

Inhaler carbon footprint guide

This guide is focused on adult respiratory care but may be useful in children over 12 years old.

In a discussion around whether to prescribe a low carbon inhaler, the priority should be to offer an inhaler that will provide the best clinical outcomes for the patient - 'the right inhaler for the right patient'. Inhaler technique and inspiratory flow are extremely important in ensuring as much inhaled medication as possible is delivered into the lungs. Patients do not need to wait for their annual asthma/COPD review but if it is due then this is an ideal opportunity to discuss low carbon options.

Children should remain on their inhaled corticosteroid metered dose inhaler (MDI) and spacer device combination if they are already prescribed one. Alternative devices are only recommended where an individual child's adherence to a pressurised MDI and spacer combination is likely to be so poor that it would undermine effective asthma control ([ref. NICE Technology appraisal guidance \[TA38\]](#)). A lower carbon footprint brand of salbutamol MDI should still be considered, check the [Summary of product characteristics](#) to ensure the inhaler is licensed for the age of the child.

National targets

The [NHS England long term plan](#) is committed to reducing the NHS carbon footprint by 51% by 2025. A shift to lower carbon inhalers will deliver a reduction of 3%. The ultimate aim is [delivering a net zero NHS](#). The Primary Care Network (PCN) Directly Enhanced Service (DES) specification for structured medication reviews and medicines optimisation makes a requirement of PCNs to “actively work with their CCG to optimise the quality of prescribing of metered dose inhalers, where a low carbon alternative may be appropriate”. To support the use of greener inhalers the [NHS England and NHS Improvement \(NHSEI\) Investment and Impact Fund \(IIF\)](#) was published which is an incentivised scheme that contains four respiratory indicators, two of which focus on reducing avoidable carbon emissions. For example, prescribing Dry Powder Inhalers (DPI) as a lower-carbon clinical alternative to MDIs.

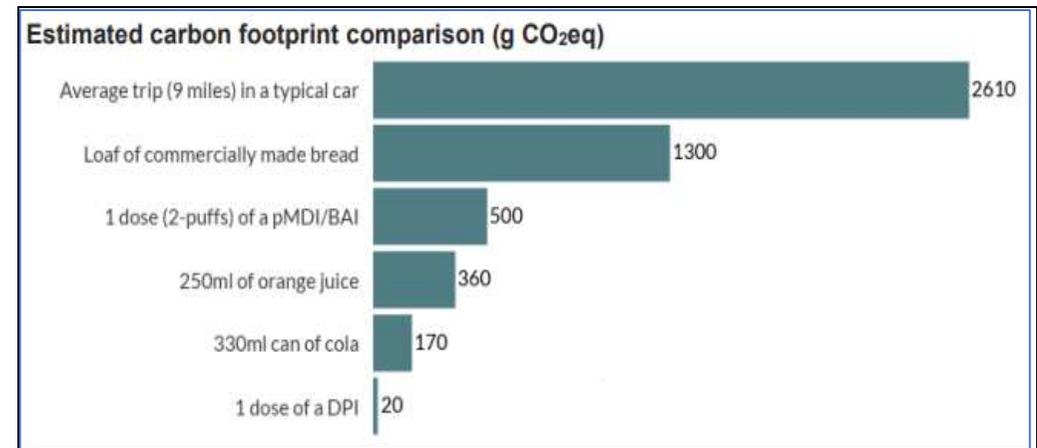
The two IIF indicators for reducing carbon emissions are as follows:

- ES-01: Metered Dose Inhaler (MDI) prescriptions as a percentage of all non-salbutamol inhaler prescriptions issued to patients aged 12 or over
- ES-02: Mean carbon emissions (kg CO₂e) per salbutamol inhaler prescribed

Environmental impact:

Inhalers such as metered dose inhalers (MDIs) and breath actuated inhalers (BAI) contain propellants known as hydrofluorocarbons (HFCs). These are greenhouse gases that can contribute to global warming.

