# COPD care and treatment guidelines

## COPD care & treatment flowchart

**Confirmed diagnosis of COPD**
**(Quality-assured spirometry post bronchodilator FEV1/FVC <0.7)**

**Encourage non-pharmacological interventions in all patients,** offer ● treatment and support to **stop smoking** at every opportunity ● **pulmonary rehabilitation** if indicated[§] ● **vaccination** - pneumococcal (once only) & influenza (annual) ● optimise treatment for co-morbidities ● co-develop a **personalised self-management plan**

[§]Offer Pulmonary Rehabilitation to patients who are breathless walking on the flat, those who have had an admission to hospital with COPD or frequent exacerbations, and those who feel limited by their breathlessness.

These treatments and plans should be revisited at every review - record CAT score, MRC scale, exacerbations and read code ABE group

**Start inhaled therapies only if:**
- all the above interventions have been offered (if appropriate), and
- inhaled therapies are needed to relieve breathlessness and exercise limitation, and
- people have been trained to use inhalers and can demonstrate satisfactory technique

Dry powder inhalers (DPIs) or Soft mist inhalers (SMIs) should be offered first line where clinically appropriate, followed by **low-carbon** propellant MDIs (lcMDI); if DPI, SMI or lcMDI unsuitable consider MDI. Aim to maintain device continuity across treatment steps.

Review medication and **assess inhaler technique** (including inspiratory effort) and adherence regularly for all inhaled therapies

**Mild disease and short-term symptom relief: Offer SABA (or SAMA) for use as required**

| **Dry Powder Inhaler (DPI) Option**<br>HIGH inspiratory Flow Rate<br>Technique: Fast and Deep | **Metered Dose Inhaler (MDI) Option**<br>LOW inspiratory Flow Rate<br>Technique: Long and Slow |
|---|---|
| Salbutamol 100mcg Easyhaler®<br>1-2 puffs QDS PRN | Salamol® 100mcg MDI<br>(salbutamol)<br>1-2 puffs QDS PRN |

*if contraindicated; not tolerated; ineffective - initiate SAMA. SABA prn can continue at all stages; STOP SAMA if on LAMA

**If the patient is limited by symptoms or has exacerbataions despite treatment (after adherence and inhaler technique checked and optimisations of non-pharmacological interventions)**

**NO Asthmatic features / features suggesting steroid responsiveness***

**LABA + LAMA**

| **Dry Powder Inhaler (DPI) Option**<br>HIGH inspiratory flow rate<br>Technique: Fast and Deep | **Metered Dose Inhaler (MDI) Option**<br>LOW inspiratory flow rate<br>Technique: Long and Slow | **Soft Mist Inhaler (SMI) Option**<br>LOW inspiratory flow rate<br>Technique: Long and Slow |
|---|---|---|
| **Anoro®** 55/22mcg Ellipta®<br>(umeclidinium/vilanterol)<br>1 puff daily[Δ] | **Bevespi®** 7.2/5mcg Aerosphere®<br>(glycopyrronium/ formoterol)<br>2 puffs twice daily | [Δ]**Spiolto Respimat®**<br>SMI 2.5/2.5mcg<br>(tiotropium/olodaterol)<br>2 puffs once a day |

**Asthmatic features / features suggesting steroid responsiveness***

**LABA + ICS**

| **Dry Powder Inhaler (DPI) Option**<br>HIGH inspiratory flow rate<br>Technique: Fast and Deep | **Metered Dose Inhaler (MDI) Option**<br>LOW inspiratory flow rate<br>Technique: Long and Slow |
|---|---|
| **Relvar®** 92/22mcg Ellipta®<br>(fluticasone/vilanterol)<br>1 puff daily | **Luforbec®**<br>100/6mcg MDI<br>(beclomethasone/ formoterol)<br>2 puffs twice daily[#] |

