



The 'How to...?' Series

How to Manage and Review Adults on Long-term and Repeated Antibiotics for the Prevention and Treatment of Chronic Obstructive Pulmonary Disease Exacerbations

First Edition

October 2022

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1 Introduction

1.1 Aim

This booklet is part of the 'How to...?' series and aims to support primary care teams to review the appropriateness of antimicrobials in the evidence-based prevention and treatment of chronic obstructive pulmonary disease (COPD) exacerbations. Further information on the 'How to...?' series can be found in **Appendix 5.1**.

The booklet is not intended to duplicate or replace national guidelines; its purpose is to provide steps and resources to review patients who have received antimicrobials for the prevention or treatment of COPD exacerbations.

1.2 Context

The English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR) annual report 2019-2020 records a 32% increase in infections resistant to antibiotics from 2015 to 2019 (PHE, 2020). Antibiotic resistance can be accelerated by antibiotic overuse (Llor C and Bjerrum L, 2014), thus antimicrobial stewardship (AMS) efforts are crucial to ensure optimal antibiotic prescribing and reduce avoidable antibiotic resistance.

General practice generates over 80% of total antibiotic prescriptions in England (UKHSA, 2021). During the COVID-19 pandemic, General Practitioners reported a lower antimicrobial prescribing threshold for respiratory infections (Borek AJ *et al.*, 2021). Ongoing and regular patient reviews are vital to ensure antimicrobial prescribing appropriateness and highlight the importance of AMS in line with the UK's five-year national action plan for antimicrobial resistance (HM Gov, 2019) and the NHS long-term plan (NHSE a, 2019) (see **Appendix 5.2** and **5.3**). COPD is also a priority area of NHS England's Core20PLUS5 approach for tackling health inequalities (NHSE b, 2021).

1.3 Background

National data reveal that COPD exacerbations are one of the most common indications for long-term and/or repeated antibiotic use. The definition of repeat prescriptions can be categorised as long-term repeat prescriptions, whereby antibiotics are taken continuously as prophylaxis, or short-term repeat prescriptions, whereby repeated courses of antibiotics are issued acutely for the same or different indication within a specified timeframe (Krockow EM *et al.*, 2022). This booklet is designed to support primary care teams to review the appropriateness of long-term antibiotic prophylaxis (available on repeat prescription) and repeated acute antibiotic courses (defined as 3 or more courses in the past 6 months) for the prevention and treatment of COPD exacerbations.

1.4 Booklet citation

Eleanor J Harvey, Shazia Patel and Diane Ashiru-Oredope, 2022. How to Manage and Review Adults on Long-term and Repeated Antibiotics for the Prevention and Treatment of Chronic Obstructive Pulmonary Disease Exacerbations. The 'How To...? Series. TARGET Toolkit [online]. Place of publication: TARGET. Available from: *URL* [accessed date]

2 Information for the primary care team

2.1 Chronic Obstructive Pulmonary Disease and Exacerbations

Chronic Obstructive Pulmonary Disease (COPD) is characterised by persistent respiratory symptoms and airflow obstruction. It is usually progressive, not fully reversible, and treatable but not curable (NICE, 2021). The main treatment goals of COPD management are the reduction of symptoms and risk of exacerbations (GOLD, 2022).

COPD exacerbation is 'an acute worsening of respiratory symptoms that results in additional therapy'. It may present as an acute change in symptoms with dyspnoea, sputum production (change in colour, purulence or volume), cough, and wheeze – usually lasting between 7-10 days but may last longer. The treatment goals of COPD exacerbations are to get the patient better, reducing the negative impact of their current exacerbations and preventing future exacerbations which are associated with disease progression (GOLD, 2022).

2.2 Risk factors for COPD

The following are risk factors to consider:

- Tobacco and marijuana smoke
 - Cigarette smoke: the leading risk factor for COPD.
 - Cigarette smokers have increased respiratory symptoms, faster decline in Forced Expiratory Volume in the first second (FEV₁) and higher mortality compared to non-smokers (Kahansal R *et al.*, 2009).
 - Non-smokers exposed to second-hand smoke also carry increased risk for COPD (Yawn BP *et al.*, 2021).
 - Other types of tobacco smoke (pipe, cigar, water pipe) increase COPD risk (GOLD, 2022).
 - Marijuana: when smoked alone or alongside tobacco, increases risk of respiratory symptoms and COPD (Tan WC *et al.*, 2009).
- Indoor and outdoor air pollution
 - Including indoor biomass fuel exposure during cooking (Salvi S *et al.*, 2010; Sana A *et al.*, 2018).
- Occupational exposures
 - Organic and inorganic dusts, chemical agents and fumes.
 - No research has been done to demonstrate that lowering occupational exposure decreases COPD burden, however it seems sensible to advise patients to avoid exposure to potential airway irritants (GOLD, 2022).
- Genetic factors
 - Including alpha-1 antitrypsin deficiency (GOLD, 2022).
- Age and sex
 - In the UK, official figures from 2012 showed that those living with COPD were mostly over 40 and male (British Lung Foundation, 2022). However, expert advice suggests that COPD rates are now similar between males and females.
- Impaired lung growth and/or development
- Socioeconomic status

