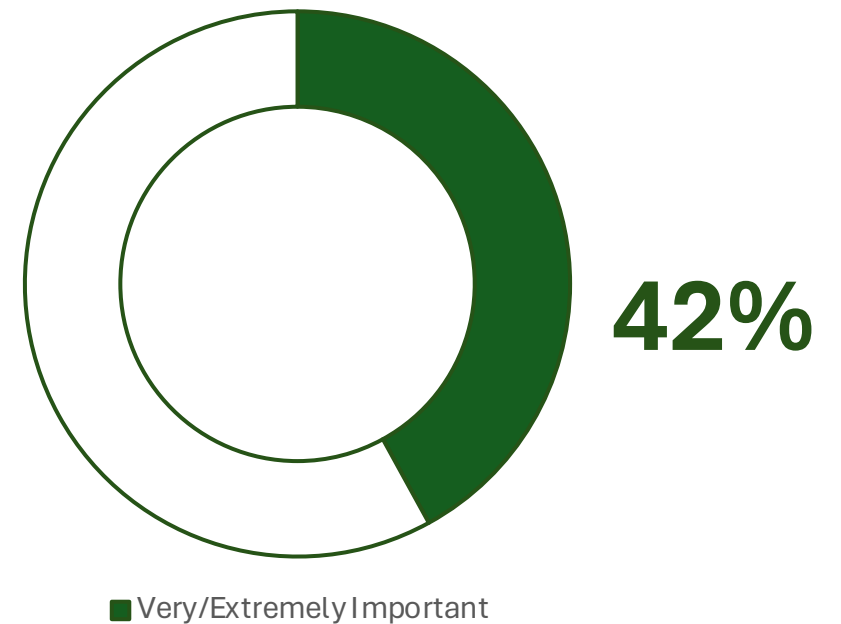
- 58 survey responses
  - 46% physicians (n = 25), 15% EM residents (n = 8), 33% RNs (n = 18), 4% pharmacists (n = 2) and 1 paramedic
- **76%** did not know MDIs could be recycled to minimize environmental impact
- **Only 18%** knew MDIs contributed to 4% of healthcare-related greenhouse emissions
- **53%** were unaware of available lower emission inhalers
- **22%** were unaware of the environmental impacts of MDIs