All inhalers have a carbon footprint measured in carbon dioxide equivalents (g CO₂eq). The higher the carbon dioxide equivalent, the greater the impact on global warming. Practices should be prepared for patients who actively request a low carbon option. The image opposite highlights how much the carbon emissions from inhalers compare to everyday products/activities.



Reference: NICE NG80 Inhalers for asthma patient decision aid

What options are available to lower carbon emissions?

- Use dry powder inhalers as first choice when clinically appropriate. Soft mist inhalers are also preferable to MDIs.
- Choose a low carbon brand – refer to local formularies.
- Reduce excess prescribing of short acting beta agonists (SABA) – reducing the number of devices prescribed reduces carbon emissions.
- Optimise prescribing where patients could be on a combination inhaler. This will reduce the overall number of inhaler items dispensed and be more convenient for patients, for example:
 - ICS + LABA → ICS/LABA (switch to a formulary dual combination inhaler)
 - ICS + LABA/LAMA → ICS/LABA/LAMA (switch to a formulary triple combination inhaler).
- Optimise the strength of the inhaler i.e. prescribe 1 puff of 200mcg rather than 2 puffs of 100mcg where licensing allows.
- Where patients still require an MDI – offer a spacer device (refer to the [formulary](#))
- Correct inhaler technique to ensure patients get the most benefit from their inhalers.
- Encourage all patients to return empty and unwanted inhalers to their community pharmacy for disposal.

More information can be found in the Greener Practice “How to Reduce the Carbon Footprint of Inhaler Prescribing. A Guide for Healthcare Professionals in the UK”:
<https://static1.squarespace.com/static/5e70ffa08cc1d3609c2cd386/t/618bc3db5b31ab66cebeada/1636549596726/Reducing+Carbon+Footprint+of+Inhaler+Prescribing+v3.3.2.pdf>

What devices are available and the inspiration required?

Device type. Refer to the local formulary for brands	Inspiration required
Dry powder inhaler (DPI)	Quick and deep
Soft mist inhaler (SMI)	Slow and deep
Breath-actuated metered dose inhaler (BAI)	Slow and steady
Pressurised metered dose inhaler (MDI)	Slow and steady
Pressurised metered dose inhaler (MDI) plus a spacer	Tidal breathing or slow and steady

Key	
	Low (<35 g CO ₂ e) carbon footprint per puff
	High (≥35 g CO ₂ e) carbon footprint per puff

Reference: PrescQIPP Inhaler carbon footprint data 2.10.1

How do I assess a patient's inspiratory flow?

For most patients, MDIs do not confer any additional clinical advantages over DPIs. Whether consultations are in person or remote, inspiratory flow should be discussed. Adults with mild to moderate asthma are likely to be able to demonstrate they have the quick and deep inspiration sufficient for a DPI. It may be useful checking inspiratory flow in those with more severe disease or older patients using a device such as the In Check Dial™ or equivalent as procedures around Covid-19 allow.

The [NICE asthma patient decision aid](#) (appendix 1) includes an algorithm of questions that a patient (aged 17 years and over) can answer to help determine which type of device is suitable. Once a device has been agreed with the patient prescribe a **formulary choice** according to the local asthma or COPD guidelines. Placebo devices may also be helpful.

Inhaler technique

Regardless of whether a change in device was made:

- Discuss inhaler technique at every opportunity.
- Demonstrate inhaler technique with placebos where possible, taking into consideration infection control recommendations around Covid-19.
- Signpost to videos i.e. [Right breath](#), [Asthma UK](#) or the myCOPD app
- The community pharmacy can support with inhaler technique and follow up under the "[New Medicines Service](#)".

Relievers (SABA) :

- During exacerbations, patients may not have the inspiratory flow required to deliver an effective dose from a reliever in the form of a dry powder device. For these patients a salbutamol MDI prescribed by brand with a formulary spacer should be given.
- Prescribe SABA by brand name and choose a low carbon brand where possible (see table below). Do not prescribe generically. If the practice anticipates switching a large number of patients please forewarn the community pharmacies this will affect to ensure stock will be available.
- Ensure patients are aware of the expiry date and schools return inhalers at the end of term.

