

Low carbon inhalers for CYP

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Terminology

pMDI	Metered Dose Inhaler
DPI	Dry Powder Inhaler
SMI	Soft Mist Inhaler
GWP	Global Warming Potential
kg CO ₂ e	Weight (kg) carbon dioxide equivalent
HFC	hydrofluorocarbon
HFA	hydrofluoroalkane (are HFC propellants used in pMDIs)
AIR	Anti-inflammatory reliever
MART	Maintenance and reliever therapy





Learning outcomes

- To identify which inhalers have a lower-carbon footprint
- To review national guidelines on asthma management and identify low carbon inhaler choices in line with the guidelines
- To discuss some strategies for what primary care teams can do to support reduction carbon emissions from inhalers



Delivering a Greener NHS

MAJOR
EMISSIONS

CH₄

N₂O

SF₆

CO₂

CFCs

PFCs

HFCs

SCOPE 1
DIRECT

SCOPE 2
INDIRECT

SCOPE 3
INDIRECT

TRAVEL
OUTSIDE GHGP
SCOPES

FOSSIL FUELS

NHS FACILITIES

ANAESTHETICS

NHS FLEET &
LEASED VEHICLES

METERED DOSE
INHALERS

WATER

WASTE

BUSINESS TRAVEL
PUBLIC TRANSPORT
GREY FLEET, ETC.

ELECTRICITY

ENERGY
WELL-TO-TANK

MEDICAL
DEVICES

FREIGHT
TRANSPORT

BUSINESS
SERVICES

CONSTRUCTION

MANUFACTURING
PRODUCTS, CHEMICALS, GASES

COMMISSIONED HEALTH
SERVICES OUTSIDE NHS

FOOD &
CATERING

MEDICINES

PATIENT,
VISITOR
TRAVEL

ICT

STAFF
COMMUTING

NHS CARBON
FOOTPRINT

NHS CARBON
FOOTPRINT PLUS

For NHS Carbon Footprint (Scope 1 and 2) aim is to reach net zero by 2040, and 80% reduction by 2028 – 2032.

For NHS Carbon Footprint Plus (Scope 3) aim is to reach net zero by 2045, and 80% reduction by 2036 – 2039.



**The greenest inhaler is the
inhaler device that the patient
can use and will use**



- Poor inhaler technique = poor disease control and SABAs +++++
- Poor adherence = waste of inhalers



