Green Inhaler Guide

Reducing the environmental impact of Metered Dose Inhalers (MDI's)

Quick reference guide to top prescribed MDI's and recommended Dry Powder Inhaler (DPI) options

The NHS Long Term Plan sets targets to deliver significant, accelerated reductions in the total emissions from the NHS by moving to lower carbon inhalers, such as dry powder inhalers (DPI's)[1].

To support this, the Primary Care Network (PCN) Direct Enhanced Service (DES) specification[2] for structured medication reviews (SMR's) and medicines optimisation makes a requirement of PCN's to "actively work with NHSSTW to optimise the quality of prescribing of metered dose inhalers, where a low carbon alternative may be appropriate".

To support practices, we have developed this quick reference guide on recommended DPI options for the most frequently prescribed MDIs within NHSSTW

Choosing or switching an inhaler should be a shared decision between patients and clinicians. Metered dose inhalers require patients to inhale slowly and steadily for 3-5 seconds whereas DPI's require a patient to inhale quickly and deeply.
Matching the inhaler to the patient's abilities and preferences can improve technique and compliance.
In young children, a MDI and a spacer is the preferred method of delivery; a facemask is required until the child can breathe reliably using the spacer mouthpiece.

With regards to switching of salbutamol: The NHSE Investment and Impact Fund (IIF) guidance[3] states:

"Where a salbutamol inhaler is required, this indicator encourages PCN's to consider prescribing a lower carbon option. This does not necessarily mean changing the type of inhaler that the patient receives (e.g. MDI to Dry Powder inhaler or DPI)." A lower carbon salbutamol MDI should be prescribed where a dry powder inhaler (DPI) is not clinically indicated. Switching to a salbutamol DPI should not occur unless there is a clinical reason to do so.

It is important to note that this does not mean changing the type of inhaler device that the patient receives (e.g. MDI to DPI), since different salbutamol MDI's have different carbon emissions and significant carbon reductions can be achieved by moving to an alternative MDI of almost equivalent cost that has lower carbon impacts.

NHSSTW spend on generic/ventolin salbutamol MDI 2020/21 was £372,000, carbon reduction can be achieved by switching to a cost-neutral, lower carbon MDI alternative. Wholesale switches to salbutamol DPI's pose a significant financial cost pressure of up to £1.5million. Similarly the

switch of non-salbutamol MDI's to DPI's could save up to £100k or cost an additional £1.5million depending on the choices of inhalers. It is anticipated that this guide will aid conversations with patients and help make the decision of which DPI to choose more straightforward.

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What to do	How to do it	Impact
Improve asthma control	Review treatment and encourage regular preventer treatment by every means possible	Fewer symptoms and reduced use of salbutamol metered dose inhalers (MDIs) which contain potent greenhouse gases
Improve COPD control and reduce use of SABA reliever inhalers	Prioritise smoking cessation, exercise promotion and pulmonary rehabilitation, flu immunisation. Finally add in regular long acting bronchodilators.	These preventive interventions are proven to be more cost-effective treatments than inhalers. Regular long acting bronchodilators should be the mainstay of drug treatment in
Promote effective self-management	Written personal action plans	Better disease control and quicker response to exacerbations
Ensure all inhalers are used with correct technique for greater effectiveness	Know how to assess this and teach it. Encourage use of online video tutorials. e.g. https://www.rightbreathe.com/	Reduced waste, more effective use of inhalers
Consider changing MDI treatments to DPIs for regular therapy.	Ensure this is clinically appropriate and acceptable to the patient. Matching the inhaler to the patient's abilities and preferences can improve technique and compliance.	Typical MDIs have a carbon footprint of ~20kg CO_2e each. DPIs and SMI devices are less than 1kg CO_2e each
Make optimal use of spacers to increase clinical effectiveness of MDIs where these are used	Encourage all patient using MDIs to use spacers when at home	Increases lung deposition and reduces oral deposition of drug
Prescribe MDIs so as to minimise propellant quantity	Salamol inhalers contain half as much propellant as Ventolin inhalers for equivalent dosage. Beclometasone 200mcg one puff twice daily uses half as much ropellant as Beclometasone 100mcg two puffs twice daily	Halves the carbon footprint. One Ventolin inhaler has a carbon footprint of 28kg CO2e per inhaler. (equivalent to a journey of 180
Prioritise HFA134a inhalers over HFA227ea inhalers	HFA134a is 1,300 times more potent than CO2 butHFA227ea is 3,320 times more potent. Most inhalers use HFA134a, but Flutiform and Symbicort MDI contains HFA227ea. (NB Symbicort turbohaler is a DPI and contains no propellant)	Switching Flutiform or Symbicort MDI MDI such as Fostair saves ~20kgCO2e per inhaler

