Mass General Brigham

Reducing Greenhouse Gas Emissions from Inhalers

Background

The hydrofluorocarbon propellants in metered dose inhalers (MDIs) are potent greenhouse gases, with up to 3600 times the global warming effect of carbon dioxide. Emissions from all metered dose inhalers prescribed annually in the United States are roughly equivalent to driving 550,000 automobiles for a year. Dry powder inhalers (DPIs) and soft mist inhalers (SMIs) do not contain a propellant.

There are numerous ways in which prescribers can help reduce the environmental impact of metered dose inhalers.

Eight Actions to Reduce MDI Associated Emissions

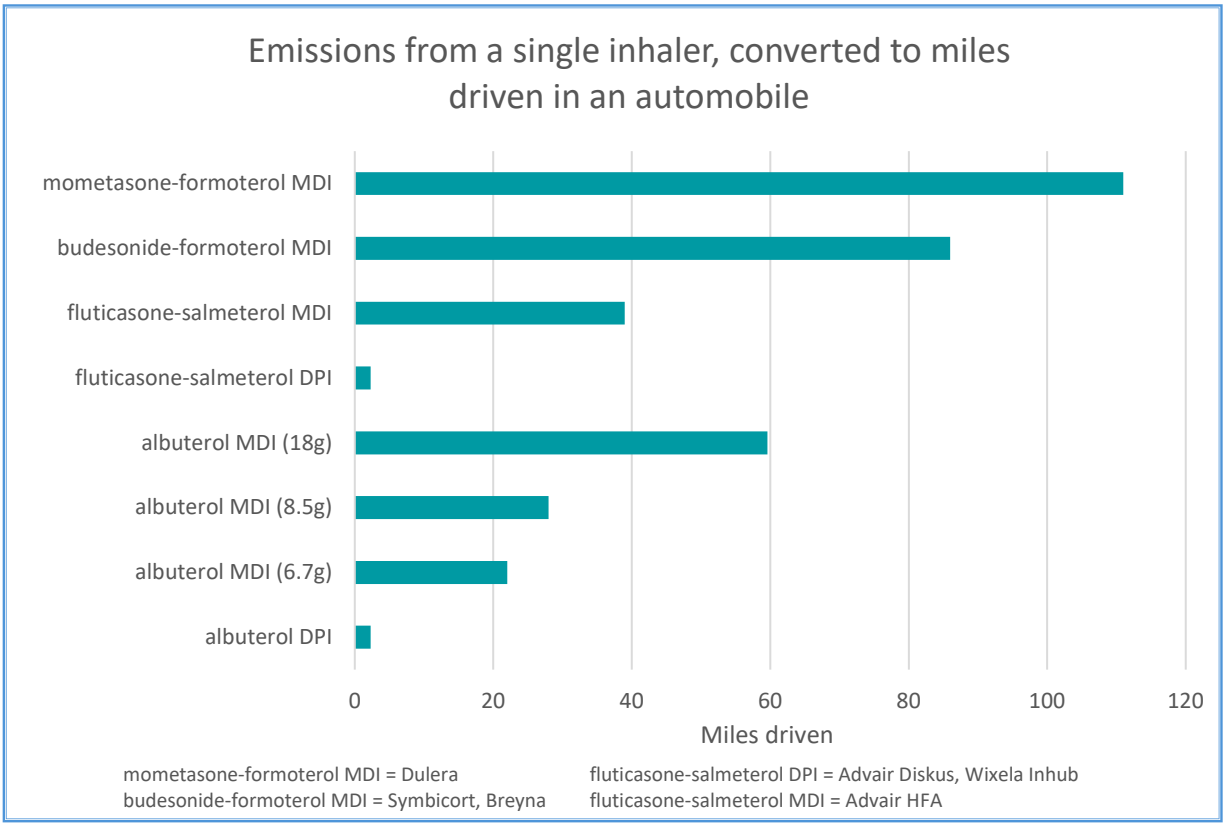
The following strategies should be employed to reduce the environmental impact of inhaler prescribing *provided they align with guideline concordant asthma and COPD care*. Follow links for additional context.