Salbutamol metered dose inhalers (MDIs) are the single biggest source of carbon emissions from NHS medicines prescribing. Prescribing by brand ensures a lower carbon option is dispensed. When switching brands of salbutamol, the patient may notice that the propellant feels different in the mouth. The patient should be reassured that this does not affect the effectiveness of the inhaler. The table below indicates the carbon footprint of some brands of salbutamol inhalers.

Salbutamol brand (device)	Carbon emissions per inhaler (kg CO ₂ e)
Easyhaler Salbutamol 100mcg (DPI)	0.62
Easyhaler Salbutamol 200mcg (DPI)	0.62
Salamol CFC-free 100mcg (MDI)	11.95
Salamol Easi-breath 100mcg (BAA)	12.08
Salbulin Novolizer 100mcg (DPI)	3.75
Ventolin Accuhaler 200mcg (DPI)	0.58
Ventolin Evohaler 100mcg (MDI)	28.26

Key	
	Low (<35 g CO ₂ e) carbon footprint per puff
	High (≥35 g CO ₂ e) carbon footprint per puff

Reference: [NHS Network Contract Directed Enhanced Service IIF 2022/23](#) & [PrescQIPP](#) Inhaler carbon footprint data

Reviewing medical records

Before switching a patients inhaler to a lower carbon option, identify those with poor control and offer a full review to optimise their care. Indicators of poor control include:

- Over-use of SABA. Check that any over ordering is not due to inadvertent monthly re-ordering through electronic repeat dispensing or a care home. Please note, electronic repeat dispensing does allow for PRN medications to be ordered at a different frequency to regular monthly repeats.
- Under-use of preventers
- Need for oral prednisolone to manage exacerbations

Establish where the patient is on the local asthma or COPD guidelines to ensure they are being managed optimally.

Patient follow up

When a change has been made to a patient's treatment or inhaler device they should be offered a follow up appointment around 6-8 weeks later or sooner if required.

Patients with asthma or COPD can be referred or they can self-refer to the free [Community Pharmacy New Medicines Service \(NMS\)](#). This includes any patient who was changed to a new inhaler device during the Covid-19 pandemic. The service provides support for people with long-term conditions such as asthma or COPD who are newly prescribed a medicine to help them understand their new medicine, improve adherence and will include an opportunity to check inhaler technique.

Disposal

Used MDI canisters still contain propellants that contribute to global warming. Encourage patients to:

- Check dose counters where applicable to ensure the inhaler is empty.
- Return empty/unwanted inhalers to the community pharmacy. Incineration thermally degrades hydrofluoroalkanes (HFA) into far less potent greenhouse gases. Inhalers that end up in landfill release their remaining propellant which leaks HFA into the atmosphere.
- As spacers cannot currently be recycled, recommend patients clean and replace them according to manufacturer's instructions. Formulary choices are shown on [netFormulary](#).

For more information on the safe recycling of medicines and inhalers see <https://www.recyclenow.com/what-to-do-with/medicines-0>

Switching options

Examples of formulary inhaler switches to lower the carbon footprint. This list is not exhaustive. Prices taken from: [MIMS](#) or [BNF](#)

Switch from	Switch to:	Therapeutic group	Different drug(s)?	Different dose?	Different device?	Cost impact if switched (£) + = costs more - = cost saving	Low (<35 g CO2e) or High (≥35 g CO2e) carbon footprint per puff	Reduction in carbon footprint per inhaler (g CO2e) data from PrescQIPP	Difference in licensed indication or age range?
AirFluSal® 125/25 Sereflo® 125/25 Seretide® 125/25 evohaler Sirdupla® 125/25	Fostair 100/6 NEXThaler®	ICS/LABA	Yes	2 puffs of 125/25 is approximately equivalent to 2 puffs of Fostair 100/6	Yes	+ £12.90 +£14.33 +£5.87 +£6.87	LOW	-18395.8 -15530.8 -18595.8 -18730.8	Fostair licensed in adults only.
AirFluSal® 250/25 Sereflo® 250/25 Seretide® 250/25 evohaler Sirdupla® 250/25	Fostair NEXThaler® 200/6 2 puffs BD	ICS/LABA	Yes	2 puffs of 250/25 is approximately equivalent to 2 puffs of Fostair 200/6	Yes	+£8.80 +£9.33 £0 +£1	LOW	-18394.6 -15379.6 -18594.6 -18729.6	Fostair licensed in adult asthma only.

