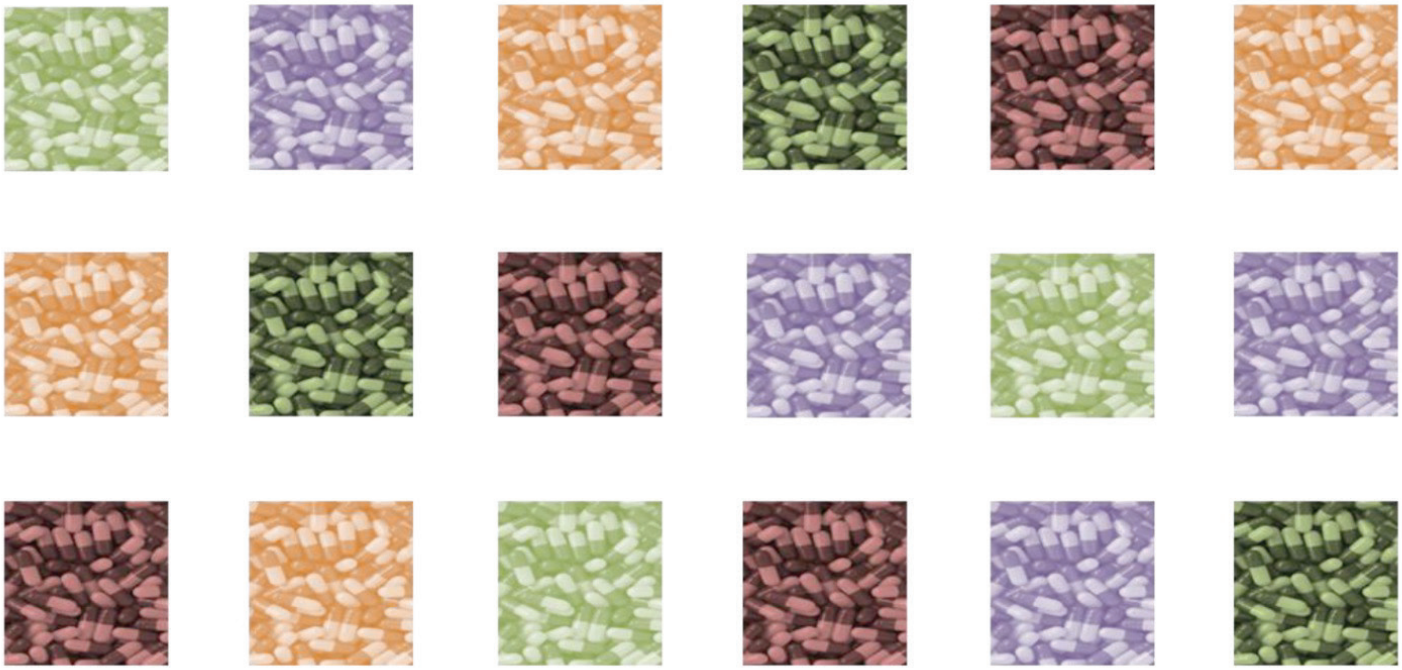
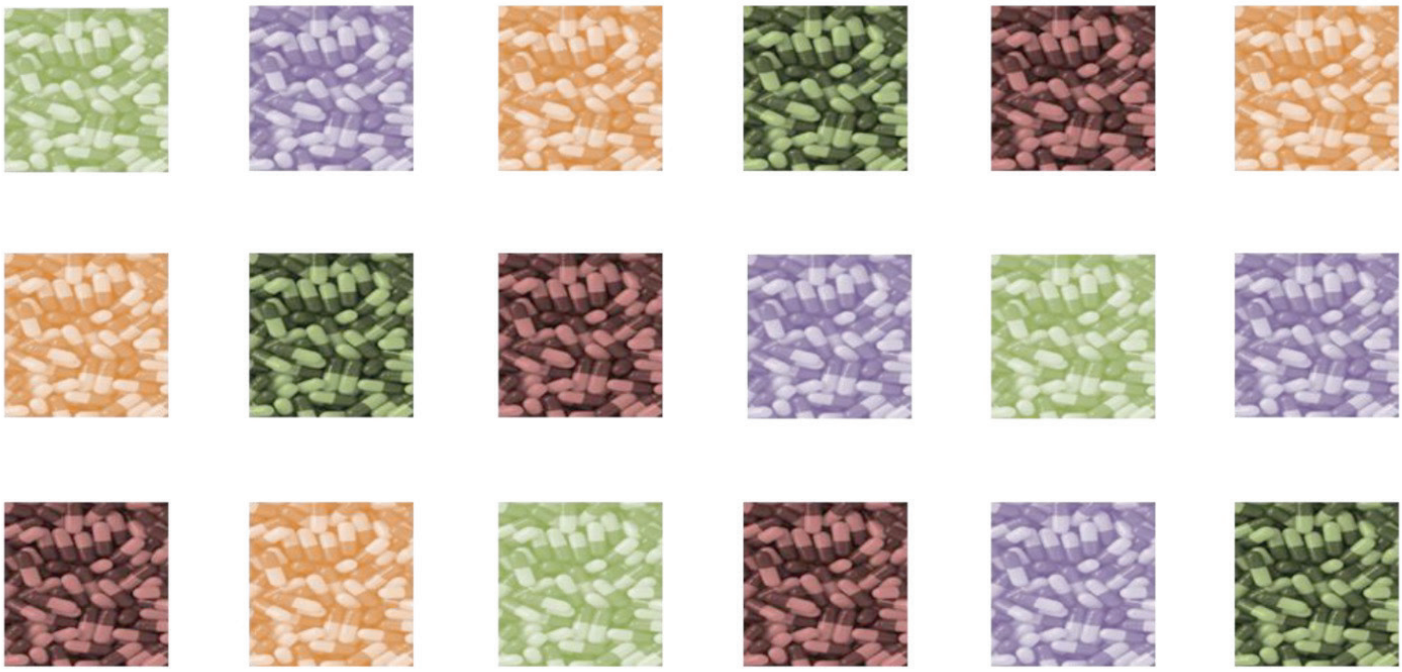


Quality Prescribing Strategy for Respiratory

A Guide for Improvement

2024-2027



Centre for Sustainable Delivery
NHS SCOTLAND
REALISTIC MEDICINE
EFFECTIVE PRESCRIBING & THERAPEUTICS DIVISION
Scottish Government
Riaghaltas na h-Alba

Clinical Foreword

Promotion of appropriate prescribing of medicines to treat asthma, chronic obstructive pulmonary disease (COPD), bronchiectasis and idiopathic pulmonary fibrosis (IPF) is essential to optimise treatment outcomes and achieve the best care for the individual, while minimising harm.

We aim to achieve better disease control and outcomes for the individual by:

- placing an emphasis on the person-centred review of medicines
- optimising care for respiratory conditions in adults
- using effective pharmaceutical and non-pharmaceutical treatment options

This guide promotes a person-centred approach to care and the 7-Steps approach to medicine reviews in the management of respiratory illness, embedding shared decision-making throughout the process.

This document also takes into account environmental considerations. We envisage that better control of respiratory conditions can be achieved through:

- promotion of good person-centred care
- improved preventative treatment plans
- promotion of correct use of metered dose inhalers where necessary
- use of environmentally sustainable inhalers where appropriate - including considering a switch from metered dose inhalers (MDI) to dry powder inhalers (DPI) or soft mist inhalers (SMI) where clinically appropriate

Improved disease control will also lessen environmental impact by preventing admissions to hospital and unplanned contact with healthcare providers, and this will ultimately aid NHS Scotland in achieving net zero carbon emissions.

This guide highlights clinical recommendations for respiratory prescribing practices and utilises data for improvement and benchmarking across NHS boards in Scotland. This will help optimise therapy and drive improvement according to current national guidance.

This guide builds upon the previous 2018-21 strategy and has been written by Scottish Government and NHS Scotland, supported by individuals with lived experience, patient organisations and the multidisciplinary team across primary and secondary care. It is aimed at primary and secondary care clinicians, Managed Clinical Networks and Board Medicines Management Teams. The guide is also endorsed and will be adopted in the respiratory care pathway by the Centre for Sustainable Delivery.

An Equality Impact Assessment for this guidance has been completed and will be available on gov.scot. If you would like to see a copy of this, please contact EPandT@gov.scot.

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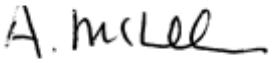

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Table of Contents

1. Executive Summary

Respiratory conditions are a major contributor to ill health, disability, and premature death – the most common conditions being asthma and COPD.[1] The Scottish Health Survey reported the average incidence of asthma as 16% and COPD as 4%.[2]
The World Health Organisation has identified chronic respiratory disease as a non-communicable disease (NCD) along with diabetes, cancers and cardiovascular disease. NCDs are responsible for 71% of global death annually.[3]

This guide is designed to ensure people with respiratory conditions are at the centre of their treatment. They, their families and their carers should be actively involved and engaged with treatment and care decisions at all stages of their condition.

This quality prescribing guide is intended to support clinicians and shared decision-making for people with respiratory conditions (asthma, COPD, bronchiectasis and idiopathic pulmonary fibrosis (IPF)) in the appropriate use of medicines, taking a person-centred approach whilst applying the principles of value-based healthcare and realistic medicine.

This guide will consider the effective treatment of respiratory conditions, as well as the delivery devices and their environmental impact. The vast majority of medicines for respiratory conditions are delivered via the inhaled route, either by pressurised metered dose inhaler (pMDI), dry powder inhaler (DPI) or soft mist inhaler (SMI).

In asthma, early control is the aim of treatment, using inhaled corticosteroids (ICS) as the most effective preventer drug. Add-on therapy should only be initiated after checks on inhaler technique, adherence, and elimination of trigger factors.

People with asthma who order more than three short-acting beta-2-agonists (SABA) inhalers a year should be prioritised for a review, as this is a marker of poor asthma control and increased healthcare utilisation. Boards may need to review those taking six or more initially, then move on to those taking three or more SABA inhalers per year. Reduction in over-reliance on SABA inhalers, through improved respiratory disease control, will also support the reduction in CO2 emissions from pressurised metered dose inhalers (pMDIs). SABA pMDI's currently account for the majority of pMDIs prescribed in Scotland and are a source of two-thirds of the CO2 emissions from inhalers.

Individuals who are prescribed SABA monotherapy should be reviewed to confirm their respiratory diagnosis and ensure that appropriate preventative treatment is prescribed, for example, ICS for asthma. People with asthma should be maintained on the lowest possible dose of ICS inhalers to effectively treat their symptoms and reduce the potential for side effects or harm from treatment.

People at risk of severe asthma should be identified using criteria such as number of SABA reliever inhalers per year, number of exacerbations or poor symptom control and be referred to secondary care for treatment optimisation where appropriate.

In people with COPD, ICS are prescribed (as part of combination therapy) for those who have a severe exacerbation (requiring hospitalisation) or more than two exacerbations in one year or if there are asthmatic features. ICS therapy should be reviewed to reduce the risk of pneumonia and adrenal suppression. Triple therapy inhalers instead of multiple individual inhalers should be considered to improve adherence, cost effectiveness and reduce the carbon footprint from inhaler use.

Antibiotics should only be used for infective exacerbations in COPD (five-day course) and up to 14 days in bronchiectasis. Following advice from secondary care, some patients who have frequent exacerbations may require regular antibiotic prophylaxis with azithromycin. Oral corticosteroids should be avoided in patients with bronchiectasis unless there is a clear indication for an alternative comorbidity such as asthma. Long term oral corticosteroids are not recommended for people with COPD, but short courses may be used to treat exacerbations.

IPF is treated with anti-fibrotics, which should be prescribed and monitored by a clinician with experience of treating IPF.

The environmental impact of inhalers is a key consideration to contribute to the achievement of net zero greenhouse gas emissions by NHS Scotland by 2040. Prescribers are asked to consider inhalers with a lower global warming potential (GWP) where appropriate and local formularies should highlight and promote inhalers with a lower GWP.

To support this work, a suite of safety and medication effectiveness data indicators have been developed, with a multi-professional and patient group including experts by experience. These indicators provide data to enable benchmarking and help drive quality improvement by reducing unwarranted variation in prescribing practice.

2. Summary of Prescribing Recommendations

For all people with respiratory conditions:

- recommend that patients receive person-centred medication reviews using the Polypharmacy 7-Steps approach

Asthma

- clinical recommendations are to review patients that are taking three or more reliever inhalers annually. However, the clinical and patient consensus was to prioritise those prescribed six or more reliever inhalers annually. This is a trigger for timely, priority review. An immediate prescription may be necessary, but review should take place before authorisation of the next prescription
- review patients on SABA inhalers alone, clarifying the diagnosis and establishing reasons for SABA only use
- review patients with asthma prescribed SABA and LABA without ICS
- review patients with asthma who have been prescribed an ICS inhaler and do not currently order on their repeat prescription - assess adherence and understanding of treatment to establish appropriate use of SABA inhalers
- review inappropriate use of high strength corticosteroid inhalers (maintaining patients at the lowest possible dose of inhaled corticosteroid)
- reductions in high dose ICS should be considered every three months, decreasing the dose by approximately 25 to 50% each time and arranging regular review as treatment is reduced
- issue a steroid treatment card to patients on high dose inhaled corticosteroids – a steroid emergency card may also be required
- review montelukast at four to eight weeks following initiation to ensure a response and review continued need at regular intervals

In severe asthma

- identify patients at risk of severe asthma and where modifiable risk factors are addressed and asthma control remains suboptimal, refer to secondary care for treatment optimisation

In children with asthma

This guidance is not for children, therefore prescribers should refer to guidance on asthma management in children, however, there are two medication safety points to highlight:

- record regular growth monitoring when treating children with ICS
- ensure children on medium / high-dose ICS are under the care of a specialist paediatrician

COPD

- ICS (licensed only as part of combination therapy with LABA and/or LAMA) are prescribed for people with COPD who have a severe exacerbation, more than two exacerbations in one year or if there are features of asthma
- review patients with COPD following initiation of ICS as part of combination therapy after three months. Stop ICS if there is insufficient response or if there are adverse effects that outweigh benefits
- mucolytic therapy is considered for symptoms of chronic cough with productive sputum and should be reviewed four weeks after commencing therapy, stopping if symptoms have not improved with use
- review of mucolytic therapy during the annual COPD review should be undertaken and may be stopped if no productive cough
- review patients with COPD on separate LAMA and LABA/ ICS inhalers and, if appropriate, change to triple therapy inhalers
- review antibiotic course length (five-day course recommended) if needed for infective exacerbations of COPD, with sputum cultures for treatment failure
- repeated use of 'rescue medication' (steroid and/or antibiotic) (two or more per year) should trigger a review to optimise long-term management

Bronchiectasis

- antibiotic choice should be directed by previous positive cultures. In the absence of previous positive sputum cultures, broad spectrum oral antibiotics to cover common respiratory pathogens are recommended, using local formulary guidance where available
- azithromycin 250mg three times a week is recommended for patients with four or more exacerbations in any 12-month period, usually started after advice from secondary care
- recommend six-month review of the effectiveness of mucolytic therapy

Idiopathic pulmonary fibrosis

- anti-fibrotics should only be prescribed by a clinician with experience of treating IPF
- only prescribe anti-fibrotics when there is confirmed fibrotic lung disease with evidence of physiological progression

Environmental considerations

- promote regular reviews to optimise disease control and reduce inappropriate prescribing of inhalers
- prioritise review of people with asthma who are over-reliant on SABA inhalers, defined as ordering more than three inhalers per year (see asthma chapter). Those on six or more should be targeted first
- streamline inhaler devices, avoiding mixed device use where possible
- review separate inhalers where a combination inhaler device would be possible
- review patients prescribed SABA alone, check diagnosis and appropriate treatment, and if appropriate consider a low GWP inhaler
- update local formularies to highlight and promote inhalers with lower CO2 emissions
- use ScriptSwitch to promote key messages e.g.
    - to highlight SABA overuse
    - prescribe low volume pMDI with lower global warming potential (GWP)
- raise public awareness to promote improvements in asthma care and environmental impact of respiratory prescribing
- utilise resources to support environmentally friendly prescribing (see Appendix 1)
- **for new patients:**
    - use inhalers with low global warming potential where they are as equally effective
    - where there is no alternative to a pMDIs, lower volume HFA 134a pMDIs should be used in preference to large volume or HFA 227ea pMDIs
- **for existing patients:**
    - switch to DPI or SMI if appropriate, following a person-centred review - we do not recommend a blanket switch
    - consider switch to DPI for individuals with asthma who have an adequate inspiratory flow. If there is concern regarding inspiratory ability due to age or frailty, it can be checked using an inspiratory flow device, such as placebo whistles or In-check device®

3. Introduction

What is the purpose of this guidance?

Respiratory conditions are a major contributor to ill health, disability, and premature death, with the most common conditions being asthma and COPD.[1] The Scottish Health Survey reported the average incidence of asthma as 16% and COPD as 4%.[2]

The World Health Organisation has identified chronic respiratory disease as a non-communicable disease (NCD) along with diabetes, cancers and cardiovascular disease. NCDs are responsible for 71% of global death annually.[3]

The impact of respiratory conditions can vary depending on many factors. There is often a high prevalence of comorbidities such as heart disease, hypertension and diabetes in individuals with respiratory conditions, which should also be addressed during a prescribing review. Optimising pharmacological treatment of these conditions is vital to help control symptoms and increase the quality of life for the individual.

This guidance promotes Realistic Medicine using the holistic 7-Steps polypharmacy approach to medicine reviews that includes shared decision-making, a personalised approach to care, reducing harm and waste and addressing unwarranted variation and ineffective prescribing practice.[4,5]

This guide will build on what already works well in respiratory prescribing and encourage further quality improvement within NHS Scotland. It highlights key respiratory prescribing indicators, and it is hoped that clinicians will reflect on their current practice in prioritised areas. This guidance should be read in conjunction with clinical guidance such as SIGN[6] or NICE[7] - it is not intended to replace them. The guidance has four main sections on asthma, COPD, bronchiectasis and Interstitial Lung Disease (ILD), focusing on Idiopathic Pulmonary Fibrosis (IPF).

Environmental considerations for respiratory prescribing will be introduced and explored. NHS Scotland has committed to be a net zero greenhouse gas emissions organisation by 2040[8] with more individuals interested in their own carbon footprint.

We sometimes refer to ‘patients’ throughout the document and recognise that different terminology is often used in official documentation. We recognise that patients are people who are managing different medical conditions, including respiratory disease.

Who is the guide for?

It is for all healthcare professionals involved in respiratory care and prescribing decisions in both primary and secondary care including doctors, nurses, pharmacists, pharmacy technicians, physiotherapists and occupational therapists.

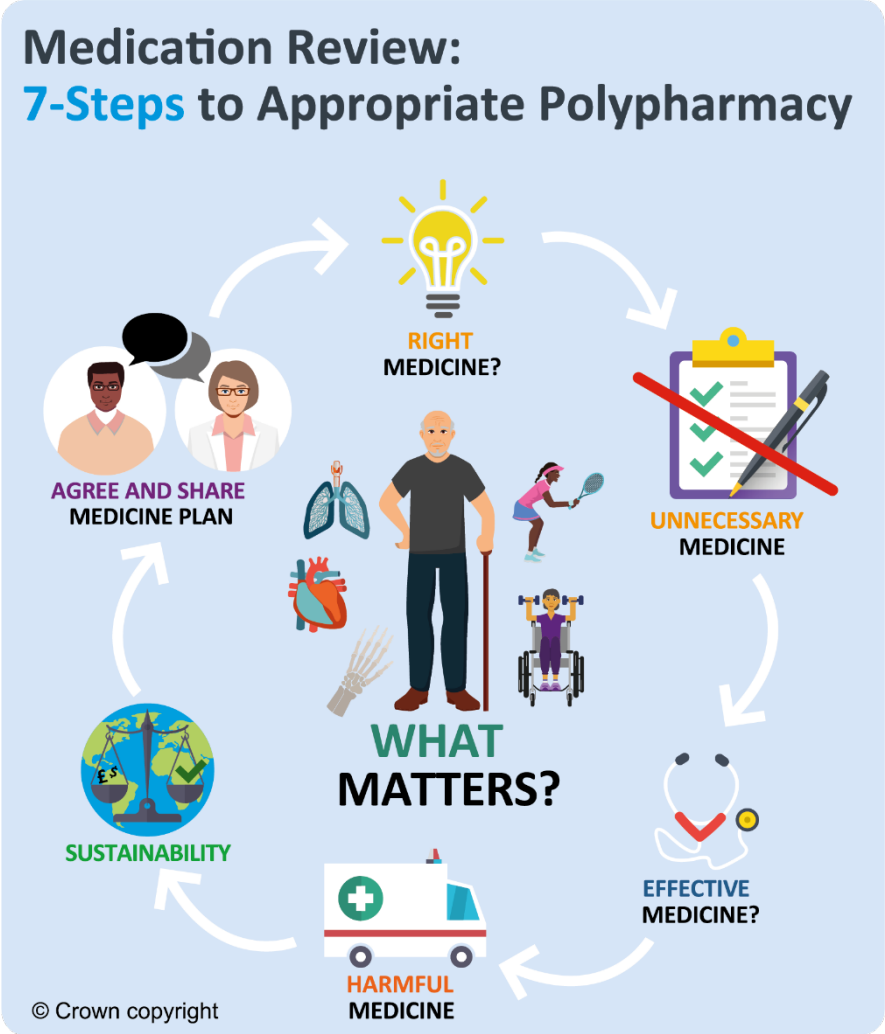
The guide will be available on the Polypharmacy: Manage Medicines app for ease of access and as an additional support for patients and clinicians.[9] If clinicians can reflect on their own prescribing practice, it will help reduce unwanted variation of prescribing across Scotland.[10]

Why is the guide important?

What are the benefits of guidance to patients?

This guide focuses on quality prescribing and should result in improvements in patient care and treatment of respiratory conditions. The 7-Steps medication review process promotes a shared decision-making approach to medicine reviews and places the individual at the centre of their care to ensure prescribing is effective and appropriate for them. People will be encouraged to self-manage their condition where appropriate and be asked 'what matters to you?'[11] to support a holistic approach to care in line with the Scottish Government's polypharmacy guidance.[5]

Figure 1: The 7-Steps medicine review process



What are the benefits to Health Boards?

Optimising therapy through shared decision-making will lead to improved person-centred care. Appropriate and effective use of pharmacological therapy for respiratory conditions will facilitate better outcomes for individuals with respiratory conditions and should reduce healthcare utilisation and hospital admissions due to respiratory disease.

There is an increase in the volume of prescriptions dispensed and the cost of medicines year on year. Appropriate review of respiratory prescribing should improve medication safety and ensure cost effective and sustainable prescribing.

Figure 2 below highlights the spend of respiratory prescribing in primary care in 2022/23 by inhaler type. The total annual spend in 2022/23 was approximately £117.02 million. This represents 9.5% of the Scottish primary care prescribing spend and is £7.81 million less than the total prescribed in 2016/17. Prescribing costs of

short-acting $Beta_2$ Agonist inhalers (SABA) have reduced by 3.7% in the same time period. At the same time, there has been an increase in use of long-acting combination bronchodilator inhalers (LABA/LAMA) and triple combination inhalers (ICS/LABA/LAMA) as they are now more widely available and are more cost effective compared to single ingredient inhaler use.

Figure 2: Respiratory Prescribing Spend in primary care in 2022/23

BNF Chapter	**Total Spend**		
Drugs used in respiratory conditions	£117,018,822		
BNF Section	**Section Spend**	**Class of Respiratory Medicine**	**Spend**
Bronchodilators	£32,460,779	Combination LABA & LAMA	£8,929,750
		Combination SABA & SAMA	£55,304
		LABA	£959,393
		LAMA	£12,951,530
		Other	£260,674
		SABA	£8,949,933
		SAMA	£124,764
		Theophylline	£229,429
Corticosteroids (respiratory)	£80,369,161	Combination ICS & LABA	£50,183,468
		Combination ICS, LABA & LAMA	£22,508,569
		ICS	£7,677,125
Cromoglycate & LRA	£1,063,467	LRA	£802,793
		Miscellaneous	£260,674
Mucolytics	£3,125,414	Mucolytics for CF	£1,839,063
		Mucolytics for COPD	£1,286,350

4. Polypharmacy

Person-centred respiratory prescribing

Medication is by far the most common form of medical intervention for many acute and chronic conditions with around 280,000 items prescribed every day in Scotland, with around 21,000 items for respiratory medicines.[12] The term polypharmacy means "many medications" and is defined to be present when a patient takes two or more medications. Pharmacological therapy can be highly effective in preventing disease or slowing disease progression, with guidelines for single diseases recommending the use of a variety of evidence-based medicines. However, there is often a mismatch between prescribing guidelines for specific medical conditions and the range of clinical complexity found in individuals. It is important to note that polypharmacy is not necessarily a bad thing, it can be both rational and required.

To ensure outcomes from medication are optimised, and prescribing is appropriate and safe, the 7-Steps medication review process provides a clear structure for both the **initiation** of new and the **review** of existing treatments, and places an emphasis on 'what matters to the individual'? A polypharmacy review (following the 7-Steps approach) should ensure optimal management of respiratory and other conditions. It should include addressing aggravating lifestyle factors and consideration of the most appropriate medication at the right dose, with regular review. The following 7-Steps are intended as a guide to structure the review process.

Step 1: Aim: What matters to the patient?
Step 2: Need: Identify essential drug therapy.
Step 3: Need: Does the patient take unnecessary drug therapy?
Step 4: Effectiveness: Are therapeutic objectives being achieved?
Step 5: Safety: Is the patient at risk of ADRs or suffers actual ADRs?
Step 6: Sustainability: Is therapy cost-effective and environmentally sustainable?
Step 7: Person-centred: Is the person willing and able to take therapy as intended?

The 7-Steps to appropriate polypharmacy demonstrate that the review process is not in fact a linear single event, but cyclical, requiring regular repeat and review (see Figure 1 above). The circle is centred on what matters to the individual, ensuring they are provided with the right information, tools and resources to make informed decisions about their medicines and treatment options. It should be used at both initiation and review of medicines.

This is outlined in the Scottish Government's Polypharmacy guidance[5] with accredited Polypharmacy training available on TURAS for prescribers (three points of external CPD by Royal College of Physicians, United Kingdom). The training equips healthcare professionals (including doctors, nurses and pharmacists) to undertake comprehensive person-centred medicines reviews. The training can be

accessed at NHS Education for Scotland on TURAS learn. Find more information on the iSIMPATHY website.

Environmental impact of polypharmacy and healthcare

Over-prescribing is commonplace, accounting for at least 10% of all prescribed medications. It is estimated that up to 18% of unplanned hospital admissions are attributed to harm from medicines.[5] About half of these admissions are deemed to be preventable, through methods such as effective medicine review, following the 7-Steps polypharmacy review process.

The healthcare industry is increasingly asked to account for the negative environmental impact generated through providing medical care. In Scotland, every 10 days a 10-tonne truck of medicines waste (returned to community and hospital pharmacies) is transported for incineration. These are the associated costs for incineration; travel costs and the environment impact (see Figure 3 below) in addition to the direct costs of the unused medication.

Reduction of medicines waste can be achieved by ensuring appropriate prescribing and initiation of medicines, regular person-centred medication reviews and deprescribing where appropriate.

Reducing waste from medicines has a double carbon benefit by

- reducing upstream emissions e.g. in distribution
- downstream emissions, with fewer medicines to be disposed of

Medicines that are disposed of in general waste, poured down the sink or flushed down the toilet, increase the risk of environmental harm and may enter the human food chain in trace amounts.[13] Residues from medicines which are unused, not properly disposed of, or from those that pass through the body, can be found in water, soil and sludge and in organisms at all stages of their lifecycles. Further information is available using the SEPA data visualisation tool for Pharmaceuticals in the Water Environment.[14] With regard to inhalers, any remaining propellant gas in metered dose inhalers can be safely destroyed by incineration, which avoids it leaking into the atmosphere.

Unused or unwanted medicines should be returned to community pharmacy for safe disposal or recycling where available.