Carbon footprint of inhalers



= Most pMDIs

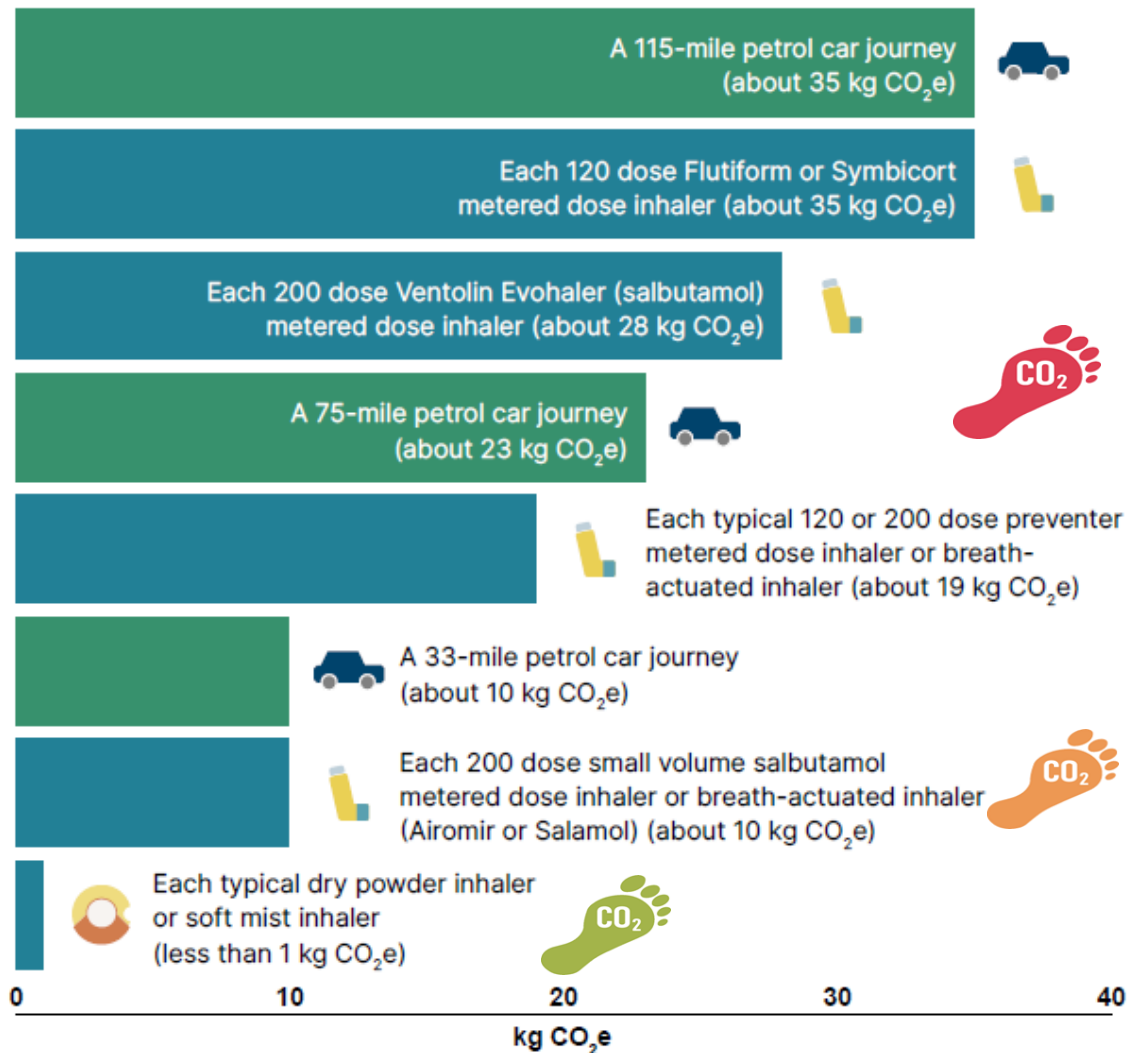


= Airomir or Salamol



= DPIs and SMI

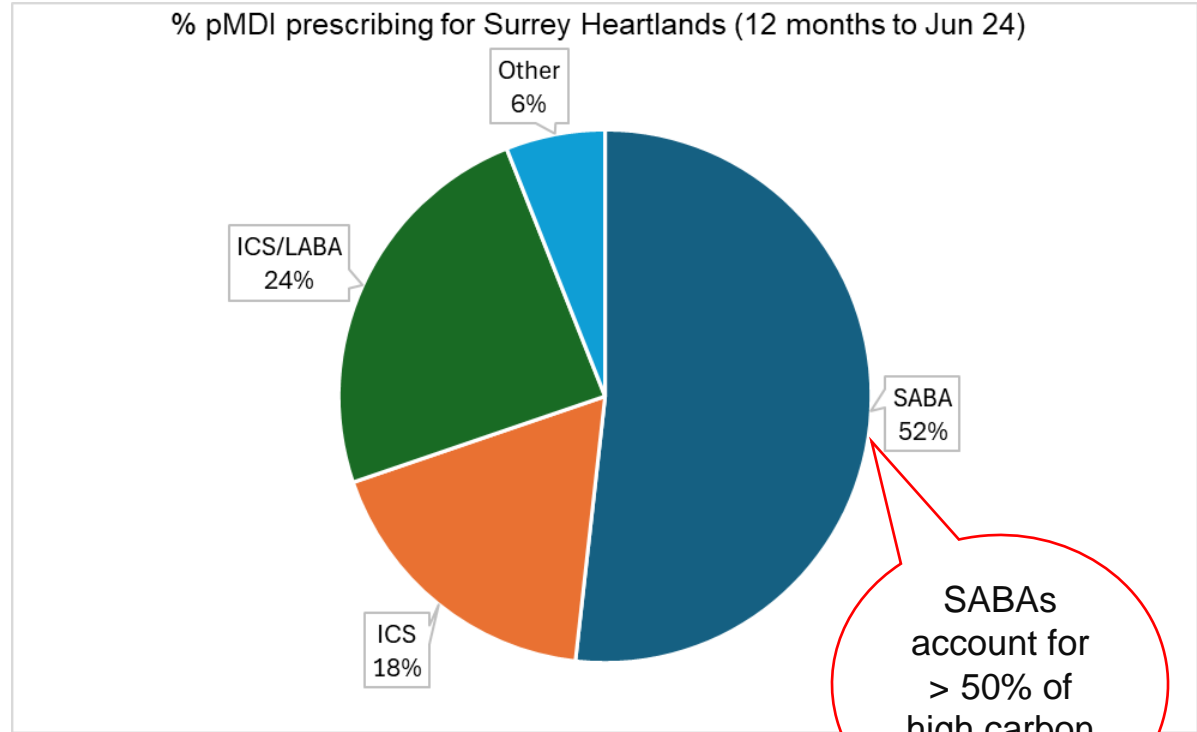
pMDI= metered dose inhaler, DPI = dry powder inhaler
SMI = soft mist inhaler