**For patients who have day-to-day symptoms that adversely impact quality of life, or have 1 severe or 2 moderate exacerbations within a year**

**NO Asthmatic features / features suggesting steroid responsiveness***

Day-to-day symptoms adversely impact quality of life

1 severe exacerbation or 2 moderate exacerbations within a year[ǂ]

**Consider 3-month trial of LABA + LAMA + ICS (Triple Therapy).** If no improvement, revert back to LABA + LAMA

**Asthmatic features / features suggesting steroid responsiveness***

**LABA + LAMA + ICS (Triple Therapy)**

| **Dry Powder Inhaler (DPI) Option**<br>HIGH inspiratory Flow<br>Technique: Fast and Deep | **Metered Dose Inhaler (MDI) Options**<br>LOW inspiratory Flow<br>Technique: Long and Slow | | |
|---|---|---|---|
| Trelegy® 92/55/22mcg Ellipta®<br>(Fluticasone/umeclidinium/vilanterol)<br>1 puff daily | Trixeo® 160/7.2mcg/5mcg Aerosphere® with HFA1234ze(E)<br>(Budesonide/glycopyrronium/formoterol)<br>2 puffs twice daily | **OR** | Trimbow® 87/9/5mcg MDI<br>(Beclometasone/glycopyrronium/formoterol)<br>2 puffs twice daily[#] |

- **If the patient is still limited by breathlessness or subject to frequent exacerbations consider referral to a specialist for advice on management, to explore any diagnostic uncertainty, & for consideration of further treatment options**
- **If patient experiences side effects or treatment not tolerated, consider stepdown to previous therapy (see ICS step-down algorithms)**

**KEY**: **mcg** = micrograms; **SABA** = Short acting beta$_2$ agonist; **SAMA** = short acting muscarinic antagonist; **SMI** = soft mist inhaler; **LAMA+LABA** = combined long acting muscarinic antagonist & long acting beta$_2$ agonist inhaler; **LABA+ICS** = combined long acting beta$_2$ agonist & inhaled corticosteroid inhaler; **LABA+LAMA+ICS** = combined long acting beta$_2$ agonist inhaler, long acting muscarinic antagonist & inhaled corticosteroid inhaler; **qds** = four times a day; **prn** = when required; # = contains small amount of alcohol per actuation; low carbon footprint; high carbon footprint

## Inhaled corticosteroid (ICS) treatment

***Asthmatic features/features suggesting steroid responsiveness in this context include:** any previous secure diagnosis of asthma or atopy, a higher blood eosinophil count (see notes below), substantial variation in FEV$_1$ over time (at least 400ml) or substantial diurnal variation in peak expiratory flow (at least 20%)

- Do not use oral corticosteroid reversibility tests to identify patients who will benefit from ICS as they do not predict response.
- A number of studies have shown that blood eosinophil counts predict the magnitude of the effect of ICS:
  - A blood eosinophil count less than 100 cells/μL (0.1x10$^9$/L) identifies patients who are unlikely to benefit from ICS treatment.
  - Patients with eosinophil counts above 100 cells/μL (0.1x10$^9$/L) are more likely to gain benefit, with the greatest benefit observed in patients with > 300cells/μL (0.3 x10$^9$/L).
  - For patients with eosinophil counts between 100-300cells/μL consider use of ICS in exacerbating patients where benefit is likely to outweigh the risks e.g. ≥ 2 moderate exacerbations or at least one severe exacerbation requiring hospitalisation in a year.
- Be aware of, and be prepared to discuss, the risk of side effects (including pneumonia) in people with COPD taking ICS (link).
- Follow the MHRA advice on the risk of psychological and behavioural side effects associated with inhaled corticosteroids (link).
- Document the reason for continuing ICS use in clinical records and review at least annually.
- Give steroid card at ≥1000mcg beclometasone dipropionate (BDP) equivalent daily (HWE ICS/ICB FAQ Steroid Cards)

**[ǂ]Classification of severity of exacerbations**

- **Moderate**: a sustained worsening of respiratory status that requires treatment with systemic corticosteroids ± antibiotics
- **Severe**: a rapid deterioration in respiratory status that requires hospitalisation.