Figure 3: Annual cost of managing medicines waste in Scotland

5. Asthma

Asthma

Over five million people are receiving asthma treatment in the UK. Asthma accounts for 2-3% of primary care consultations, 60,000 hospital admissions, and 200,000 bed days per year in the UK.[15] The Asthma and Lung UK report identified that poor access to care, outdated treatment guidelines and an ineffective care pathway has left the UK with some of the worst asthma outcomes in Europe.[16]

Summary of recommendations in asthma

In all individuals with asthma

- clinical recommendations are to review patients that are taking three or more reliever inhalers annually. However, the clinical and patient consensus was to prioritise those prescribed six or more reliever inhalers annually. This is a trigger for timely, priority review. An immediate prescription may be necessary, but review should take place before authorisation of the next prescription
- review patients on SABA inhalers alone, clarifying the diagnosis and establishing reasons for SABA only use
- review patients with asthma prescribed SABA and LABA without ICS
- review patients with asthma who have been prescribed an ICS inhaler and do not currently order on their repeat prescription - assess adherence and understanding of treatment to establish appropriate use of SABA inhalers
- review inappropriate use of high strength corticosteroid inhalers (maintaining patients at the lowest possible dose of inhaled corticosteroid)
- reductions in high dose ICS should be considered every three months, decreasing the dose by approximately 25 to 50% each time and arranging regular review as treatment is reduced
- issue a steroid treatment card to patients on inhaled high dose corticosteroids – a steroid emergency card may also be required
- review montelukast at four to eight weeks following initiation to ensure a response and that therapy is still required

In severe asthma

- identify patients at risk of severe asthma and where modifiable risk factors are addressed and asthma control remains suboptimal, refer to secondary care for treatment optimisation

In children with asthma

This guidance is not for children, therefore prescribers should refer to guidance on asthma management in children, however, there are two medication safety points to highlight:

- recommendation for regular growth monitoring when treating children with ICS
- ensure children on medium / high-dose ICS are under the care of a specialist paediatrician

Principles of prescribing for asthma

Asthma is a chronic respiratory condition associated with airways inflammation and hyper-responsiveness.

The aim of treatment is control of the disease with:

- no daytime symptoms
- no night-time waking due to asthma
- no need for rescue medication
- no asthma attacks
- no limitations on activity including exercise
- minimal side effects from medication
- normal lung function (in practical terms FEV1 and/or PEF>80% predicted or best)[6]

Inhaled therapy is used as the main treatment of asthma, which should be started at the level most appropriate to the initial severity of asthma symptoms. The aim is to achieve and maintain early control by increasing treatment as necessary and reducing unnecessary treatment when control is good.[6] Personalised asthma action plans, agreed with the healthcare professional, empower individuals to gain control using the minimum dosage of inhaled corticosteroid.[6]

Inhaled corticosteroids are the most effective preventer drug to achieve treatment goals. Add-on therapies, including long-acting $beta_2$ agonists (LABA), leukotriene antagonists, long-acting muscarinic antagonist (LAMA) and theophyllines, should only be initiated after checks to inhaler technique, adherence and elimination of trigger factors. People with asthma should be reviewed at least annually to determine whether their existing treatment regime is adequately managing their symptoms.[6] Clinicians should target care and review to optimise therapy and management, considering frequency of review for those most at risk.

Inhaler device selection is important. People with asthma should receive training on how to use their inhaler device and be able to use the device.[6] The environmental impact of inhalers is a key consideration and prescribers are asked to consider inhalers with a lower global warming potential where appropriate for the individual (see chapter 10).

In frail and older adults

- Lung function generally decreases with longer duration of asthma and increasing age, due to stiffness of the chest wall, reduced respiratory muscle function, loss of elastic recoil and airway wall remodelling.[26]
- Factors such as older age may affect inhaler technique. A review was not able to determine whether this was related to dexterity, cognition, physical ability or the device.[17] Inhaler choices should be made with the patient, ensuring the right device for the right patient.[9]
- Factors such as arthritis, muscle weakness, impaired vision, and inspiratory flow should be considered when choosing inhaler devices for older adults.[26] Individuals with cognitive impairment may require carers to help them use their asthma medications effectively.

To prescribe most effectively for people with asthma, we recommend the 'what matters to you?' principles and the Polypharmacy 7-Steps approach. Table 1 outlines the main principle for treating patients with asthma.

Table 1: Principles of treating patients with asthma

	Polypharmacy review 7-Steps	
1	What matters to the patient?	• Ask the patient what matters to them? Ask patient to complete Patient Reported Outcomes Measures (PROMs) (questions to prepare for my review) before the review • How does the condition affect patient's day to day life/activities? • Take account of comorbidities when prescribing for asthma, by using the Polypharmacy 7-Steps approach • Ensure patient has a personalised asthma action plan • Do environmental prescribing issues matter? (see chapter 10)
2	Identify essential drug therapy	• Asthma diagnosis confirmed? • Fractional exhaled nitric oxide (FeNO) test could be used as an optional investigation to test for eosinophilic inflammation when there is diagnostic uncertainty.[6] In the absence of FeNO, assessing eosinophil levels as part of a full blood count (FBC) may assist with review. FBC would give access to eosinophil results as part of an asthma assessment[26] • Ensure asthma therapy is optimised as per local / SIGN / BTS guidelines[6] • Consider the use of Maintenance and Reliever therapy (MART) regimen in patients where there is poor control or adherence when on separate medium dose ICS/LABA and SABA[6] • Consider use of an anti-inflammatory reliever (AIR) inhaler, that is a low-dose ICS-formoterol, as this approach reduces risk of severe exacerbations compared with using a SABA reliever[26] • Assess adherence, review inhaler technique and eliminate trigger factors prior to initiating or adjusting therapy using an asthma action plan • Confirm ongoing need for and effectiveness of medication and screen for side effects
3	Does the patient take unnecessary drug therapy?	• Discuss SABA use with patients prescribed more than three SABAs annually as this is a marker of poor control

		• When asthma is controlled and stable, clinicians should consider stepping down inhaled corticosteroid (ICS) treatment slowly, every three months reducing by 25 to 50% each time and monitoring for deterioration[6] as part of a holistic asthma review

4	Are therapeutic objectives being achieved?	• Can the patient use their inhalers properly? Assess asthma control using a validated questionnaire such as the Asthma Control Test (ACT) or Asthma Control Questionnaire (ACQ).[21] Consider addition of spacer to aid MDI lung deposition or consider DPI/SMI if appropriate
		• Any patient who has asthma medicine started or changed should be reviewed within three months
		• Medication should be titrated to a dose which balances maximum clinical efficacy with minimal risk and stopped if found to be ineffective or if adverse effects outweigh benefits
		• If asthma is not adequately controlled on recommended initial or additional therapies, as per BTS/ SIGN,[6] patient should be referred for specialist assessment
		• Exacerbations should be considered as an opportunity to review therapy, optimise treatment and ensure self-management plans are updated.
		• Consider risk factors for future risk of asthma attack and address these when prescribing - for instance, patients:
		  ○ with an asthma attack in the past
		  ○ who have received more than one course of oral corticosteroids in one year
		  ○ who have received more than six SABA inhalers a year should be prioritised for an asthma review
		  ○ on high dose inhaled steroids
		  ○ with multiple morbidities e.g. COPD, depression, Gastro-oesophageal reflux disease
		  ○ with poor asthma control
		  ○ who smoke
		• Review those who have received emergency hospital treatment for an asthma attack within two working days[6]
		• Once the dose is stable and effectiveness has been established, ongoing review should occur as

		clinically appropriate, with follow up at least annually if asthma control has been achieved • Delivery of a SABA via a pMDI and spacer or a DPI leads to a similar improvement in lung function as delivery via a nebulizer for treatment of acute exacerbations. A person-centred approach to treatment plans for acute exacerbations should be taken and that individuals have a reliever inhaler that they can use[26] • Consider switch to pMDI with lower global-warming potential where this is clinically appropriate • Ensure awareness of how allergies (pet, pollen, dust), air pollution can affect respiratory conditions • Vaccinations should be offered if not up to date as per national guidance • Individuals should be encouraged to engage in appropriate physical activity - social prescribing such as exercise would be dependent on ability • A breathing exercise program can reduce symptoms • Smoking cessation should be advised and the adverse effects of smoking on children highlighted. Offer appropriate support - signpost patients to the NHS inform Quit Your Way Scotland website (includes community pharmacy services) • Weight reduction should be considered in patients who are overweight (BMI 25 – 29.9) or obese (BMI >30) to reduce respiratory symptoms[6]
5	Is the patient at risk of Adverse Drug Reactions (ADR)s or suffer actual ADRs?	• Steroid treatment cards should be provided to patients on high dose steroids (both oral and inhaled). A steroid emergency card may also be required.[18] • Review risk of osteoporosis if on long term or frequent (more than three or four courses a year) oral corticosteroid treatment[19] • Take measures to reduce the risk of and increase awareness of oral thrush - ensure correct technique to reduce incidence - a spacer device is recommended for use with a pMDI and will reduce oral thrush side effects • Yellow card reporting of ADRs
6	Sustainability	• Opportunities for sustainable prescribing and cost minimisation should be explored but only considered if effectiveness, safety or adherence would not be comprised

		• For new drugs, ensure prescribing is in line with Health Board formulary recommendations • For environmental considerations, using a patient centred approach, consider switch to low GWP inhalers for patients with asthma who have an adequate inspiratory flow
7	Is the patient willing and able to take drug therapy as intended?	• A personalised asthma action plan is key to this approach, with focus on inhaler technique, peak flow monitoring, worsening symptom advice, appropriate use of a spacer and avoidance of new trigger factors • Make patient aware of support information e.g. the My Lungs My Life website (Appendix 1) • Non-attenders should be followed up – alternative strategies to encourage engagement may be required (e.g. through community pharmacy / Near Me / telehealth acknowledging limitations) • Agree with the patient arrangements for repeat prescribing - signpost to Medicines Care and Review service in Community Pharmacy where appropriate • ask patient to complete the post-review PROMs questions after their review

Prescribing issues to address

The issues identified below are priority areas of prescribing, where there is unwarranted variation within Health Boards and where accurate prescribing data can be provided. Ensuring asthma medicines are reviewed and optimised regularly will reduce this unwarranted variation. The indicators below help to highlight some higher risk groups who may benefit from prioritisation of review, focusing on patient safety and quality prescribing. Consideration should be given to prioritisation of these groups to optimise care. The indicators focus on ensuring quality prescribing and any of the recommendations made follow national clinical guidance.[6] The indicators included are as follows:

- prescribing of short-acting beta-agonists (SABA) per annum
- prescribing of inhaled high dose corticosteroids
- prescribing of long-acting beta-agonists (LABA) without inhaled corticosteroids (ICS)
- prescribing of SABA only
- prescribing of leukotriene receptor antagonists

Prescribing of short-acting beta-agonists (SABA)

Evidence for review of SABA

Overreliance on SABA is an indicator of poor asthma control.[20,26] It is essential that patients who appear to be overusing SABA inhalers are assessed for control of symptoms as part of a holistic asthma review. Asthma control test (ACT) questions[21] highlight that a patient is not controlled if they use a SABA inhaler three or more times in a week.[6] The National Review of Asthma Deaths (NRAD) report[22] found that patients who used more than 12 reliever inhalers per year were at a greater risk of uncontrolled asthma and sudden death. There was evidence of under-prescribing of preventer medication. Use of 12 SABAs in one year implies the use of 46 puffs in one week and for six SABAs a year is 23 puffs a week.[23] In the SABINA study,[24] an association across all asthma severities was found between high SABA use, of more than three inhalers per year, and an increase in exacerbation rates and healthcare utilisation.[25] It is crucial that patients understand the importance of when and how to use their inhalers and of adherence to therapy with their preventer inhaler.[22]

The main focus of an asthma review is to ensure that the individual's condition is well controlled, they are prescribed the optimum inhaler therapy in alignment with current guidance and are using their inhalers effectively. We know that there are many people with asthma in Scotland who are prescribed six or more SABA inhalers in 12 months (see Chart 1 below). Use of three or more SABA inhalers is associated with a higher rate of exacerbations and hospitalisation.[24]

Following clinical consensus regarding asthma control, this indicator has been reduced from the previous 12 SABA inhalers prescribed annually to recommend that a patient prescribed six or more inhalers annually is a trigger for timely, priority review (see Chart 1). This should ideally take place before the issue of the next prescription. Review is required for those using three or more SABA inhalers, but prioritisation may be considered for those using six or more SABA inhalers.[25]

This guide includes an indicator chart of people prescribed three or more SABA inhalers as an aspirational level, as a person with well-controlled asthma would need no more than this (see Chart 2). This should be discussed at their annual routine review. This indicator is a guide and is unable to distinguish between people with asthma and COPD.

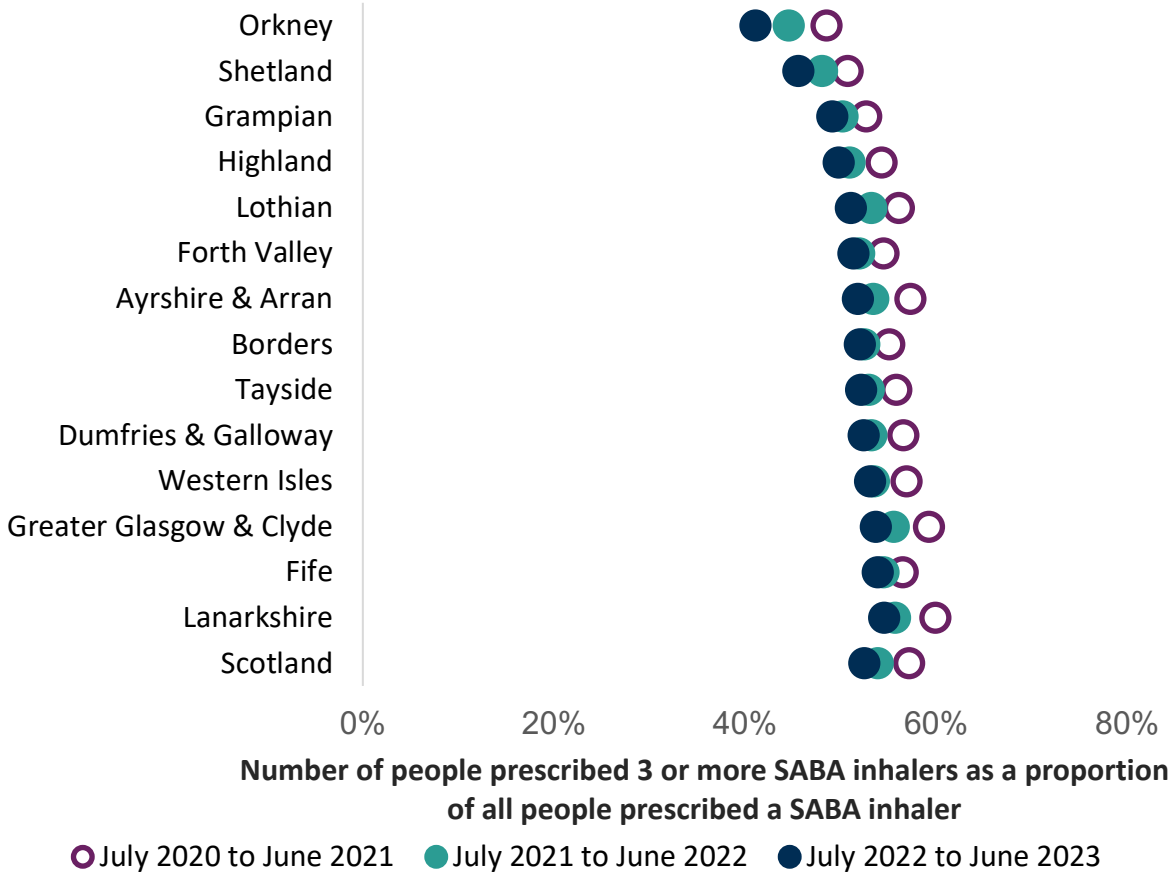
SABAs are not first step maintenance treatment for asthma, a low dose ICS is recommended.[6] The Global Initiative for Asthma (GINA) guidelines recommend initiation of ICS-containing treatment when, or as soon as possible after a diagnosis of asthma is made.[26] They recommend reliever therapy using an anti-inflammatory reliever (AIR), a low-dose combination ICS-formoterol inhaler taken as needed as preferred step one treatment.[26] As-needed low-dose ICS-formoterol reduces the risk of severe exacerbations and emergency department visits or hospitalisations by 65% compared with SABA-only treatment.[27] Licensed indications for products and local formularies should be checked for choice of low-dose ICS-formoterol combinations, where appropriate, if prescribing the AIR regimen.

It should be noted that emergency supplies of SABA inhalers are possible to obtain from the community pharmacy. Liaison with community pharmacy colleagues is advised to help reach those people with asthma who may be poorly controlled and do not attend asthma reviews.

The Scottish Therapeutic Utility (STU) software (chapter 12) is recommended, to support GP Practices to identify individuals with asthma who are over-reliant on SABA inhalers using practice coding.

Chart 1: People prescribed six or more short-acting beta-agonists (SABA) inhalers per annum

Chart 2: People prescribed three or more short-acting beta-agonist (SABA) inhalers per annum



Charts 1 and 2 highlight that the number of SABA inhalers that patients have received annually has remained fairly constant, after a slight increase during July 2020 to June 2021 across NHS Scotland. This may be due to prescribing of SABA inhalers in response to the COVID-19 pandemic.

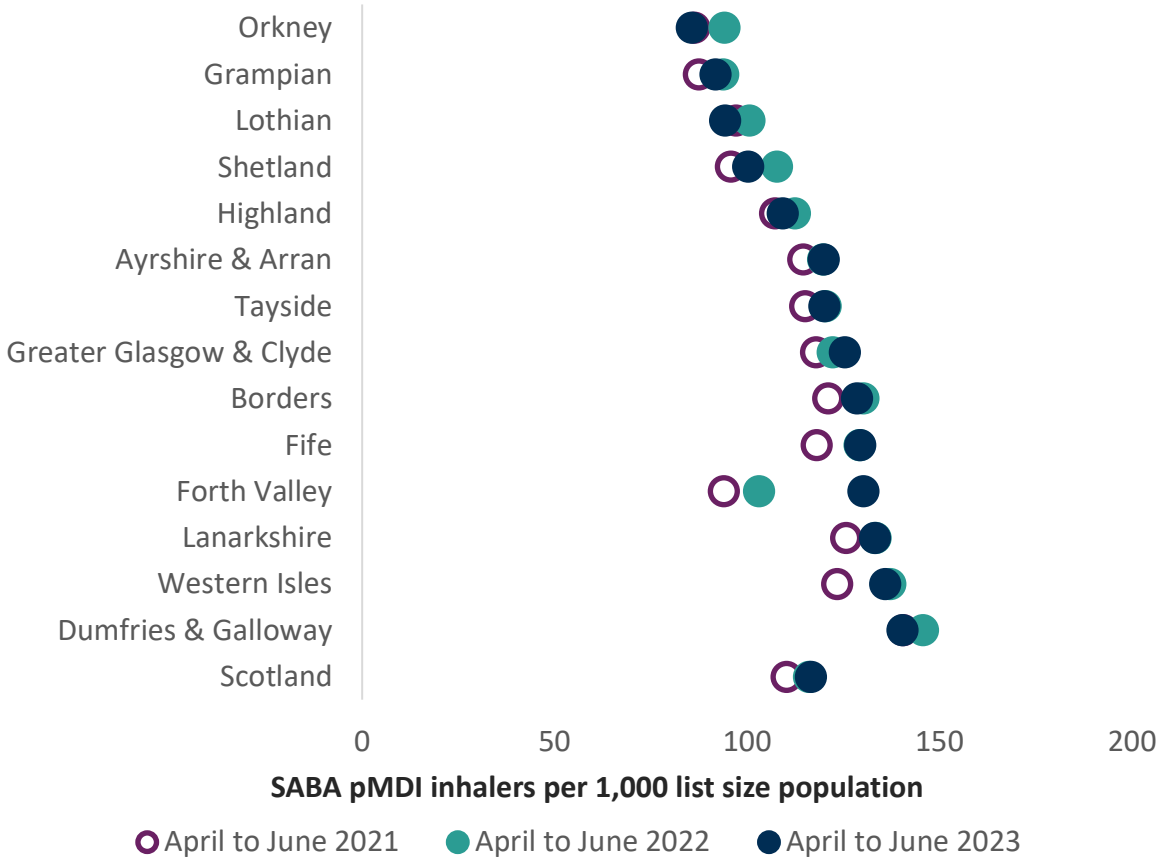
Prescribing of inhalers with dose counters may assist in monitoring adherence with inhalers and ensure individuals know how many doses remain in the inhalers to prevent medicine waste.[28]

Review of high SABA pMDI use

A recent study found that SABA inhalers accounted for the majority of pMDIs prescribed and advocated better disease control to reduce SABA inhaler use and CO2 emissions[29] (see environmental chapter). Approximately 70% of all inhalers in NHS Scotland are prescribed as an pMDI. The UK has a high proportion of pMDI use (70%) compared with the rest of Europe (< 50%) and Scandinavia (10–30%). Asthma mortality rates amongst members of the European Union are 0.63 per 100,000 population compared to the UK which are 1.23 per 100,000 population.[30]

Reviewing patients regularly, optimising treatments and providing education on good control of respiratory disease will reduce SABA inhaler use, improve patient care and disease control. This will also support reduction in CO2 emissions, which is a target for NHS Scotland (see environmental chapter). Chart 3 below highlights the proportion of SABA pMDI inhalers prescribed in each NHS Board.

Chart 3: Number of SABA pMDI inhalers prescribed per 1,000 list size



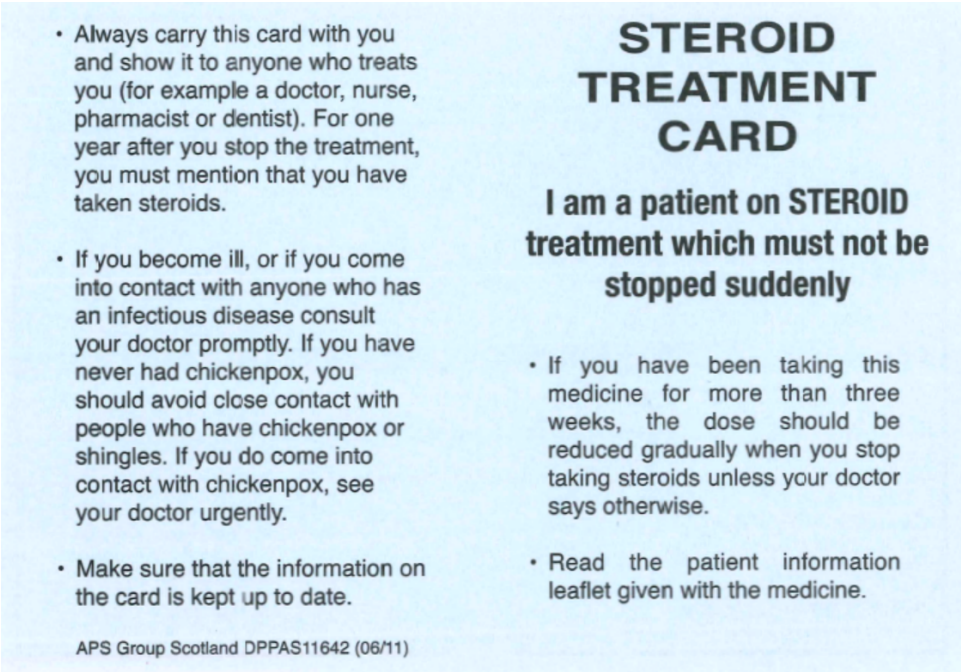
Prescribing of high dose corticosteroid inhalers

There are safety concerns regarding the inappropriate use of high dose corticosteroid inhalers and the importance of ensuring that the patient's steroid load is kept to the minimum level whilst effectively treating symptoms. It is recognised that some patients will require treatment with high-dose ICS. This indicator acts as a guide for highlighting use of inhaled high dose corticosteroids but is unable to distinguish between patients with asthma and COPD. The STU software will allow GP practices to identify patients within each cohort for review.

Patients on inhaled high dose corticosteroids (or multiple steroid preparations) should be issued with a steroid treatment card (blue), see Figure 4. There is an additional steroid emergency card (Figure 5) which alerts patients who are dependent on long term steroids and at risk of adrenal insufficiency to the potentially

serious, systemic side effects from them. A full list of steroid doses to assist with determining who should be issued with a steroid emergency card (red) is contained within the Healthcare Improvement Scotland advice[18] and STU software will assist identification of these patients. The most concerning side effect is adrenal suppression, others include growth failure; reduced bone density; cataracts and glaucoma; anxiety and depression; and diabetes mellitus.[31]

Figure 4: Steroid treatment card



- Always carry this card with you and show it to anyone who treats you (for example a doctor, nurse, pharmacist or dentist). For one year after you stop the treatment, you must mention that you have taken steroids.
- If you become ill, or if you come into contact with anyone who has an infectious disease consult your doctor promptly. If you have never had chickenpox, you should avoid close contact with people who have chickenpox or shingles. If you do come into contact with chickenpox, see your doctor urgently.
- Make sure that the information on the card is kept up to date.

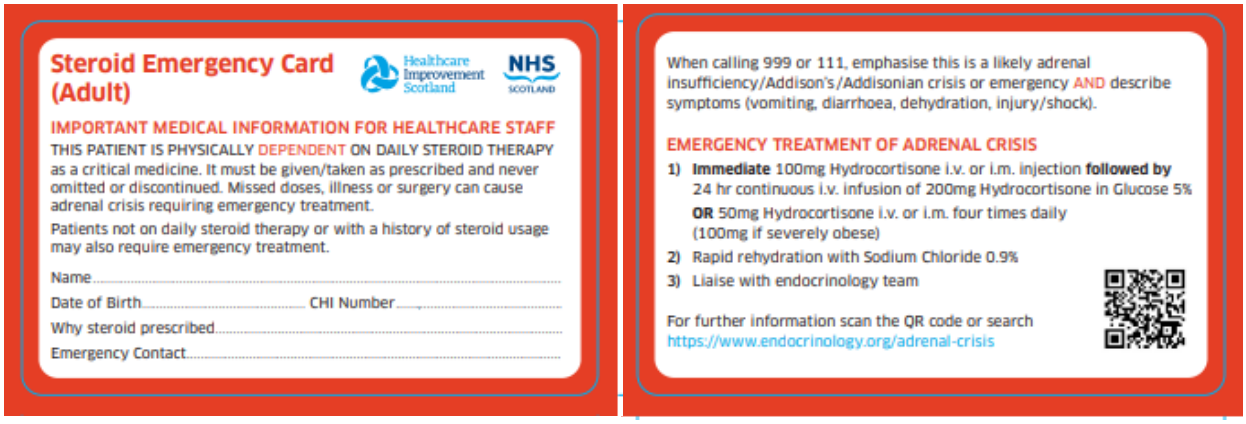
APS Group Scotland DPPAS11642 (06/11)

STEROID TREATMENT CARD

I am a patient on STEROID treatment which must not be stopped suddenly

- If you have been taking this medicine for more than three weeks, the dose should be reduced gradually when you stop taking steroids unless your doctor says otherwise.
- Read the patient information leaflet given with the medicine.

Figure 5: Steroid emergency card



Steroid Emergency Card (Adult)

Healthcare Improvement Scotland NHS SCOTLAND

IMPORTANT MEDICAL INFORMATION FOR HEALTHCARE STAFF

THIS PATIENT IS PHYSICALLY DEPENDENT ON DAILY STEROID THERAPY as a critical medicine. It must be given/taken as prescribed and never omitted or discontinued. Missed doses, illness or surgery can cause adrenal crisis requiring emergency treatment.

Patients not on daily steroid therapy or with a history of steroid usage may also require emergency treatment.

Name.....

Date of Birth..... CHI Number.....

Why steroid prescribed.....

Emergency Contact.....

When calling 999 or 111, emphasise this is a likely adrenal insufficiency/Addison's/Addisonian crisis or emergency AND describe symptoms (vomiting, diarrhoea, dehydration, injury/shock).