Inhalers and carbon footprint



- Estimated that inhalers are responsible for 3% of all NHS carbon emissions
- **70% of inhalers prescribed in Surrey are pMDIs** which contain hydrofluoroalkanes (HFAs) propellants





Strategies for greener inhaler prescribing CYP

1. Optimise asthma prescribing through shared decision making

[NICE Patient Decision Aid](#)

Assess child's suitability for and ability to use inhaler device



2. Offer DPI as first choice inhaler if **clinically and age** appropriate

5. Return used & unwanted inhalers to community pharmacy

- ✓ Reduced SABA use
- ✓ Increase DPI use
- ✓ Greener disposal
- ✓ Re-check inhaler technique and retrain patients often

3. Minimise kg CO₂e if child needs **pMDI**

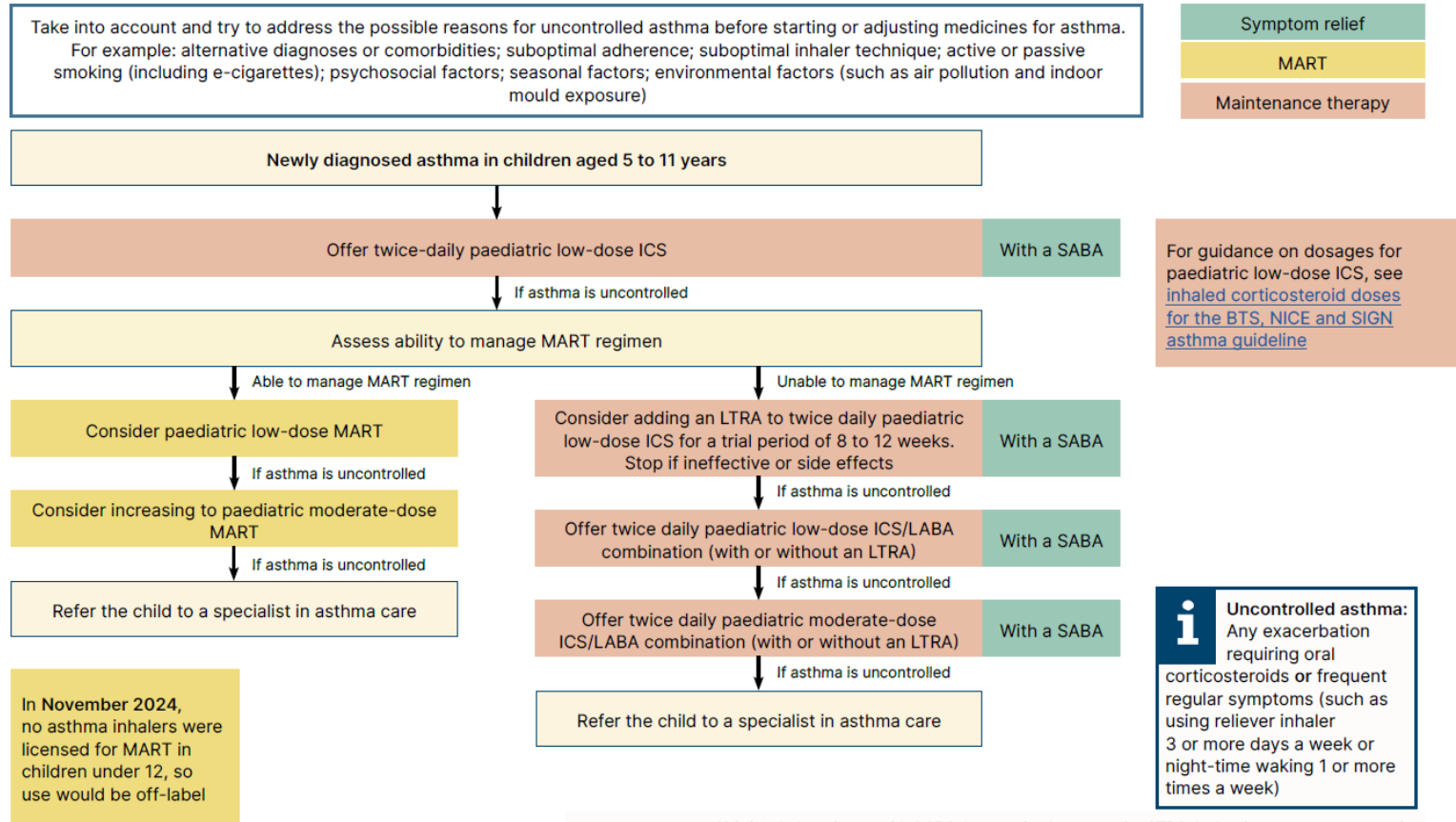
5. **MART** regimen minimises carbon footprint (SABA for emergency use only in under 12's)