**Preferred Inhaler Choices**

- Choose drug & device considering: preferred inhaler choices; factors such as age, dexterity, coordination, & inspiratory flow; effectiveness; side-effects; co-morbidities; licensed indications; carbon footprint; cost; patient preference
- In line with the NHS Long Term Plan choose carbon-friendly options whenever possible - DPIs are preferred due to their lower carbon footprint but are not suitable for those with low inspiratory flow.
- Dry powder inhalers (DPIs) or Soft mist inhalers (SMIs) should be offered first line where clinically appropriate, followed by low-carbon propellant MDIs (lcMDI); if DPI, SMI or lcMDI unsuitable consider MDI. Aim to maintain device continuity across treatment steps. lcMDIs and MDIs should be offered with spacers. **Prescribe inhalers by BRAND**
- Consider use of In-Check dial and inhaler training devices (e.g. ellipta® inhalation trainer) to help identify suitable inhaler type and/or correct inspiratory flow rate/technique
- Preferred inhaler choices are shown in the flowchart. Alternative low cost, low carbon footprint options are available if required (see Appendix 1)
- Existing stable patients can remain on current therapy. Stable patients using more than one single component inhaler should be switched to a combination inhaler where one is available and is suitable for the individual. This will reduce the overall number of inhaler items used, the carbon footprint and be more convenient for patients. Take this opportunity to match patients to the most appropriate device type & optimise inhaler technique

**Review and follow-up**

Review: mild to severe COPD at least once a year; very severe COPD at least twice per year

**AT REVIEW & BEFORE THERAPY CHANGE CHECK**: Non-smoker? Immunised? Inhaler Technique? Adherence? Clinical effectiveness/side-effects? Pulmonary Rehabilitation? Correct Diagnosis? Red Flag symptoms?

- If COPD is well controlled, consider reducing/stopping ICS therapy (in particular review triple therapy in mild/moderate COPD without asthmatic features (less than 2 exacerbations a year, no hospital admissions).
- Review patients on high strength ICS regularly. Patients prescribed high strength LABA/ICS for COPD should be reviewed for a change to a lower potency/cost effective ICS see **LINK**

## COPD care and treatment guidelines

### Diagnosis

On basis of signs & symptoms & supported by quality-assured **spirometry** in non-acute phase
For information on diagnosis please consult NICE Guideline NG115 - Chronic obstructive pulmonary disease in over 16s: diagnosis and management

### Smoking cessation

- **ALL** patients should be encouraged to stop, & offered help to do so, at every opportunity & **ALWAYS** before a therapy change.
- Signpost patients direct to a local NHS smoking cessation service:
  - **Hertfordshire's Stop Smoking Service** **Tel** 0800 389 3998 healthimprovementservice@hertfordshire.gov.uk
  - **Essex Wellbeing Service** **Tel** 0300 303 9988 provide.essexwellbeing@nhs.net

### Pulmonary Rehabilitation

- Make pulmonary rehabilitation available to all appropriate people with COPD including people who have had a recent hospitalisation for an acute exacerbation.
- Offer pulmonary rehabilitation to all people who view themselves as functionally disabled by COPD (usually Medical Research Council [MRC] grade 3 and above but in some cases an MRC score of 2 will be accepted [e.g. frequent exacerbation, functional limitation or admission to hospital]).
- Pulmonary rehabilitation is not suitable for people who are unable to walk, who have unstable angina or who have had a recent myocardial infarction.