- Lower socioeconomic status is associated with increased risk of COPD; reasons for this could be linked to increased exposure to air pollutants, crowding, poor nutrition, increased infections (GOLD, 2022).
- Asthma and airway hyper-reactivity
 - Patients with asthma had a 12-fold higher risk of developing COPD compared to those without asthma (Silva GE *et al.*, 2004).
 - After smoking, airway hyper-responsiveness was the next highest risk factor for COPD (de Marco R *et al.*, 2011).
- Chronic bronchitis
 - In smokers, chronic bronchitis has led to increased risk of developing COPD (Guerra S *et al.*, 2009).
 - Chronic bronchitis has been associated with increased risk of more frequent and more severe exacerbations (Kim V *et al.*, 2011).
- Infections
 - HIV-positive patients were found to be at increased risk of COPD compared to HIV-negative patients (Bigna JJ *et al.*, 2018).
 - Pulmonary tuberculosis is a risk factor for COPD; 21% of patients with prior pulmonary tuberculosis had pooled prevalence of COPD (Byrne AL *et al.*, 2015; Fan H *et al.*, 2021).

3 In practice

Follow an audit cycle approach to improve antimicrobial prescribing and management of COPD exacerbations in clinical practice (see **Figure 1**).

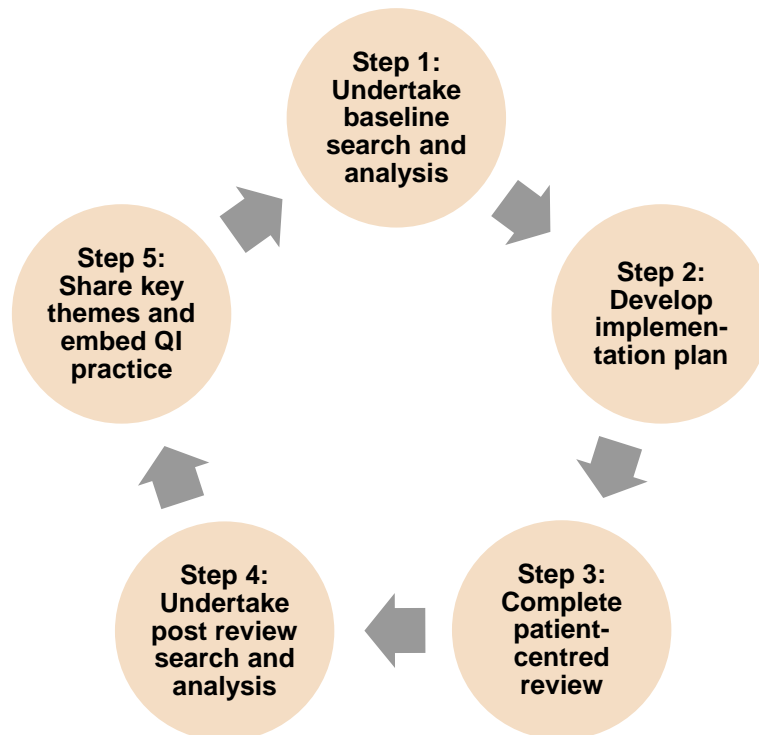


Figure 1. Improving antimicrobial prescribing in clinical practice, adapted from ‘Guide to the TARGET Resources’ (RCGP, 2021).

3.1 Step 1: Undertake baseline search and analysis

Run a baseline search of practice records to find patients prescribed continuous long-term and/or repeated acute courses of antibiotics for COPD exacerbation (see **Appendix 5.4** for a sample search strategy). Review the antibiotic prescribing and trend data for your practice. In addition, review your data in the context of benchmarking against other practices where data are available.