# Provider Dispensing Behaviours & Beliefs

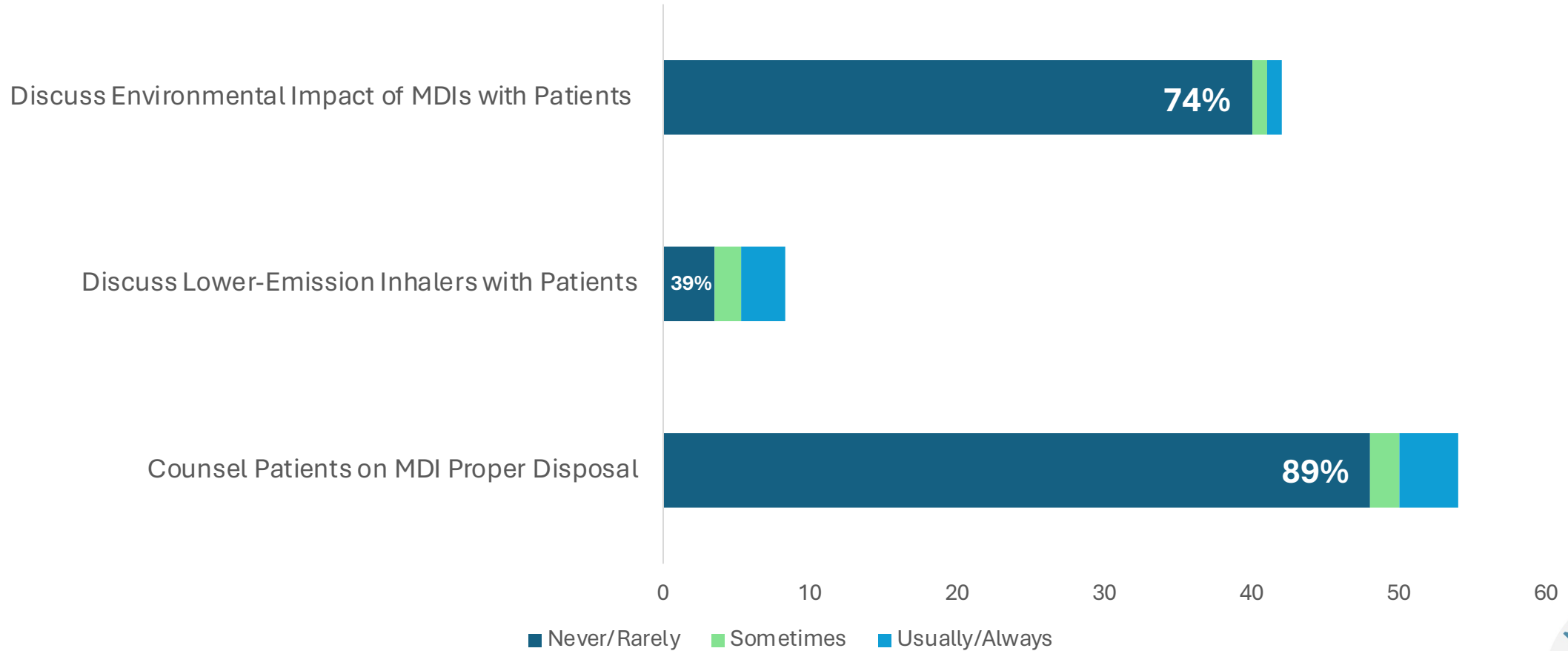


Frequency providers considered environmental impacts of inhalers when dispensing

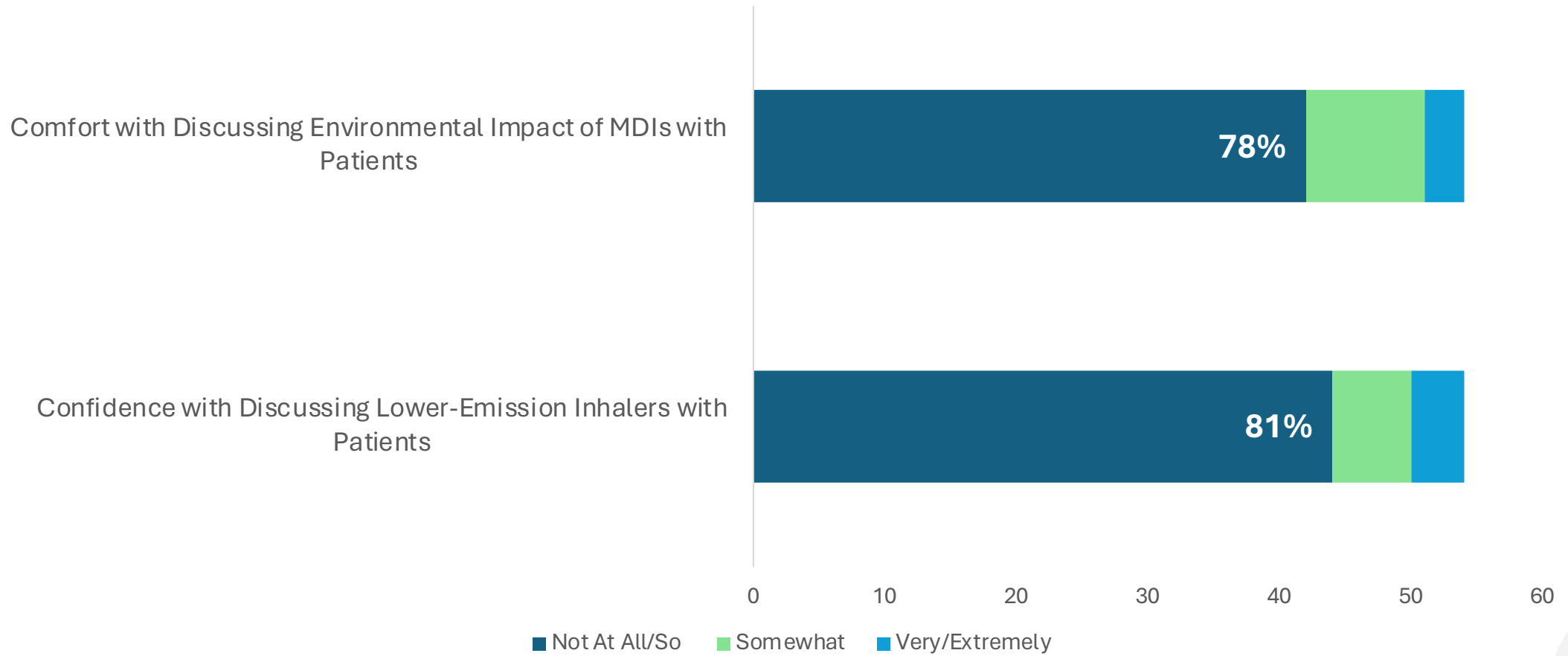


