

Environmental Impact of Inhalers

The NHS Long Term Plan identifies a shift to lower carbon inhalers as a way of significantly reducing the carbon footprint of health and social care. Dry powder inhalers (DPIs) are less harmful to the environment than traditional metered dose inhalers (MDIs) and the NHS long term plan and Kernow CCG support the use of DPI where it is clinically appropriate. Inhaler technique and flow rate need to be assessed, discussed and agreed with the patient before switching to a DPI device.

Pressurised metered dose inhalers (pMDI) and Breath Actuated Inhalers (BAIs) contain hydrofluorocarbon (HFC) propellants that do not have an effect on the ozone layer but are powerful greenhouse gases and can contribute to global warming. This is referred to as their carbon footprint, measured in carbon dioxide equivalents (g CO₂eq). The bigger the carbon dioxide equivalent, the bigger the impact on global warming.

DPIs and Soft Mist inhalers (SMI) do not use these propellants and have substantially lower global warming potential, producing 20g CO₂ equivalent (CO₂eq) per dose of a DPI compared with 500g CO₂eq for pMDIs as specified in the [NICE patient decision aid](#). Estimated carbon footprints for comparison indicate an average trip (9 miles) in a typical car produces 2,610g CO₂eq (or 290g CO₂eq per mile) is equivalent to 5 puffs of a MDI . The [greeninhaler website](#) provides further information for patients and information on the different carbon footprints of inhalers depending on the type of device and propellant used. Substantial carbon savings can be made by using small volume HFA134a MDI e.g. Salamol in preference to large volume HFA134a MDIs e.g. Ventolin, or those containing HFA227ea as a propellant e.g. Flutiform . The propellants in pMDIs are responsible for an estimated 3.5% of all NHS emissions and the NHS plans to reduce this by changing to lower carbon inhalers, such as DPIs.

To support this change, 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”.⁵ The specification states that the NHS has committed to reducing the carbon impact of inhalers used in the treatment of respiratory conditions by 50%.⁵ All inhaler prescriptions, Structured Medication Reviews or planned Asthma Reviews taking place in primary care should consider moving or facilitating patients to lower carbon options where it is clinically appropriate to do so

Switch to lower carbon inhaler footprint DPIs or SMI

Any inhaler switches need to be tailored to the individual. Where a new device is used, inhaler technique should be instructed and checked upon commencement. The inhaler technique instruction could be undertaken by the PCN or other primary care pharmacist or other member of the primary care team. If the patient is going to be prescribed a new medicine as part of the switch, they can also be referred to their community pharmacist for further support utilising the [New Medicine Service](#).

A pMDI plus a spacer is the first line device recommended for children aged five to 15 years requiring an inhaled corticosteroid for chronic asthma.¹ Alternative devices are only recommended where an individual child's adherence to a pMDI and spacer combination is likely to be so poor that it would undermine effective asthma control.¹ Where alternative devices are used, the following factors should be taken into account when choosing inhaler devices for individual children with chronic asthma¹:

- the ability of the child to develop and maintain an effective technique with the specific device
- the suitability of a device for the child's and carer's lifestyles, considering factors such as portability and convenience
- the child's preference for and willingness to use a particular device
- the need to minimise the risks of systemic absorption of corticosteroids

Table 1 provides an indicative carbon footprint value for a range of inhalers and this may be used to consider switch options for inhalers not listed in table 2. The data can be viewed by groupings available under each of the header selectors

Table 2 provides a summary of potential inhaler switches in adults to reduce the use of pMDIs. The switches listed are for the most frequently used pMDIs or where there are simple cost saving switches available. Salbutamol pMDIs have been excluded as these are excluded from the PCN DES. The table lists whether the switch would involve a change in drug, device, licensed indication or age range and the cost and carbon impact of the switch per year.