Further information and referral details available here: **WE** **ENH** **SWH**
Patient information leaflet: **ENH** **SWH**

### Immunisation

Encourage **ALL** patients to have **annual influenza vaccination** & once only **pneumococcal** polysaccharide vaccine (PPV23) should be considered

### Educate about COPD & Treatment

- Patent should be educated about COPD and its management.
- Advise on nutrition/weight management
- Advise on physical activity/exercise to prevent deconditioning
- Offer personalised self-management plan
- **Identify treatment aims: symptoms / improve QOL / prevent exacerbations**
- Consider community pharmacy **New Medicines Service (NMS)** at review/therapy change

## Inhaled therapy

### *Before prescribing*

- **Consider use of In-Check dial and inhaler training devices** (e.g. ellipta® inhalation trainer) to help identify suitable inhaler type (DPI or MDI) and/or correct inspiratory flow rate/technique
- Discuss benefits/risks of treatments including potential risk of side-effects (including non-fatal pneumonia) with ICS
- **Discuss inhaler types and teach inhaler technique** (use placebos ± Spacer but consider infection control issues). Use training videos for inhaler technique support (e.g. rightbreathe, PrescQIPP). You can also get phone apps to support correct use of inhalers e.g. RightBreathe App
- A compatible Spacer should be used with MDIs to optimise delivery and drug efficacy.
- **Ensure patient demonstrates correct technique, knows dose & importance of adherence.**

### *When treating symptoms/to improve quality of life*

- Discuss and **agree clinically relevant response outcomes** for symptom control/QOL improvements.
- **Set review date of 1 month for bronchodilators and 3 months for ICS after initiation.**

### *When reviewing and before a therapy change*

- Check & reinforce **inhaler technique** (including inspiratory effort) and **adherence** (patient reported use & Rx history).
- Consider change to alternative inhaler device + Spacer if needed. **Make one therapy change at a time.**
- **Stop therapy if it does not provide the desired outcome.**

## Spacers

- If using an lcMDI or MDI, a spacer should be used
- Teach use, ensure patient can demonstrate use
- Ensure patient aware of cleaning requirement, (not more frequently than monthly).
- Replace Spacer every 12 months
- The website www.rightbreathe.com has information regarding which spacers are compatible with different MDIs.

## Oral Therapy

Carbocisteine: **1st Line**: 375mg capsules;

- Consider 4 week trial of 2 x 375mg TDS **if chronic cough productive of sputum**
- Continue ONLY if patient reports symptom improvement (↓cough and sputum production)
- If required longer term reduce to 2 x 375mg BD, review ongoing need at regular intervals.
- Do not routinely use to prevent exacerbations

Acetylcysteine:

- **2nd line**: 600mg S/F effervescent tablets ONCE daily for patients **not tolerating, struggling with capsule burden and/or compliance with carbocisteine 375mg caps** or does not obtain symptomatic benefit from carbocisteine and a trial of an alternative mucolytic is considered clinically appropriate.
- **For patients with swallowing difficulties and or with enteral feeding tubes: 1st line**: acetylcysteine 600mg S/F effervescent tabs; **2nd line**: carbocisteine 250mg/5ml oral solution.
- Consider 4 week trial of Acetylcysteine if chronic cough productive of sputum. Continue ONLY if patient reports symptom improvement (↓cough and sputum production)

Theophylline

- Consider trial if unable to use inhaled therapy
- Monitor plasma levels and for drug interactions.
- Caution use in older people.
- Titrate **and review after 4-8 weeks**. Continue ONLY If symptomatic improvement

Oral corticosteroids

- Maintenance use in COPD is not normally recommended

Roflumilast **– AMBER Initiation (initiation by specialist and continuation in primary care)**:

- Prescribing in line with NICE TA461 as per HWE ICB area prescribing committee decision.
- Consider adding to LABA/LAMA/ICS (triple therapy) if FEV1 <50% predicted and ≥2 exacerbations in last 12 months
- Specialist initiation for first 3 months followed by GP prescribing.