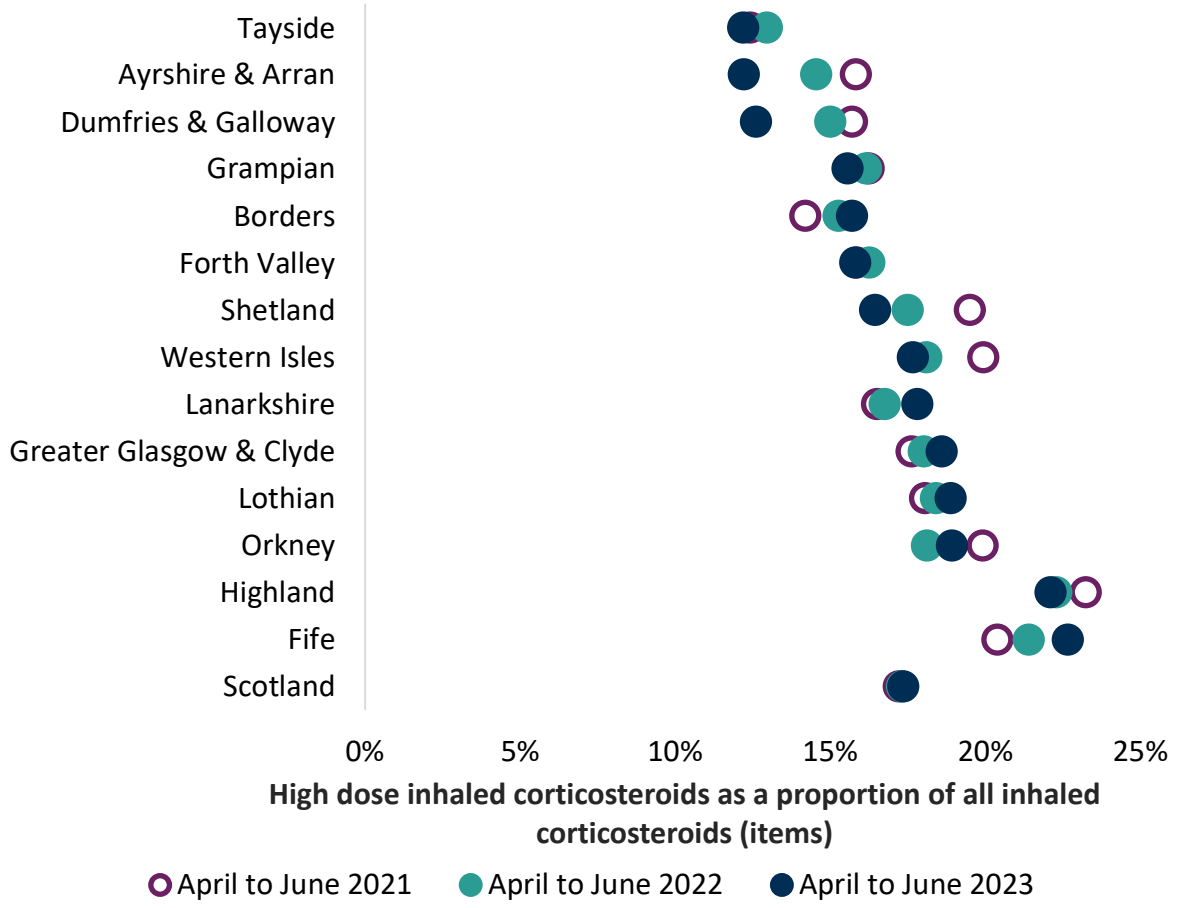
EMERGENCY TREATMENT OF ADRENAL CRISIS

1) **Immediate** 100mg Hydrocortisone i.v. or i.m. injection **followed by** 24 hr continuous i.v. infusion of 200mg Hydrocortisone in Glucose 5%
   OR 50mg Hydrocortisone i.v. or i.m. four times daily (100mg if severely obese)
2) Rapid rehydration with Sodium Chloride 0.9%
3) Liaise with endocrinology team

For further information scan the QR code or search https://www.endocrinology.org/adrenal-crisis

Chart 4 shows that high dose corticosteroid inhaler prescribing has increased in most NHS boards since 2021.

Chart 4: High dose corticosteroid inhalers as a percentage of all corticosteroid inhaler items (using 2019 SIGN/BTS classification of high dose)



This guidance is not for children; therefore prescribers should refer to guidance on asthma management in children, however, there are two medication safety points to highlight. Prescribing of high dose inhaled corticosteroids in children, aged under 12 years, is of particular concern due to long term safety concerns. Children on high dose corticosteroids should be reviewed and under the care of paediatricians with a special interest in respiratory medicine. Transition from child to adult services should be considered for children with unstable asthma or co-existing risks, such as food allergies and a review carried out in children's services to facilitate this. There is a report available using the STU utility to identify high dose corticosteroid use in children under 12 years.

When treating children with ICS:[6]

- it is important to record growth (Height and weight centile) on an annual basis using the same equipment[6] (unreliable indicator of adrenal suppression) - if there are concerns regarding growth, advice should be sought from a paediatrician

- high-dose ICS should be used only under the care of a specialist paediatrician
- adrenal insufficiency should be considered in any child with shock and/or reduced consciousness who is maintained on ICS

Evidence for review of high dose inhaled corticosteroids

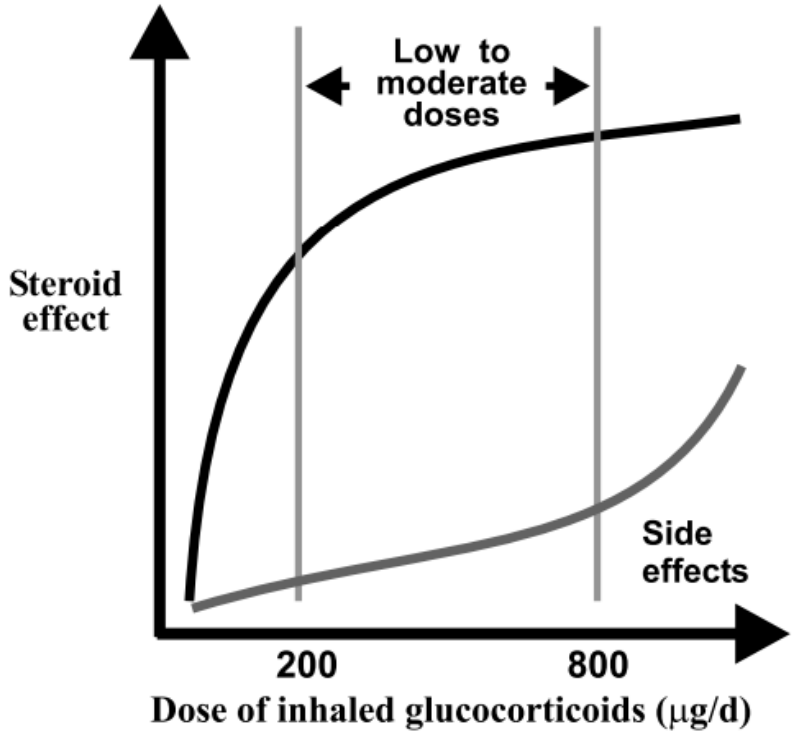
SIGN 158 recommends the following for adults and children.[6]

Patients should be maintained at the lowest possible dose of inhaled corticosteroid. Reduction in inhaled corticosteroid dose should be slow as patients deteriorate at different rates. Reductions should be considered every three months, decreasing the dose by approximately 25 to 50% each time. It is difficult to set a specific threshold level of ICS inhalers for review due to their varying potencies, dosing and quantities (for example 200 actuations in most ICS MDIs and 100 doses in some ICS DPIs).

It is important to arrange for a regular review of patients as treatment is reduced. When deciding the rate of reduction, it is important to take into account the following aspects: the severity of asthma, the side effects of the treatment, time on current dose, the beneficial effect achieved, and patient preference.

The dose – response curve for inhaled corticosteroids (Figure 6)[32] shows the difference in clinical effect and side effects when a corticosteroid dose is increased. At doses of 800 micrograms per day and above, the clinical benefit of increasing inhaled corticosteroid dose is outweighed by increase in side effects.

Figure 6: Dose – response curve for inhaled corticosteroids



Reproduced with permission from National Library of Medicine (Hannu Kankaanranta, Aarne Lahdensuo, Eeva Moilanen, and Peter J Barnes)[32]

Number of inhaled corticosteroids prescribed per annum

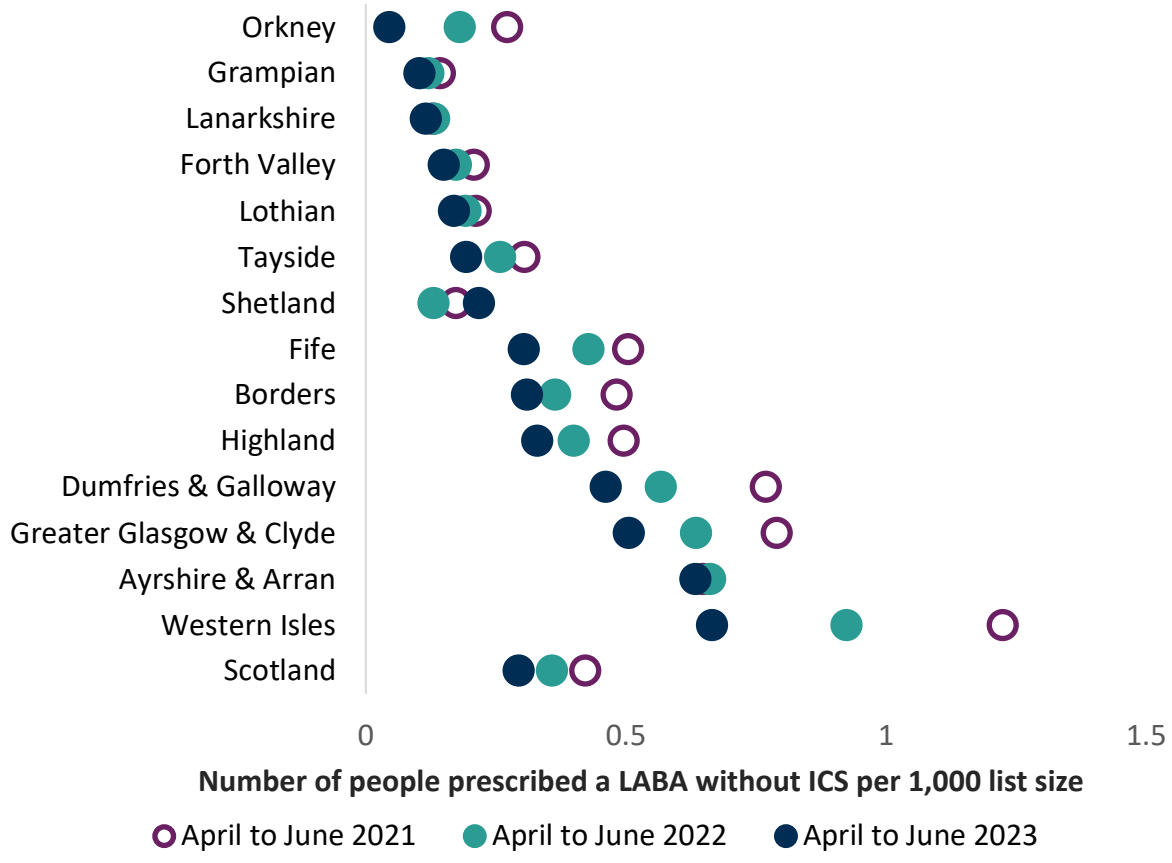
People who have been prescribed an ICS inhaler and do not order on repeat prescription should be checked for adherence and understanding of preventer treatment and to establish appropriate use of SABA inhalers. The National Review of Asthma Deaths (NRAD) report[22] highlighted that some people at risk of uncontrolled asthma / sudden death had under used preventer medicines. Most ICS inhalers (pMDIs and DPIs) have a dose counter and that may be used to aid understanding of adherence based on an individual's asthma management plan.

Conversely, some people may over-order inhalers for various reasons, such as poor understanding of therapy. A review would be advised to explore this. Use of the STU software is recommended for GP practices to identify patients receiving 14 or more ICS inhalers a year (see chapter 12).

Prescribing of SABA plus LABA without ICS

The NRAD report[22] highlighted that individuals with asthma who were prescribed a LABA without an ICS were at higher risk of death. As is clear from Chart 5 the number of people without an ICS prescribed is small and continues to reduce. Some of these patients may have a COPD diagnosis in which case prescribing of a LABA without an ICS would be reasonable.

Chart 5: People prescribed a LABA without ICS per 1000 patient size



Prescribing of SABA only

This indicator highlights the proportion of patients who receive a SABA inhaler in the absence of other inhalers. SIGN 158 states that on diagnosis of asthma, patients be considered for monitored initiation on low dose ICS plus a SABA as required and GINA recommends AIR therapy.[26] Patients on SABA inhalers alone should be reviewed, establishing reasons for SABA only use, such as COPD diagnosis, viral wheeze and COVID-19 symptoms.

Using STU software is recommended within GP practices and will allow identification of individuals coded on a SABA inhaler only (see chapter 12).

Chart 6: Prescribing of SABA only (in absence of other inhalers)

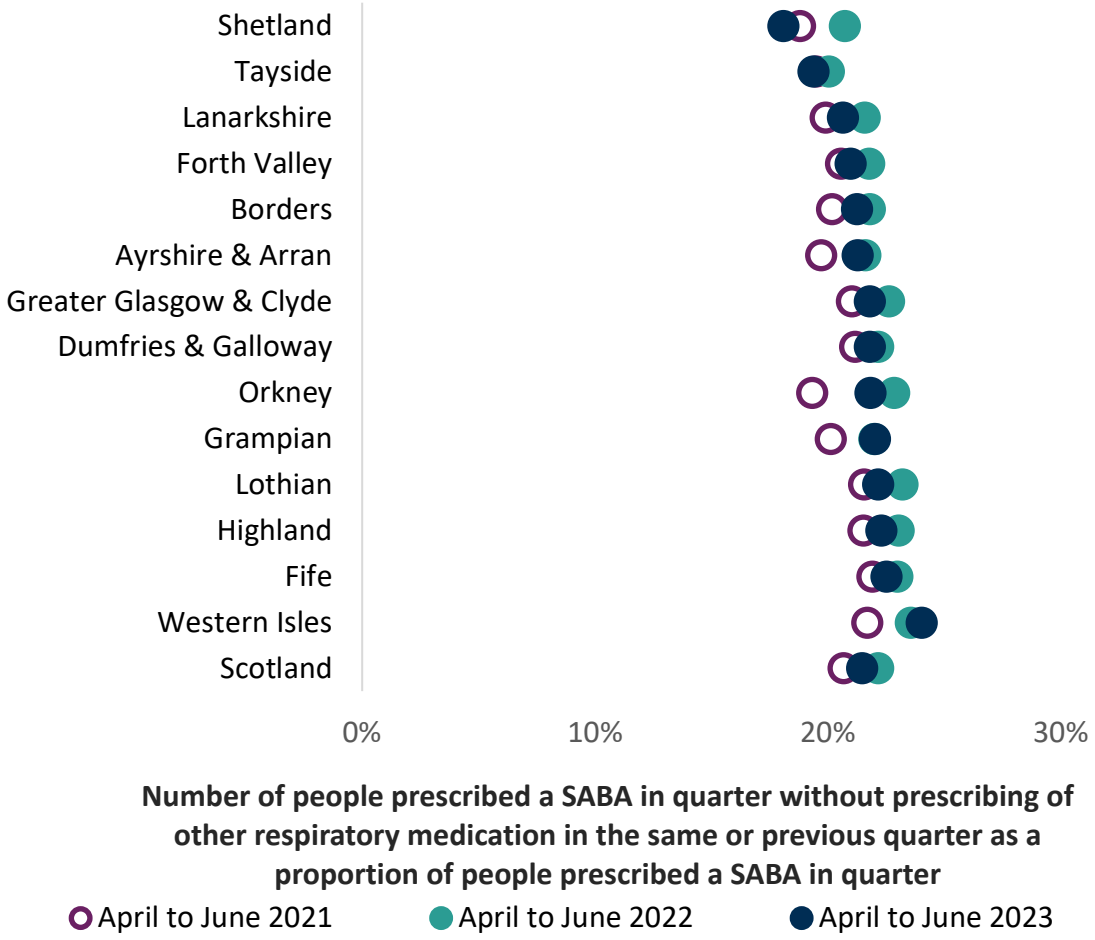


Chart 6 shows that in NHS Scotland approximately 22% of people being prescribed a SABA inhaler are not prescribed other inhaler therapy. As per national asthma and COPD guidelines, very limited numbers of patients should be prescribed SABA inhalers only.

Prescribing of Montelukast (leukotriene receptor antagonist)

Montelukast can be used as an additional add on therapy for asthma in adults. If control remains suboptimal after the addition of an inhaled LABA to low-dose ICS then either:

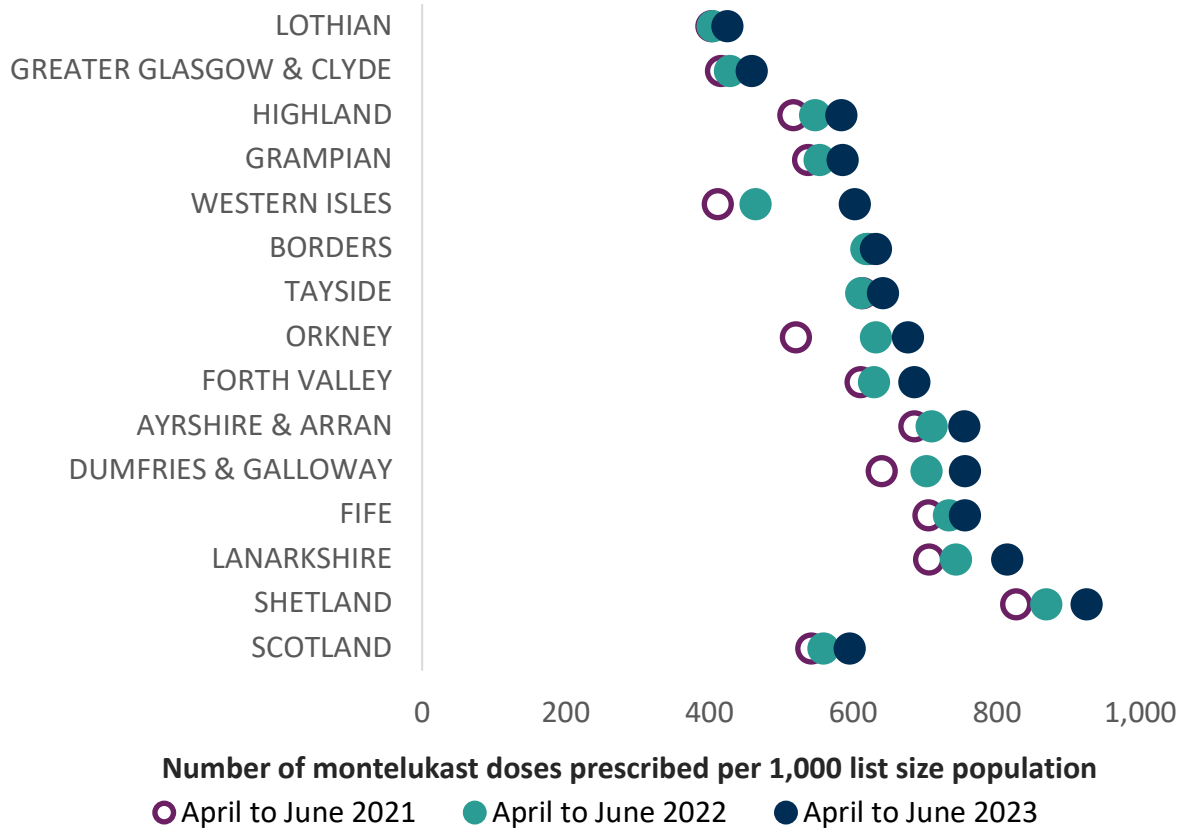
- increase the dose of inhaled corticosteroids to medium dose

or

- consider adding a leukotriene receptor antagonist[6]

Chart 7 below highlights prescribing of montelukast, which shows a variance in NHS Boards across Scotland. Overall prescribing appears to have increased. Montelukast should be reviewed four to eight weeks following initiation[33] to ensure that there has been a response to therapy and that it is still required.

Chart 7: Number of montelukast doses prescribed per 1000 list size of population



The Medicines and Healthcare products Regulatory agency (MHRA) issued a reminder regarding the known risks of neuropsychiatric reactions with montelukast.[34]

A recent EU Review[35] of montelukast confirmed the known risks and that the magnitude was unchanged. The review highlighted that there had been some delays in recognising that neuropsychiatric reactions were a potential side effect to

montelukast. Consider the benefits and risks of continued prescribing should these side effects occur.

Treatment of exacerbations

A personalised asthma action plan should identify what to do in the event of worsening symptoms and how to prevent deterioration using the individual's own inhaler devices, highlighting when emergency care is required. Patients should be encouraged to continue to use their usual inhaler device in an acute exacerbation as this is the device that they will have been taught to use effectively and will be confident in using.

During acute exacerbations, treatment is with repeated administration of SABA, early introduction of oral corticosteroids, and controlled flow oxygen where indicated.

Inhaled SABA therapy such as salbutamol should be administered frequently for patients presenting with acute asthma. Delivery of SABAs via a pMDI and spacer or a DPI leads to a similar improvement in lung function as delivery via a nebulizer for treatment of acute exacerbations.[26] A person-centred approach to treatment plans for acute exacerbations should be taken to ensure that the individual has a reliever inhaler that they can use effectively in the event of an acute attack.[36] If a patient has concerns regarding their ability to use their usual inhaler device during an exacerbation, this should be discussed and a person-centred choice made.

Refer to local acute protocols for management of acute asthma exacerbations in a secondary care setting, including use of agents such as intravenous (IV) magnesium sulfate and aminophylline etc.

Severe Asthma

Severe asthma is defined as asthma that is uncontrolled despite adherence with optimised ICS-LABA therapy and treatment of contributory factors, or that worsens when high-dose treatment is decreased.[26]

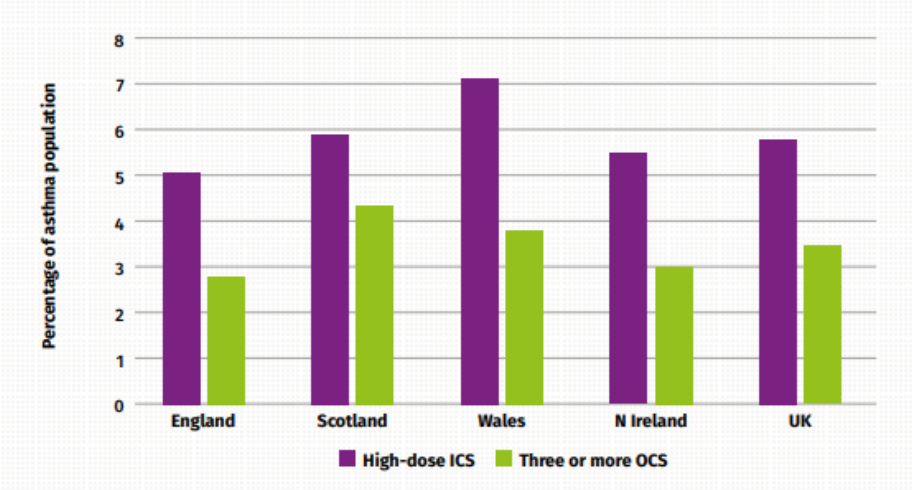
Difficult-to-treat asthma is defined as asthma that remains uncontrolled despite prescribing medium or high dose ICS-LABA treatment or requires high dose ICS-LABA treatments to maintain good symptom control and reduce exacerbations.

Poorly controlled and/or unrecognised severe asthma is a significant problem, leading to morbidity and mortality. Severe asthma is associated with poor asthma control, impaired lung function and repeat exposure to oral corticosteroids (OCS) which can lead to further OCS-related adverse effects such as diabetes, adrenal insufficiency, and osteoporosis.

Severe asthma is estimated to affect 3% to 5% of the asthma population. Scotland has higher rates of difficult and severe asthma compared to the rest of the UK.[37]

Proxy measures of inhaled high dose corticosteroids (ICS) or number of courses of oral corticosteroids (OCS) treatments have been suggested as indicators of those at risk of severe asthma.[37] Figure 7 below outlines the differences in difficult or severe asthma prevalence, based on the indicators of high-dose ICS or those receiving three or more OCS courses across the nations in the UK in 2016.[37] For three or more OCS prescriptions Scotland has the highest figure in the UK, with 4.3%, compared to the UK figure of 3.4% of the asthma population.

Figure 7: Prevalence levels of severe asthma in the UK (2016)



Early identification of at-risk patients with asthma is key to ensure prompt referral to specialists for consideration of Monoclonal antibody (mAb) therapy where appropriate. Pathways have been developed to support the identification and management of patients at risk of severe asthma.[38]

Criteria to identify patients at risk of severe asthma:

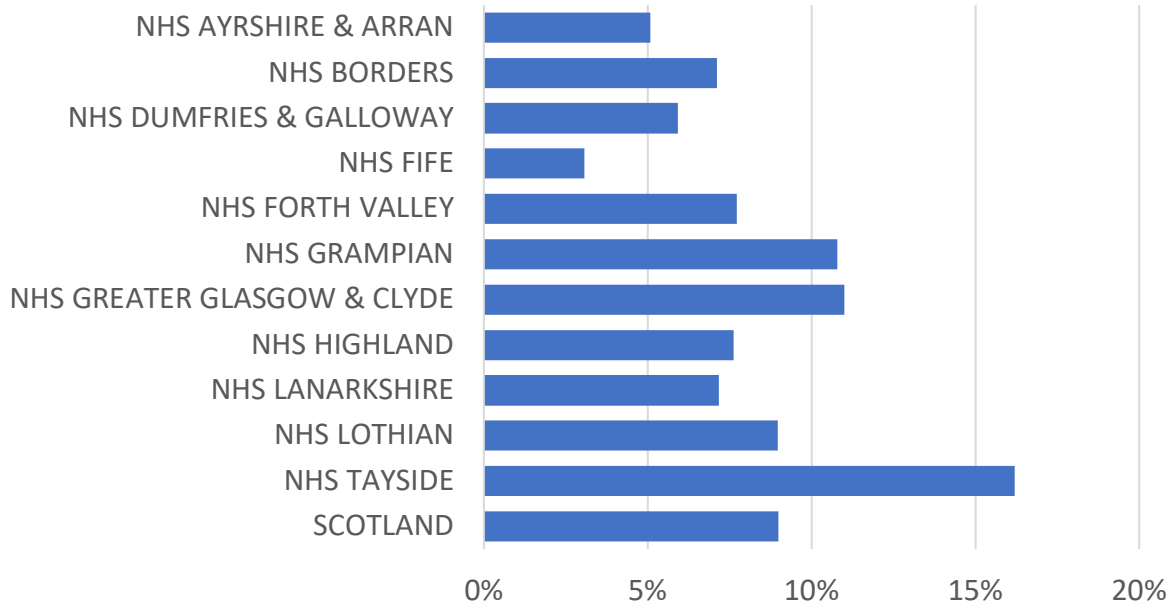
- ≥6 SABA prescriptions in previous 12 months **or**
- ≥2 asthma exacerbations / OCS prescriptions in previous 12 months **or**
- ACQ6 >1.5 (or ACT <20) despite maximum inhaled therapies (ICS and LABA and LAMA)[26,37]

Modifiable risk factors such as smoking status, inhaler technique, adherence and housing conditions should be addressed and a referral made where asthma control remains suboptimal.[38] The Scottish Therapeutic Utility (STU) software will aid identification of these patients within GP practices.

Monoclonal antibodies (mAb) are a type of biologic drug that can be used to treat severe asthma. They target specific biological processes to reduce inflammation in the lungs and currently either target 'allergic' asthma or 'eosinophilic' asthma. There are various mAbs approved by the Scottish Medicine Consortium (SMC) for Scotland including; benralizumab, dupilumab, mepolizumab, omalizumab and tezepelumab. These medications have been shown to significantly reduce asthma exacerbations, hospital admissions and oral corticosteroid use.[39,40,41,42] The SMC has set strict eligibility criteria for patients receiving these drugs to ensure that they are used for patients most likely to benefit and in the most cost-effective way. Consequently, mAbs are included in SIGN/BTS and NICE clinical guidance for the treatment of severe asthma.[6,7]

It has been previously estimated that 20% of eligible patients with severe asthma, received treatment with mABs in the UK.[37] The Accelerated Access Collaborative estimated this as 17-21% of eligible patients in England.[43] A benchmarking exercise was completed across NHS Scotland identifying adult patient numbers prescribed mAbs as a proportion of the estimated severe asthma population (shown in Chart 8) showing wide variation in prescribing based on weighted population. A prevalence of 6.4% was assumed for asthma, based on the Scottish Public Health Observatory figures, and severe asthma estimated as 4% of this. Uptake and use of mAbs for the management of severe asthma varies across Scotland. Ongoing work is required to increase early identification, referral and assessment of at-risk patients.

Chart 8: Number of people with severe asthma receiving biologics as a proportion of the estimated severe asthma population



Number of severe asthmatics receiving biologics as a proportion of the estimated severe asthma population (April to June 2022)

Environmental considerations in severe asthma

A report published by the Sustainable Healthcare Coalition[44] estimated that the greenhouse gas (GHG) emissions associated with a person's management of severe asthma is reduced by approximately 50% through the use of mAb therapy.

This reduction is due to the combined effects of improved symptom control, reduced exacerbations and a decrease in hospital admissions. These trends directly affect the environmental impact associated with asthma management and are important steps towards more sustainable treatment.