Table 1 Lowest cost lower carbon footprint inhalers by therapeutic group based on the data from PRESQUIP and from the Greener inhalers website

Indication ⁹⁻¹¹	Therapeutic group ⁹	Preparation	Indicative carbon footprint per year ³	Indicative cost per year ^{9,11}
Asthma	SABA	Easyhaler Salbutamol 100 microgram DPI	3,900	£19.86
COPD	SAMA	Only ipratropium 20 microgram pMDI available	78,078	£30.42
Asthma/ COPD	LABA	Easyhaler Formoterol 12 microgram DPI	13,650	£144.04
Asthma/ COPD	LAMA	Spiriva Respimat 2.5 microgram SMI	9,464	£279.11
Asthma	ICS	Easyhaler Budesonide DPI 100 micrograms 200 micrograms 400 micrograms	13,650 13,650 6,825	£32.24 £64.48 £64.48
Asthma/ COPD	ICS/LABA	Fostair Nexthaler 100/6 DPI DuoResp DPI 160/4.5 micrograms 320/9 micrograms Relvar Ellipta DPI 92 /22 micrograms Fobumix Easyhaler DPI 160/4.5 micrograms 320/9 micrograms	13,650	£130.39 £260.91
COPD	LABA/LAMA	Anoro Ellipta 55 micrograms/22 micrograms inhalation powder, pre-dispensed DPI Spiolto Respimat 2.5 microgram/2.5 microgram, inhalation solution SMI	6,825 9,464	£394.29
COPD	ICS/LABA/LAMA	Trelegy Ellipta 92 micrograms/55 micrograms/22 micrograms inhalation powder, pre-dispensed DPI	6,825	£539.89

Table 2 Summary of product switches in adults to reduce the use of pMDIs (excluding salbutamol) based on the data from PRESQUIP

Switch from pMDI	Switch to DPI	Different drug(s)?	Different device?	Estimated cost impact	Indicative carbon footprint reduction per year (gCO ₂ e) ³	Difference in licensed indication or age range? ⁹⁻¹¹
Switches with a cost saving						
Atimos Modulite 12micrograms/dose inhaler	Formoterol Easyhaler 12micrograms/dose dry powder inhaler	No	Yes	£74.75	80,990	Formoterol Easyhaler age 6+, Atimos Modulite age 12+
Clenil Modulite 200micrograms/dose	Easyhaler Budesonide 200micrograms/dose inhalation powder	Yes	Yes	£5.59	60,424	Easyhaler Budesonide age 6+. Clenil Modulite 200micrograms is adults only.
Qvar 100 inhaler	Easyhaler Beclometasone 200micrograms	No	Yes	£8.32	60,424	Qvar for age 12+, Easyhaler Beclometasone age 18+.
Seretide 125 Evohaler	Seretide 250 accuhaler	No	Yes	£140.14	224,406	Accuhaler licensed for asthma and COPD. Evohaler licensed for asthma only.
Seretide 250 Evohaler	DuoResp Spiromax 320/9	Yes	Yes	£119.86	224,406	Seretide 250 Evohaler licensed for asthma only. DuoResp Spiromax 320/9 licensed for asthma and COPD.
Seretide 250 Evohaler	Relvar Ellipta 184/22	Yes	Yes	£125.58	231,231	No

Switch from pMDI	Switch To DPI	Different drug(s)? ⁹	Different device?	Estimated cost impact per year	Indicative carbon footprint reduction per year (gCO ₂ e) ³	Difference in licensed indication or age range? ⁹⁻¹¹
Cost neutral switches						
Fostair® 100/6 microgram	Fostair NEXThaler® 100/6	No	Yes	£0.00	210,756	No
Fostair® 200/6 microgram	Fostair NEXThaler® 200/6	No	Yes	£0.00	210,756	No
Seretide 50 Evohaler	Seretide 100 accuhaler	No	Yes	£0.00	224,406	No
Switches with a small cost pressure						
Clenil Modulite 50micrograms/dose	Easyhaler Budesonide 100 mcg	Yes	Yes	£1.82	134,498	No lower age limit stated for Clenil Modulite in SPC, BNF states use from 2+. Easyhaler Budesonide is age 6+.
Clenil Modulite 100micrograms/dose	Easyhaler Budesonide 100 mcg	Yes	Yes	£5.20	60,424	No lower age limit stated for Clenil Modulite in SPC, BNF states use from 2+. Easyhaler Budesonide is age 6+.
Qvar 50 inhaler	Easyhaler Budesonide 100micrograms	Yes	Yes	£3.64	60,424	Qvar for age 5+, Easyhaler Budesonide age 6+.
Qvar 100 inhaler	Easyhaler Budesonide 200micrograms	Yes	Yes	£1.82	60,424	Qvar for age 12+, Easyhaler Budesonide age 6+.
Separate ICS, LABA and LAMA inhalers	Trimbow 87 micrograms/5 micrograms/9 micrograms pressurised inhalation, solution, pMDI Trelegy Ellipta 92 /55/ 22 micrograms,DPI DPI	Depends on starting inhalers	Depends on starting inhalers	Cost saving Reduces number of pMDIs used	Depends on starting inhalers	Depends on starting inhalers

Waste and recycling

Used pMDI canisters still contain propellants; all used pMDI canisters should be returned to a pharmacy (or dispensing GP practice) to dispose of in an environmentally safe way.