4. As child gets older, review pMDI, and assess ability to use DPI



Algorithm D: Pharmacological management of asthma in children aged 5 to 11 years

BTS, NICE and SIGN guideline on asthma



ICS, inhaled corticosteroid; LABA, long-acting beta₂ agonist; LTRA, leukotriene receptor antagonist;

MART, maintenance and reliever therapy (using ICS/formoterol combination inhalers); SABA, short-acting beta₂ agonist.

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BTS ISBN: 978-1-917619-29-5. NICE ISBN: 978-1-4731-6640-0. SIGN ISBN: 978-1-909103-98-6.

Which inhalers – children age 5 to 11?

Paediatric low dose ICS

- pMDI (*Clenil Modulite, Qvar*)
- DPI (*Easyhaler Budesonide, Pulmicort Turbohaler*)

Paediatric low & moderate dose MART* (ICS/formoterol)

- pMDI (*Symbicort pMDI 100mcg*)
- DPI (*Fobumix Easyhaler 80mcg, DuoResp Spiromax 160mcg, Symbicort Turbohaler 100mcg, 200mcg*)

Paediatric low & moderate dose ICS/LABA

- pMDI (*Combisal, Flutiform, Seretide Evohaler*)
- DPI (*Fobumix Easyhaler 80mcg, Symbicort Turbohaler 100mcg, Seretide Accuhaler 100mcg*)

SABAs

- pMDI (*Ventolin Evohaler*) *Salamol licensed from 12 yrs*
- DPI (*Easyhaler Salbutamol, Ventolin Accuhaler, Salbulin Novolizer, Bricanyl Turbohaler*)

- * No inhalers are currently licensed for MART in children under 12 years. Only inhalers licensed from 12 years are listed.
- MART = maintenance and reliever therapy

Algorithm C: Pharmacological management of asthma in people aged 12 years and over