Asthma case study

Background Details - (Age, Sex, Occupation, baseline function)

- 47-year-old female
- Works as cleaner in local high school, but currently on sick leave
- Has had 16 courses of oral prednisolone therapy in 12 months without any face-to-face review with a clinician.
- Has ordered 24 salbutamol pMDIs in 12 months
- Breathless, nocturnal wheeze most nights
- Never tested positive for Covid

History of presentation/ reason for review

Referred to primary care healthcare professional due to OCS use and high-volume ordering of salbutamol, despite current treatment with Airflusal® pMDI (fluticasone 250 micrograms /salmeterol 25 micrograms) two puffs twice daily. Worsening symptoms over the past year. Multiple courses of oral prednisolone therapy

Current Medical History and Relevant Comorbidities

Asthma

Current Medication and drug allergies (include OTC preparation and Herbal remedies)

- Airflusal® pMDI 250/25 two puffs twice daily, only ordered six inhalers in 12 months
- Salbutamol pMDI two puffs, as required, 24 inhalers ordered in 12 months

Lifestyle and Current Function (inc. Frailty score for >65yrs) alcohol/ smoking/ diet/ exercise

- Lives with husband and three children. Has two dogs and one cat.
- Current smoker of 10 cigarettes per day with 18 pack years
- Overweight with BMI 31. Little motivation to engage with physical activity

Results e.g. biochemistry, other relevant investigations or monitoring

- Asthma Control Test (ACT) 7/25
- RadioAllergosorbent Test (RAST) – High positive dogs, moderate positive cats, low positive pollen, dust mite. Await Total IgE and aspergillus serology.
- Normal eosinophils. TFTs, FBC, U and Es, Bone, Glucose, ANA, ANCA, CRP, Iron studies and B12- normal.
- Referred Chest X-Ray (CXR) and Pulmonary function tests (PFTs)

Most recent consultations

First consultation:

- Discussed symptoms and ACT 7/25. Carried out full asthma serology screen. Referred for full PFTs, CXR and DEXA scan
- Chest exam-NAD. SpO2 98% room air
- Discussed concerns over multiple prednisolone courses, high volume salbutamol use and poor adherence to Airflusal® in the context of symptoms and ACT score, adherence to preventer therapy discussed
- Agreed move to Fobumix® Easyhaler® DPI (budesonide 320 micrograms/ formoterol 9 micrograms) two puffs twice daily and Easyhaler® salbutamol, as inhaler technique poor with MDI and good with Easyhaler®. Discussed this in line with health board's green agenda. Discussed physiology of asthma and concerns, as identified as at risk
- Explained side effect risks from prednisolone and need for DEXA scan
- Discussed smoking cessation and Very Brief Advice (VBA) given. Will consider referral to Quit Your Way
- Full asthma screen and review arranged for following week

Follow up appointment:

- Given blood results and awaiting Total IgE and Aspergillus serology. Discussed addition of montelukast given RAST positivity and pets. Agreed with plan.
- Awaiting date for PFTs and CXR
- Further education and discussion around managing asthma.
- Aware dependent on awaited results may need referral onto Difficult Asthma Clinic
- Personalised Asthma Action Plan discussed, agreed and written copy issued. Advised that this may change dependent on results
- Further appointment made for four weeks for review

Step	Process	Person specific issues to address
1. **Aims** What matters to the individual about their condition(s)?	**Review diagnoses and identify therapeutic objectives with respect to:** • Identify objectives of drug therapy • Management of existing health problems. • Prevention of future health issues **Ask patient to complete PROMs** (questions to prepare for my review) **before their review**	• Worsening symptoms of asthma and poor control, resulting in multiple courses of oral steroids and high volume of salbutamol use • Getting back to work as a cleaner
2. **Need** Identify essential drug therapy	**Identify essential drugs (not to be stopped without specialist advice)** • Drugs that have essential replacement functions (e.g. levothyroxine) • Drugs to prevent rapid symptomatic decline (e.g. drugs for Parkinson's disease, heart failure)	• Inhaled corticosteroids for asthma control, currently prescribed as a combination MDI, Airflusal® (not being ordered regularly)
3. **Need** Does the individual take unnecessary drug therapy?	**Identify and review the (continued) need for drugs** • What is medication for? • with temporary indications • with higher than usual maintenance doses • with limited benefit/evidence of its use in general • with limited benefit in the person under review (see Drug efficacy & applicability (NNT) table)	• Salbutamol is used frequently (24 inhalers ordered in 12 months), unnecessary if preventer therapy used effectively • Past frequent courses of oral steroids (16 courses in 12 months) increasing potential for adverse effects
4. **Effectiveness** Are therapeutic objectives being achieved?	**Identify the need for adding/intensifying drug therapy in order to achieve therapeutic objectives** • to achieve symptom control • to achieve biochemical/clinical targets • to prevent disease progression/exacerbation	• Discussion and education regarding adherence to preventer therapy and salbutamol use. MART therapy also discussed as an option. • Checked inhaler technique with MDI to ensure able to use • Inhaler changed to a DPI (Fobumix® Easyhaler®, containing an ICS/LABA) as MDI technique was poor

	• is there a more appropriate medication that would help achieve goals	• RAST positivity and presence of pets at home, therefore addition of montelukast to trial
5. **Safety** Does the individual have ADR/ Side effects or is at risk of ADRs/ side effects? Does the person know what to do if they're ill?	**Identify individual safety risks by checking for** • If the targets set for the individual appropriate? • drug-disease interactions • drug-drug interactions (see ADR table) • monitoring mechanisms for high-risk drugs • risk of accidental overdosing **Identify adverse drug effects by checking for** • specific symptoms/laboratory markers (e.g. hypokalaemia) • cumulative adverse drug effects (see ADR table) • drugs that may be used to treat side effects caused by other drugs **Medication Sick Day guidance**	• Advised of potential for adverse effects from multiple oral steroid courses. DEXA scan arranged. Inhaled corticosteroids treat the condition with reduced exposure to systemic effects, therefore reduced ADRs • Risk of hypokalaemia with salbutamol over-use, U and Es were normal • Personalised Asthma Action Plan reinforces advice to take when symptoms of asthma control deteriorate
6. **Sustainability** Is drug therapy cost-effective and environmentally sustainable?	**Identify unnecessarily costly drug therapy by** • Consider more cost-effective alternatives (but balance against effectiveness, safety, convenience) **Consider the environmental impact** • Inhaler use • Single use plastics • Medicines waste • Water pollution	• MDI changed to DPI (Easyhaler®) due to inhaler technique, and discussed environmental impact of propellant gases in MDI compared to DPI • Salbutamol DPI (Easyhaler®) has a dose counter, so will provide reassurance of medication availability, but with education and discussion about management of asthma to reinforce the importance of regular preventer therapy
7. **Person-centredness** Is the person willing and able to take drug therapy as intended?	**Does the person understand the outcomes of the review?** • Consider Teach back **Ensure drug therapy changes are tailored to individual's preferences by** • Is the medication in a form they can take?	**Agreed plan** • Regular preventer therapy issued in an inhaler which they are able to use correctly • Personalised Asthma Action Plan discussed and agreed, with a written copy given

	• Is the dosing schedule convenient? • Consider what assistance they might have and when this is available • Are they able to take medicines as intended **Agree and communicate plan** • Discuss with the individual/carer/welfare proxy therapeutic objectives and treatment priorities • Agree with them what medicines have an effect of sufficient magnitude to consider continuation or discontinuation • Inform relevant healthcare and social care carers, changes in treatments across the care interfaces **Ask patient to complete the post-review PROMs questions after their review**	• Discussed smoking cessation and Very Brief Advice (VBA) given. Considering referral to Quit Your Way • Possible that a further referral to the Difficult Asthma Clinic may be needed, dependent on full results and outcomes from improved education and inhaler technique • Review appointment made for four weeks' time

6. Chronic Obstructive Pulmonary Disease (COPD)

COPD

An estimated 1.2 million people live with diagnosed COPD in the UK, and the prevalence of COPD in Scotland is higher than the UK national average.[45] COPD is a disease of breathlessness, more common in those aged over 35 and in those with a risk factor, most commonly smoking or a history of smoking.[46] It is a major cause of morbidity and mortality and is a long term condition, which is set to increase in prevalence due to ageing and continued exposure to risk factors.[47]

Summary of recommendations in COPD

- ICS (licensed only as part of combination therapy (with LABA and/or LAMA)) are prescribed for people with COPD who have a severe exacerbation, features of asthma or more than 2 exacerbations in one year.
- review patients three months following initiation of inhaled ICS as part of combination therapy and stop ICS if there is insufficient response or adverse effects
- mucolytic therapy is considered for symptoms of chronic cough with productive sputum and should be reviewed four weeks after commencing therapy, stopping if symptoms have not improved with use
- regular review of mucolytic therapy during the annual COPD review should be undertaken and may be stopped if there is no productive cough
- review individuals with COPD on separate LAMA and LABA / ICS inhalers and, if appropriate, change to triple therapy inhalers
- review antibiotic course length (five-day course recommended) if needed for infective exacerbations of COPD, with sputum cultures for treatment failure
- repeated use of 'rescue medication' (steroid and/or antibiotic) (two or more courses per year) should trigger a review to optimise long-term management

Principles of prescribing for COPD

Removal or reduction of risk factors, such as stopping smoking is the first step to management of COPD. Breathlessness in COPD is managed with long-acting bronchodilation. GOLD[47] and NICE guidance recommend dual bronchodilation, although in clinical practice often single agent long-acting bronchodilation is used. Prescribers should be guided by local formulary guidance. Inhaled therapy aims to relieve the symptoms of breathlessness in COPD. Pharmacotherapy can reduce COPD symptoms, reduce the frequency and severity of exacerbations, and improve health and exercise tolerance.[47] Patients with COPD should be reviewed regularly to ensure that treatment is optimised.

Inhaler device selection is important, and patients should receive training in how to use the device and be able to use it. Sufficient inspiratory flow is needed for a dry powder

inhaler (DPI) and if an individual can breathe in quickly and deeply over two to three seconds, they are likely to be able to manage a DPI. Those who are frail, elderly or the very young are less likely to have sufficient inspiratory flow and an MDI with spacer may be more appropriate. Environmental impact of inhalers is a key consideration and prescribers are asked to consider inhalers with a lower global warming potential where it is appropriate for the patient (see chapter 10).

To prescribe most effectively for individuals with COPD the 'what matters to you?' principles and Polypharmacy 7-Steps approach are recommended. Table 2 outlines the main principle for treating patients with COPD.

Table 2: Principles of treating patients with COPD

	Polypharmacy review 7-Steps	
1	What matters to the patient?	• Ask the patient what matters to them? • Ask patient to complete PROMs (questions to prepare for my review) before their review • Is the patient's day to day life or activities affected? • Do they have relief of symptoms and would they like to consider prevention of deterioration or repeat attacks. • Clear guidance and advice on when to use rescue medication – this may involve the use of digital technology (e.g. COPD self-management app) • How to improve activity and exercise tolerance and the introduction of pulmonary rehabilitation to improve quality of life at the appropriate point. Advice regarding pacing and lifestyle • Knowledge of and avoidance of known triggers for exacerbations, e.g. infection. • Do environmental considerations matter? (see chapter 10)
2	Identify essential drug therapy	• Ensure COPD diagnosis confirmed by spirometry carried out by trained professionals • Check adherence and inhaler technique before stepping up or adding medicines • Ensure treatment is optimised with local / GOLD guidelines[47] • When considering therapy, note when patients may have COPD with a background of asthma • Acute COPD exacerbations, defined as a sustained worsening of respiratory symptoms with acute onset, from their usual stable state beyond normal day-to-day variations, usually triggered by a respiratory tract

		infection. Initial treatment is with SABA. Consider the use of oral corticosteroids (OCS) with the possibility of antibiotics if indicated, for five days following the local formulary and personalised self-management plan[48] ◦ Indication for antibiotics (three of the following symptoms, or only one additional symptom if change in sputum colour is present)[47] ▪ worsening breathlessness and ▪ cough ▪ increased sputum production ▪ change in sputum colour • For regular exacerbations, consider referral to secondary care where recommended antibiotic prophylaxis may be prescribed, referring to local formularies for guidance. Consider risk-benefit due to increased bacterial resistance.[47,49] ▪ Monitoring during antibiotic therapy may be required[46] • Secondary care review to confirm ongoing need for and effectiveness of medication and screen for side effects
3	Does the patient take unnecessary drug therapy?	• Review use of ICS as part of combination therapy in people with COPD who are not exacerbating or who do not have blood eosinophils >300 cells/μL to reduce the risk of pneumonia and other potential ADRs[47] • Long term OCS are not recommended due to the potential for adverse effects • Steroid treatment cards should be provided to patients on high dose steroids (both oral and inhaled). A steroid emergency card may also be required.[18] • Ordering six or more SABA inhalers per year may indicate continued breathlessness and therapy optimisation may be needed • Repeated use of 'rescue medication' (two or more per year)[47] should trigger a review to optimise long term management. Sputum samples are necessary to guide antibiotic prescribing, especially if empirical prescribing has not resolved symptoms.[47] • Review the need for mucolytics on a regular basis and continue only if symptomatic improvement (reduction in cough and sputum)[48] • Regular use of nebuliser therapy should be a prompt for review. Nebulisers should only be used under medical recommendation. They require regular servicing and a pMDI with a spacer is at least as good

		as a nebuliser in treating mild / moderate asthma attacks[6] • If oxygen saturations are below 92% on air consistently, refer for oxygen assessment as per local Health Board criteria • Patients with significant emphysema and air trapping may benefit from lung volume reduction surgery
4	Are therapeutic objectives being achieved?	• Ensure at least annual review • Can the patient use their inhalers properly? Consider addition of spacer to aid MDI lung deposition or consider DPI/SMI if appropriate • Improvement in general health and exercise tolerance • Reduction in breathlessness and reduction of the risk of exacerbations or hospital admissions • Use COPD Assessment Test (CAT)[50] and/or Modified Medical Research Council (MRC) breathlessness scales[51] score as objective measurements of effect on activities of daily living (ADLs) • Optimise therapy if there are frequent exacerbations and update self-management plans. • Manage comorbidities affecting management and symptoms of COPD e.g., depression, heart failure, osteoporosis, obesity, anxiety and dysfunctional breathing • Vaccinations should be offered if not up to date (influenza, pneumococcal, DTaP (if not vaccinated in adolescence) and Covid-19) • Patients should be encouraged to engage in appropriate physical activity, including pulmonary rehabilitation. Social prescribing such as exercise, dependant on ability and singing classes • Smoking cessation should be advised and the adverse effects of smoking on children highlighted. Offer appropriate support. Signpost patients to the NHS inform Quit Your Way Scotland website (which includes community pharmacy services) Weight reduction is recommended in obese patients (BMI >30) • Nutritional advice and support will be necessary in those with a BMI less than 20
5	Is the patient at risk of Adverse Drug Reactions (ADR)s or suffer actual ADRs?	• Appropriate use of ICS as part of combination therapy ensures reduced risk of developing pneumonia (low eosinophil counts are predictive of increased risk of pneumonia) and adrenal suppression[47]

		• Oral corticosteroid use should not be used routinely unless comorbidity diagnosis requires OCS treatment. If withdrawal not possible, prescribe the lowest possible dose. Monitor for the possibility of adrenal suppression/ glucocorticoid effects and osteoporosis if on long term or frequent (more than three or four courses a year) treatment[19] • Assess for oral thrush - ensure correct technique to reduce incidence and add spacer device for pMDI if required • Dry mouth is common due to anticholinergic effects of long-acting muscarinic antagonist (LAMA) inhalers. • Antibiotic use may cause adverse effects including potential allergies and are not suitable for all COPD exacerbations. Minimal course length should be prescribed to reduce the risk of resistance. Ensure true antibiotic allergies are recorded and review accuracy of previous records. Scottish Antimicrobial Prescribing Group (SAPG) have a penicillin de-labelling toolkit.[52] • Yellow card reporting of ADRs
6	Sustainability	• Triple therapy may be more cost effective compared to using separate long-acting beta$_2$ agonist (LABA)/ LAMA and ICS inhalers and aids adherence as well as reducing the carbon footprint of the inhalers (single versus multiple inhaler use) • Consider whether a DPI or SMI would be appropriate • Opportunities for cost minimisation should be explored but only considered if effectiveness, safety or adherence would not be compromised • For new medicines ensure prescribing is in line with Health Board formulary recommendations
7	Is the patient willing and able to take drug therapy as intended?	• A personalised action plan is a key factor, with focus on inhaler technique, worsening symptom advice and awareness of symptom control. • Refer to Pulmonary Rehabilitation (PR) or physiotherapist management of dysfunctional breathing, when necessary, as per local Health Board criteria. • Consider end-of-life and palliative care support. Does the patient have an Anticipatory Care Plan (ACP)? • Make patient aware of support information e.g. the My Lungs My Life website (See Appendix 1) • Agree with the patient arrangements for repeat prescribing. Signpost to Medicines Care and Review

		(MCR) service in community pharmacy where appropriate • Ask patient to complete the post-review PROMs questions after their review

Prescribing areas to address for COPD

The indicators included are priority areas of prescribing where there is variation within NHS Boards. Ensuring COPD medicines are reviewed and optimised may support the reduction of unwarranted variation. The indicators focus on ensuring quality prescribing and any recommendations made follow national clinical guidance. PIS Prescribing data cannot be separated by diagnosis however the Scottish Therapeutics Utility (STU) software enables GP practices to identify patients with asthma or COPD (see chapter 12).

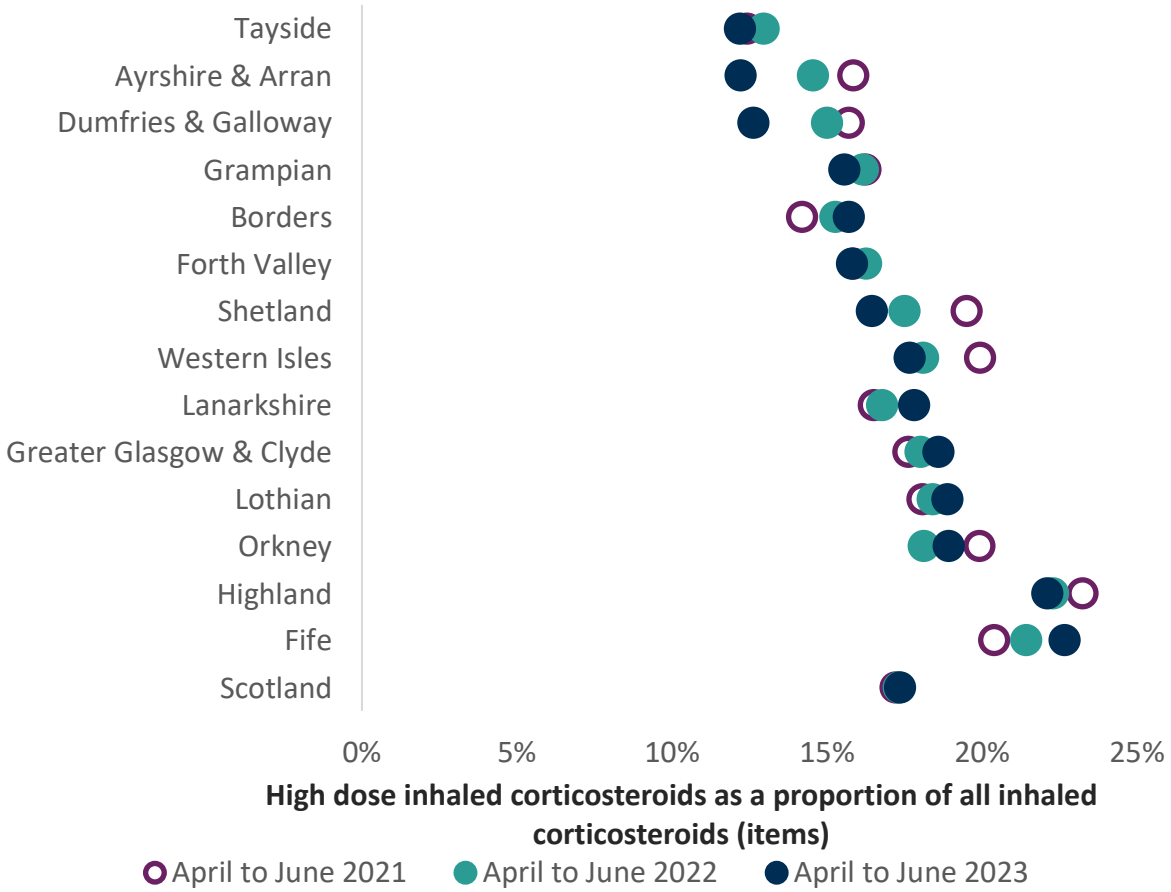
Prescribing of inhaled high dose corticosteroids

The place of inhaled corticosteroids as part of combination therapy has been revised.[47] For people with COPD who are at high risk of exacerbations, based on blood eosinophils of ≥300cells/μL, initial treatment with triple therapy (inhaled ICS plus LABA and LAMA) is recommended by GOLD.[47] In addition, escalation to triple therapy is recommended if exacerbations occur in patients with blood eosinophils ≥300 cells/μL receiving monotherapy or patients with blood eosinophils ≥100 cells/μL receiving LABA + LAMA.[53] If people with COPD also have a diagnosis of asthma, they should be treated according to treatment guidelines for asthma, with ICS.[47]

ICS (licensed only as part of combination therapy (with LABA and/or LAMA) are prescribed for people with COPD who have a severe exacerbation or more than two exacerbations in one year or if there are asthmatic features or features suggesting steroid responsiveness.[47] ICS provide some benefit to patients with severe COPD, reducing exacerbations by 20-25% however there is a dose dependant risk of side effects (including pneumonia and osteoporosis). Clinical review following initiation of ICS should be undertaken after three months and ICS stopped if there is insufficient response or if there are adverse effects.[46] A blood eosinophil count ≥300 cells/microlitre is more likely to cause relapse or exacerbations if ICS is withdrawn and needs to be monitored carefully. Refer to local guidelines to optimise treatment.

The chart below shows the variation in inhaled high dose corticosteroids between NHS Boards over the last three years. The high dose classification is based on SIGN 158.[6]

Chart 4: High dose corticosteroid inhalers as a percentage of all corticosteroid inhalers items (using 2019 SIGN/BTS classification of high dose)



*High dose ICS prescribing used in the data corresponds to the definition of high dose steroids (both for adults and children) as per Table 12 in SIGN 158.[6]

Prescribing of Mucolytics

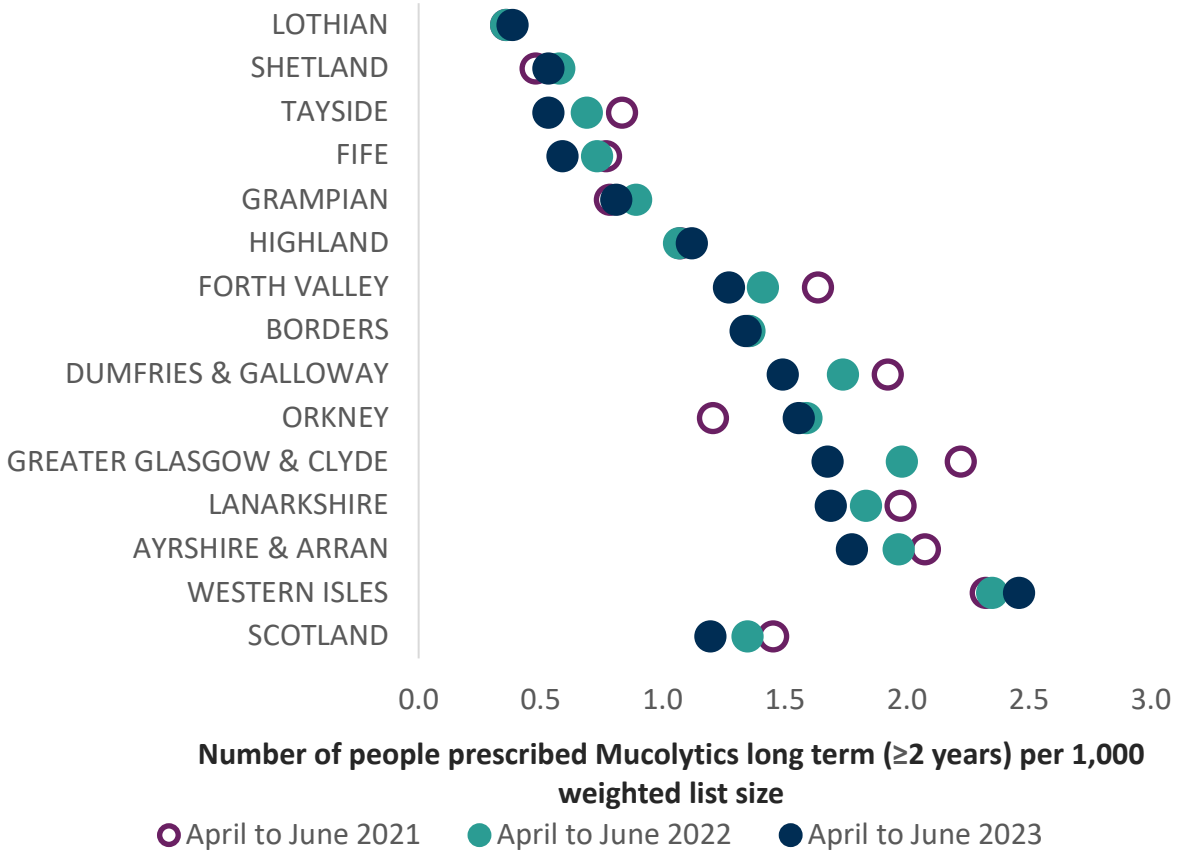
Mucolytics are taken orally to assist patients coughing up sputum, as it breaks down the protein bonds, 'loosening' the mucus. A recent Cochrane review found that use of mucolytics may reduce the likelihood of an acute exacerbation, reduced days of disability per month and possibly reduced hospital admissions with minimal adverse effects. There is doubt in the confidence of early trials reviewed in the results, due to possible risk of bias in selection or publication, therefore the benefits of treatment may not be as great as suggested.[54] Mucolytics do not appear to affect health related quality of life or improve lung function. NICE has previously recommended that mucolytics should not be routinely prescribed to prevent exacerbations for patients with stable COPD. Mucolytic drug therapy may be considered for people with a chronic cough productive of sputum.[46]

Mucolytic therapy should be reviewed after a four-week trial and stopped if symptoms of cough and sputum production have not improved. Regular review of mucolytic therapy should be undertaken during the annual review and may be stopped if there is no

productive cough or if symptoms have not improved with use.[48] This review could be completed in primary or secondary care.

Chart 9 below shows the wide variation and increasing use of mucolytics between NHS Boards over the last three years.

Chart 9: Number of people prescribed mucolytics long term (≥2 years) per 1,000 weighted list size



Prescribing of Triple therapy

Triple therapy has been shown to improve lung function and patient related outcomes as well as reduce exacerbations compared with LABA alone, LABA/LAMA and LABA/ICS inhalers.[47] Triple therapy may be suitable for patients with COPD who are experiencing exacerbations or for those with COPD with a background of asthma and still experiencing symptoms or exacerbations. Use of triple therapy inhalers should increase adherence by patients, is cost effective and will have a reduced carbon footprint versus multiple inhalers.

Lifestyle aspects of therapy should be optimised when considering a move onto triple therapy. This includes smoking cessation as well as excluding other potential causes of breathlessness or poor control (adherence, inhaler technique). A clinical review after three months is recommended in order to assess benefit from the triple therapy,

discontinuing the ICS if there is no improvement.[46] This review can be completed in primary or secondary care.

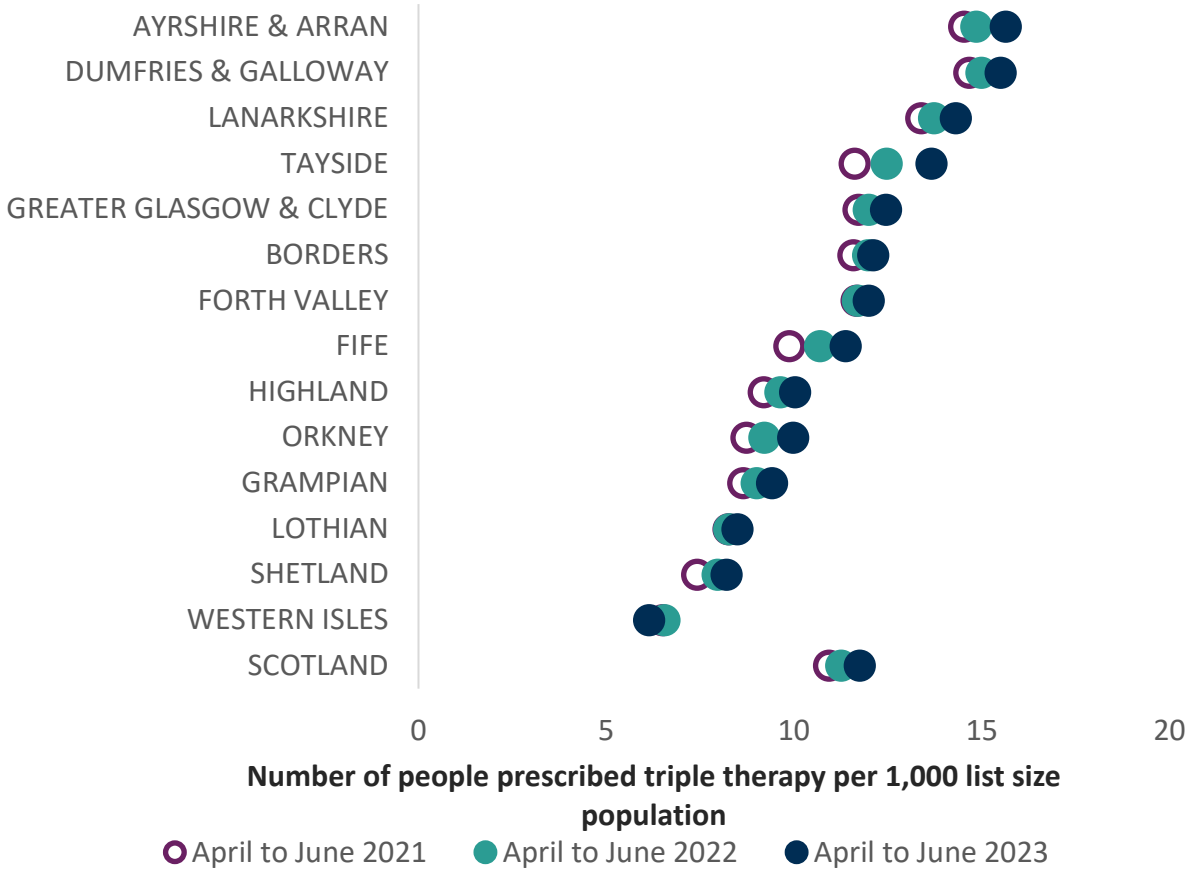
The current triple inhalers Trelegy® Ellipta®, Trimbow® (MDI and Nexthaler®), Trixeo® Aerosphere® and Enerzair®Breezhaler® have differences in licensed indication[55,56,57,58,59,60] outlined in Table 3 below. See individual Summary of Product Characteristic (SPC) for licence details. The information in Table 3 was correct at the time of publication.