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Offer patients at risk of exacerbations an MDI and spacer emergency treatment pack for self-management of exacerbations, especially if using DPIs for regular treatment	Provide emergency treatment packs with clear simple pictorial instructions for their use.	Patient can access effective therapy even during exacerbations when inspiratory flow rates drop.
Ensure MDIs are not discarded before they are empty	Ensure patients know how many doses their MDI contains when new, especially if the inhaler lacks a dose counter	Recycling studies show that many MDIs are discarded when still half full.
Promote responsible disposal of inhalers	Encourage patients to return used inhalers to local pharmacies, or ideally to a pharmacy where they can be recycled. https://www.recyclenow.com/recycle-an-item/inhalers	Inhalers returned in medical waste are incinerated. Thermal degradation converts the HFAs into products with far lower greenhouse effect. Recycling captures the HFAs for re-use in refrigeration or air conditioning, and reduces plastic and aluminum waste.

Table 2: Summary of suggested product switches in adults to reduce the use of pMDIs

SABA SWITCHING	Image of pMDI	Recommended options	Image of new Inhaler	Different Drug?	Different Dose?	
Ventolin pMDI 100mcg/dose Or prescribed generically as Salbutamol pMDI 100mcg/ dose		**Salamol®** pMDI 100mcg /dose CFC free. (NOT Easi-breathe) This is still an MDI but has HALF the carbon footprint of Ventolin MDI)		NO	NO	Where a salbutamol inhaler is required for asthma, practices are asked to prescribe a lower carbon inhaler option. This does not mean changing the type of inhaler device that the patient receives (e.g. MDI to Dry Powder Inhaler or DPI), since different salbutamol MDI's have different carbon emissions and significant carbon reductions can be achieved by moving to an alternative MDI of almost equivalent cost. Prescribing a lower carbon salbutamol MDI will reduce overall carbon emissions from salbutamol inhalers without compromising patient safety or disease control and without having an increase in treatment costs. Switching to a salbutamol DPI should not occur unless there is a clinical reason to do so such as inability of the patient to use an MDI appropriately, as wholesale switches to DPI's for salbutamol will present substantial increased treatment costs to the local health economy.
		Easyhaler® Salbutamol 100mcg 200D		NO	NO	

OTHER INHALERS (non-salbuatamol inhalers) containing inhaled corticosteroids						
Switch form pMDI	**Image of pMDI**	**Recommended DPI**	**Image of new inhaler**	**Different Drug?**	**Different Dose**	**Estimated Cost impact per year (+ = more expensive)**
Clenil Modulite 100micrograms/dose inhaler 200D Or prescribed generically as Beclometasone 100micrograms/dose inhaler CFC free and generic brand • Soprobec		Easyhaler Beclometasone 200microgram/dose 200D	 	NO	YES Clenil 100microgram/dose TWO PUFFS TWICE A DAY TO **Easyhaler Beclometasone 200 micrograms/dose ONE PUFF TWICE A DAY** **NOTE: Different strength regimen** ***Clenil 100 will last 50days while the Easyhaler Beclometasone 200 will last 100days at dose stated above.***	**£0**
Clenil Modulite 200micrograms/dose inhaler Or prescribed generically as Beclometasone 200micrograms/dose inhaler CFC free		Easyhaler Beclometasone 200micrograms/dose 200D	 	NO	NO	**-£9.01**