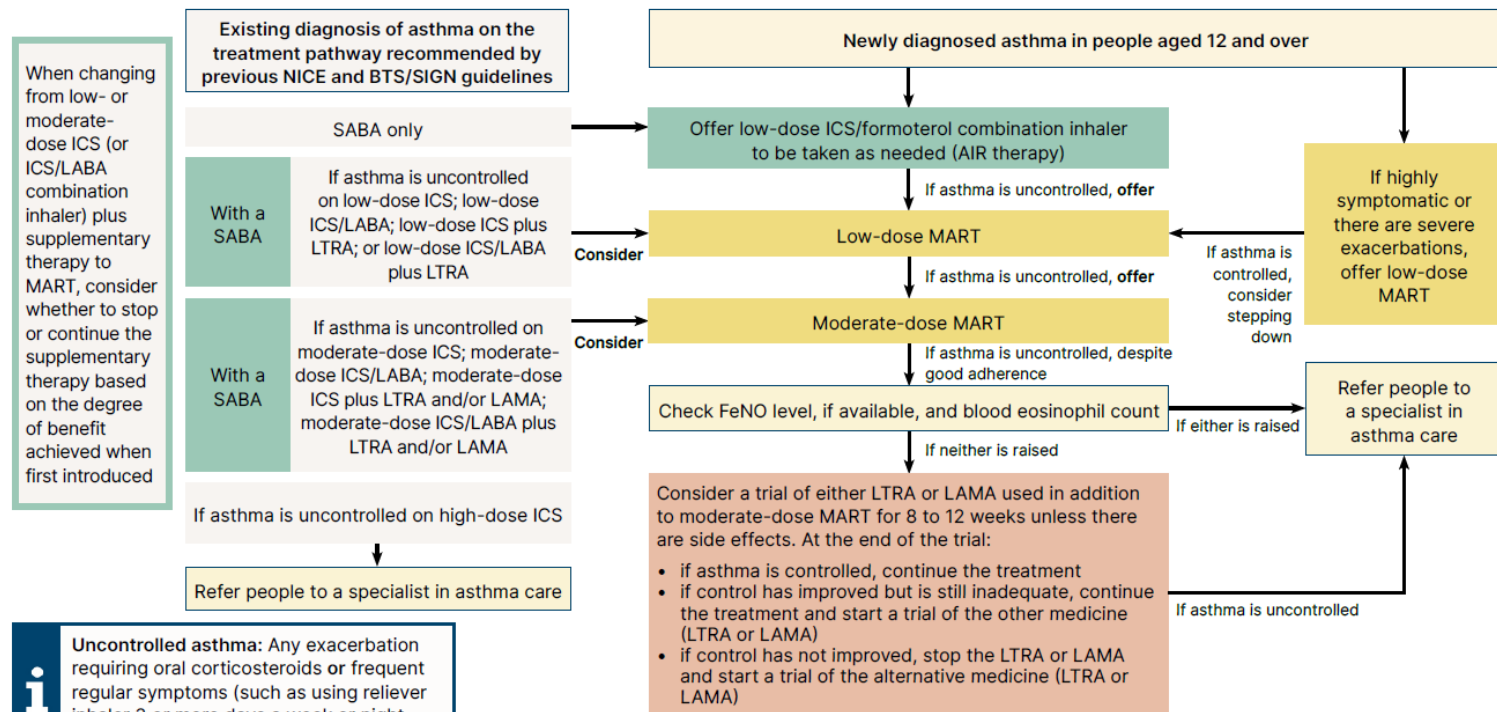
BTS, NICE and SIGN guideline on asthma

Take into account and try to address the possible reasons for uncontrolled asthma before starting or adjusting medicines for asthma.
For example: alternative diagnoses or comorbidities; suboptimal adherence; suboptimal inhaler technique; active or passive smoking (including e-cigarettes); psychosocial factors; seasonal factors; environmental factors (such as air pollution and indoor mould exposure)

Symptom relief

MART

Maintenance therapy



Uncontrolled asthma: Any exacerbation requiring oral corticosteroids or frequent regular symptoms (such as using reliever inhaler 3 or more days a week or night-time waking 1 or more times a week)

ICS, inhaled corticosteroid; LABA, long-acting beta₂ agonist; LAMA, long-acting muscarinic receptor antagonist; LTRA, leukotriene receptor antagonist; MART, maintenance and reliever therapy (using ICS/formoterol combination inhalers); SABA, short-acting beta₂ agonist.



British
Thoracic
Society

NICE

National Institute for
Health and Care Excellence



Healthcare
Improvement
Scotland

SIGN

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BTS ISBN: 978-1-917619-28-8. NICE ISBN: 978-1-4731-6639-4. SIGN ISBN: 978-1-909103-97-9.

Which inhalers – children age 12 to 18?

Low dose ICS/formoterol
as needed (AIR*)

- DPI (*DuoResp Spiromax 160mcg, Symbicort Turbohaler 200mcg*) *WockAIR*

Low & moderate dose
MART* (ICS/formoterol)

- pMDI (*Symbicort pMDI 100mcg*)
- DPI (*Fobumix Easyhaler 80mcg, 160mcg, DuoResp Spiromax 160mcg, Symbicort Turbohaler 200mcg*) *WockAIR*

LAMA add-in

- Soft Mist Inhaler (*Spiriva Respimat*)

- AIR = Anti-inflammatory reliever. *Only inhalers licensed from 12 years are listed
- MART = maintenance and reliever therapy.
- LAMA = long-acting muscarinic receptor antagonist



Can Children use DPIs?