Table 3: Licensed indications of triple inhalers (as of December 2023)

Triple inhaler	Licensed for asthma	Licensed for COPD
Enerzair® Breezhaler® (indacaterol 114 micrograms / glycopyrronium 46 micrograms / mometasone 136 micrograms)[55]	Yes	No
Trelegy® Ellipta® (fluticasone 92 micrograms/ umeclidinium 55 micrograms/ vilanterol 22 micrograms)[56]	No	Yes
Trimbow® pMDI (beclomethasone 87 micrograms/ formoterol 5 micrograms/ glycopyrronium 9 micrograms)[57]	Yes	Yes
Trimbow® pMDI (beclomethasone 172 micrograms/ formoterol 5 micrograms/ glycopyrronium 9 micrograms)[58]	Yes	No
Trimbow® NEXThaler® (beclomethasone 88micrograms / formoterol 5 micrograms / glycopyrronium 9 micrograms)[59]	No	Yes
Trixeo® Aerosphere® (formoterol 5 micrograms / glycopyrronium 7.2micrograms/ budesonide 160 micrograms)[60]	No	Yes

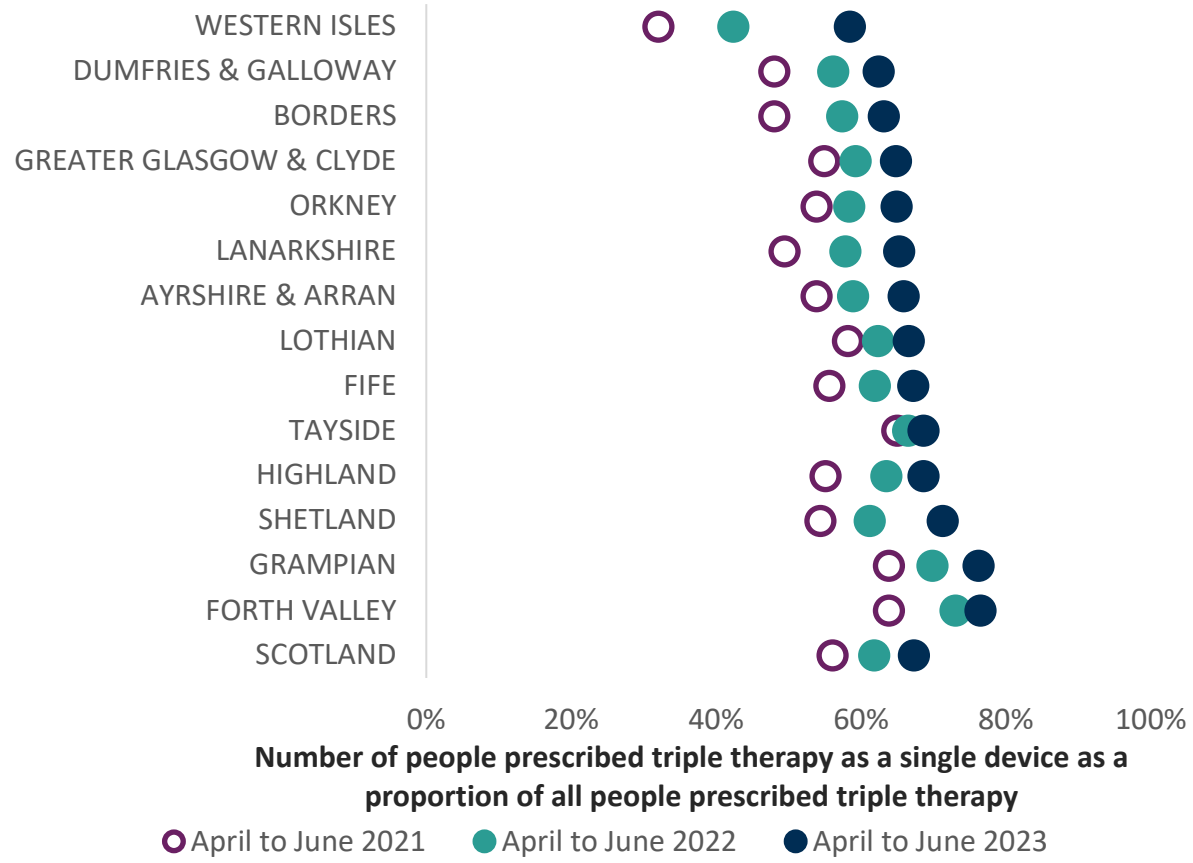
Chart 10 below illustrates the use of triple therapy prescribing, as either separate inhalers or as a single triple inhaler, showing wide variation between NHS Boards, ranging from 15.63 in Ayrshire & Arran to 6.13 in the Western Isles. This may vary with prevalence of COPD within board regions.

Chart 10: Number of people receiving triple therapy (as single inhaler or separate inhalers)



The chart below shows the individual inhaler prescribing per Health Board which potentially could be prescribed as a combination inhaler (noting that there may not be an exact equivalent available as a triple therapy inhaler).

Chart 11: Number of people prescribed triple therapy as a single device as a proportion of all people prescribed triple therapy



Treatment of Exacerbations

A range of factors may trigger an exacerbation, for example, a viral infection or smoking. Only half of exacerbations are caused by bacterial infection.

Oral corticosteroids, at a dose of 30mg for five days,[46] should be considered for people with COPD with an exacerbation causing breathlessness which is interfering with their usual day to day activities, unless they are contraindicated.

An antibiotic may sometimes be necessary for an acute exacerbation of COPD, depending on factors such as severity of symptoms, including purulence of sputum, previous exacerbations or hospital admissions and risk of complications. Five-day courses of antibiotics are recommended as this is effective, reduces risk of resistance and minimises adverse effects.

Treatment failure with antibiotics requires a sputum culture before prescribing further antibiotics. If symptoms worsen despite antibiotic therapy, other causes must be investigated, e.g. pneumonia.[48]

COPD case study

Background (Age, Sex, Occupation, baseline function)

- 51-year-old male
- Self-employed businessman

History of presentation/ reason for review

- Orders at least two Salbutamol pMDIs per month, therefore highlighted for a respiratory review with a primary care healthcare professional

Current Medical History and Relevant Comorbidities

- Salbutamol pMDI originally started about three years ago, for occasional breathlessness
- No confirmed respiratory diagnosis
- No other medical history of note
- No allergies
- No family history of respiratory conditions

Current Medication and drug allergies (include OTC preparation and Herbal remedies)

- Salbutamol pMDI, inhale two puffs when required for breathlessness

Lifestyle and Current Function (inc. Frailty score for >65yrs) alcohol/ smoking/ diet/ exercise

- Smokes 20 a day including regular cannabis use
- Drinks alcohol on a regular basis, at least six units a day (shares a bottle of wine with his partner most days)
- Sedentary lifestyle, ‘No time to exercise’ due to pressures of work

“What matters to me” (Patient Ideas, Concerns and Expectations of treatment)

- Wants to improve his symptoms of breathlessness and does not see the problem with use of frequent salbutamol
- Patient acknowledges stress of job and smokes to relieve this, clearly states that he cannot stop

Results e.g biochemistry, other relevant investigations or monitoring

- Spirometry reversibility testing confirmed diagnosis of COPD (FEV1/FVC ratio 66)
- Sats on air 97%

- BMI 28
- MRC score 2

Most recent relevant consultations

- Commenced regular long-acting bronchodilator therapy, tiotropium in a soft mist inhaler (tiotropium and olodaterol Respimat®), demonstrating inhaler technique and explaining the need to order refills every month and to replace the device every six months, for environmental reasons.
- In addition, offered the option to change to a salbutamol DPI for environmental reasons as well as the presence of a dose counter. Checked inhaler technique and changed to Easyhaler® Salbutamol.
- Organized influenza and pneumococcal vaccination
- Encouraged to stop smoking. The patient was not keen to do this at the present time due to ongoing stress at work but acknowledged the need to think about this. Signposted to the Stop smoking service at the local community pharmacy for the time he is ready to quit. In the meantime, advised to reduce amount smoked, particularly in relation to cannabis.
- Discussed stress management strategies including making time for some cycling and swimming which he was keen to do. Increased activity will also help with lung function, pulmonary rehabilitation may be appropriate for referral in the future. Acknowledges that he needs to make time to do this.
- Also highlighted problem alcohol drinking and advice to have two alcohol free days at least.
- Issued with a COPD management plan so that symptoms of exacerbations were clear and actions to follow in that case were explained.

Step	Process	Person specific issues to address
1. **Aims** What matters to the individual about their condition(s)?	**Review diagnoses and identify therapeutic objectives with respect to:** • Identify objectives of drug therapy • Management of existing health problems • Prevention of future health issues **Ask patient to complete PROMs** (questions to prepare for my review) **before their review**	• No confirmed respiratory diagnosis • Would like to improve symptoms of breathlessness • High volume of salbutamol use (which he does not see a problem with) • Stressful job, smokes as relief
2. **Need** Identify essential drug therapy	**Identify essential drugs (not to be stopped without specialist advice)** • Drugs that have essential replacement functions (e.g. levothyroxine) • Drugs to prevent rapid symptomatic decline (e.g. drugs for Parkinson's disease, heart failure)	• None
3. **Need** Does the individual take unnecessary drug therapy?	**Identify and review the (continued) need for drugs** • What is medication for? • with temporary indications • with higher than usual maintenance doses • with limited benefit/evidence of its use in general • with limited benefit in the person under review (see Drug efficacy & applicability (NNT) table)	• Salbutamol is used frequently (Two salbutamol MDIs ordered every month) originally prescribed for occasional breathlessness three years ago • Spirometry performed to establish diagnosis, confirmed as COPD
4. **Effectiveness**	**Identify the need for adding/intensifying drug therapy in order to**	• Add long-acting bronchodilator therapy, checking inhaler

Are therapeutic objectives being achieved?	**achieve therapeutic objectives** • to achieve symptom control • to achieve biochemical/clinical targets • to prevent disease progression/exacerbation • is there a more appropriate medication that would help achieve goals	technique to ensure able to use, tiotropium and olodaterol Respimat® • Influenza and pneumococcal vaccinations organised
5. **Safety** Does the individual have ADR/ Side effects or is at risk of ADRs/ side effects? Does the person know what to do if they're ill?	**Identify individual safety risks by checking for** • If the targets set for the individual appropriate? • drug-disease interactions • drug-drug interactions (see ADR table) • monitoring mechanisms for high-risk drugs • risk of accidental overdosing **Identify adverse drug effects by checking for** • specific symptoms/laboratory markers (e.g. hypokalaemia) • cumulative adverse drug effects (see ADR table) • drugs that may be used to treat side effects caused by other drugs **Medication Sick Day guidance**	• Risk of hypokalaemia with salbutamol over-use • Personalised COPD management plan reinforces action to take when symptoms of COPD deteriorate
6. **Sustainability** Is drug therapy cost-effective and environmentally sustainable?	**Identify unnecessarily costly drug therapy by** • Consider more cost-effective alternatives (but balance against effectiveness, safety, convenience)	• Tiotropium and olodaterol Respimat is a soft mist inhaler which does not contain propellant, so has a very low global warming potential. It has a refill which can be issued every month, only needing to

	Consider the environmental impact • Inhaler use • Single use plastics • Medicines waste • Water pollution	replace the inhaler device every six months which has a lower environmental impact • Salbutamol MDI changed to DPI (Easyhaler®) due to inhaler technique, and discussed environmental impact of propellant gases in MDI compared to DPI • Salbutamol DPI (Easyhaler®) has a dose counter, so will provide reassurance of medication availability, however long-acting bronchodilator should provide better symptom control
7. Person-centredness Is the person willing and able to take drug therapy as intended?	**Does the person understand the outcomes of the review?** • Consider Teach back **Ensure drug therapy changes are tailored to individual's preferences by** • Is the medication in a form they can take? • Is the dosing schedule convenient? • Consider what assistance they might have and when this is available • Are they able to take medicines as intended **Agree and communicate plan** • Discuss with the individual/carer/welfare proxy therapeutic objectives and treatment priorities • Agree with them what medicines have an effect of sufficient magnitude to	**Agreed plan** • Regular long-acting bronchodilator inhaled therapy to improve symptom control • Personalised COPD management plan discussed and agreed, with a written copy given • Discussed smoking cessation but as not keen to do this at present, encouraged to reduce and in particular reduce cannabis use. • Stress management strategies and alcohol advice discussed

	consider continuation or discontinuation • Inform relevant healthcare and social care carers, changes in treatments across the care interfaces **Ask patient to complete the post-review PROMs questions after their review**	

7. Bronchiectasis, Persistent Bacterial Bronchitis and Chronic Bronchial Sepsis

Bronchiectasis

Repeated lower respiratory tract infections can be caused by a range of clinical conditions. Bronchiectasis is characterised by the radiological finding of dilated, non-tapering bronchi with thickened walls on a high-resolution Computerised Tomography (CT) scan of the thorax. The associated clinical syndrome is characterised by frequent, usually daily, sputum production and repeated lower respiratory tract infections. It has become evident, however, that the clinical syndrome can be present in the absence of the characteristic CT findings – this clinical syndrome has become known, variably, as Persistent Bacterial Bronchitis, Chronic Bronchial Sepsis, and Bronchiectasis with a normal CT scan.

Severity of radiological bronchiectasis does not correlate well with the severity of symptoms, and a holistic approach should be taken with assessment of bronchiectasis severity, with a number of validated scoring systems available e.g. The Bronchiectasis Severity Score.[61] Guidance for referral to secondary care can be found in the BTS Guideline for Bronchiectasis in Adults.[62]

Summary of recommendations in bronchiectasis

- antibiotic choice should be directed by previous positive cultures - in the absence of previous positive sputum cultures, oral antibiotics to cover common respiratory pathogens are recommended, using local formulary guidance where available
- azithromycin 250mg three times a week is recommended for patients with four or more exacerbations in any 12-month period, usually started after advice from secondary care
- recommend six-month review of effectiveness of mucolytics

Principles of prescribing for Bronchiectasis

There are no licenced treatments for bronchiectasis, other than antibiotics for acute bacterial exacerbations.

There is a growing body of high-quality research for long term treatments for bronchiectasis; recent guidelines from national and international respiratory societies offer evidence-based recommendations for clinicians.[62,63]

Airway clearance techniques and adjuncts should be considered, with appropriate instruction from a suitably trained physiotherapist.

Prescribing issues to address

Acute exacerbations

Oral antibiotic therapy should be guided by sputum cultures. Antibiotic choice should not be delayed while culture results are awaited – the choice should be directed by previous positive cultures. In the absence of previous positive sputum cultures, oral antibiotics to cover common respiratory pathogens are recommended, using local formulary guidance where available. The recommended duration is 14 days. Shorter courses may suffice in those with mild bronchiectasis.[62]

- 1st line - amoxicillin 500mg to 1g three times a day[62]
- 2nd line - doxycycline 100mg twice a day

A first positive culture for Pseudomonas aeruginosa in sputum should trigger a discussion with local bronchiectasis specialists to consider eradication therapy.

Long term antibiotics

Azithromycin 250mg three times a week is recommended for patients with four or more exacerbations in any 12-month period, after advice from secondary care. It has the most evidence base. Patients should be made aware of the potential adverse effects:

- tinnitus and hearing loss (which can be reversed if treatment is stopped early)
- prolongation of QTc interval and consequent increased risk of ventricular tachycardia
- anti-microbial resistance

Prior to commencing azithromycin, a mycobacterial culture of at least six weeks should be negative. An ECG should be performed to ensure a normal QTc and a medication check should be carried out to consider interactions, particularly with other medications that may prolong the QTc interval. Liver function tests with six monthly monitoring is recommended.

Azithromycin should be continued during exacerbations requiring antibiotics, except when receiving quinolone antibiotics (ciprofloxacin, levofloxacin, moxifloxacin) in which case the azithromycin should be stopped due to risk of QTc prolongation. Azithromycin is less beneficial in active smokers.[47]

Clarithromycin 250mg daily can be used as an alternative macrolide for long term prophylaxis of exacerbations.

Doxycycline 100mg daily can be used as an alternative in patients who cannot tolerate, or are not suitable for, long term macrolide therapy.

Check local formulary guidance for area specific recommendations.

Bronchodilator Therapy

Breathlessness is multifactorial in bronchiectasis. A trial of combination bronchodilator containing a long-acting beta$_2$agonist (LABA) and long-acting muscarinic antagonist (LAMA) can be considered, particularly if the patient has co-existent COPD. The choice of LABA/LAMA should be based on the inhaler technique of the patient, local and national prescribing guidance.

Inhaled and Oral Corticosteroids

Oral steroids should be avoided in patients with bronchiectasis, unless there is a clear indication for an alternative comorbidity, such as asthma.

Although there is evidence for benefit of inhaled corticosteroids (ICS) for patients with COPD and elevated eosinophil counts, studies in bronchiectasis with eosinophilia are yet to report. Patients with concomitant COPD and bronchiectasis should receive ICS in line with current COPD guidance. Patients with isolated bronchiectasis and an eosinophilia may benefit from a trial of ICS. Advice from a bronchiectasis expert is strongly recommended.

Nebulised Saline

Nebulised saline can be considered for sputum clearance in bronchiectasis if airways clearance techniques are not effective. Available concentrations are 0.9% (“Normal” saline), and 3%, 6%, 7% (hypertonic saline). Perform an airway reactivity challenge test when inhaled mucoactive treatment is first administered.[62]

There is currently no evidence to recommend any concentration of saline over any other, though side effects may limit the higher concentrations in use. The dosing schedule is four ml of saline nebulised two to four times per day.

Oral Mucolytics

There is currently no high-quality evidence base for oral mucolytic therapy in people with bronchiectasis, however carbocisteine and acetylcysteine are widely used in Scotland to improve sputum clearance. Their use should be accompanied by support for airway clearance techniques. Acetylcysteine has once daily dosing which may assist with adherence to therapy. At least annual review of effectiveness of oral mucolytics is strongly recommended if either agents are trialled in any individual. If a mucolytic is started in secondary care it can be reviewed in either primary or secondary care for effectiveness. See Chart 8 for prescribing of mucolytics in Health Boards.

Acetylcysteine should not be given at the same time of day as antibiotic therapy as it potentially reduces antibiotic absorption.

Fungal infection

Fungal infection can occur in advanced bronchiectasis. Cultures for fungal infection, and serology for aspergillus, should be sought in cases of severe bronchiectasis refractory to other treatment. Results suggestive of the presence of fungal infection warrant immediate discussion with a bronchiectasis and/or fungal infection specialist. Antifungal treatment for aspergillus disease should be co-ordinated through a dedicated multidisciplinary team.

To prescribe most effectively for individuals with bronchiectasis the 'what matters to you?' principles and the Polypharmacy 7-Steps approach are recommended. Table 4 outlines the main principle for treating patients with bronchiectasis.

Table 4: Principles of treating patients with bronchiectasis

	Polypharmacy review 7-Steps	Bronchiectasis

1	What matters to the patient?	• Ask the patient what matters to them?
		  ○ chronic sputum production
		  ○ frequency of exacerbations
		  ○ breathlessness
		  ○ cough
		• Ask patient to complete PROMs (questions to prepare for my review) before their review
		• How does the condition affect patient's day to day life / activities
		• Side effects of medicines versus benefit
		• Patient's awareness of the reason for taking medications
		  ○ antibiotics for exacerbations
		  ○ preventative treatments
		  ○ inhaled therapies
		  ○ mucolytics
		• A holistic Polypharmacy 7-Steps approach is recommended to ensure treatment is optimised giving consideration to comorbidity

2	Identify essential drug therapy	• Confirm ongoing need for and effectiveness of medication and screen for side effects ○ all patients on long term macrolide should have assessment of hearing/tinnitus
3	Does the patient take unnecessary drug therapy?	• Assess adherence and ensure patient understands treatment regime • Is there evidence of benefit from taking the treatment, e.g. reassuring physiology, maintaining exercise tolerance • Assess the benefit of mucolytic therapy – is it warranted?

4	Are therapeutic objectives being achieved?	• Frequency of infective exacerbations ○ is there a role for long term antibiotic therapy? • Ensure regular monitoring of physiology • Ensure sputum cultures are up to date. Discuss sputum cultures, including annual nontuberculous mycobacterial (NTM) cultures • Check antibiotic course duration is appropriate • Vaccinations should be offered if not up to date (influenza, pneumococcal, DTaP (if not vaccinated in adolescence) and Covid-19) • Patients should be encouraged to engage in appropriate physical activity. Social prescribing such as exercise dependant on ability, singing classes • Discuss Pulmonary Rehabilitation (PR) • Smoking cessation should be advised and the adverse effects of smoking on children highlighted. Offer appropriate support. Signpost patients to the NHS inform Quit Your Way Scotland website (which includes community pharmacy services) • Weight reduction is recommended in obese patients (BMI >30) • Nutritional advice and support will be necessary in those with a BMI less than 20
5	Does the patient have ADR/ side effect or is at risk of side effects?	• Ensure regular drug monitoring as per local protocol • Review potential drug interactions which can potentiate side effects • Discuss side effect profile with perceived benefit of treatment • Confirm antibiotic allergy/side effect profile ○ Consider referral for penicillin allergy de-labelling[52] if available locally • Yellow card reporting of ADRs
6	Sustainability	• Ensure drugs are either within current guidelines or have been discussed at a specialist multidisciplinary team meeting • Course length of antibiotics?
7	Is the patient willing and able to take drug therapy as intended?	• Are at-home antibiotics appropriate for the patient to enable self-management? • Make patient aware of support information • Non-attenders should be followed up – alternative strategies to encourage engagement may be required, (e.g. through community pharmacy / Near Me / telehealth acknowledging limitations

		• Agree with the patient arrangements for repeat prescribing. Signpost to Medicines Care and Review (MCR) service in community pharmacy • Ask patient to complete the post-review PROMs questions after their review

Bronchiectasis Case Study

Background Details - (Age, Sex, Occupation, baseline function)

- 58-year-old female
- Works as a secondary school teacher
- Still working full time

History of presentation/ reason for review

- Referred by primary care healthcare professional due to productive cough, asking if she has COPD.
- On presentation at clinic, has had two episodes of chest infection requiring antibiotics in last six months. On both occasions, sputum grew Haemophilus influenzae
- Daily production of yellow sputum
- Minimal breathlessness
- No chest pains

Current Medical History and Relevant Comorbidities

- Severe chest infection at eight years (spent three months in hospital)
- Was ‘chesty’ through adulthood

Current Medication and drug allergies (include OTC preparation and Herbal remedies)

- No current medication
- Had been given SABA inhaler with no benefit
- No drug allergies

Lifestyle and Current Function (inc. Frailty score for >65yrs) alcohol/ smoking/ diet/ exercise

- Never smoked
- Drinks alcohol on special occasions
- Enjoys walking holidays

Results e.g., biochemistry, other relevant investigations or monitoring

- Localised bronchiectasis (right lower lobe), otherwise normal
- No radiological evidence of NTM pulmonary disease
- Spirometry is normal
- Mycobacterial cultures were negative for NTM

Most recent consultations

First consultation:

- Given the diagnosis of localized bronchiectasis, likely due to childhood pneumonia. No diagnosis of COPD.
- Given instruction in airway clearance techniques by specialist respiratory physiotherapist.
- Commenced on a mucolytic to assist sputum expectoration
- Pulmonary Function Test (PFTs) showed no diagnosis

Follow up 3 months:

- Significant improvement in her ability to clear sputum
- Improvement of day-to-day symptoms reported
- However further chest infections requiring antibiotics
- Discussion regarding long term azithromycin treatment
    - consented to risks of reversible tinnitus / hearing loss associated with long term macrolide use
    - ECG carried out, showing normal QTc of 405
    - advised to continue azithromycin when on other antibiotics except quinolones
- Azithromycin 250mg Monday / Wednesday / Friday commenced

Follow up 6-month review:

- Patient reported no further chest infection since commencing azithromycin
- Routine sputum samples continued to be negative
- Repeat mycobacterial culture was negative
- After discussion azithromycin has been continued long term with good effect

Steps	Process	Person specific issues to address
1. **Aims** What matters to the individual about their condition(s)?	**Review diagnoses and identify therapeutic objectives with respect to:** • Identify objectives of drug therapy • Management of existing health problems. • Prevention of future health issues **Ask patient to complete PROMs** (questions to prepare for my review) **before their review**	• Ongoing symptoms of productive cough, daily sputum production • Diagnosis of COPD
2. **Need** Identify essential drug therapy	**Identify essential drugs (not to be stopped without specialist advice)** • Drugs that have essential replacement functions (e.g. levothyroxine) • Drugs to prevent rapid symptomatic decline (e.g. drugs for Parkinson's disease, heart failure)	• None
3. **Need** Does the individual take unnecessary drug therapy?	**Identify and review the (continued) need for drugs** • What is medication for? • With temporary indications • With higher than usual maintenance doses • With limited benefit/evidence of its use in general • With limited benefit in the person under review (see Drug efficacy & applicability (NNT) table)	• None
4. **Effectiveness** Are therapeutic objectives being achieved?	**Identify the need for adding/intensifying drug therapy in order to achieve therapeutic objectives** • To achieve symptom control • To achieve biochemical/clinical targets • To prevent disease progression/exacerbation • Is there a more appropriate medication that would help achieve goals	• Localised bronchiectasis (right lower lobe), Normal spirometry. No diagnosis of COPD • Commenced a mucolytic to assist sputum expectoration

		• Airway clearance techniques taught by specialist respiratory physiotherapist • Long-term azithromycin therapy commenced following further antibiotic courses for chest infection
5. **Safety** Does the individual have ADR/ Side effects or is at risk of ADRs/ side effects? Does the person know what to do if they're ill?	**Identify individual safety risks by checking for** • If the targets set for the individual appropriate? • Drug-disease interactions • Drug-drug interactions (see ADR table) • monitoring mechanisms for high-risk drugs • Risk of accidental overdosing **Identify adverse drug effects by checking for** • Specific symptoms/laboratory markers (e.g. hypokalaemia) • Cumulative adverse drug effects (see ADR table) • Drugs that may be used to treat side effects caused by other drugs **Medication Sick Day guidance**	• ECG carried out prior to long-term azithromycin therapy, normal QTc of 405 • Risks explained of reversible tinnitus/hearing loss associated with long term macrolide use • If further antibiotics needed, can continue azithromycin apart from with quinolones
6. **Sustainability** Is drug therapy cost-effective and environmentally sustainable?	**Identify unnecessarily costly drug therapy by** • Consider more cost-effective alternatives (but balance against effectiveness, safety, convenience) **Consider the environmental impact** • Inhaler use • Single use plastics • Medicines waste • Water pollution	• Regular long-term azithromycin reduces need for repeated courses of short-term antibiotics and improved patient outcomes

7. **Person-centredness** Is the person willing and able to take drug therapy as intended?	**Does the person understand the outcomes of the review?** • Consider Teach back **Ensure drug therapy changes are tailored to individual's preferences by** • Is the medication in a form they can take? • Is the dosing schedule convenient? • Consider what assistance they might have and when this is available • Are they able to take medicines as intended **Agree and communicate plan** • Discuss with the individual/carer/welfare proxy therapeutic objectives and treatment priorities • Agree with them what medicines have an effect of sufficient magnitude to consider continuation or discontinuation • Inform relevant healthcare and social care carers, changes in treatments across the care interfaces **Ask patient to complete the post-review PROMs questions after their review**	**Agreed plan** • Regular long-term azithromycin commenced (Monday /Wednesday /Friday) • Sputum clearance techniques

Key concepts in this case

- Confirm diagnosis of bronchiectasis to allow appropriate management
- Sputum management with mucolytics and sputum clearance techniques
- Use of long-term azithromycin for regular exacerbations and discussion of side effects

8. Idiopathic Pulmonary Fibrosis

Idiopathic Pulmonary Fibrosis (IPF) is a progressive and often fatal condition. In a 2016 publication it was estimated that over 5,000 new IPF cases were diagnosed each year in the UK and over 30,000 people were living with the disease.[64]

Patients with this condition often have disabling symptoms of breathlessness and cough. Anti-fibrotic (AF) therapy has been shown to reduce loss of lung function and preserve life when used effectively in IPF.[66,67,70] These medicines (pirfenidone and nintedanib) have a high side effect profile, however, and do not improve the symptoms of IPF.[66,67] Nintedanib has also shown benefit for patients with other Progressive Fibrosing Interstitial Lung Diseases.[65] Patient awareness of these issues and the risks and benefits of taking treatment is important to ensure appropriate adherence with therapy. Anti-fibrotic therapy should only be prescribed in secondary care.

