

## KISS: Green Inhaler Prescribing

Thank you to the authors of this guide: Drs James Smith, Aarti Bansal, & Joe Barron-Snowdon, from [Greener Practice](#); edits and inhaler costs by NB Medical. For FAQs and QI ideas see [www.greenerpractice.co.uk](http://www.greenerpractice.co.uk). See the Traffic Light tables below for the relative carbon footprint of inhalers.

Inhalers account for 3-4% of the whole NHS carbon footprint. Metered dose inhalers (MDIs) use hydrofluoroalkanes (HFA) propellants which are potent greenhouse gases, 1000 – 3000 times more potent than carbon dioxide. In the UK approximately 70% of inhalers used are MDIs which is much higher than many other European countries, and most short acting beta-agonists (SABA) are prescribed as MDIs. Salbutamol accounts for the majority of the carbon footprint associated with inhalers.

### KISS: How to Reduce Inhaler Carbon Footprint

#### 1. Optimize asthma and COPD care

- The *clinical and environmental harms of poor disease control will likely outweigh any benefits* from the use of different inhalers. NB: on the Hot Topics course we have recently discussed:
  - **Over-use SABA in asthma is extremely common and a marker of poor control and risk factor for exacerbation and death.**
    - Patients should need SABA no more than 3 times per week, or 2 inhalers per year.
  - [International asthma guidelines](#) now recommend **SABA monotherapy in mild asthma should be avoided and use of combined maintenance & reliever therapy using a formoterol LABA/ICS inhaler may be more appropriate** as the drip-feed of steroid ↓ risk of exacerbation & long-term airway changes.
  - **Metered dose inhalers (MDIs) are most effective when used with spacers.** Let's encourage patients to use these every time, not just when they have a flare of asthma.
- **Optimising asthma & COPD care will inevitably lead to ↓ salbutamol MDI inhaler requirement.**

#### 2. Use dry powder inhalers or soft mist inhalers as preferred choice when clinically appropriate

- DPI and SMIs can be used as long as patients have sufficient inspiratory flow. This may be too low in certain groups, e.g. younger children and the very elderly, and during severe exacerbations, when MDI via a spacer is more appropriate.
- Patient choice and clinical judgement remains crucial, [NICE has a useful Patient Decision Aid](#).
  - Refer to your local guidance. Where DPIs or SMIs are not a recommended 1st line option engage with the local prescribing team about why and see if the guidelines can be updated.

#### 3. If MDIs are needed choose a brand and regime to minimize carbon footprint

- **Avoid using branded Ventolin Evohaler**
  - **Ventolin Evohaler has more than double the carbon footprint of other Salbutamol MDIs, e.g. Salamol.** Prescribe by brand, not generic. Lower carbon MDI options such as *Salamol* or *Airsalb* are equivalent price. (NB: this does not apply to Ventolin Accuhaler, a DPI.)
- **Prescribe inhaled corticosteroids to minimize the number of puffs required for the same dose.**
  - For example, prescribe 1 puff of 200mcg Clenil twice a day rather than 2 puffs of 100mcg Clenil twice a day. This can effectively halve the carbon footprint of treatment.
- **Avoiding using MDIs containing HFA227ea when clinically appropriate**
  - HFA227ea has a much higher carbon footprint than the HFA134a used in other MDIs.
  - These are Flutiform and Symbicort MDI. (NB: not Symbicort Turbohaler which is a DPI.)

#### 4. Ask patients to return all used inhalers to pharmacies for disposal

- Inhalers should not be put into household waste as this allows release of remaining HFAs into the atmosphere. Incineration thermally degrades HFAs into far less potent greenhouse gases. Some pharmacies may have access to inhaler recycling which allows the plastics and gases to be recycled.

NB: cost is always a consideration for clinicians but DPIs are not always more expensive than MDIs.