Importance of considering environmental impact of inhalers when dispensing

# MDI & DPI Counselling

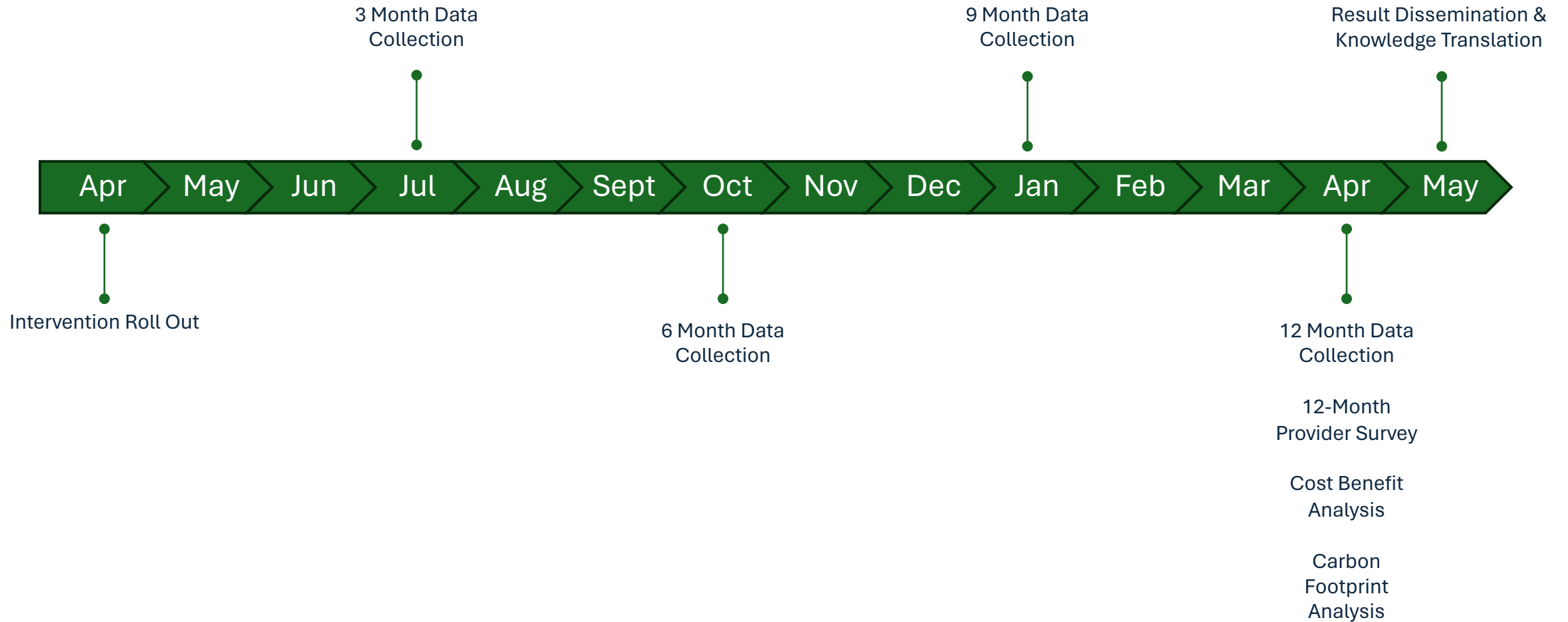


# MDI & DPI Counselling



**Moving Forward**

# Next Steps



# Thank you!



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