Switch from MDI	Switch to DPI	Therapeutic group	Different drug(s)?	Different dose?	Different device?	Cost impact if switched (£) + = costs more - = cost saving	Low (<35 g CO2e) or High (≥35 g CO2e) carbon footprint per puff	Reduction in carbon footprint per inhaler (g CO2e) data from PrescQIPP	Difference in licensed indication or age range?
Clenil 100mcg	Easyhaler® Beclometasone 200mcg	ICS	No	Yes - 100mcg Clenil® is equivalent to 100mcg Easyhaler® Beclomethasone	Yes	+ £0.05 (accounting for change in no. of puffs)	LOW	-15942	Easyhaler Beclomethasone® is only licensed in adult asthma and only available as 200mcg/puff.
Clenil 200mcg	Easyhaler® Beclometasone 200mcg	ICS	No	No	Yes	-£1.24	LOW	- 15712	
Flutiform®50/5	Fostair 100/6 NEXThaler	ICS/LABA	Yes	Yes - 2 puffs of Flutiform 50/5 is approximately equivalent to 1 puff of Fostair 100/6	Yes	+£0.26 (accounting for change in no. of puffs)	LOW	-35610.8	Fostair 100/6 is licensed in adult asthma and COPD.
Flutiform® 125/5	Fostair 100/6 NEXThaler	ICS/LABA	Yes	No – 1 puff of Flutiform 125/5 is approximately equivalent to 1 puff of Fostair 100/6	Yes	+£1.32	LOW	-35610.8	Fostair 100/6 is licensed in adult asthma and COPD.
Flutiform® 250/10	Fostair 200/6 NEXThaler	ICS/LABA	Yes	No - 1 puff of Flutiform 250/10 is approximately equivalent to 1 puff of Fostair 200/6	Yes	-£16.24	LOW	-35609.6	No
Fostair® 100/6	Fostair® 100/6 NEXThaler	ICS/LABA	No	No	Yes	£0.00	LOW	10359.6	No
Fostair® 200/6	Fostair® NEXThaler 200/6	ICS/LABA	No	No	Yes	£0.00	LOW	13262.4	No