1. Do not prescribe albuterol or ipratropium for URIs or acute bronchitis in patients without a history of asthma or COPD.
2. Prescribe dry powder inhalers (DPIs) or soft mist inhalers (SMIs) instead of MDIs for appropriate patients. Albuterol in a dry powder inhaler (ProAir Respiclick) is covered for patients with MassHealth but not by many other insurers.
3. When prescribing albuterol MDIs, choose 6.7 g or 8.5 g canisters rather than the 18 g canister when possible. The 18 g canister is associated with 2 to 3 times greater emissions and has roughly the same climate impact as an automobile driven for 65 miles.
4. Prevent excessive albuterol use by optimizing inhaled corticosteroid-containing asthma regimens for patients with poorly controlled asthma. Use of three or more albuterol canisters per year is a marker of poor disease control.
5. Limit albuterol prescriptions to 3 devices (or 1 device with 2 refills) in order to more-easily identify patients using excessive amounts of albuterol.
6. Do not prescribe two puffs of a metered-dose inhaler when the same dose of medication can be delivered with one puff (ie, one puff fluticasone propionate 220 mcg/inh vs two puffs flucticasone propionate 110 mcg/inh).
7. Confirm the diagnosis of COPD with pulmonary function testing before committing a patient to long-term therapy. A diagnosis of asthma should ideally be confirmed with pulmonary function testing prior to committing a patient to long term therapy. However, a diagnosis of probable asthma can be made in patients with characteristic symptoms for whom spirometry is not readily available or who do not have airflow obstruction at the time of pulmonary function testing.
8. Ensure proper inhaler technique.

Additional Context

1. ***Do not prescribe albuterol or ipratropium for URIs or acute bronchitis in patients without a history of asthma or COPD.***
   Rationale:
   Neither albuterol nor ipratropium have been shown to reduce cough from a URI or acute bronchitis in patients without asthma or COPD. Additionally, there is not good evidence to support the use of albuterol or ipratropium for treatment of post-infectious cough syndrome in patients without asthma or COPD.

2. ***Prescribe dry powder inhalers (DPIs) or soft mist inhalers (SMIs) instead of MDIs for appropriate patients. Albuterol in a dry powder inhaler (ProAir Respiclick) is covered for patients with MassHealth but not by many other insurers.***
   Rationale:
   DPIs and SMIs generate substantially fewer emissions than MDIs because they do not contain a propellant.



Notes:

a. Unfortunately, there is not currently a DPI version of ICS-formoterol available in the United States. Consistent with guidelines, patients with asthma whose insurance covers ICS-formoterol MDI should ideally be prescribed this medication for anti-inflammatory reliever therapy (AIR), including as part of SMART (single maintenance and reliever therapy).
b. There is no evidence that any single device type (MDI, DPI, or SMI) is clinically superior to another. International asthma and COPD guidelines do not state a preference for one over another. Many countries use DPIs at a far higher rate than the United States and achieve superior clinical outcomes.
c. Patients using DPIs make fewer medication administration errors than patients using MDIs.
d. Patients using DPIs must be able to take a fast, deep breath. Children under 12, older adults, and adults with significantly impaired lung function may not be able to use DPIs.
e. Any patient being prescribed a new device type requires education in appropriate inhaler use. Useful videos on proper inhaler technique are available from the American Lung Association.

3. ***When prescribing albuterol MDIs, choose 6.7 g or 8.5 g canisters rather than the 18 g canister when possible. The 18 g canister is associated with 2 to 3 times greater emissions and has roughly the same climate impact as an automobile driven for 65 miles.***