Azithromycin **– AMBER Initiation (initiation by specialist and continuation in primary care)**

- Please refer to HWE ICB prescribing support guide, prescribing in line NICE guidance NG115.
- Consider in optimised patients who are non-smokers & continue to have frequent, prolonged or severe exacerbations. Initiation by or on advice of specialist only.
- Required tests prior to initiation include: sputum culture and sensitivity, CT thorax, ECG, baseline LFTs. LFTs and ECG rechecked within 2 months.
- Patients should be advised about the small risk of hearing loss and tinnitus – patients advised to stop medication and seek advice if they notice hearing impairment or signs of tinnitus
- Usually 250 mg 3 times a week Monday, Wednesday, Friday (off-label)
- Specialist review at 3 months and 9 months. Transfer of prescribing to GP if continuing after 3 month review.

Oral anti-oxidant therapy

- Treatment with alpha-tocopherol and beta-carotene supplements, alone or in combination, is not recommended.

Oral anti-tussive therapy

- Anti-tussive therapy should not be used in the management of stable COPD

## At review and follow-up

**Review: mild to severe COPD at least once a year; very severe COPD at least twice per year and consider:**

- Review & reinforce inhaler technique (including inspiratory effort) and adherence (patient reported use & Rx history)
- Review effectiveness/side-effects of therapy e.g. function, breathlessness, exercise tolerance, exacerbation frequency
- Stop/change therapy if cannot use/ineffective/not tolerated
- Review of ICS treatment, particularly high strength ICS (document reason for continuation if ongoing)
- Non-smoker?
- Had relevant immunisations?
- Had an appropriate referral for Pulmonary Rehabilitation?
- Any red flag symptoms?
- Use of or need for self- management plan ± home exacerbation rescue pack
- Presence of complications & co-morbidities e.g. heart failure
- Presence of anxiety & depression (treat or refer if present)
- Spirometry
- Physical activity, nutrition, weight/body mass index
- Pulse oximetry
- Need for referral to a respiratory specialist

## Exacerbations and Self-Management

- Advise at risk patients how to prevent and identify exacerbations and to respond promptly to symptoms
- Offer personalised self-management plan to include: when to increase as required bronchodilators, when to start oral corticosteroids ± antibiotics, actions/healthcare professional to contact if symptoms do not improve
- Assess for management in appropriate setting
- Increase as required bronchodilator (+ Spacer if MDI)
- Treat with prednisolone (NOT e/c) 30mg daily for 5 days +/- 5 days amoxicillin (500mg three times daily) OR doxycycline (200mg day 1 then 100mg daily) OR Clarithromycin (500mg twice a day) OR if resistance co-amoxiclav (625mg three time daily). Patients with bronchiectasis may require longer antibiotic courses.
  Refer to: ICS Guidelines for the management of infection in primary care
  NG114 - Chronic obstructive pulmonary disease (acute exacerbation): antimicrobial prescribing
  NG115 - Chronic obstructive pulmonary disease in over 16s: diagnosis and management
- Consider standby course of prednisolone ± antibiotics to keep at home with self-management plan (monitor use)
  Consider the need for osteoporosis prophylaxis if the patient has taken ≥ 3 courses of oral steroids in a year
- Review treatment post at exacerbation follow-up at 4-6 weeks.

## Consider referral to respiratory specialist:

- Diagnostic uncertainty
- Haemoptysis (follow 2 week pathway)
- Symptom onset at age <40 years, or a family history of alpha1-antitrypsin deficiency
- Symptoms disproportionate to disease severity
- Pulmonary rehabilitation
- Frequent exacerbations
- Rapid clinical or $FEV_1$ decline
- Problematic withdrawal of steroids
- Complex patient requiring specialist MDT review
- Long term oxygen therapy (for hypoxia, if SpO2 ≤ 92% breathing air during clinical stability)

**Red flag symptoms in COPD include:** worsening MRC score, breathlessness out of proportion to severity of COPD, frequent exacerbations, pain on inspiration/chest pain, significant unintentional weight loss, worsening oedema, haemoptysis, hypoxia, abnormal Chest X-ray

**ENH Integrated Community Respiratory Service** (enhertscommunity.respiratoryteam@nhs.net)

**SWH Enhanced Community Respiratory Service** (westherts.resp@nhs.net):
GP practices can refer directly via e-Referral Service (e-RS) using DXS referral form. If not possible complete referral form and email to respective service.