For many combination inhalers, the cheapest DPI equivalent may be cost-saving vs MDI, while some common brands such as *Symbicort* and *Fostair* have directly equivalent MDI and DPI versions at the same price.

The cheapest salbutamol DPI is approx. 2x the price of the cheapest MDI (e.g. Ventolin 100 Evohaler MDI NHS indicative price Feb 2021 is £1.50 vs Easyhaler 100 DPI is £3.31) although still cheaper than many MDIs. Even then this cost is small in comparison to the £20-60 of many combination inhalers, while having a 10-30x smaller carbon footprint and dwarfed by savings from optimising care, reducing SABA overuse, consultations and treatment for exacerbations and hospitalisations.

Non-ICS Inhalers by Carbon Footprint				
	<i>Short Acting Beta Agonists (SABA)</i>	<i>Long Acting Beta Agonists (LABA)</i>	<i>Short Acting Muscarinic Antagonists (SAMA)</i>	<i>Triple combination (ICS/LABA/LAMA)</i>
<b>Low Carbon Footprint (&lt;1kg CO2e per inhaler)</b> Use where clinically appropriate	<b>Salbutamol:</b> Salbutamol Easyhaler Salbulin Novolizer Ventolin Accuhaler <b>Terbutaline:</b> Bricanyl Turbohaler	<b>Formoterol:</b> Foradil (DPI) Formoterol Easyhaler (DPI) Oxis Turbohaler (DPI) <b>Indacaterol:</b> Onbrez Breezhaler (DPI) <b>Olodaterol:</b> Striverdi Respimat (SMI) <b>Salmeterol:</b> Serevent Accuhaler (DPI)	n/a	<b>Fluticasone Furoate / Umeclidinium / Vilanterol:</b> Trelegy Ellipta (DPI)
<b>High Carbon Footprint (10-20kgCO2e per inhaler)</b> Use if low carbon footprint alternative not appropriate	<b>Salbutamol:</b> Airomir AirSal Salamol Airomir 100 Autohaler (BAI) Salamol 100 Easi-breathe (BAI)	<b>Formoterol:</b> Atimos Modulite (MDI) <b>Salmeterol:</b> Serevent Evohaler (MDI) Multiple other manufacturers (MDI)	<b>Ipratropium</b> Atrovent MDI	<b>Beclometasone / Glycopyrronium / Formoterol:</b> Trimbow (MDI)
<b>Higher Carbon Footprint (28KgCO2e)</b>	<b>Salbutamol:</b> Ventolin 100 Evohaler 100mcg			
All Long Acting Muscarinic Antagonists (LAMA) and LAMA/LABA inhalers have low carbon footprint (DPI or SMI)				

**Inhaled Corticosteroid (ICS) Inhalers by Adult Dose and Carbon Footprint**

	ICS	Low Dose	Medium Dose	High Dose #
<b>Low Carbon Footprint (&lt;1kg CO2e per inhaler)</b> Use where clinically appropriate	<b>Beclometasone</b>			
	Beclomethasone Easyhaler	200mcg one puff twice a day	200mcg two puff twice a day	n/a
	<b>Budesonide</b>			
	Budesonide Easyhaler	200mcg one puff twice a day	400mcg one puffs twice a day*	400mcg two puffs twice a day
	Pulmicort Turbohaler	200mcg one puff twice a day*	400mcg one puff twice a day*	400mcg two puffs twice a day
	Budelin Novolizer	200mcg one puff twice a day	400mcg one puff twice a day	400mcg two puffs twice a day
	<b>Fluticasone propionate</b>			
	Flixotide Accuhaler	100mcg one puff twice a day	250mcg one puff twice a day	500mcg one puff twice a day
<b>Mometasone</b>				
Asmanex Twisthaler	200mcg one puff twice a day	400mcg one puff twice a day	n/a	
<b>High Carbon Footprint (10-20kgCO2e per inhaler)</b> Use if low carbon footprint alternative not appropriate	<b>Beclometasone</b>			
	Clenil Modulite pMDI	200mcg one puff twice a day*	200mcg two puffs twice a day	250mcg two-to four puffs twice a day
	Kelhale pMDI (extrafine)	100mcg one puff twice a day*	100mcg two puffs twice a day	100mcg four puffs twice a day
	Qvar pMDI / Autohaler / Easi-Breathe (all extrafine)	100mcg one puff twice a day*	100mcg two puffs twice a day	100mcg four puffs twice a day
	Soprobec pMDI	200mcg one puff twice a day*	200mcg two puffs twice a day	250mcg two or four puffs twice a day
	<b>Ciclesonide</b>			
	Alvesco pMDI	160mcg one puff once a day*	160mcg two puffs once a day	160mcg two puffs twice a day
	<b>Fluticasone propionate</b>			
Flixotide Evohaler	50mcg two puffs twice a day	250mcg one puff twice a day*	250mcg two puffs twice a day	