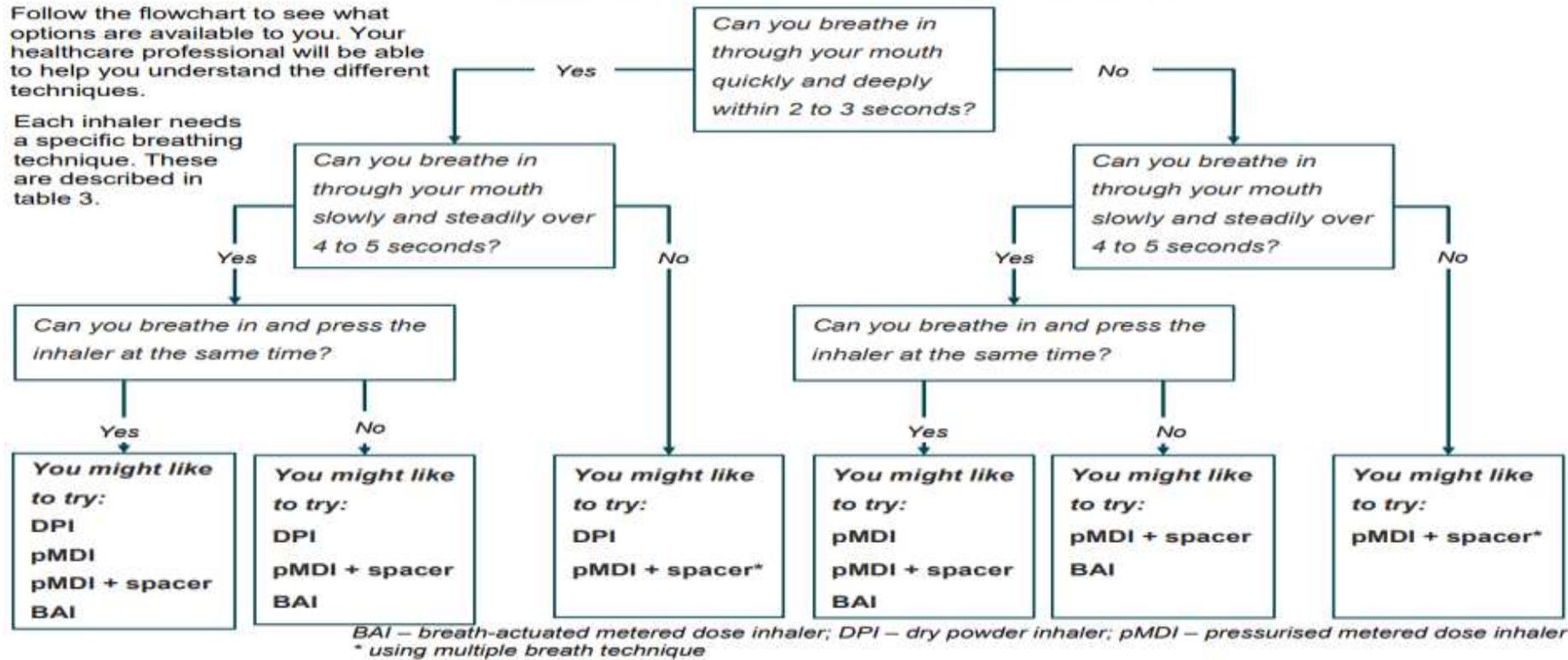
Switch from MDI	Switch to: MDI or DPI	Switch to lower carbon footprint alternative	Therapeutic group	Different drug(s)?	Different dose?	Different device?	Cost impact if switched (£) + = costs more - = cost saving	Low (<35 g CO2e) or High (≥35 g CO2e) carbon footprint per puff	Reduction in carbon footprint per inhaler (g CO2e) data from PrescQIPP	Difference in licensed indication or age range?
Qvar® 100 (extra fine particles)	DPI	Easyhaler® Beclometasone 200mcg	ICS	No	Yes - 1 puff of Qvar 100mcg is equivalent to 1 puff of 200mcg Easyhaler beclomethasone	Yes	-£2.28	LOW	-19740	Easyhaler Beclomethasone® licensed in adults only.
Trimbow MDI	DPI	Trimbow DPI	ICS/LABA /LAMA	No	No	Yes	£0	LOW	-13314	DPI device only licensed in COPD
Ventolin Evohaler® 100mcg	MDI	Salamol® 100 micrograms	SABA	No	No	No	-£0.04	HIGH	-16312	No
	DPI	Easyhaler Salbutamol® 100mcg	SABA	No	No	Yes	+£1.81	LOW	-27642	No
		Easyhaler Salbutamol® 200mcg	SABA	No	2 puffs of Ventolin 100mcg is equivalent to 1 puff of Easyhaler 200mcg	Yes	+£1.82 (accounting for change in no. of puffs)	LOW	-27642	No

Appendix 1

2: Flowchart – how to use the inhalers

Follow the flowchart to see what options are available to you. Your healthcare professional will be able to help you understand the different techniques.

Each inhaler needs a specific breathing technique. These are described in table 3.



Reference: NICE NG80 Patient decision aid. Inhalers for asthma