For GP practices these medicines should be added to the patient record to highlight prescribing in secondary care (as an 'outside issue'). This allows interactions to be checked when prescribing for another condition.

Good patient care of people with IPF will require effective communication between secondary and primary care clinicians alongside the use of respiratory support services such as Pulmonary Rehabilitation and secondary care Respiratory Nurse Specialists where available.

End of life care can often be managed in primary care. GP practice teams should ensure that anticipatory care plans and medicines are in place when approaching end of life, to allow timely access to these when required.

Summary of recommendations in Idiopathic Pulmonary fibrosis

- anti-fibrotics prescribed only by a clinician with experience of treating IPF
- only prescribe anti-fibrotics when there is confirmed fibrotic lung disease with evidence of physiological progression

Principles of prescribing for Idiopathic Pulmonary Fibrosis in Secondary Care

There are various principles to be mindful of when prescribing nintedanib or pirfenidone for patients with IPF. These include the following:

- nintedanib and pirfenidone should only be prescribed by a clinician with experience of treating IPF and they should monitor the benefit of AF medicines
- nintedanib and pirfenidone are approved for restricted use in Scotland for patients with a predicted forced vital capacity (FVC) less than or equal to 80%[66,67]

- the two available drugs have similar efficacy and have different side effect profiles - most patients who cannot tolerate one therapy will tolerate the other
- ensure appropriate treatment choice including drug interactions and potential side effect profile
    - nintedanib is associated with liver injury and requires blood monitoring monthly for the first three months then six monthly thereafter[68] - common side effects include diarrhoea, nausea, abdominal pain, weight loss and decreased appetite
    - pirfenidone is associated with hepatic injury and requires blood monitoring monthly for the first six months then three monthly thereafter[69] - common side effects include nausea, indigestion, photosensitivity and rash
- primary care clinicians should refer the patient presenting with these side effects to the consultant.
- shared care agreements are variable across Scotland, so it is important to establish who is responsible for blood monitoring

Prescribing areas to address for quality prescribing in Idiopathic Pulmonary Fibrosis

Prescribing appropriate anti-fibrotic treatment for patients with progressive Idiopathic Pulmonary Fibrosis

Anti-fibrotic therapy is difficult to tolerate with a high side effect profile. Patients should only be prescribed this treatment when there is confirmed fibrotic lung disease with evidence of physiological progression. Ideally this should have been reviewed at an IPF multi-disciplinary team meeting before initiation of therapy.

There is no conclusive evidence to support use of any medicines to increase the survival of people with IPF[70] however NICE technology appraisals for pirfenidone or nintedanib should be consulted prior to prescribing.[71,72]

IPF therapy is currently included in the NHS Scotland Patient Access Scheme which improves the cost effectiveness of nintedanib and pirfenidone.[73]

Adopting the ‘what matters to you?’ principles is recommended and knowledge of comorbidities and co-prescribing will allow an approach to incorporating the Polypharmacy 7-Steps approach to the review. Table 5 outlines the main principle for treating patients with IPF.

Table 5: Principles of treating patients with IPF

	Polypharmacy review 7-Steps	IPF
1	What matters to the patient?	• Ask the patient what matters to them? • Ask patient to complete PROMs (questions to prepare for my review) before their review • How does the condition affect patient's day to day life / activities ○ cough interfering with ability to work • Patient awareness of the reason for taking medications- to preserve lung function with anti-fibrotic treatment • Patient awareness of side effect profiles of medicines versus benefit • Pulmonary Rehabilitation (PR) • Discuss monitoring oxygenation when mobilising
2	Identify essential drug therapy	• Assess adherence • Confirm ongoing need for and effectiveness of medication and screen for side effects • Ensure therapy is optimised with no drug interaction
3	Does the patient take unnecessary drug therapy?	• Is there evidence of benefit from taking the treatment, e.g. reassuring physiology, maintaining exercise tolerance
4	Are therapeutic objectives being achieved?	• Halted rate of decline of lung function • Ensure regular monitoring of physiology • Review oxygenation at rest and on mobilizing • Medication should be titrated to a dose which balances maximum clinical efficacy with minimal risk and stopped if found to be ineffective or if adverse effects outweigh benefits • Once the dose is stable and effectiveness has been established, ongoing recorded review should occur as clinically appropriate for the individual patient, bearing in mind that side effects can develop after established on therapy • Vaccinations should be offered if not up to date (influenza, pneumococcal, DTaP (if not vaccinated in adolescence) and Covid-19) • Can the patient use their inhaler properly? • Patients should be encouraged to engage in appropriate physical activity. Social prescribing such as exercise dependent on ability, singing classes • Smoking cessation should be advised and the adverse effects of smoking on children highlighted. Offer appropriate support. Signpost patients to the NHS inform

		Quit Your Way Scotland website (which includes community pharmacy services). • Weight reduction is recommended in obese patients (BMI >30) • Nutritional advice and support will be necessary in those with a BMI less than 20
5	Does the patient have ADR/ side effect or is at risk of side effects?	• Discuss side effect profile with perceived benefit of treatment - often patients may not be aware that side effects are related to the drug treatment • Ensure regular drug monitoring as per local protocol • Consider additional therapy to control side effects e.g. loperamide for GI upset, morphine for cough • Review potential drug interactions which can potentiate side effects • Yellow card reporting of ADRs
6	Sustainability	• Discuss dispensing options with patient e.g. potential home delivery schemes • Ensure that drug is either within current guidelines or has been discussed at a regional IPF multidisciplinary team
7	Is the patient willing and able to take drug therapy as intended?	• A personalised action plan is key to this approach, with focus on maintain lung function, preserving quality of life • Agree with the patient arrangements for repeat prescribing. Signpost to Home care delivery arrangements / Medicines Care and Review (MCR) service in community pharmacy • Make patient aware of support information • Non-attenders should be followed up. Alternative strategies to encourage engagement may be required e.g., through community pharmacy / Near Me / telehealth acknowledging limitations • Ask patient to complete the post-review PROMs questions after their review

Idiopathic Pulmonary Fibrosis Case Study

Background Details - (Age, Sex, Occupation, baseline function)

- Male
- age 78
- MRC grade 4 Shortness of Breath

History of presentation/ reason for review

- Presented to clinic with persistent cough which impacted on his ability to work
- Slow progression of condition

Current Medical History and Relevant Comorbidities

- No previous medical history, previously fit and well

Current Medication and drug allergies (include OTC preparation and Herbal remedies)

- Struggled to tolerate therapy, with multiple side effects but treatment eventually established- had to switch from pirfenidone to nintedanib
- Opiates (morphine sulfate 10mg/5ml oral solution, 2.5ml) to control cough / breathlessness due to progression
- Oxygen (maintain saturation / promote mobility)

Lifestyle and Current Function (inc. Frailty score for >65yrs) alcohol/ smoking/ diet/ exercise

- Condition slowly progressed – required opiates to control breathlessness

Results e.g., biochemistry, other relevant investigations or monitoring

- Investigations confirmed IPF
- Monitored at clinic - when lung function showed evidence of progression antifibrotic treatment started

Most recent consultations

- Despite progressive condition and high symptom burden he was able to maintain a reasonable quality of life, socialising, spending time with family, travelling and painting

Step	Process	Person specific issues to address
1. **Aims** What matters to the individual about their condition(s)?	**Review diagnoses and identify therapeutic objectives with respect to:** • Identify objectives of drug therapy • Management of existing health problems. • Prevention of future health issues **Ask patient to complete PROMs** (questions to prepare for my review) **before their review**	• Persistent cough, impacting ability to work • Slow progression of condition
2. **Need** Identify essential drug therapy	**Identify essential drugs (not to be stopped without specialist advice)** • Drugs that have essential replacement functions (e.g. levothyroxine) • Drugs to prevent rapid symptomatic decline (e.g. drugs for Parkinson's disease, heart failure)	• Nintedanib, started by specialist respiratory consultant to reduce loss of lung function
3. **Need** Does the individual take unnecessary drug therapy?	**Identify and review the (continued) need for drugs** • What is medication for? • With temporary indications • With higher than usual maintenance doses • With limited benefit/evidence of its use in general • With limited benefit in the person under review (see Drug efficacy & applicability (NNT) table)	• None
4. **Effectiveness** Are therapeutic objectives being achieved?	**Identify the need for adding/intensifying drug therapy in order to achieve therapeutic objectives** • To achieve symptom control • To achieve biochemical/clinical targets • To prevent disease progression/exacerbation • Is there a more appropriate medication that would help achieve goals	• Cough and breathlessness symptoms due to progression of IPF controlled by addition of opiates (morphine sulfate 10mg/5ml solution, 2.5ml dose) • Oxygen therapy to maintain saturation

		and promote mobility
5. **Safety** Does the individual have ADR/ Side effects or is at risk of ADRs/ side effects? Does the person know what to do if they're ill?	**Identify individual safety risks by checking for** • If the targets set for the individual appropriate? • Drug-disease interactions • Drug-drug interactions (see ADR table) • Monitoring mechanisms for high-risk drugs • Risk of accidental overdosing **Identify adverse drug effects by checking for** • Specific symptoms/laboratory markers (e.g. hypokalaemia) • Cumulative adverse drug effects (see ADR table) • Drugs that may be used to treat side effects caused by other drugs **Medication Sick Day guidance**	• Side effect profiles for the anti-fibrotic drugs differ and previous therapy not tolerated due to side effects. Now established on nintedanib. Side effects associated with nintedanib are liver injury, blood monitoring required • Common side effects of nintedanib are diarrhoea, nausea, abdominal pain, weight loss and decreased appetite
6. **Sustainability** Is drug therapy cost-effective and environmentally friendly	**Identify unnecessarily costly drug therapy by** • Consider more cost-effective alternatives (but balance against effectiveness, safety, convenience) **Consider the environmental impact** • Inhaler use • Single use plastics • Medicines waste • Water pollution	• Anti-fibrotic therapy is monitored and reviewed by specialist IPF teams
7. **Person-centredness** Is the person willing and able to take drug therapy as intended?	**Does the person understand the outcomes of the review?** • Consider Teach back **Ensure drug therapy changes are tailored to individual's preferences by** • Is the medication in a form they can take?	**Agreed plan** • Continued treatment with nintedanib • Opiate use for control of cough and breathlessness symptoms • Oxygen for mobility

- Is the dosing schedule convenient?
- Consider what assistance they might have and when this is available
- Are they able to take medicines as intended

Agree and communicate plan

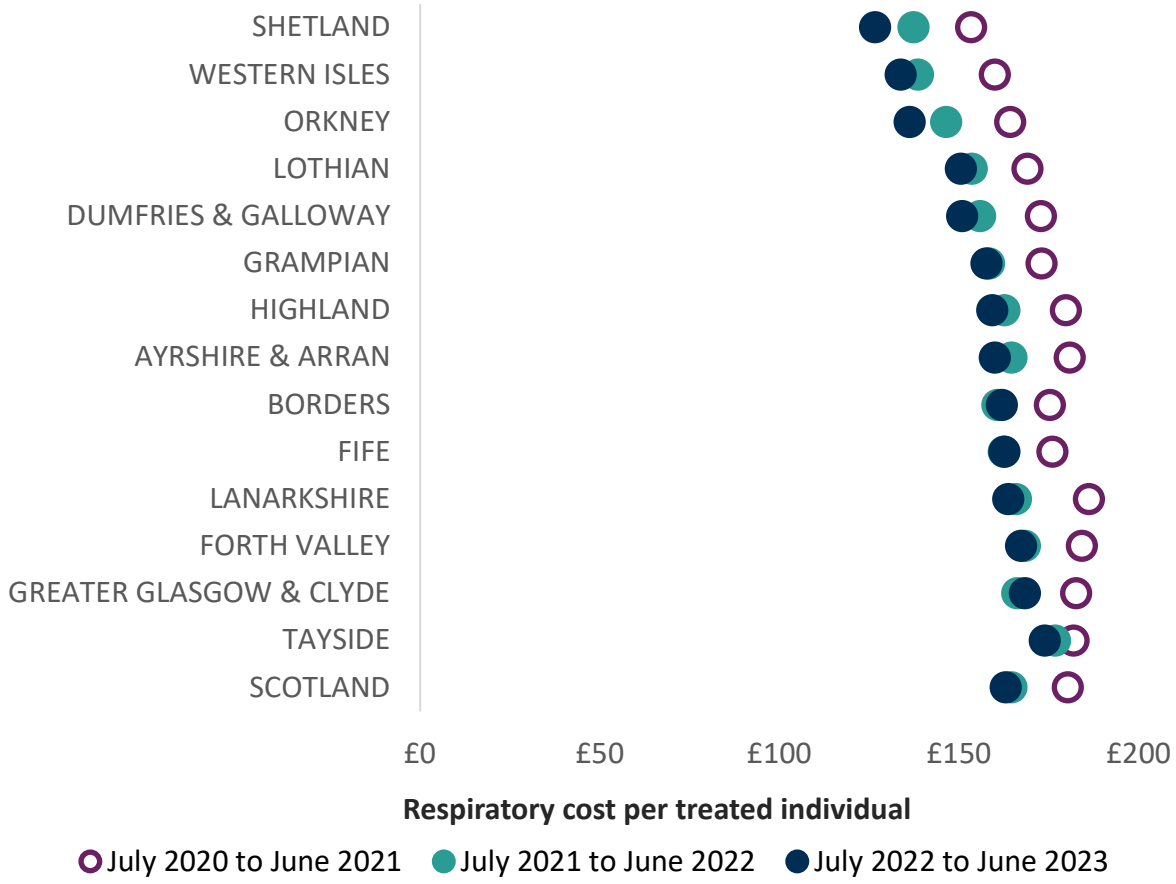
- Discuss with the individual/carer/welfare proxy therapeutic objectives and treatment priorities
- Agree with them what medicines have an effect of sufficient magnitude to consider continuation or discontinuation
- Inform relevant healthcare and social care carers, changes in treatments across the care interfaces

Ask patient to complete the post-review PROMs questions after their review

9. Respiratory Prescribing Data for NHS Health Board

This chapter contains some top-level prescribing information comparing NHS Boards. Chart 12 below highlights the cost per treated patient which has decreased by £17.00 in NHS Scotland between 2020/21 and 2022/23.

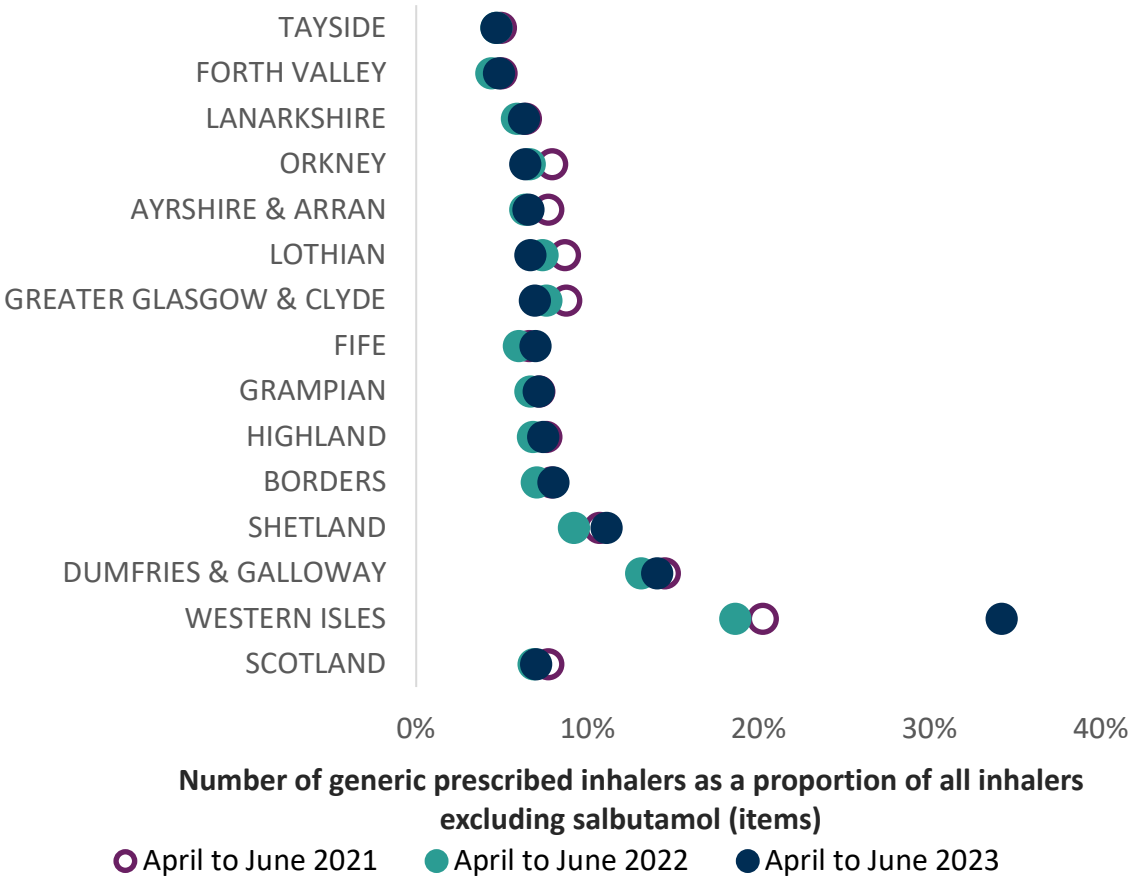
Chart 12: Respiratory Costs per treated patient



Generic Prescribing

National and local guidance promotes branded prescribing of all inhalers excluding salbutamol inhalers. This ensures that the correct inhaler device and product is given to the individual (e.g. formulations of inhaled corticosteroids differ in potency). Chart 13 shows prescribing of generic inhalers across health boards, showing improvements across all boards.

Chart 13: Proportion of generically prescribed inhalers as a proportion of all inhalers (excluding salbutamol)



10. Environmental impact of inhalers

NHS Scotland has committed to be a net zero greenhouse gas emissions organisation by 2040.[8]

It is estimated that NHS Scotland emissions due to inhaler propellant was 81,072 tonnes of carbon dioxide (CO_2) equivalent in 2022/23. This is approximately the same as 81,000 people flying from London to New York. Approximately 3% of the carbon footprint of NHS Scotland results from the use of metered dose inhalers (pMDI), more than from NHS fleet and waste combined.[74,8] Salbutamol alone accounts for two thirds of the total carbon footprint from pMDIs.[29]

Summary of recommendations for environmental considerations of respiratory prescribing

Our recommendations are as follows:

- promotion of person-centred reviews to optimise disease control and ensure quality prescribing in line with national guidance
- prioritise review of people with asthma who are over-reliant on SABA inhalers, defined as ordering more than three inhalers per year (see asthma chapter). Those on six or more should be targeted first
- streamline devices for patients, avoiding multiple device use where possible
- review separate inhalers where a combination inhaler device would be possible
- review individuals prescribed SABA alone, check diagnosis and if appropriate consider a low GWP inhaler
- update local formularies to highlight and promote inhalers with lower CO_2 emissions
- use ScriptSwitch in GP Practices to promote better asthma care and environmental messages e.g.
    - highlighting SABA overuse
    - prescribe low volume cannister Salbutamol pMDI with lower GWP
- raise public awareness to promote good asthma care and the environmental impact of respiratory prescribing
- utilise resources to support patients and clinicians in environmentally friendly and sustainable prescribing (see Appendix 1)

For new patients:

- use inhalers with low global warming potential where they are as equally effective.

- where there is no alternative to a pMDIs, lower volume HFA 134a pMDIs should be used in preference to large volume or HFA 227ea pMDIs

For existing patients:

- switch to DPI or SMI if appropriate, following a patient review. We do not recommend a blanket switch
- consider switch to DPI inhalers for patients with asthma who are interested and: have an adequate inspiratory flow. If there is concern regarding inspiratory ability due to age or frailty, it can be checked using an inspiratory flow device, such as placebo whistles or In-check® device

Environmental impact of inhalers

Prescribing data for the year 2020/2021 shows that in NHS Scotland 68% inhalers dispensed were pMDI and 32% were dry powder inhalers (DPI) or soft mist inhalers. The UK has a high proportion of pMDI use (70%) compared with the rest of Europe (< 50%) and Scandinavia (10–30%).[75] Asthma mortality rates amongst members of the European Union are 0.63 per 100,000 population compared to the UK which are 1.23 per 100,000 population.[30]

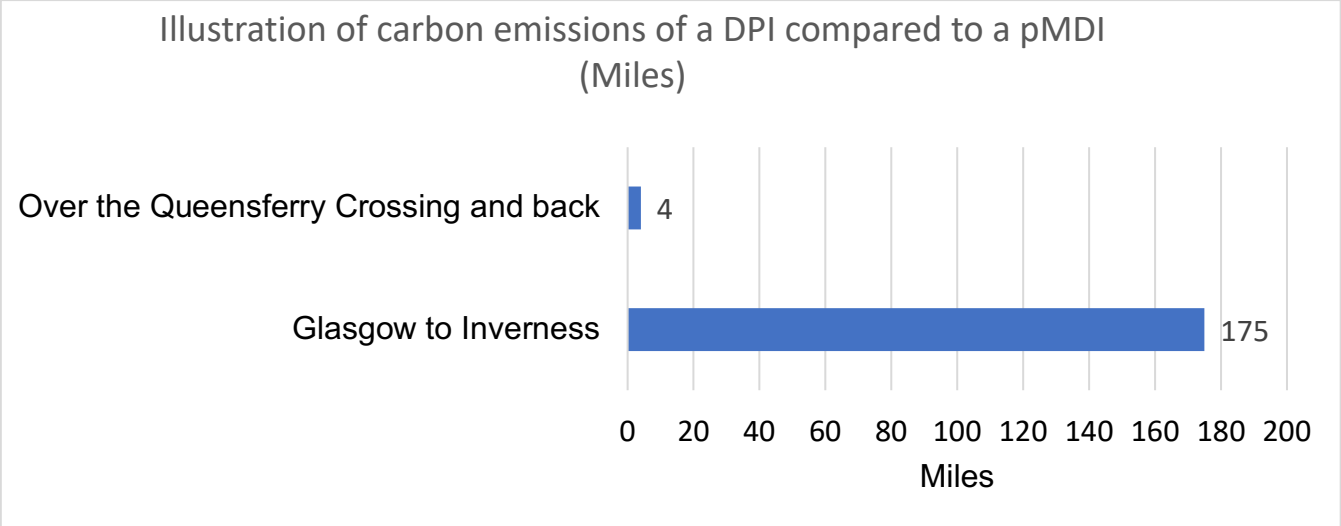
Healthcare professionals should be aware of the differences in environmental impact and global warming potential of metered dose inhalers (pMDI), dry powder inhalers (DPI) and soft mist inhalers (SMI). The hydrofluoroalkane (HFAs) propellant gases used in pMDIs, HFA 134a and HFA 227ea, are potent greenhouse gases which are respectively 1300 and 3350 times more potent than CO2.[76] DPI inhalers have significantly less global warming potential.[77]

A UK based post-hoc analysis has demonstrated that patients can be changed from an MDI to a DPI without loss of asthma control.[78] Delivery of SABAs via a pMDI and spacer or a DPI leads to a similar improvement in lung function as delivery via nebulizer.[26,79] Individuals are generally able to generate PIFR of 30 L/min with any device and most can reach 60 L/min with medium-low resistance devices even during exacerbations.[79]

Figure 8 highlights the approximate difference in greenhouse gas emissions comparing a Ventolin® Evohaler® with Ventolin® Accuhaler® or salbutamol Easyhaler® and illustrates the equivalent carbon emissions from driving a car emitting 180g CO2/Km. Many people recognise the carbon emissions from driving and therefore this can be a helpful comparison. The calculation is based on an average of 12g of propellant per MDI. There are currently two types of propellants used, HFA-134a and HFA-227ea which have a global warming potential (GWP) of 1300 or 3350 times greater than CO2.The carbon emissions were estimated by

multiplying the estimated weight of HFA propellant by its GWP. We have assumed that DPIs have zero emissions (due to absence of propellant).

Figure 8: Illustration of carbon emissions of a DPI compared to a pMDI



Equivalent car exhaust emissions CO2 emissions from a Ventolin Evohaler (containing 100 x 2 puff doses) and a Ventolin Accuhaler (60 x 1 puff doses) or Salbutamol Easyhaler (200 x 1 puff doses). Assumes car achieves 180g CO2/Km.

Individuals may be interested in the carbon footprint of their inhaler treatment which should be considered during review. Changes should only be made if effectiveness, safety or adherence is not compromised and this should be managed on a case-by-case basis, using a shared decision-making approach. Changes should not be made without consulting the patient - the NICE: inhalers for asthma prescribing decision aid can be a useful aid for this process.[36]

Switching inhalers from MDIs to DPIs could result in the same amount of carbon saving as planting seven trees. (Based on one year of treatment in a person with good control of asthma, using no more than three doses of SABA per week and a regular preventer).

> The most environmentally friendly inhaler is the one that the patient can, will and does use correctly

The most important factor in choosing an inhaler device is that the individual can use the inhaler properly.[6] It is essential that reviews are timely to ensure control of their condition is maximised, and inhalers are prescribed and used appropriately, checking adherence to therapy.

Poor control of asthma leads to over-reliance on reliever inhalers and Salbutamol MDI alone accounts for 66% of the total carbon footprint from inhalers.[29] Through clinician review and improved management of asthma and COPD, we can improve

outcomes for patients, reduce salbutamol use and reduce carbon emissions from inhalers (see Chapter 1).

Good asthma control is better for your patient and the environment

Local formularies should be updated to highlight and promote lower CO2 emission inhalers and ScriptSwitch can be used to promote environmentally friendly prescribing messages, particularly when prescribing for new patients.

Health Boards should consider how to raise public awareness to promote environmentally friendly prescribing and encourage individuals to ask prescribers about this at their review.

CO2 emissions in Scotland

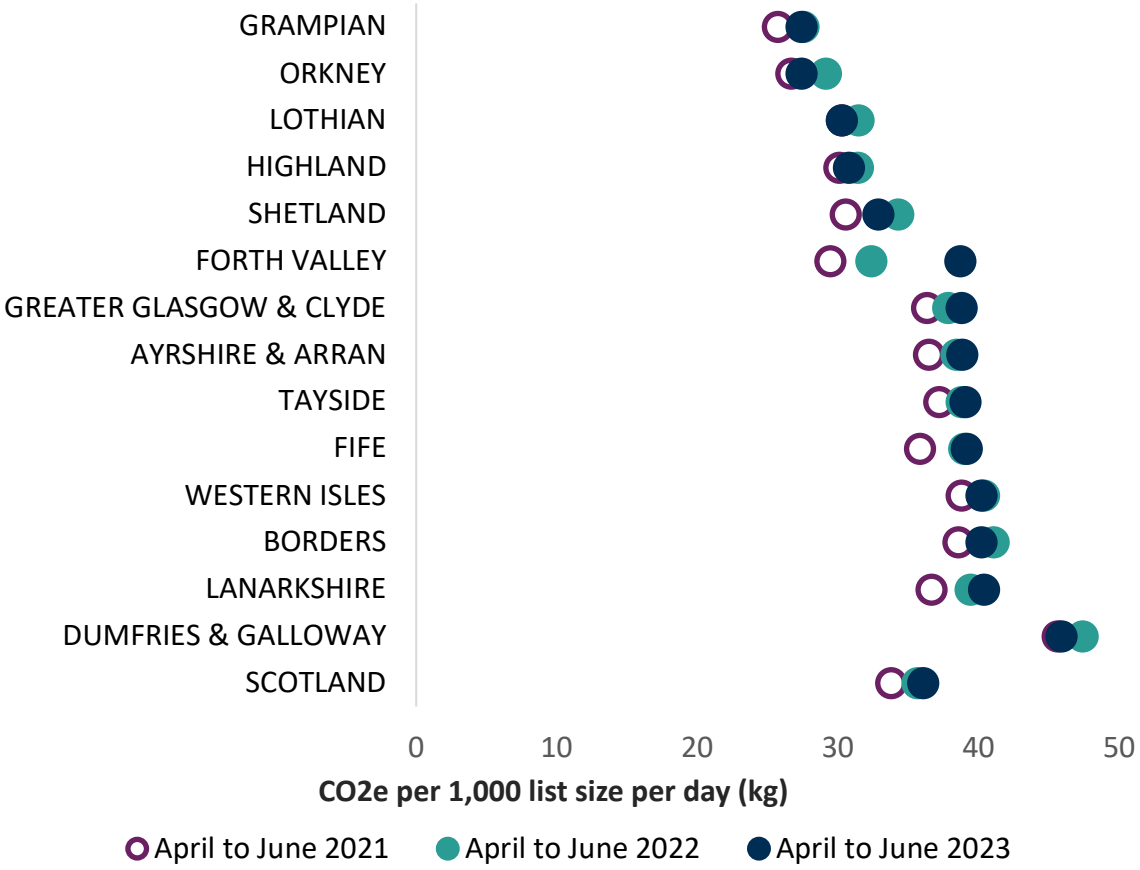
An ambitious target of 70% reduction in CO2 emissions from inhalers by 2028 has been set, as NHS Scotland works towards the commitment of net zero emissions by 2040. The 70% reduction has been split into biennial targets:

- a 25% reduction of CO2 emissions is required by the end of 2024
- a 50% reduction of CO2 emissions is required by 2026 and
- a 70% reduction by end of 2028

Prescribing indicators have been developed, as described below, to support achievement of the target.