# Only use after referring the patient to specialist care.

\* Alternative regimes exist consisting of more puffs of lower strength per day.

For paediatric dosing please refer to the BNF.

**ICS/LABA Combination Inhalers by Adult ICS Dose and Carbon Footprint**

	ICS/LABA	Low Dose	Medium Dose	High Dose #
<b>Low Carbon Footprint (&lt;1kg CO<sub>2</sub>e per inhaler)</b> Use where clinically appropriate	<b>Beclometasone dipropionate (extrafine) with formoterol</b>			
	Fostair Nexthaler	100/6 one puff twice a day	200/6 one puff twice a day*	200/6 two puffs twice a day
	<b>Budesonide with formoterol</b>			
	Duoresp Spiromax Fobumix Easyhaler	160/4.5 one puff twice a day	320/9 one puff twice a day*	320/9 two puffs twice a day
	Symbicort Turbohaler	200/6 one puff twice a day	400/12 one puff twice a day*	400/12 two puffs twice a day
	<b>Fluticasone propionate with salmeterol</b>			
	Seretide Accuhaler	100/50 one puff twice a day	250/50 one puff twice a day	500/50 one puff twice a day
	Fusacomb Easyhaler	n/a	250/50 one puff twice a day	500/50 one puff twice a day
	Aerivio Spiromax AirFluSal Forspiro Stalpex Orbicel	n/a	n/a	500/50 one puff twice a day
	<b>Fluticasone furoate with vilanterol</b>			
Relvar Ellipta	n/a	92/22 one puff once a day	184/22 one puff once a day	
<b>High Carbon Footprint (10-20kgCO<sub>2</sub>e per inhaler)</b> Use if low carbon footprint alternative not appropriate	<b>Beclometasone dipropionate (extrafine) with formoterol</b>			
	Fostair pMDI	100/6 one puff twice a day	200/6 one puff twice a day *	200/6 two puffs twice a day
	<b>Fluticasone propionate with salmeterol</b>			
Combisal pMDI; Seretide Evohaler; (Other MDI brands exist)	50/25 two puffs twice a day	125/50 two puffs twice a day	250/25 two puffs twice a day	
<b>Highest Carbon Footprint (&gt;35kgCO<sub>2</sub>e per inhaler)</b> Avoid unless no appropriate alternative or switching is inappropriate clinically	Flutiform MDI	50/5 two puffs twice a day	125/5 two puffs twice a day	250/10 two puffs twice a day
	Flutiform K-haler	50/5 two puffs twice a day	125/5 two puffs twice a day	250/10 two puffs twice a day
	Symbicort MDI	200/6 one puff twice a day	200/6 two puff twice a day	n/a

# Only use after referring the patient to specialist care.

\* Alternative regimes exist consisting of more puffs of lower strength per day.

For paediatric dosing please refer to the BNF.

*Please Note: The above information was accurate on the date it is was written, 25th February 2021*