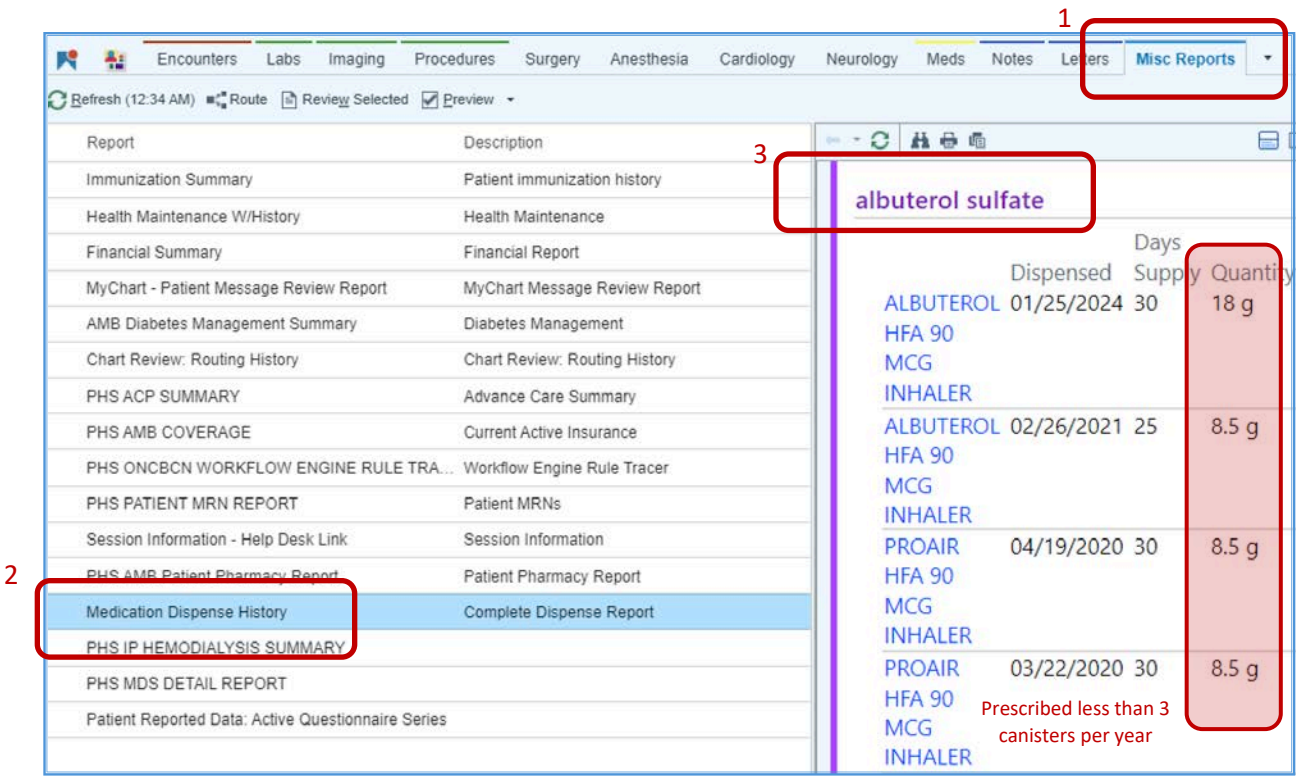
   Rationale:
   Albuterol in the outpatient setting is sold in three different MDI sizes: 6.7 g (Proventil and generic), 8.5g (generic), and 18g (Ventolin and generic). All contain 200 actuations of 90 mcg of albuterol. The weight difference is attributable to the different volume of propellant in each formulation. Smaller canisters are therefore associated with fewer emissions per actuation.

   Notes:
   - *a.* MassHealth requires the 18g MDI canister but also now covers the DPI form of albuterol (ProAir Respiclick).
   - *b.* Albuterol is available as a DPI (ProAir Respiclick) but it is not covered by most insurance plans other than MassHealth.
   - *c.* The 8g albuterol MDI is for inpatient use only and should not be prescribed to outpatients.
   - *d.* More than two thirds of all albuterol prescriptions sent from MGB providers are for the albuterol 18g canister. There is a significant opportunity for improvement, particularly since albuterol is by far the largest contributor to MGB's MDI associated emissions.

4. ***Prevent excessive albuterol use by optimizing inhaled corticosteroid-containing asthma regimens for patients with poorly controlled asthma. Use of three or more albuterol canisters per year is a marker of poor disease control.***

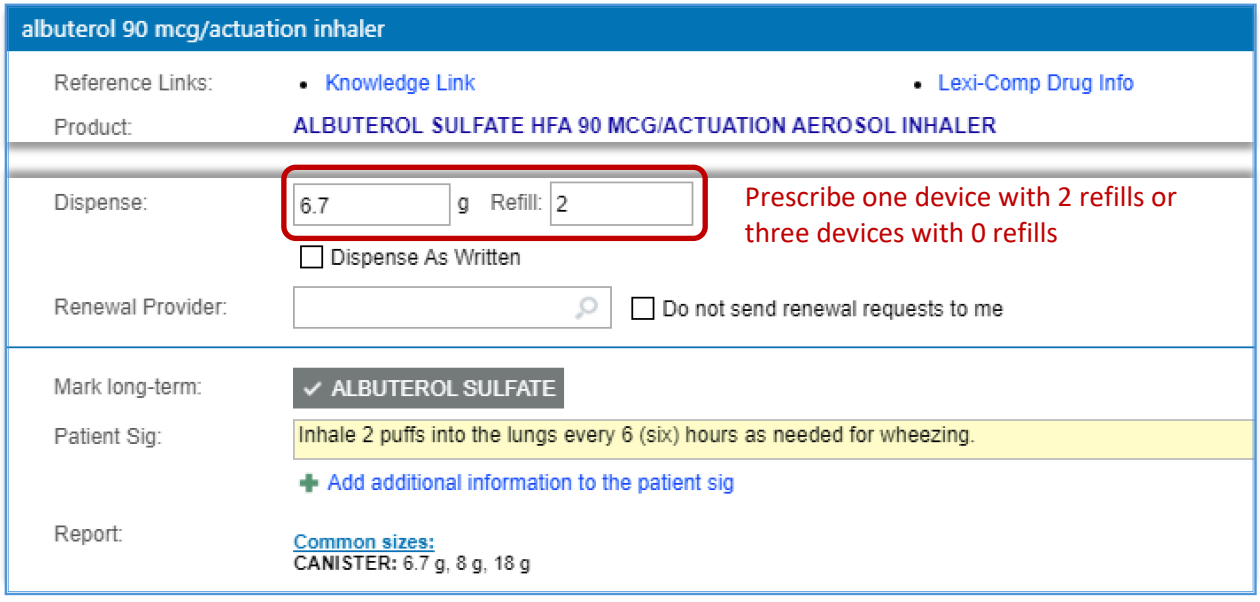
   Rationale:
   The vast majority of MDI associated emissions come from albuterol, particularly from use of albuterol among individuals with poorly controlled asthma. Improving asthma control by adding an inhaled corticosteroid can reduce albuterol use and thereby albuterol associated emissions.