- DPIs should be **offered to children from age 11**, or younger if they can use them
 - Children can use dry powder inhalers with **correct assessment and training**
 - Some guidelines recommend use of DPIs from age 6!
 - Inspiratory pressure rather than inspiratory flow rate is important for use of DPIs
 - Consider providing an additional pMDI SABA inhaler plus spacer for emergency use for children under 12 years who may be unable to activate a dry powder inhaler during an acute asthma attack (NICE)
-
- In-Check Dial can be useful in determining whether a pMDI is suitable for a patient rather than a DPI. It is less useful for choosing specific DPI.

Further reading:

[Demystifying Dry Powder Inhaler Resistance with Relevance to Optimal Patient Care | Clinical Drug Investigation](#)
[The Confusing World of Dry Powder Inhalers: It Is All About Inspiratory Pressures, Not Inspiratory Flow Rates](#)





What are our preferred low carbon inhalers (SABA and ICS) if we want to switch?

How do we minimise kg CO₂ if pMDI needed?





SABA (salbutamol / terbutaline) low carbon choices

MDIs:

- Ventolin Evohaler
- Salbutamol 100 micrograms/dose inhaler
- Salbutamol breath actuated inhaler

DPI preferred if suitable for patient

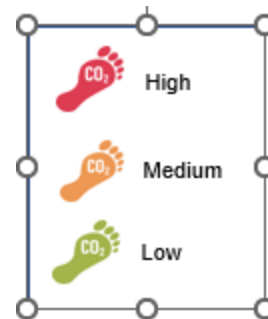
DPIs:

- Easyhaler Salbutamol 100 /200 micrograms OR
 - Ventolin Accuhaler 200 micrograms
- Other options (increasing cost order)
- Bricanyl Turbohaler 500 micrograms
 - Salbulin Novolizer 100 micrograms

If DPI not suitable for patient

Preferred MDI:

- Salamol 100 micrograms/dose inhaler (licensed from 12 years)





ICS (inhaled corticosteroids) low carbon choices

MDIs:

- Clenil Modulite inhaler
- Qvar (inhaler, Easi-Breathe inhaler, Autohaler)
- Flixotide Evohaler

DPI preferred if suitable
for patient



DPIs:

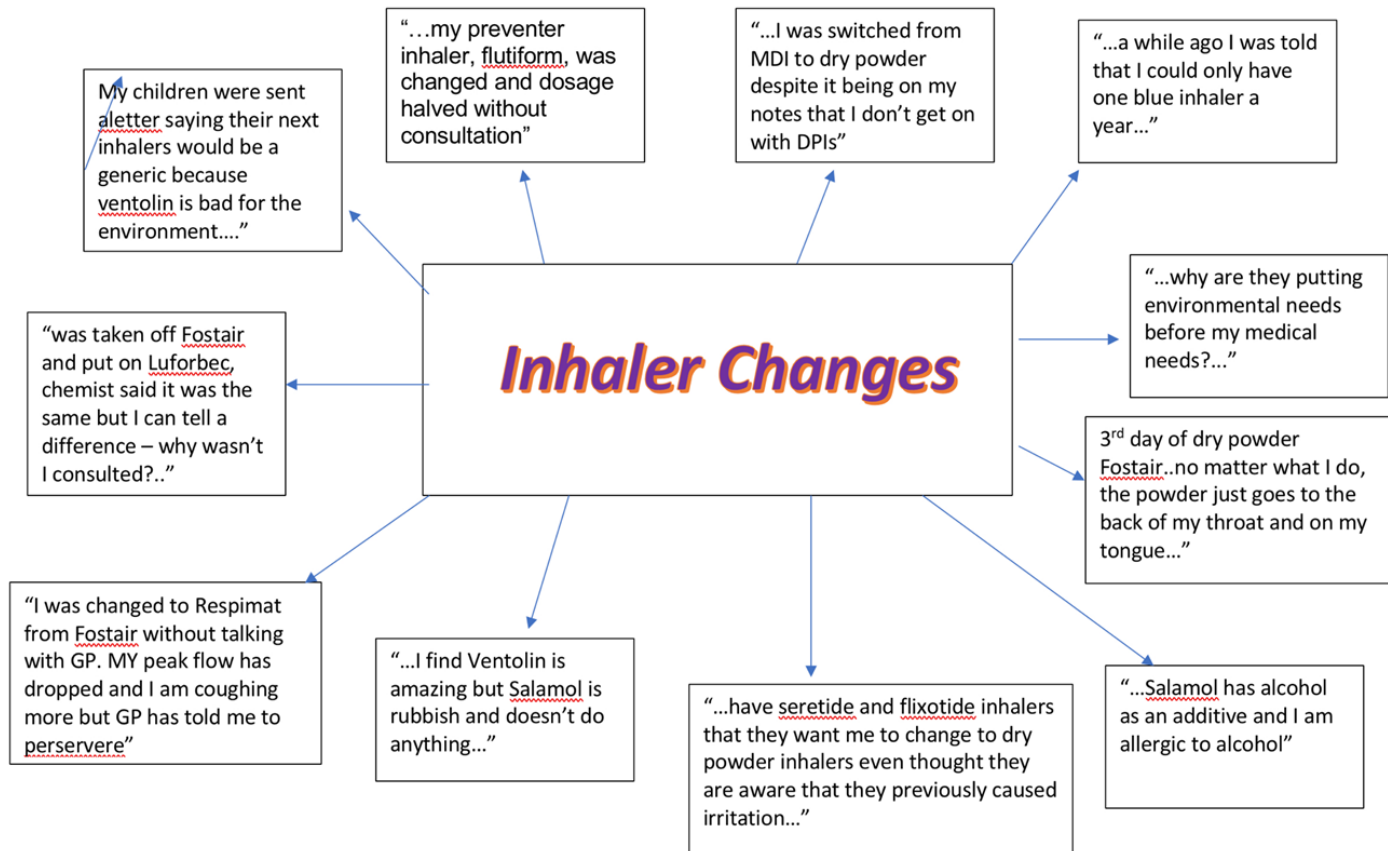
- Easyhaler Budesonide
- Pulmicort Turbohaler
- Budelin Novolizer
- Flixotide Accuhaler

