CASCADES

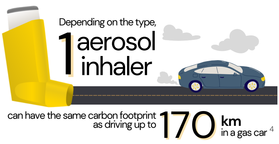
Environmentally Sustainable Opportunities for Health Systems

Metered Dose Inhalers (MDIs)

MDIs are common medical devices used to deliver inhaled medication. They are typically used in the treatment of asthma and chronic obstructive pulmonary disorder. [1]

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.



Hydrofluorocarbons (HFCs)

Common HFC propellants used in MDIs include:

HFC 134a	HFC 227ea**
370 GWP* [2]	3350 GWP*

*100 year time horizon
**Used to a lesser extent

Global Warming Potential (GWP)

Global Warming Potential (GWP) is a standardization tool used to compare the global warming impact of different types of GHGs over a fixed time period (usually 100 years). It measures the amount of energy a given gas will absorb compared to the equivalent mass of carbon dioxide (CO_2), which has a standardized GWP of 1.

HFCs are "high-GWP gases" as they trap substantially more heat than CO2 per unit mass.

Health care systems can curb MDI-related HFC emissions by implementing the following strategies

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]

CARBON FOOTPRINTS

Ventolin HFA MDI
28.26 kg CO_2e* [6]

Ventolin Diskus DPI
0.58 kg CO_2e [6]

Combivent Respimat SMI**
0.78 kg CO_2e [6,7]

*CO_2e = 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.

WHEN MDIs ARE NECESSARY...

Choose smaller volume relievers

Small volume relievers emit less propellant at each use, and therefore, have lower carbon footprints than large volume relievers. [8]

2 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]

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

National Institute for Health and Care Excellence: Patient Decision Aid Inhalers
Provides information to assist patients and health care professionals in discussing suitable inhaler options, appropriate usage, and the environmental impact of inhalers. [9]

Canadian Network for Respiratory Care: Certified Respiratory Educator
Health care professionals looking to enhance their skills and knowledge in respiratory care can opt to complete the certified respiratory educator exam, which trains professionals in up-to-date respiratory care guidelines and techniques. [11]

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.

CO_2 emission SAVINGS 4-18kg [8] per inhaler*

CO_2 emission SAVINGS 3-17kg [8] per inhaler*

*Compared to landfill disposal

4 DEVELOPING SUITABLE PRESCRIBING PRACTICES AROUND INHALERS

Best practices for diagnosing, managing, and monitoring patients' respiratory conditions can reduce unnecessary inhaler prescription and, subsequently, the environmental impact associated with their use.

NEW
CANADIAN THORACIC SOCIETY

6 Evidence-based Recommendations
for treatments, tests, and procedures that are often unnecessarily utilized in respiratory medicine. [12]

All inhalers have environmental impacts that go beyond GHG emissions from propellants including the depletion and destruction of natural resources. Health care providers and patients should be mindful of these impacts when selecting an inhaler.

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