**Essex Partnership University Trust (EPUT) Community Respiratory service** supports patient in WE. Referrals for this service are made via Single Point Access (SPA) using the EPUT SPA referral form.

**Consider advice from/referral to other services if appropriate:**
e.g. Physiotherapy, Dietetics, Psychological Services, Social Prescribers, Community Pharmacy (NMS service), Palliative Care planning

**Appendix 1: Alternative inhalers with cost and associated carbon footprint (correct as of October 2021)**
**Preferred formulary inhalers are shaded in grey**

| Inhaler | Type | Dose | Cost/ year | Estimated annual carbon footprint (expressed as equivalent miles in a car per year) ᵃ |
|---|---|---|---|---|
| **SABA** | | | | |
| Salbutamol 100mcg (Easyhaler®) | DPI | Two puffs qds prn | £48 | 4 |
| Terbutaline 500mcg (Turbohaler®) | DPI | One puff qds prn | £101 | 3 |
| Salbutamol 100mcg (Salamol®) | MDI | Two puffs qds prn | £21 | 85 |
| Salbutamol 100mcg (Ventolin® evohaler) | MDI | Two puffs qds prn | £22 | 199 |
| **SAMA** | | | | |
| Ipratropium 20micrograms | MDI | Two puffs qds prn | £81 | 289 |
| **LAMA/LABA** | | | | |
| Umeclidinium/vilanterol 55/22mcg (Anoro Ellipta®) | DPI | One puff daily | £395 | 32 |
| Aclidinium/formoterol 400/12mcg (Duaklir Genuair®) | DPI | One puff twice daily | £395 | 24 |
| Glycopyrronium/indacaterol 85/43mcg (Ultibro® Breezhaler®) | DPI | One puff daily | £395 | 25 |
| Tiotropium/olodaterol 2.5/2.5mcg (Spiolto® Respimat®) | SMI | Two puffs daily | £395 | 0.03 |
| Glycopyrronium/formoterol 7.2/5mcg (Bevespi® Aerosphere®) | MDI | Two puffs twice daily | £395 | 576 |
| **LABA/ICS** | | | | |
| Fluticasone furoate/vilanterol 92/22mcg (Relvar® Ellipta®) | DPI | One puff daily | £268 | 34 |
| Budesonide/formoterol 320/9mcg (Fobumix®easyhaler) | DPI | One puff twice daily | £262 | 11 |
| Budesonide/formoterol 320/9mcg (Duoresp® Spiromax®) | DPI | One puff twice daily | £340 | 18 |
| Budesonide/formoterol 320/9mcg (WockAIR®) | DPI | One puff twice daily | £231 | 26 |
| Budesonide/formoterol 400/12mcg (Symbicort Turbohaler®) | DPI | One puff twice daily | £341 | 35 |