Chart 14 below shows the CO2 equivalent emissions of inhaler propellant for each Health Board. The calculation is based on an average of 12g of propellant per MDI. There are currently two types of propellants used, HFA-134a and HFA-227ea which have a global warming potential (GWP) of 1300 or 3350 times greater than CO2.The carbon emissions were estimated by multiplying the estimated weight of HFA propellant by its GWP. We have assumed that DPIs have zero emissions.[8] Other factors such as manufacturing process, plastics used and recycling potential are not included in these calculations.

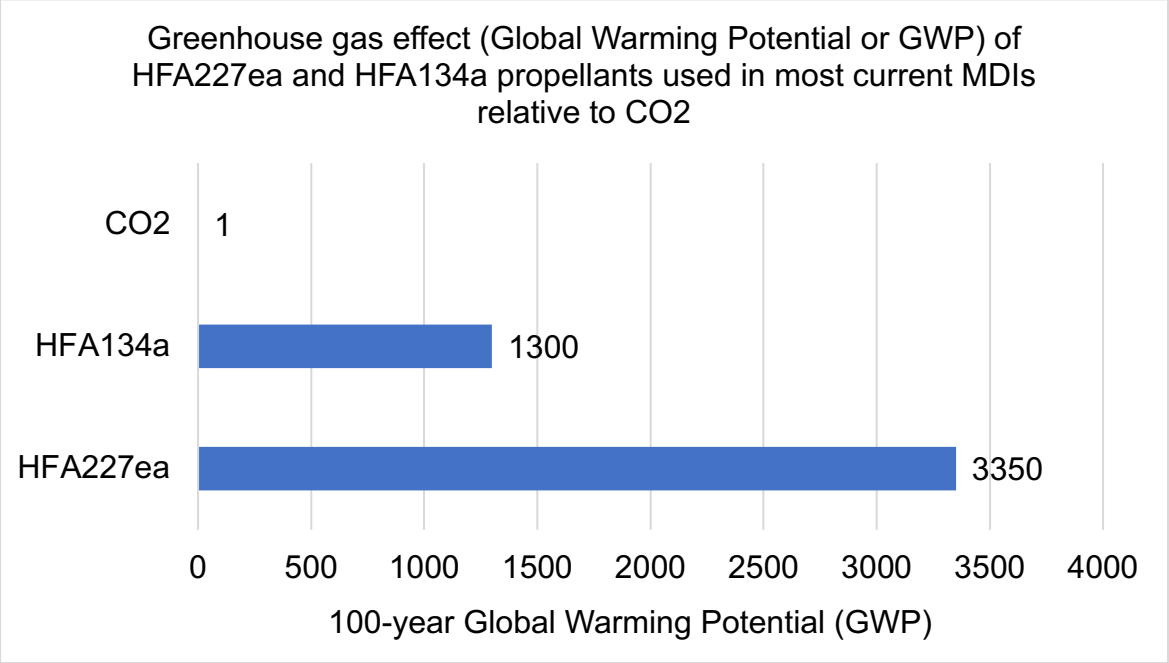
Chart 14: CO2 Emissions (kg) per 1000 patients on list size



Rationale for CO2 emission target

CO2 has a 100- year global warming potential (GWP) of one. pMDI's contain the propellants HFA 134a or HFA 227ea which have 1300 and 3320 higher GWP respectively then CO2. Figure 9 below highlights the differences in GWP of the propellants.[77] All dry powder inhalers and soft mist inhalers have considerably lower GWP than pMDIs.

Figure 9: Global Warming Potential[77]



New propellants such as HFA 152a and HFO-1234ze will have a low global warming potential and reduce the carbon footprint of pMDIs by at least 90%.[80,81] There is ongoing development of new propellants within the pharmaceutical sector, predicted to be available by 2025.

PrescQIPP data is available which estimates an indicative total CO2 emission (g) for each inhaler based on the life cycle including manufacturing process, plastics used, recyclable material and propellants contained.[82] A lot of these factors are subject to change, so this guide has focussed on CO2 emissions of the propellant initially to allow NHS Scotland to meet the CO2 reduction targets set. It is acknowledged that recycling of inhalers within NHS Scotland needs to improve and at present it is harder to recycle a DPI. Table 6 gives examples of inhalers and the respective GWP.

Table 6: Examples of pMDIs with different global warming potential

SMI (soft mist inhaler) **Very Low GWP**	**DPI** **Very low GWP**	**HFA 152a containing MDI inhalers due 2025** **Very low GWP**	**HFA 134a containing pMDI** **High GWP**	**HFA 134a containing pMDI (large volume cannister)** **Very high GWP**	**HFA 227ea containing pMDI** **Very high GWP**
Spiriva® Respimat ®	Accuhaler ®	MDI inhalers containing HFA 152a or other propellants due **2025**	Salamol® Easibreathe ® pMDI	Ventolin® pMDI	Flutiform® pMDI
Spiolto® Respimat ®	Easyhaler®		Clenil ® pMDI		Symbicort® pMDI
	Ellipta ®		Seretide ® pMDI		

Environmental prescribing issues to consider

For new patients

Opportunities for environmentally sustainable prescribing should be considered when prescribing inhalers for a new patient.

As there are significant differences in the global warming potential of different pMDIs, the following should be considered:

- use inhalers with a low global warming potential when they are as equally effective[6]
- where there is no alternative to a pMDI, lower volume HFA134a pMDI should be used in preference to large volume or HFA227ea pMDIs[6]
- prescribing decisions should be based on patient preference and ability to use the device. Ensure inhaler technique is taught and inspiratory flow may be assessed using an In-check® device
- patient should be counselled on expectations of treatment, signs of poor control and importance of adherence and attendance at review
- for patients with asthma use NICE asthma inhalers and the environment patient decision aid

For existing patients

As part of a person-centred review when optimising treatment, consider the opportunity for using a more carbon friendly inhaler. During the review, prescribers should use their judgement and consider the following:

- aim for the lowest GWP where possible, for example, a DPI or SMI
- switching stable patients from pMDI to DPI for SABA inhalers, where the individual is co-prescribed a DPI combination inhaler[6]
- using combination inhalers in place of separate inhalers to reduce the quantity of inhalers and GWP
- poor control may be due to poor inhaler technique, and if this is a pMDI, then a change to a DPI or SMI may help improve control. Ensure that inhaler technique is taught and checked

See Appendix 2 for consideration of when a DPI may not be suitable.

Prescribing Indicators to support reduction of CO2 emissions from inhalers

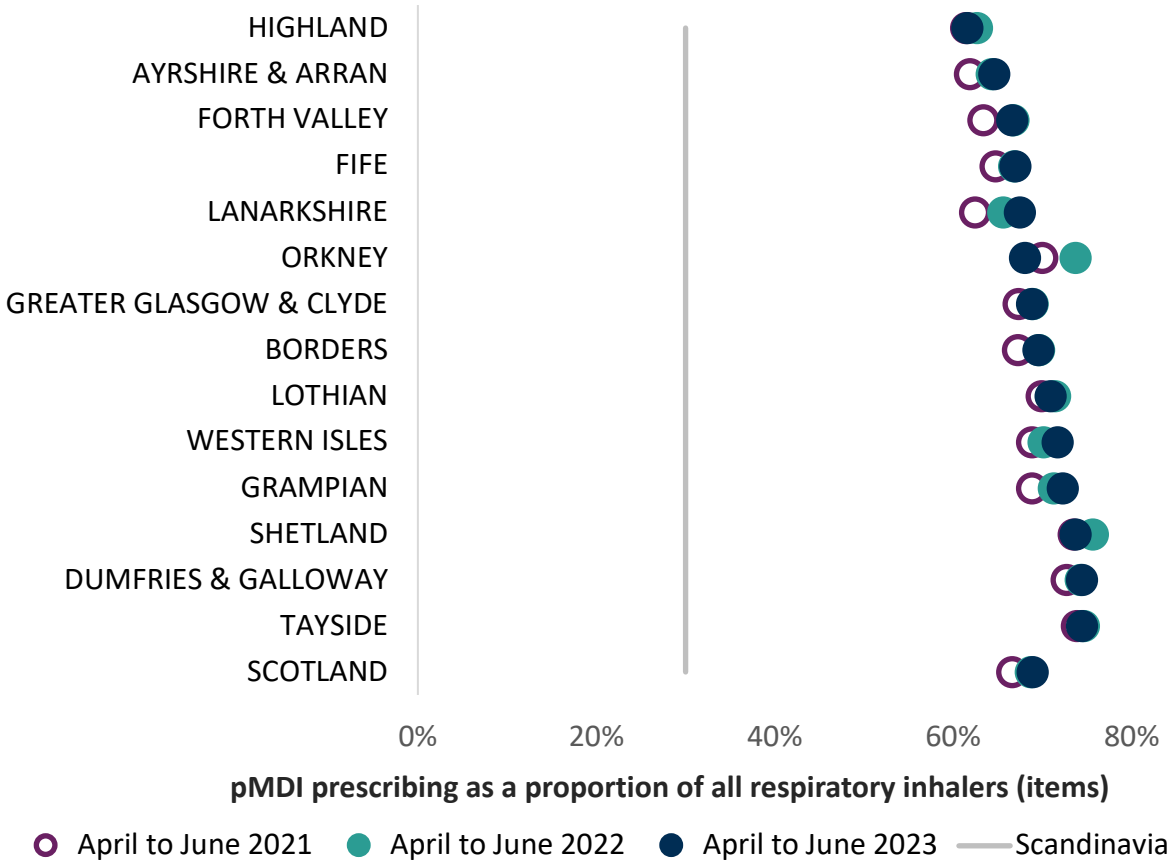
Proportion of pMDIs versus all inhalers

Chart 15 shows the proportion of pMDIs dispensed as a proportion of all other inhalers (including dry powder inhalers and soft mist inhalers). As detailed above, the UK has a high proportion of pMDI use (70%) compared with the rest of Europe (< 50%) and Scandinavia (10–30%).[75] The grey line on the chart indicates the Scandinavian level of pMDI prescribing at 30% as a comparator.

There may be opportunities to discuss inhaler choices with patients at their regular respiratory review. Changes to inhaler type should only take place in discussion with the patient but may be an opportunity to reduce carbon emissions where disease control will not be compromised. An inhaler selection decision aid has been developed to support this guidance, based on Appendix 2, and is incorporated into the Respiratory section of the Polypharmacy: Manage Medicines app[9] which supports clinicians and patients when discussing the suitability of a DPI rather than an MDI.

There are links to practical tips and support available from various sources to reduce carbon emissions from pMDIs, e.g. PrescQIPP and Greener practice.[83,84]

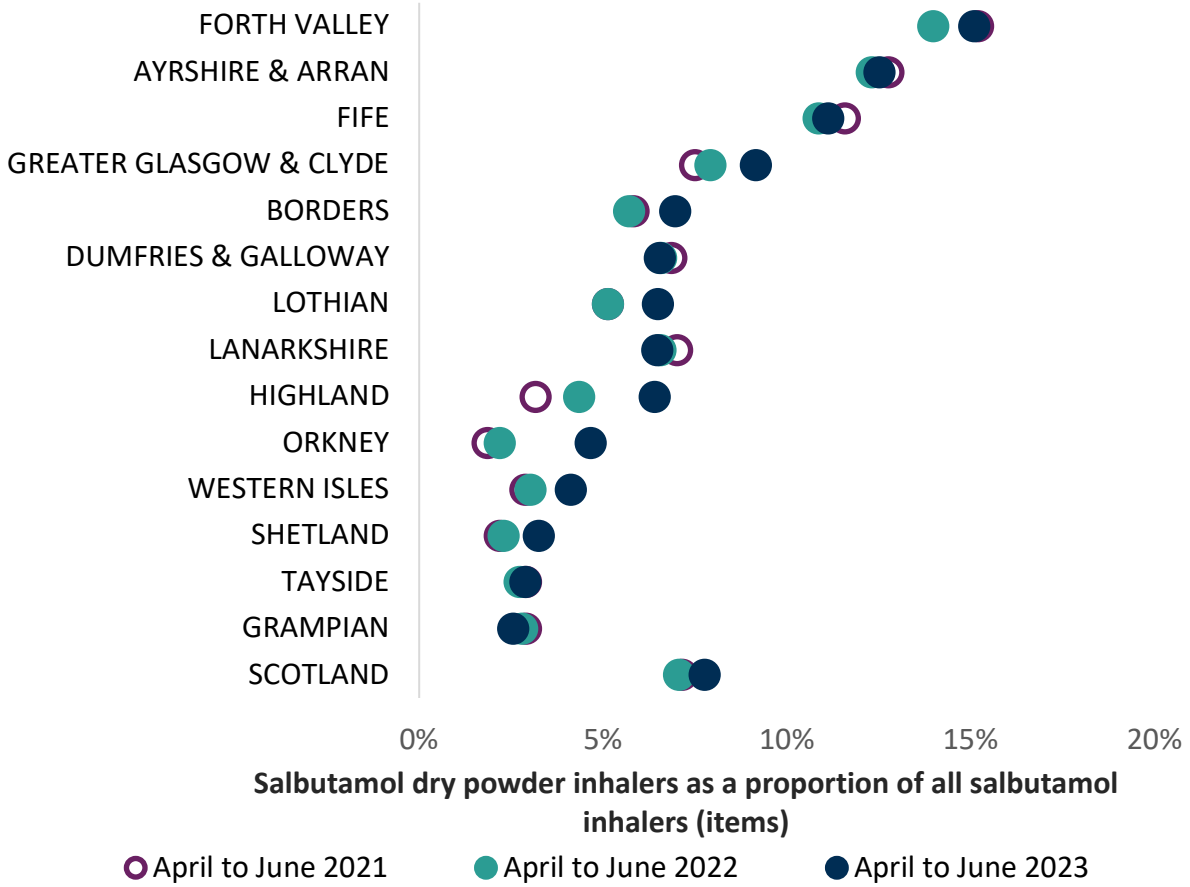
Chart 15: Proportion of pMDIs versus all inhalers (dry powder and soft mist inhalers)



As detailed above, the UK has a high proportion of pMDI use (70%) compared with the rest of Europe (< 50%) and Scandinavia (10–30%).[75] The grey line on the chart indicates the Scandinavian level of pMDI prescribing at 30% as a comparator.

Chart 16 below highlights that the use of DPI for salbutamol is low. In NHS Scotland only 7.8% of salbutamol inhalers are DPIs. If consideration is given to switching a patient to a DPI the clinician should be confident that the patient can use the DPI for acute circumstances. They may not be suitable for the very young or very old (see Appendix 2).

Chart 16: Salbutamol DPI as a proportion of all salbutamol (items)

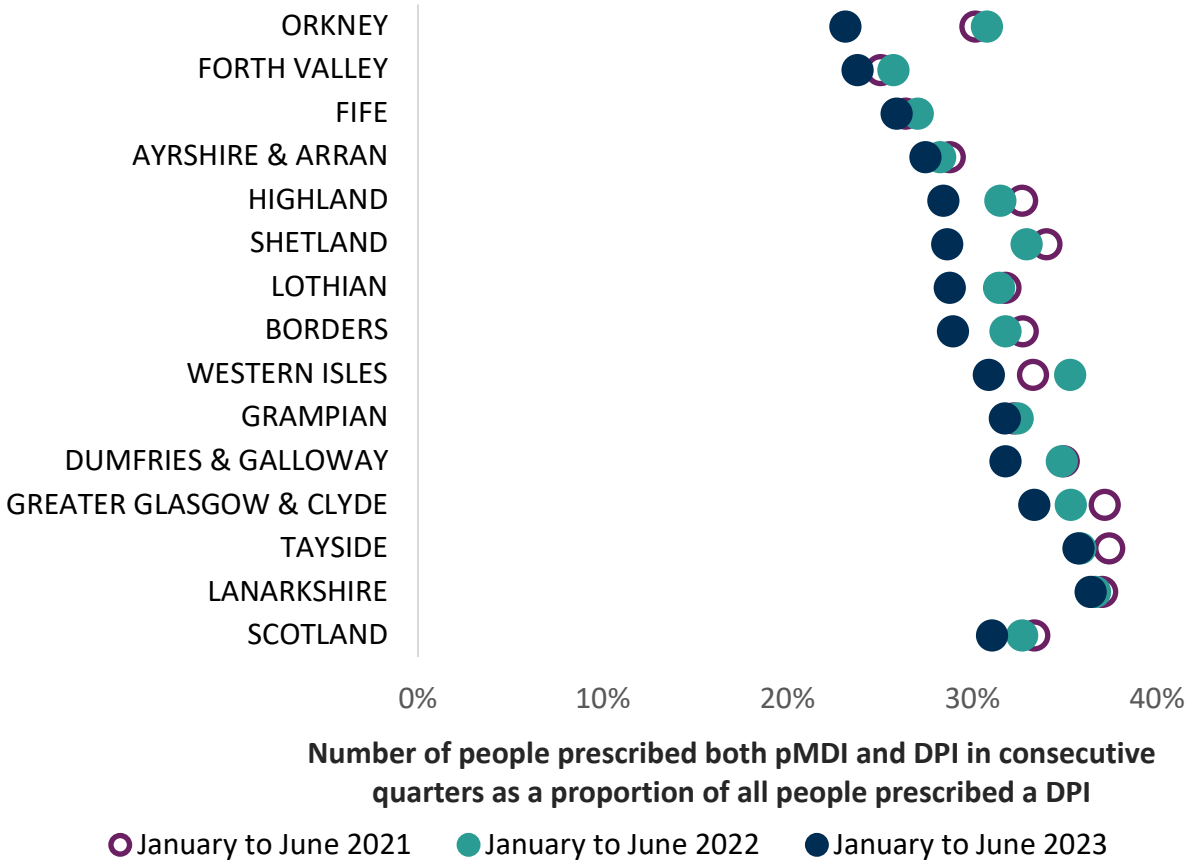


Proportion of patients receiving reliever and preventer inhalers in (BNF Chapter 3) as different devices

Using different devices may cause confusion regarding inhaler technique and lead to increased errors in use.[6] If the patient can use both a pMDI and a DPI then carbon emissions will be reduced if the pMDI inhaler is switched to a DPI.

In Chart 17 below, NHS Boards at the top of the chart have a lower proportion of patients on two different devices. Healthcare professionals are advised to include this as part of their respiratory review.

Chart 17: People prescribed both pMDI and DPI in consecutive quarters as a proportion of all people prescribed a DPI

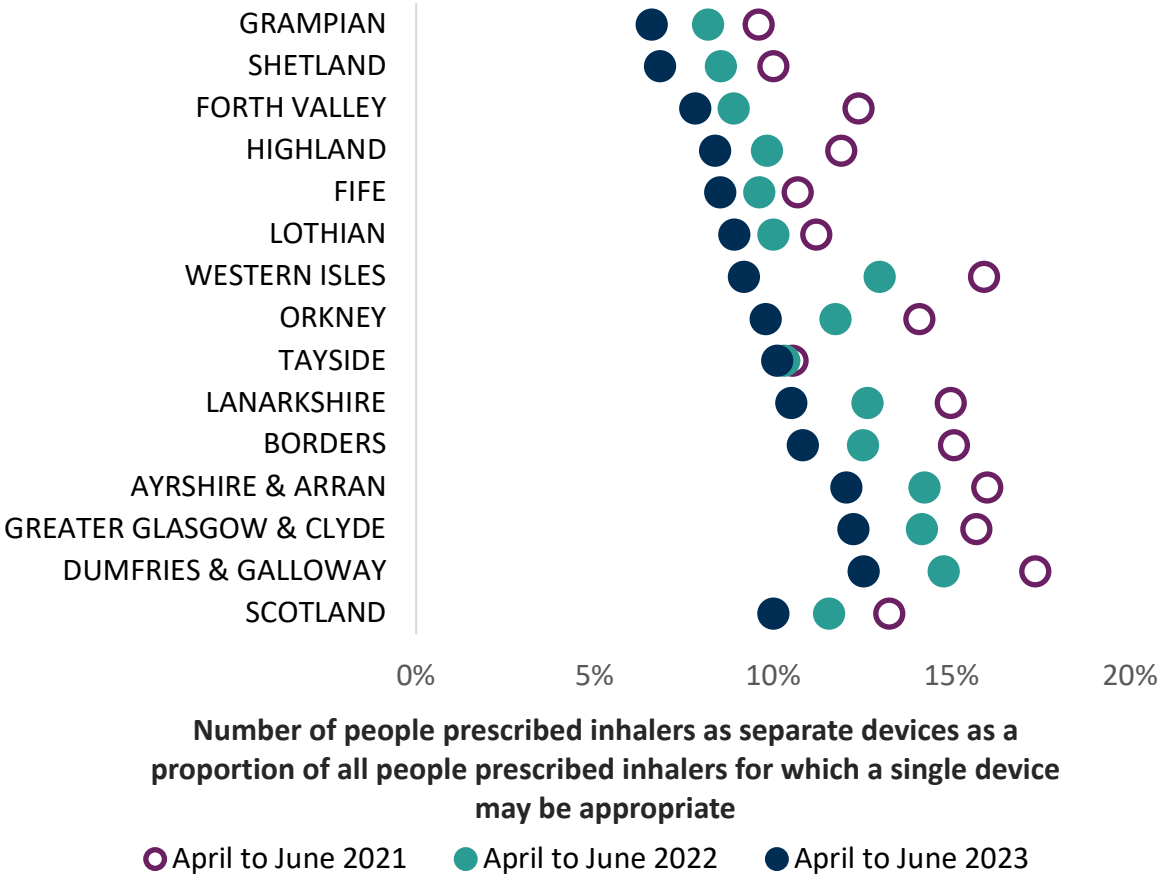


Proportion of patients receiving inhalers which could be prescribed as a combination

Clinicians are recommended to prescribe combination inhalers where appropriate, to improve overall adherence[6] and to guarantee that a LABA is not taken without corticosteroid for asthma.[6] Incorporating this consideration into a respiratory review will also result in reduced overall carbon emissions, as one inhaler is being used instead of two.

Chart 18 indicates those patients who may be considered for a combination inhaler, and all NHS Boards are improving. Please note that not all combination inhalers are licensed for both asthma and COPD. Please refer to individual Summary of Product Characteristics.

Chart 18: People prescribed inhalers as separate devices as a proportion of people prescribed any inhaler for which a combination inhaler may be appropriate



Area wide projects to promote inclusion of environmental focus for local formularies

The NHSGGC asthma and COPD Inhaler device guide includes a traffic light system on their formulary

Figure 10: NHSGGC Inhaler choice guide traffic light system

Environmental Impact	
CO2e	low CO2 emissions
CO2e	high CO2 emissions
CO2e	very high CO2 emissions

Case Study from NHS Lothian highlighting success in reduction of SABA inhalers

Background

Overreliance of short-acting beta-agonists (SABA) often indicates poor asthma control and is a predictor for future risk of asthma attack and death. The Scottish Therapeutics Utility (STU) tool uses data from GP health records to provide practice-level reports on repeat and high-risk prescribing. STU contains five searches relating to respiratory, including >12 SABA in one year, without a diagnosis of COPD'. STU is installed across Lothian, yet not every practice used it. We aimed to improve primary care prescribing of SABA in NHS Lothian, Scotland, by improving awareness of STU data.

Methods

A training event raised awareness of STU and the ease at which high risk asthmatic patients could be identified. Practices were incentivised to analyse their data and review patients' over-ordering SABAs. We analysed SABA prescribing data extracted from STU before (June 2019) and after the intervention (May 2021).

Results

Before the intervention, >12 SABA were prescribed to an average of 56 patients per practice (standard deviation (SD) 71). There was wide variation in prescribing: per practice, the minimum number of individuals receiving >12 SABA was 10; the highest was 602 patients. Following the intervention, the number of individuals receiving >12 SABA decreased with an average of 36 per practice and a reduction in variation between practices (SD 28).

Lessons learned

Although STU data was available prior to the intervention, few practices were aware of the benefits. Following the intervention, a reduction in the number of individuals who were prescribed >12 SABA per year which was seen across all areas of the health board.

Messages for others

We saw a reduction in SABA over-prescribing in NHS Lothian by promoting the use of primary care data to help educate and encourage practices to change prescribing. To see change, we needed to raise awareness directly with users.

11. Recommendations

Using the clinical guidance and prescribing recommendations contained in this guide.

Clinicians should:

Develop a clear management plan collaboratively with patients at the centre adopting the "what matters to me?" principles and the 7-Steps medication review process. Clinicians should optimise prescribing of medicines, reduce the potential for harm, manage patient expectations and consider the environmental impact of their prescribing.

Follow a clinically appropriate approach to initiation of medication, discussing risks and benefits and incorporating agreed criteria for stopping/continuing medication. Inhaler technique remains a key component of co-production of positive clinical outcomes. Therefore, review of inhaler technique should be undertaken as a priority. This is of particular importance due to the growing variety of inhaler devices – ongoing review is recommended.

Review effectiveness, tolerability and adherence on a regular basis. Medicine burden and waste should be reduced where possible, in line with the Scottish Government's Polypharmacy guidance.

Ensure awareness of relevant changes to inhaler formularies, new inhalers to market, carbon emissions of inhalers and updated guidance.

Pursue non-pharmaceutical approaches wherever possible, either alone or in conjunction with medicines. Self-management should be actively encouraged and supported for appropriate patients.

Clusters should:

Engage with local Medicines Management Teams and review respiratory prescribing data. View the National Therapeutic Indicators for respiratory prescribing including prescribing information by GP cluster on the shinyapp.[85] Respiratory prescribing issues should be included in the Cluster Quality Improvement plan if deemed a priority. Reduction of carbon emissions is a national priority and this document provides guidance on how to reduce carbon emissions due to respiratory prescribing.

Secondary care teams should:

Engage with pharmacy teams to ensure hospital prescribing is in line with local formulary.

Understand the influence that secondary care prescribing has in the primary care setting and educate associated staff.

Health Boards should:

Consider this guidance alongside the data provided on prescribing positions and trends. Prescribing action plans set out local priorities for how Health Boards will continue to improve quality of medicines management. These action plans should, where appropriate, encourage use of this document to drive that improvement.

Nominate a local lead from within Medicines Management and **a local clinical lead** from within the local Managed Clinical Network or Respiratory Community. The two leads should work closely together to drive delivery and implementation of the recommendations within this document with the local Managed Clinical Network, where possible.

Ensure the primary/secondary care interface is appropriately developed. Given the considerable influence that local secondary care prescribing culture has on primary care clinicians, it is vital to ensure engagement with secondary care clinicians. Encourage ownership of primary care data by clinicians in both settings.

Review local prescribing pathways and formulary and support clinicians, based on current SIGN guidance and environmental issues.

Ensure non-pharmacological management is promoted within prescribing action plans.