Ensure **correct equivalent dose** of inhaled corticosteroid is prescribed when changing inhaler device





Patient feedback to NHS England via national PPV programme





**Greener
Practice**

**Greener
Practice -
Use this
resource!**

- Educational videos for you and your patients
- Resource booklet
- Searches
- Patient leaflets
- Accurx messages
- Posters
- Quality Improvement Toolkit

How to Reduce the Carbon Footprint of Inhaler Prescribing for Children and Young People with asthma

**A Guide for Healthcare
Professionals in the UK**

www.greenerpractice.co.uk





Practical tools and tips – Quick wins

Reduce wastage

- Manage inhaler re-ordering, know how long an inhaler lasts
- Prescribe inhalers with dose counters – if available
- Prescribe refills
- Prevent duplicate inhaler prescribing when changing Rx
- Prescribe higher strength for same dose - in stable patients

Ensure appropriate disposal



How to manage inhaler supplies - Receptionist guide

<https://surreyccg.res-systems.net/PAD/Guidelines/Detail/5198>

Please use this as a guide to see how long inhalers should last and suggested intervals for reordering more.

Number of doses per inhaler (Refer to the table overleaf)	Number of doses per day (You will find the doses per day on your pharmacy label on the inhaler)	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 a day	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)



Carbon friendly MDI disposal

Advise patients

- Do not put inhalers in domestic waste
 - Risks residual HFCs released into atmosphere
- Return inhalers to pharmacy for disposal
 - Incinerated at high temperature destroys HFCs



Help reduce global warming
- return your used aerosol
inhalers to your pharmacy for
environmentally safe disposal



The greenest inhaler is the inhaler device that the patient can use and will use

Do not blanket switch patients – Optimise inhaler choice and technique

- ✓ With the patient, decide the best device for them assess their ability to use, let them see, touch and feel the inhaler, then describe, show and provide support materials
- ✓ Ensure correct inhaler technique, most patients don't know how to use their inhaler and many health care professionals who teach the use of MDI cannot demonstrate it correctly
- ✓ Use a spacer, when using an MDI correctly a max of 15% of the drug enters the lung. With a spacer this can be increased up to 30%
- ✓ Prescribe inhalers by brand, so patient receives correct inhaler device
- ✓ Rationalise inhaler devices for an individual patient, avoid mixing too many different inhaler types
- ✓ Re-check inhaler technique and retrain patients often, inhaler technique deteriorates over time, lots of patients think they are using their inhalers correctly when they are not



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