| Beclometasone/formoterol 100/6mcg (Fostair® NEXThaler) | DPI | Two puffs twice daily | £357 | 39 |
| Fluticasone propionate/salmeterol 500/50mcg (Stalpex®) ⁺ | DPI | One puff twice daily | £199 | 49 |
| Fluticasone propionate/salmeterol 500/50mcg (Fixkoh airmaster®) ⁺ | DPI | One puff twice daily | £293 | 49 |
| Fluticasone propionate/salmeterol 500/50mcg (Fusacomb easyhaler®) ⁺ | DPI | One puff twice daily | £328 | 25 |
| Fluticasone propionate/salmeterol 500/50mcg (AirFluSal Forspiro®) ⁺ | DPI | One puff twice daily | £365 | 26 |
| Fluticasone propionate/salmeterol 500/50mcg (Seretide Accuhaler®) ⁺ | DPI | One puff twice daily | £398 | 40 |
| Beclometasone/formoterol 100/6mcg (Luforbec®)# | MDI | Two puffs twice daily | £250 | 495 |
| Beclometasone/formoterol 100/6mcg (Fostair®)# | MDI | Two puffs twice daily | £357 | 495 |
| Budesonide/formoterol 200/6mcg (Symbicort® MDI) | MDI | Two puffs twice a day | £341 | 1,512 |
| Fluticasone propionate/salmeterol 250/25mcg (Sereflo®) * ⁺ | MDI | Two puffs twice daily | £243 | 723 |
| Fluticasone propionate/salmeterol 250/25mcg (AirFluSal®) * ⁺ | MDI | Two puffs twice daily | £250 | 848 |
| Fluticasone propionate/salmeterol 250/25mcg (Combisal®) * ⁺ | MDI | Two puffs twice daily | £341 | 707 |
| Fluticasone propionate/salmeterol 250/25mcg (Sirdupla®) *#⁺ | MDI | Two puffs twice daily | £345 | 863 |
| Fluticasone propionate/salmeterol 250/25mcg (Seretide Evohaler®) * ⁺ | MDI | Two puffs twice daily | £357 | 855 |
| Fluticasone propionate/formoterol 250/10mcg MDI (Flutiform®)* #+ | MDI | Two puffs twice daily | £554 | 1,556 |
| **LABA/LAMA/ICS** | | | | |
| Fluticasone/vilanterol/umeclidinium 92/22/55mcg (Trelegy Ellipta®) | DPI | One puff daily | £541 | 34 |
| Beclometasone/formoterol/glycopyrronium 88/5/9mcg (Trimbow Nexthaler®) | DPI | Two puffs twice daily | £541 | 39 |
| Budesonide/formoterol/glycopyrronium 160/5/7.2 (Trixeo Aerosphere® with HFO-1234ze(E) | MDI | Two puffs twice daily | £541 | 4$ |
| Beclometasone/formoterol/glycopyrronium 87/5/9mcg (Trimbow MDI®) # | MDI | Two puffs twice daily | £541 | 624 |