12. Scottish Therapeutics Utility (STU)

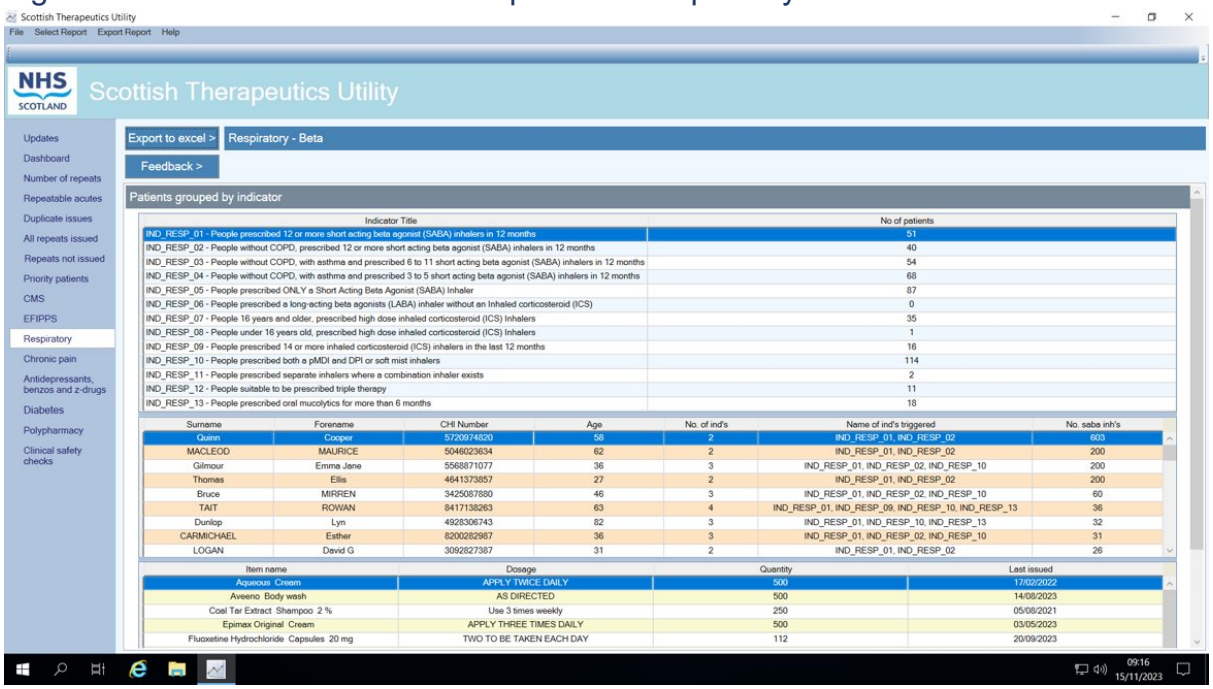
The Scottish Therapeutics Utility (STU) is a computer programme that uses data from GP IT systems with a focus on repeat prescribing and other clinical areas including respiratory prescribing. It generates a suite of standardised reports to facilitate targeted medicines management activity. The reports populate an interactive dashboard using prescription items issued by an individual practice. STU works alongside the clinical system to provide direct access to the individual patient clinical record for ease of use to make changes if required and supports identification and prioritisation of patients for review.

STU is licensed by the Effective Prescribing and Therapeutics Division at the Scottish Government and is available to GP practices throughout Scotland free of charge. The Pharmacy Team within GP practices are using this programme already and will assist any interested clinicians. Find more information on STU and how to access it on the Effective Prescribing and Therapeutics Division website.

STU searches will support the prescribing indicators discussed in this document to allow identification of patients for review.

The screenshot below shows how the searches look within STU. Screenshot taken from test system with no real patient details displayed.

Figure 11: STU Screenshot – Example from Respiratory Tab – Data Tables



Abbreviations

A&A	Ayrshire & Arran
ACQ (6)	Asthma control Questionnaire
ACP	Activated Clotting Time
ACT	Asthma Control Test
AF	Anti-fibrotic
AHP	Allied Healthcare Professional
ANA	Anti-Nuclear Antibodies
ANCA	Anti-Neutrophil Cytoplasm Antibodies
ANP	Advanced Nurse Practitioner
ARDs	Acute Respiratory Distress Syndrome
BMI	Body Mass Index
BNF	British National Formulary
BTS	British Thoracic Society
CAT	Computerized Axial Tomography
CF	Cystic Fibrosis
CO2	Carbon dioxide
COPD	Chronic Obstructive Pulmonary Disease
CRP	C-reactive protein
CSH	Centre for Sustainable Healthcare
CXR	Chest X-ray
D&G	Dumfries & Galloway
DEXA	Dual Energy X-ray Absorptiometry
DPI	Dry powder inhaler
DTaP	Diptheria-tetanus-pertussis vaccine
ECG	Electrocardiogram
ERS	European Respiratory Society
EU	European Union
FBC	Full blood count
FeNO	Fractionated Exhaled Nitric oxide
FEV_1	Forced Expiratory Volume in 1 Second
FV	Forth Valley
FVC	Forced Vital Capacity
GGC	Greater Glasgow & Clyde
GOLD	Global Initiative for Chronic Obstructive Lung Disease
GP	General Practitioner
GWI	Global Water Intelligence
GWP	Global warming potential
HFA	Hydrofluoroalkane
HIS	Healthcare Improvement Scotland
HSCP	Health and Social Care Partnership
ICS	Inhaled Corticosteroids

ILD	Interstitial Lung Disease
IPF	Idiopathic pulmonary fibrosis
IT	Information Technology
ITU	Intensive Therapy Unit
LABA	Long-Acting $Beta_2$ Agonist
LAMA	Long-Acting Muscarinic Antagonist
LRA	Leukotriene receptor antagonists
MAB	Monoclonal antibody
MART	Maintenance and Reliever Therapy
MCN	Managed Clinical Network
MCR	Medicines care and Review
MDI/ pMDI	Metered Dose inhaler (pressurised)
MRC	Medical Research Council – Breathlessness scale
NCDs	Non-communicable Diseases
NHS	National Health Service
NICE	National Institute for Health and Social Care Excellence
NRAD	National Review of Asthma Deaths
NTM	Nontuberculous Mycobacterial
OCS	Oral Corticosteroids
PFTs	Pulmonary Function Tests
PIS	Prescribing Information System
PRISMS	Prescribing Reporting Information System
QI	Quality Improvement
RAST	Radioallergosorbent Test
RCGP	Royal College of General Practitioners
SABA	Short-Acting $Beta_2$ Agonists
SAMA	Short-Acting Muscarinic Antagonist
SAPG	Scottish Antimicrobial Prescribing group
Sats	Saturations (Oxygen)
SIGN BTS	Scottish Intercollegiate Guidelines Network / British Thoracic Society
SMC	Scottish Medicines Consortium
SPC	Summary of product characteristics
STU	Scottish Therapeutics Utility
TFT	Thyroid Function Test
U and Es	Urea and Electrolytes
VBA	Very Brief Advice
WHO	World Health Organisation

Appendix 1 - Resources for clinicians and patients

My Lungs My Life
My Lungs My Life is a comprehensive, free website for anyone living with COPD, asthma or for parents/guardians of children with asthma. The resource is a collaboration between NHS, third sector and the University of Edinburgh.

In addition to general information regarding conditions, videos demonstrating technique on a number of the most commonly prescribed inhaler devices are provided. These may be considered useful when initiating or changing inhalers at a patient level.

Don't Waste a Breath
The Don't Waste a Breath website, developed by NHS Grampian, provides information for patients on inhaler technique and how to recycle inhalers. This website complements My Lungs My Life and is aimed directly at patients.

Personal Asthma Action Plans
There is substantial evidence to support the value of personalised actions plans for asthma in both adults and children. Clinicians should refer to local guidance and resources. Access a generic template from Asthma + Lung UK.

Stepping down of Chronic Asthma Drugs
Following a period of stable asthma, clinicians should consider stepping down treatment. The State of the Art Review 'Why and how to step down chronic asthma drugs' on the BMJ website provides a helpful reference source.

Charity Resources
The Chest Heart and Stroke Scotland website, the Asthma + Lung UK website and the Asthma and Allergy Foundation website have lots of information to support healthcare professionals and patients. There are patient leaflets, booklets and toolkits available for use and all have a patient helpline providing advice.

RESPe
RESPe is a free online learning resource provided by CHSS working with the University of Edinburgh for all healthcare professionals.

Resources to assist GP practices to review environmentally friendly respiratory prescribing

Access PrescQIPP respiratory care resources and campaign materials (developed jointly by NHS England and PrescQIPP). PrescQIPP also showcase good practice examples of projects in respiratory care and signpost to self-care resources available for organisations to use to support their own respiratory care campaigns.

Patient information resources to support environmentally friendly prescribing are included in the resources listed with the PrescQIPP inhaler carbon footprint bulletin e.g. What should I do if I need to use my reliever inhaler often for my asthma? (See example 1 below)

Greener practice has a toolkit designed to help UK general practices improve asthma outcomes whilst also reducing carbon emissions. It contains step-by-step Quality Improvement (QI) projects. Project resources include downloadable searches, educational videos, templates and patient information (See example 2 below).

The Royal College of General Practitioners (RCGP) Green Impact for Health toolkit has been developed and can help any general practice improve their sustainability and environmental impact; reduce their harmful impact on planetary health, the risks of climate change and reduce their practice expenses. It answers the question – 'What can we do in our practice?' and covers many aspects, including prescribing of inhalers.

The Centre for Sustainable Healthcare (CSH) offers strategic input and consultancy on sustainable healthcare research and practice to national and local programmes. There is a CSH network for Sustainable respiratory care with many resources and projects shared. Join the network to access their resources.

Example 1: Patient information leaflet focusing on SABA overreliance from PrescQIPP, which can be adapted for local use

What should I do if I need to use my reliever inhaler often for my asthma?
If you need to use your **reliever** inhaler for **three or more days each week**, then it may be a sign that your asthma is not well controlled.

Continue to use your reliever inhaler when you need it, and make a routine appointment at the GP surgery, so we can see if there is anything we can do to help you.

What can I also do to help myself?

- make sure you use your **preventer** (treatment) inhaler every day even if you don't have any symptoms. This should reduce how much you need to use your reliever inhaler.
- look at your inhaler dose counter, if it has one, or think about ways to help you remember to use your inhaler.
- check that you are using your inhaler correctly so that you get all the benefits from using your inhaler. You can read a leaflet or watch a video on how to use your inhaler.
- follow your asthma action plan, which tells you what to do when your asthma symptoms are getting worse.

What is a reliever inhaler?
Reliever inhalers work quickly when you have symptoms like difficulty breathing, wheezing or coughing.

They contain a medicine that relaxes the muscles in your lungs and so opens your airways. This makes it easier to breathe and stops you from wheezing or coughing.

What is a preventer (treatment) inhaler?
Preventer (treatment) inhalers contain medicines what reduce any swelling or inflammation in your lungs making it easier to breathe.

They shield you from your asthma triggers.

Preventer inhalers should be taken every day as instructed on the label from your pharmacy.

Talk to your doctor, nurse or pharmacist if you are concerned about using an inhaler every day.

Example 2: Patient information leaflet from Greener Practice

View the leaflet ‘Inhalers and the environment – choosing an inhaler which is good for you and good for the planet’.

Appendix 2 - When is a dry powder inhaler (DPI) suitable or not?

For patients with respiratory conditions who are interested and happy to try a DPI, it is suggested that a DPI device is a suitable option for those who can breathe in through their mouth quickly and deeply over two to three seconds.[86]

Many patients may find DPIs easier to use, especially when given inhaler technique instruction,[87] although teaching inhaler technique has positive impacts on disease and patient outcome for all inhalers.[88] Factors such as older age affect inhaler technique but a review was not able to determine whether this was related to dexterity, cognition, physical ability, or the device.[17]

In clinical use, DPIs perform as well as other types of inhaler device even during asthma or COPD exacerbations.[79] This is irrespective of patient's respiratory condition or age. Patient's inspiratory flow does not limit the use of any inhaler type however there are patient beliefs and misconceptions[79] that DPIs may be difficult to use when inspiratory flow is low. Previously, it was thought that DPIs were not an appropriate choice of inhaler for patients who are not able to generate sufficient inspiratory flow.,[89,90] An In-check® device can be used to determine inspiratory flow if desired and this can be cross referenced to the manufacturer's recommended minimum inspiratory flow rate for individual device types.

All inhalers are prone to technique errors. Correct inhaler technique, treatment adherence and patient preference has a greater impact on disease outcomes rather than the indiscriminate choice of a specific device.[88,91] pMDIs require the ability to co-ordinate actuation of the inhaler with a long slow inspiration, which can be a problem for some patients.[89] A review highlighted that DPIs may not be suitable[89] for the following groups:

- frail, elderly patients
- very young patients
- those with muscle weakness

A person-centred approach, checking inhaler technique and suitability of the device chosen is recommended for the groups highlighted above. Inhaler choices should be made with the patient,[89] ensuring the right device for the right patient.[92]

Individuals should have a reliever inhaler (DPI or MDI plus spacer) that they are able to use in the event of an acute exacerbation of asthma or COPD. If a patient has concerns regarding their ability to use their inhaler device during an exacerbation, this should be discussed, and a person-centred choice made. In this situation a single issue of a pMDI reliever plus spacer may be reasonable for use in an acute exacerbation. Table 14, SIGN 158[6] Consider switch to pMDI with lower global-warming potential if this is clinically appropriate.

Reassure those for whom a DPI is unsuitable that the greenest inhaler is the one that they can use effectively to have good disease control, minimise the use of their reliever inhaler and avoid hospitalisation. Good control is better for the individual, and for the environment.

Appendix 3 - Data tables from indicator charts

Table 7: People prescribed six or more short-acting beta-agonists (SABA) per annum (Chart 1)

NHS Board	July 2020 to June 2021	July 2021 to June 2022	July 2022 to June 2023
NHS Ayrshire & Arran	33.8%	30.4%	28.9%
NHS Borders	32.8%	30.0%	28.9%
NHS Dumfries & Galloway	34.6%	31.6%	30.2%
NHS Fife	34.2%	31.7%	31.4%
NHS Forth Valley	31.0%	28.2%	27.5%
NHS Grampian	29.1%	26.9%	25.9%
NHS Greater Glasgow & Clyde	38.0%	34.2%	32.8%
NHS Highland	32.0%	29.1%	27.2%
NHS Lanarkshire	36.5%	32.8%	31.9%
NHS Lothian	34.0%	30.7%	28.4%
NHS Orkney	27.2%	23.2%	18.8%
NHS Shetland	28.5%	25.9%	22.3%
NHS Tayside	33.4%	30.2%	29.2%
NHS Western Isles	35.0%	32.1%	32.5%
Scotland	34.7%	31.4%	30.0%

Table 8: People prescribed three or more short-acting beta-agonists (SABA) per annum (Chart 2)

NHS Board	July 2020 to June 2021	July 2021 to June 2022	July 2022 to June 2023
NHS Ayrshire & Arran	57.3%	53.4%	51.8%
NHS Borders	55.1%	52.5%	52.0%
NHS Dumfries & Galloway	56.6%	53.2%	52.4%
NHS Fife	56.5%	54.5%	53.9%
NHS Forth Valley	54.5%	52.0%	51.4%
NHS Grampian	52.7%	50.2%	49.1%
NHS Greater Glasgow & Clyde	59.3%	55.6%	53.7%
NHS Highland	54.3%	51.0%	49.8%
NHS Lanarkshire	60.0%	55.7%	54.6%
NHS Lothian	56.1%	53.2%	51.1%
NHS Orkney	48.5%	44.6%	41.1%
NHS Shetland	50.8%	48.1%	45.6%
NHS Tayside	55.8%	53.0%	52.2%
NHS Western Isles	56.9%	53.5%	53.1%
Scotland	57.2%	53.9%	52.5%

Table 9: Number of SABA pMDIs prescribed per 1,000 list size (Chart 3)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	114.61	119.76	119.86
NHS Borders	120.98	130.21	128.55
NHS Dumfries & Galloway	140.51	145.73	140.31
NHS Fife	118.09	129.24	129.35
NHS Forth Valley	93.88	103.08	130.17
NHS Grampian	87.39	93.80	91.72
NHS Greater Glasgow & Clyde	117.91	122.18	125.41
NHS Highland	107.32	112.43	109.31
NHS Lanarkshire	125.64	133.42	133.13
NHS Lothian	97.17	100.63	94.33
NHS Orkney	86.36	94.03	85.58
NHS Shetland	95.76	107.81	100.32
NHS Tayside	115.03	120.42	120.11
NHS Western Isles	123.35	137.22	135.94
Scotland	110.26	116.15	116.56

Table 10: High dose corticosteroid inhalers as a percentage of all corticosteroid inhaler items (using 2019 SIGN/BTS classification of high dose) (Chart 4)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	15.8%	14.5%	12.2%
NHS Borders	14.2%	15.3%	15.7%
NHS Dumfries & Galloway	15.7%	15.0%	12.6%
NHS Fife	20.4%	21.4%	22.7%
NHS Forth Valley	15.8%	16.3%	15.8%
NHS Grampian	16.2%	16.1%	15.6%
NHS Greater Glasgow & Clyde	17.6%	18.0%	18.6%
NHS Highland	23.2%	22.3%	22.1%
NHS Lanarkshire	16.5%	16.8%	17.8%
NHS Lothian	18.1%	18.4%	18.9%
NHS Orkney	19.9%	18.1%	18.9%
NHS Shetland	19.5%	17.5%	16.4%
NHS Tayside	12.4%	13.0%	12.2%
NHS Western Isles	19.9%	18.1%	17.7%
Scotland	17.2%	17.3%	17.3%

Table 11: People prescribed a LABA without ICS per 1000 patient size (Chart 5)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	0.65	0.66	0.63
NHS Borders	0.48	0.36	0.31
NHS Dumfries & Galloway	0.77	0.57	0.46
NHS Fife	0.50	0.43	0.30
NHS Forth Valley	0.21	0.17	0.15
NHS Grampian	0.14	0.12	0.10
NHS Greater Glasgow & Clyde	0.79	0.63	0.51
NHS Highland	0.50	0.40	0.33
NHS Lanarkshire	0.13	0.13	0.12
NHS Lothian	0.21	0.19	0.17
NHS Orkney	0.27	0.18	0.04
NHS Shetland	0.17	0.13	0.22
NHS Tayside	0.30	0.26	0.19
NHS Western Isles	1.22	0.92	0.66
Scotland	0.42	0.36	0.29

Table 12: Prescribing of SABA only (in absence of other inhalers) (Chart 6)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	19.7%	21.6%	21.3%
NHS Borders	20.2%	21.8%	21.2%
NHS Dumfries & Galloway	21.2%	22.2%	21.8%
NHS Fife	21.9%	23.0%	22.5%
NHS Forth Valley	20.6%	21.8%	21.0%
NHS Grampian	20.1%	22.0%	22.0%
NHS Greater Glasgow & Clyde	21.0%	22.6%	21.8%
NHS Highland	21.5%	23.1%	22.3%
NHS Lanarkshire	19.9%	21.6%	20.7%
NHS Lothian	21.5%	23.2%	22.2%
NHS Orkney	19.3%	22.8%	21.8%
NHS Shetland	18.8%	20.7%	18.1%
NHS Tayside	19.5%	20.0%	19.4%
NHS Western Isles	21.7%	23.6%	24.0%
Scotland	20.7%	22.2%	21.5%

Table 13: Number of montelukast doses prescribed per 1000 list size of population (Chart 7)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	684.65	708.69	754.26
NHS Borders	620.71	617.89	631.82
NHS Dumfries & Galloway	639.92	702.01	755.10
NHS Fife	704.61	732.91	755.32
NHS Forth Valley	609.75	629.23	685.04
NHS Grampian	536.92	552.78	584.97
NHS Greater Glasgow & Clyde	416.17	428.70	458.94
NHS Highland	516.94	547.05	583.13
NHS Lanarkshire	705.80	743.00	813.82
NHS Lothian	402.40	404.47	424.39
NHS Orkney	520.30	631.71	676.26
NHS Shetland	826.26	868.81	924.78
NHS Tayside	612.94	610.73	641.19
NHS Western Isles	411.60	463.65	602.05
Scotland	541.43	558.63	594.72

Table 14: Number of people with severe asthma receiving biologics as a proportion of the estimated severe asthma population (Chart 8)

NHS Board	Total number of patients on biologics for severe asthma	Severe asthmatics receiving biologics per 100,000 weighted population	Potential population with severe asthma (est 4% of asthma population)
NHS Ayrshire & Arran	58	5.10%	1,141
NHS Borders	21	7.10%	295
NHS Dumfries & Galloway	26	5.90%	439
NHS Fife	30	3.10%	976
NHS Forth Valley	62	7.70%	803
NHS Grampian	151	10.80%	1,400
NHS Greater Glasgow & Clyde	397	11.00%	3,606
NHS Highland	64	7.60%	840
NHS Lanarkshire	140	7.20%	1,951
NHS Lothian	201	9.00%	2,239
NHS Tayside	180	16.20%	1,111
Scotland	**1,330**	**9.00%**	**14,802**

Table 15: Number of people prescribed mucolytics long term (≥2 years) per 1,000 weighted list size (Chart 9)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	2.07	1.97	1.77
NHS Borders	1.35	1.35	1.34
NHS Dumfries & Galloway	1.92	1.74	1.49
NHS Fife	0.77	0.73	0.59
NHS Forth Valley	1.63	1.41	1.27
NHS Grampian	0.78	0.89	0.81
NHS Greater Glasgow & Clyde	2.22	1.98	1.67
NHS Highland	1.07	1.07	1.12
NHS Lanarkshire	1.97	1.83	1.69
NHS Lothian	0.36	0.36	0.38
NHS Orkney	1.21	1.59	1.56
NHS Shetland	0.48	0.58	0.53
NHS Tayside	0.83	0.69	0.53
NHS Western Isles	2.32	2.35	2.46
Scotland	1.45	1.35	1.19

Table 16: Number of people receiving triple therapy (either as separate or single inhalers)
(Chart 10)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	14.53	14.84	15.63
NHS Borders	11.57	11.97	12.10
NHS Dumfries & Galloway	14.67	14.99	15.50
NHS Fife	9.86	10.69	11.38
NHS Forth Valley	11.66	11.69	11.98
NHS Grampian	8.65	9.00	9.41
NHS Greater Glasgow & Clyde	11.71	11.98	12.45
NHS Highland	9.18	9.63	10.03
NHS Lanarkshire	13.38	13.72	14.30
NHS Lothian	8.25	8.27	8.50
NHS Orkney	8.73	9.20	9.98
NHS Shetland	7.42	7.96	8.19
NHS Tayside	11.62	12.46	13.66
NHS Western Isles	6.49	6.54	6.13
Scotland	10.93	11.25	11.74

Table 17: Number of people prescribed triple therapy as a single device as a proportion of all patients prescribed triple therapy (Chart 11)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	53.8%	58.9%	65.8%
NHS Borders	48.1%	57.4%	63.1%
NHS Dumfries & Galloway	48.0%	56.1%	62.4%
NHS Fife	55.6%	61.9%	67.2%
NHS Forth Valley	63.9%	73.0%	76.4%
NHS Grampian	63.8%	69.9%	76.2%
NHS Greater Glasgow & Clyde	54.9%	59.3%	64.8%
NHS Highland	55.1%	63.5%	68.7%
NHS Lanarkshire	49.4%	57.8%	65.3%
NHS Lothian	58.1%	62.3%	66.6%
NHS Orkney	53.9%	58.3%	64.9%
NHS Shetland	54.4%	61.2%	71.3%
NHS Tayside	65.0%	66.5%	68.6%
NHS Western Isles	32.0%	42.4%	58.4%
Scotland	56.1%	61.8%	67.3%

Table 18: Respiratory Costs per treated patient (Chart 12)

NHS Board	July 2020 to June 2021	July 2021 to June 2022	July 2022 to June 2023
NHS Ayrshire & Arran	£181	£164	£160
NHS Borders	£175	£161	£162
NHS Dumfries & Galloway	£173	£156	£151
NHS Fife	£176	£163	£163
NHS Forth Valley	£184	£168	£167
NHS Grampian	£173	£158	£158
NHS Greater Glasgow & Clyde	£183	£166	£168
NHS Highland	£180	£163	£159
NHS Lanarkshire	£186	£166	£164
NHS Lothian	£169	£153	£150
NHS Orkney	£164	£146	£136
NHS Shetland	£153	£137	£127
NHS Tayside	£182	£177	£174
NHS Western Isles	£160	£138	£134
Scotland	£180	£165	£163

Table 19: Proportion of generically prescribed inhalers as a proportion of all inhaler (excluding salbutamol) (Chart 13)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	7.7%	6.4%	6.5%
NHS Borders	7.9%	7.0%	8.0%
NHS Dumfries & Galloway	14.5%	13.1%	14.1%
NHS Fife	6.6%	6.0%	7.0%
NHS Forth Valley	5.0%	4.4%	4.8%
NHS Grampian	7.2%	6.7%	7.2%
NHS Greater Glasgow & Clyde	8.8%	7.6%	7.0%
NHS Highland	7.6%	6.8%	7.4%
NHS Lanarkshire	6.4%	5.9%	6.3%
NHS Lothian	8.7%	7.4%	6.7%
NHS Orkney	8.0%	6.6%	6.4%
NHS Shetland	10.7%	9.2%	11.1%
NHS Tayside	5.0%	4.7%	4.7%
NHS Western Isles	20.2%	18.7%	34.2%
Scotland	7.7%	6.9%	7.0%

Table 20: CO2 Emissions (kg) per 1000 patients on list size (including targets) (Chart 14)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	36.48	38.42	38.85
NHS Borders	38.56	41.07	40.21
NHS Dumfries & Galloway	45.62	47.38	45.89
NHS Fife	35.81	38.95	39.15
NHS Forth Valley	29.45	32.36	38.71
NHS Grampian	25.71	27.52	27.40
NHS Greater Glasgow & Clyde	36.31	37.83	38.77
NHS Highland	30.08	31.43	30.75
NHS Lanarkshire	36.66	39.42	40.38
NHS Lothian	30.28	31.43	30.28
NHS Orkney	26.65	29.11	27.42
NHS Shetland	30.55	34.25	32.87
NHS Tayside	37.20	38.78	39.05
NHS Western Isles	38.80	40.36	40.20
Scotland	33.78	35.66	36.06

Table 21: Proportion of pMDIs versus all inhalers (dry powder and soft mist inhalers) (Chart 15)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	61.9%	64.3%	64.6%
NHS Borders	67.3%	69.6%	69.5%
NHS Dumfries & Galloway	72.7%	74.3%	74.4%
NHS Fife	64.7%	66.8%	67.0%
NHS Forth Valley	63.4%	66.7%	66.6%
NHS Grampian	68.8%	71.3%	72.3%
NHS Greater Glasgow & Clyde	67.3%	68.9%	68.8%
NHS Highland	61.5%	62.6%	61.6%
NHS Lanarkshire	62.4%	65.6%	67.4%
NHS Lothian	69.9%	71.4%	70.9%
NHS Orkney	70.0%	73.7%	68.0%
NHS Shetland	73.5%	75.7%	73.7%
NHS Tayside	73.8%	74.6%	74.4%
NHS Western Isles	68.8%	70.1%	71.7%
Scotland	66.6%	68.7%	68.9%

Table 22: Salbutamol DPI as a proportion of all salbutamol (items) (Chart 16)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	12.8%	12.3%	12.5%
NHS Borders	5.8%	5.7%	7.0%
NHS Dumfries & Galloway	6.9%	6.6%	6.5%
NHS Fife	11.6%	10.9%	11.1%
NHS Forth Valley	15.2%	14.0%	15.1%
NHS Grampian	2.9%	2.8%	2.6%
NHS Greater Glasgow & Clyde	7.5%	7.9%	9.2%
NHS Highland	3.2%	4.3%	6.4%
NHS Lanarkshire	7.0%	6.6%	6.5%
NHS Lothian	5.1%	5.1%	6.5%
NHS Orkney	1.9%	2.2%	4.7%
NHS Shetland	2.2%	2.3%	3.3%
NHS Tayside	2.9%	2.7%	2.9%
NHS Western Isles	2.9%	3.0%	4.1%
Scotland	7.2%	7.1%	7.8%

Table 23: People prescribed both pMDI and DPI in consecutive quarters as a proportion of all people prescribed a DPI (Chart 17)

NHS Board	January to June 2021	January to June 2022	January to June 2023
NHS Ayrshire & Arran	28.8%	28.3%	27.5%
NHS Borders	32.7%	31.8%	29.0%
NHS Dumfries & Galloway	34.9%	34.8%	31.8%
NHS Fife	26.4%	27.0%	25.9%
NHS Forth Valley	25.1%	25.7%	23.8%
NHS Grampian	32.2%	32.5%	31.8%
NHS Greater Glasgow & Clyde	37.2%	35.3%	33.4%
NHS Highland	32.7%	31.5%	28.4%
NHS Lanarkshire	37.0%	36.7%	36.4%
NHS Lothian	31.8%	31.4%	28.8%
NHS Orkney	30.2%	30.8%	23.1%
NHS Shetland	34.0%	32.9%	28.6%
NHS Tayside	37.4%	35.8%	35.7%
NHS Western Isles	33.3%	35.3%	30.9%
Scotland	33.3%	32.7%	31.1%

Table 24: People prescribed inhalers as separate devices as a proportion of people prescribed any inhaler for which a combination inhaler may be appropriate (Chart 18)

NHS Board	April to June 2021	April to June 2022	April to June 2023
NHS Ayrshire & Arran	16.0%	14.2%	12.1%
NHS Borders	15.1%	12.5%	10.8%
NHS Dumfries & Galloway	17.3%	14.8%	12.5%
NHS Fife	10.7%	9.6%	8.5%
NHS Forth Valley	12.4%	8.9%	7.8%
NHS Grampian	9.6%	8.2%	6.6%
NHS Greater Glasgow & Clyde	15.7%	14.2%	12.3%
NHS Highland	11.9%	9.8%	8.4%
NHS Lanarkshire	15.0%	12.7%	10.5%
NHS Lothian	11.2%	10.0%	8.9%
NHS Orkney	14.1%	11.8%	9.8%
NHS Shetland	10.0%	8.5%	6.8%
NHS Tayside	10.5%	10.3%	10.1%
NHS Western Isles	15.9%	13.0%	9.2%
Scotland	13.3%	11.6%	10.0%

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