Fostair 100micrograms/dose / 6micrograms/dose inhaler Or prescribed generically as Beclometasone 100microg/Formoterol 6microg/dose inh CFCfree		Fostair Nexthaler 100 Beclometasone 100microg/Formoterol 6microg/dose		NO	NO	**£0**
Fostair 200micrograms/dose / 6micrograms/dose inhaler Or prescribed generically as Beclometasone 200microg/Formoterol 6microg/dose inh CFCfree		Fostair Nexthaler 200 Beclometasone 200microg/Formoterol 6microg/dose		NO	NO	**£0**
Flutiform 50micrograms/dose / 5micrograms/dose inhaler Or generically prescribed as Fluticasone 50microg / Formoterol 5microg/dose inh CFC free		Fostair Nexthaler 100 Beclometasone 100microg/Formoterol 6microg/dose		ICS- Yes LABA- No	YES. Flutiform 50/5 TWO PUFFS TWICE A DAY TO Fostair Nexthaler 100 ONE PUFF TWICE	**-£68.19**
Flutiform 125micrograms/dose / 5micrograms/dose inhaler Or generically prescribed as Fluticasone 125microg / Formoterol 5microg/dose inh CFC free		Relva Ellipta 92/22 Fluticasone furoate and Vilanterol)		ICS – Yes (Fluticasone but different salt) LABA - Yes	YES. From Flutiform 125/5 TWO PUFFS TWICE A DAY TO Relva Ellipta 92/22 ONE PUFF DAILY	**-£72.00**
Flutiform 250micrograms/dose / 10micrograms/dose inhaler Or generically prescribed as Fluticasone 250microg / Formoterol 10microg/dose inh CFC free		Relva Ellipta 184/22 Fluticasone furoate and Vilanterol)		ICS – Yes (Fluticasone but different salt) LABA - Yes	YES. From Flutiform 250/10 TWO PUFFS TWICE A DAY TO Relva Ellipta 184/22 ONE PUFF Daily	**-£192.72**

Seretide 125 Evohaler and ALL generic brands of Fluticasone propionate/ 125microgram/salmeterol 25microgram • Airflusal 125 • Aloflute 125 • Combisal 125 • Sereflo 125 • Sirdupla 125	 	Relva Ellipta 92/22 Fluticasone furoate and Vilanterol)	 	ICS – Yes (Fluticasone but different salt) LABA- Yes	YES From Seretide 125 TWO PUFFS TWICE A DAY TO Relva 92/22 ONE PUFF DAILY	**+£17.40** **(on seretide 125)** **+84.12** **(on sereflo125)**
Seretide 250 Evohaler and ALL generic brands of Fluticasone propionate/ 250microgram/salmeterol 25microgram • Airflusal 250 • Aloflute 250 • Combisal 250 • Sereflo 250 • Sirdupla 250		Relva Ellipta 184/22 Fluticasone furoate and Vilanterol)	 	ICS – Yes (Fluticasone but different salt) LABA- Yes	YES From Seretide 250 TWO PUFFS TWICE A DAY TO Relvar 184/22 ONE PUFF DAILY	**-£2.16** **(on seretide 250)** **+114.12** **(on sereflo 250)**
Trimbow 87microg/dose / 5microg/dose / 9microg/dose inhaler		Trimbow Nexthaler		NO	NO	**£0**

Key symbols	**Carbon indicator**
	Low Carbon Footprint (<2kg CO2e per inhaler)
	High Carbon Footprint (6-20kgCO2e per inhaler) Use if low carbon footprint alternative not appropriate

	Highest Carbon Footprint (>34kgCO2e per inhaler) Avoid unless no appropriate alternative or switching is inappropriate clinically

Table 3: Please use this as a guide to see how long inhalers should last and when to reorder:

Number of doses per inhaler	Number of doses per day (This is based on the dosing instruction)	How often ONE inhaler would need reordering
200	One inhalation twice a day	Every 3-4 months
200	Two inhalations once a day	Every 3-4 months
200	Two inhalations twice a day	Every 50 days (6-7 weeks)
200	Two inhalations three times aday	Every 33 days (4 weeks)
200	One inhalation four times a day	Every 50 days (6-7 weeks)
120	Two inhalations once a day	Every 60 days (8 weeks)
120	One inhalation twice a day	Every 60 days (8 weeks)
120	Two inhalations twice a day	Every 30 days (4 weeks)
100	One inhalation twice a day	Every 50 days (6-7 weeks)
100	Two inhalations twice a day	25 days (1 inhaler every 3 weeks or order 2 inhalers every 6 weeks)
100	Two inhalations once a day	Every 50 days (6-7 weeks)
60	One inhalation twice a day	Every 30 days (4 weeks)
60	One inhalation once a day	Every 60 days (8 weeks)
60	Two inhalations twice a day	15 days (1 inhaler every 2 weeks or order 2 inhalers every 4 weeks)

60	Two inhalations once a day	Every 30 days (4 weeks)
30	One inhalation once a day	Every 30 days (4 weeks)

References

1. NHS Long term Plan https://www.longtermplan.nhs.uk/
2. Janson C, Henderson R, Löfdahl M, et al Carbon footprint impact of the choice of inhalers for asthma and COPD Thorax 2020;75:82-84
3. The NHSE Investment and Impact Fund (IIF) guidance. https://www.england.nhs.uk/wp-content/uploads/2021/08/B0828-iii-annex-b- investment-and-impact-fund-21-22-22-23.pdf