   Notes:
   a. Patients with asthma, and particularly those with poorly controlled asthma, should ideally be prescribed anti-inflammatory reliever therapy (AIR) or maintenance and reliever therapy (MART), per GINA guidelines. However, these regimens will not be available to all patients, and so we will continue to prescribe albuterol.
   b. Patients using albuterol alone who require improved disease control and who cannot obtain coverage of ICS-formoterol (Symbicort, Breyna, Dulera) should be prescribed an ICS or ICS-LABA, ideally in DPI form for those who can use this device type effectively.
   c. The Medication Dispense History in Epic can be used to review how many canisters of albuterol have been prescribed to a patient in the past year.



5. ***Limit albuterol prescriptions to 3 devices (or 1 device with 2 refills) in order to more-easily identify patients using excessive amounts of albuterol.***

Rationale:
Use of three or more canisters of albuterol per year is a marker of poor disease control and is associated with increased exacerbations and mortality. Excessive albuterol use is also the primary driver of MDI associated emissions. Limiting the number of prescribed albuterol canisters can help providers identify patients who are using excessive amounts of albuterol.



6. ***Do not prescribe two puffs of a metered-dose inhaler when the same dose of medication can be delivered with one puff (ie one puff fluticasone propionate 220 mcg/inh vs two puffs flucticasone propionate 110 mcg/inh).***

   Rationale:
   Because MDI associated emissions are due to the propellant released with each inhalation, minimizing the number of inhalations reduces associated emissions. For example, two puffs of fluticasone 110 mcg results in twice the climate impact of one puff of fluticasone 220 mcg while delivering the same amount of medication.

7. ***Confirm the diagnosis of COPD with pulmonary function testing before committing a patient to long-term therapy. A diagnosis of asthma should ideally be confirmed with pulmonary function testing prior to committing a patient to long term therapy. However, a diagnosis of probable asthma can be made in patients with characteristic symptoms for whom spirometry is not readily available or who do not have airflow obstruction at the time of pulmonary function testing.***

   Rationale:
   Many patients receive an empiric diagnosis of asthma or COPD without confirmation by pulmonary function testing. Consequently, these patients may be inappropriately receiving respiratory therapies without benefit and with associated adverse environmental impacts and the potential for patient harm.

   Notes:
   a. For patients in whom there is a high suspicion of asthma or COPD, it is reasonable to initiate treatment empirically provided the diagnosis is confirmed subsequently by pulmonary function testing.
   b. Access to pulmonary function testing is difficult for some patients. It is acceptable to make a diagnosis of probable asthma for patients with characteristic symptoms who aren't able to easily access PFTs.
   c. Given the dynamic nature of the disease, a diagnosis of probable asthma can also be made for patients with characteristic symptoms of asthma who do not have evidence of obstruction at the time of PFT testing. Spirometry should ideally be used to monitor asthma severity over time.

8. ***Ensure proper inhaler technique.***
   Rationale:
   Patients who are using their inhalers incorrectly may have poor disease control, resulting in more frequent use of rescue medications for symptom management and associated increases in emissions.
   Notes:
   a. Patients should be educated on proper use of their inhalers. Instructional videos from the American Lung Association are a useful resource.
   b. Patients using MDIs should be encouraged to use a spacer.