**mcg** = micrograms; **SABA** = Short acting beta$_2$ agonist; **SAMA** = Short acting muscarinic antagonist; **LAMA/LABA** = combined long acting muscarinic antagonist & long acting beta$_2$ agonist inhaler; **LABA/ICS** = combined long acting beta$_2$ agonist & inhaled corticosteroid inhaler; **LABA/LAMA/ICS** = combined long acting beta$_2$ agonist inhaler, long acting muscarinic antagonist & inhaled corticosteroid inhaler **MDI** = pressurised Metered Dose Inhaler; **DPI** = Dry Powder Inhaler; **SMI** = Soft mist inhaler; **qds** = four times a day; **prn** = when required; *** =** off label for COPD; # = contain small amount of alcohol per actuation; ⁺ = high strength ICS
Green: low carbon footprint; Amber: higher carbon footprint; Red = highest carbon footprint

**Note**: Patients who are stable on monotherapy with LABA or LAMA inhalers do not need to change treatment.
(First line choices from previous guidelines are highlighted in grey).

| Inhaler | Type | Dose | Cost/ year | Estimated annual carbon footprint (expressed as equivalent miles in a car/year)ᵟ |
|---|---|---|---|---|
| **LABA** | | | | |
| Formoterol 12mcg (Easyhaler®) | DPI | One puff twice daily | £144 | 12 |
| Formoterol 12mcg (Oxis Turbohaler®) | DPI | One puff twice daily | £302 | 16 |
| Formoterol 12mcg (Foradil®) | DPI | One puff twice daily | £341 | 49 |
| Indacaterol 150mcg/300mcg (Onbrez Breezhaler®) | DPI | One puff daily | £392 | 25 |
| Salmeterol 50mcg (Accuhaler®) | DPI | One puff twice daily | £427 | 32 |
| Olodaterol 2.5mcg (Striverdi Respimat®) | SMI | Two puffs daily | £321 | 0.03 |
| Formoterol 12mcg (Atimos Modulite®)# | MDI | One puff twice daily | £219 | 343 |
| Salmeterol 25mcg (Soltel®) | MDI | Two puffs twice daily | £243 | 686 |
| Salmeterol 25mcg (Evohaler®) | MDI | Two puffs twice daily | £356 | 834 |
| **LAMA** | | | | |
| Tiotropium 2.5mcg (Spiriva Respimat®) | SMI | Two puffs daily | £280 | 0.03 |
| Tiotropium 10mcg (delivered dose 10mcg) (Braltus Zonda®) | DPI | One puff daily | £314 | 25 |
| Tiotropium 18mcg (delivered dose 10mcg) (Tiogiva®) | DPI | One puff daily | £234 | 25 |
| Tiotropium 18mcg (delivered dose 12mcg) (Acopair Neumohaler®) | DPI | One puff daily | £243 | Unavailable (likely green) |
| Glycopyrronium 44mcg (Seebri Breezhaler®) | DPI | One puff daily | £335 | 25 |
| Umeclidinium 55mcg (Incruse Ellipta®) | DPI | One puff daily | £335 | 32 |
| Aclidinium 322mcg (Eklira Genuair®) | DPI | One puff twice daily | £395 | 23 |
| Tiotropium 18mcg (delivered dose 10mcg) (Spiriva Handihaler®) | DPI | One puff daily | £408 | 12 |

**ᵟCarbon footprint estimations**

- The calculations of annual carbon footprint were based on figures obtained from the gov.uk website and the PrescQIPP bulletin.
- The Gov.uk website gives a figure of 0.2758kg $CO_2$e/mile (or 276g $C0_2$e/mile) for an average car of unknown fuel type (link) and the PrescQIPP bulletin provides a figure for indicative carbon footprint per annum for each inhaler (g/$CO_2$e) (link)
- $estimate based on manufacturers published value of 1.1 kg CO2 emissions per treatment per year and using gov.uk figure above to convert to miles. Values are indicative only. Circulating stock of Trixeo® with propellant HFA-134a will be used up in the supply chain until completely replaced by Trixeo® with propellant HFA1234ze(E).
- These figures were used to provide an estimate in miles/year for each of the inhalers listed. The inhalers in each class are colour coded with a traffic light designation to highlight choices with a lower carbon footprint. (**Green**: low carbon footprint; **Amber**: higher carbon footprint; **Red** = highest carbon footprint)
- Further Information on inhalers and carbon footprint can be found on the following link: https://www.prescqipp.info/our-resources/bulletins/bulletin-295-inhaler-carbon-footprint/

| | |
|---|---|
| Version | 2.0 Addition of acetylcysteine 600mg effervescent tablets ONCE daily as 2nd line mucolytic and update of Trixeo® footprint to green following change of propellant to HFO-1234ze(E) |
| Developed by | HWE ICB PMOT |
| Approved by/date | HMMC v2.0 Jan 2022 and v1.0 MOPB April 2022, APC Oct 2025 |
| Review date: | The recommendation is based upon the evidence available at the time of publication. This recommendation will be reviewed upon request in the light of new evidence becoming available. |
| Superseded versions | 1.0 Harmonisation of Hertfordshire Medicines Management Committee (HMMC) guidance and West Essex Medicines Optimisation Programme Board (WEMOPB) guidance updates include:<br>• Rebadging with HWE ICB and removal of WECCG header<br>• Review date removed and replaced with standard statement. |