Used inhalers should not be placed in general waste.

Used inhalers that are not returned to pharmacies but are placed in general waste for kerbside collection may end up in landfill, depending on local authority arrangements. As well as plastic pollution, this risks crushing or piercing the pMDI / BAI canister and releasing additional propellants into the atmosphere.

Patients should be encouraged to ask the pharmacy/dispensary if they use if they can recycle their used inhalers.

All inhalers can be recycled via pharmacies or dispensing GP practices participating in the GSK "Complete the Cycle" scheme. The inhalers are collected as part of routine deliveries, so no extra miles are travelled, and then sorted for recycling or recovery (the plastics and aluminium parts are recycled; the non-recyclable parts are incinerated to generate energy).

The Complete the Cycle scheme accepts all inhalers, regardless of type or manufacturer, however not all pharmacies/dispensing practices are part of this scheme. Patients can find their nearest participating pharmacy, hospital or dispensing doctor by visiting <https://pharmacyfinder.completethecycle.eu/index.html>. Other recycling schemes may be available locally.

If the pharmacy is not part of a recycling scheme, the inhalers can be placed in the pharmacy's pharmaceutical waste bins, which are incinerated (destroying the greenhouse gases); steel and aluminium may be recovered and recycled at some incinerators. Spacers cannot currently be recycled.

References

1. National Institute for Health and Care Excellence (NICE). Inhaler devices for routine treatment of chronic asthma in older children (aged 5–15 years). Published 27 March 2002. Last updated March 2012. Available at <https://www.nice.org.uk/guidance/ta38> Accessed 17/02/20.
2. National Institute for Health and Care Excellence (NICE). Patient decision aid. Inhalers for asthma: User guide and data sources. Last updated 23/05/19. Available at www.nice.org.uk/guidance/ng80/resources Accessed 12/02/20.
3. Wilkinson AJK, Braggins R, Steinbach I, Smith J. Costs of switching to low global warming potential inhalers. An economic and carbon footprint analysis of NHS prescription data in England. *BMJ Open*. 2019 Oct;9(10):e028763. DOI: 10.1136/bmjopen-2018-028763. <https://bmjopen.bmj.com/content/9/10/e028763>
4. NHS. The NHS Long Term Plan. Published 07/01/19. Available at www.longtermplan.nhs.uk/publication/nhs-long-term-plan/ Accessed 12/02/20.
5. NHS England. Update to the GP contract agreement 2020/21 - 2023/24. 6 February 2020. Available at <https://www.bma.org.uk/collective-voice/committees/general-practitioners-committee/gpc-england/gp-contract-agreement-england-2020-2021> Accessed 07/02/20.
6. Openprescribing.net. Environmental Impact of Inhalers. Available at <https://openprescribing.net/all-england/#perfsummary> Accessed 09/02/20.
7. National Institute for Health and Care Excellence (NICE). Patient decision aid. Inhalers for asthma. Last updated 23/05/19. Available at www.nice.org.uk/guidance/ng80/resources Accessed 12/02/20.
8. Hänsel M, Bambach, T et al. Reduced Environmental Impact of the Reusable Respimat® Soft Mist™ Inhaler Compared with Pressurised Metered-Dose Inhalers. *Advances in Therapy* 2019; 36: 2487. <https://doi.org/10.1007/s12325-019-01028-y>
9. Joint Formulary Committee. British National Formulary (online) London: BMJ Group and Pharmaceutical Press <http://www.medicinescomplete.com> Accessed on 12/02/20.
10. Summaries of Product Characteristics. Available at www.medicines.org.uk Accessed 12/02/20.
11. C+D Data. Available at www.cddata.co.uk Accessed 12/02/20.
Presquipp Hot Topics Available at <https://www.prescgipp.info/> . Accessed 26/02/2020