3.2 Step 2: Develop implementation plan

To develop an implementation plan:

- **Identify and ensure** there is a practice champion(s) who will take accountability for the relevant actions being undertaken.
- **Discuss** at a practice meeting the findings of the antibiotic prescribing and trend data analysis, the number of patients identified on long-term and repeated antibiotics, as well as any benchmarking information.
- **Plan and assign** practice staff to undertake patient-centred reviews.
- **All relevant staff to familiarise themselves** with this booklet for the management and review of adults on long-term and repeated antibiotics for the prevention and treatment of COPD exacerbations and the resources found and referenced within.

3.3 Step 3: Complete patient-centred review

For the place of the patient-centred review in the overall quality improvement cycle, refer to **Section 3.3.5** 'Flowchart to review long-term and repeated antibiotic use in COPD exacerbations'.

3.3.1 During the patient consultation

During the patient consultation undertake the following:

- **Establish** a clear history of the patient's condition, lifestyle modifications and treatments tried to-date.
 - Tools to help assess symptom severity and impact include the [modified Medical Research Council Dyspnoea Scale](#) and the [COPD Assessment Test](#).
 - Reason for patient taking repeat courses, e.g., true increase in COPD exacerbations, co-morbidity (such as anxiety), misunderstanding between day-to-day symptom variation and symptoms of exacerbation.
 - 'At all review appointments, discuss oral corticosteroid and antibiotic use with people who keep these medicines at home, to check that they still understand how to use them. For people who have used 3 or more courses of oral corticosteroids and/or oral antibiotics in the last year, investigate the possible reasons for this' (NICE, 2019).
To note: Booklet definition of repeated acute antibiotic courses is currently defined as 3 or more courses in the past 6 months (see **Section 1.3** and **Appendix 5.4**), this is under ongoing review to capture patients who would initially most benefit from follow-up (see **Section 4**).
- **Explore** how the patient is affected by their condition (physically and psychologically) to understand what lifestyle modifications and treatments they are prepared to try.

- **Confirm** whether non-pharmacological management and use of inhaled therapies for COPD have been optimised (see ‘Self-Care’ section below), consider using the NICE guideline [[NG115](#)] visual summary (NICE, 2019).
- **Encourage** self-care measures, including smoking cessation, inhaler adherence and optimised technique, vaccination uptake and pulmonary rehabilitation.
- **Manage** patient expectations regarding use of antibiotics and discuss the rationale behind using/not using antibiotic treatment through shared decision making. Consider visual aids if any language barriers foreseen.
- **Signpost** to digital apps if appropriate to provide alternatives to antibiotic courses (“to help show you when you are ok”). For example:
 - [NHS Respiratory Digital Playbook](#)
 - [Luscii](#) – Case study: [Worcestershire Royal Hospital](#)
 - [Current Health](#) – Case study: [Medway NHS Foundation Trust](#)

3.3.1.1 Self-care measures

Smoking cessation:

- Support patients to stop smoking and discuss smoking cessation interventions (see resources below).
- Inform patients that pharmacotherapy options combined with behavioural support are more likely to result in smoking cessation compared to one intervention alone or none.

To note: The effectiveness and safety of e-cigarettes as an aid to smoking cessation is uncertain at present.

Further resources:

[National Centre for Smoking Cessation and Training](#)

NICE guideline [[NG209](#)] ‘Tobacco: preventing uptake, promoting quitting and treating dependence’

[NHS community pharmacy smoking cessation service](#)

NHS Better Health [Quit Smoking](#) app for patients

Inhaler adherence and optimised inhaler technique:

- There are a range of inhalers, and the choice can depend on the patient’s ability to use the device, on local formularies and environmental impact.
 - Ensure the patient understands inhaler instructions and has optimal inhalation technique and inspiratory flow for the device they are using. Re-check at each review.
 - Recommend spacer devices to be used with all metered dose inhalers.

To note: Before a step-up in pharmacological therapy, revisit fundamentals of [COPD care](#) and ensure any worsening of symptoms is due to disease progression and not suboptimal inhaler technique, inhaler adherence or other physical or mental health comorbidity.

Vaccination uptake:

- Particularly of the following vaccinations:
 - SARS-Cov-2 (COVID-19).
 - Influenza vaccination: reduces serious illness and death in COPD patients.

- Pneumococcal vaccination: reduces incidence of lower respiratory tract infections.
- Tdap (dTaP/dTPa): protects against pertussis if not vaccinated during adolescence.
- Zoster: protects against shingles in ≥50-year-old COPD patients (GOLD, 2022).

To note: An ambition of the Core20PLUS5 approach to health inequalities is to drive the ‘uptake of COVID-19, flu and pneumonia vaccines to reduce infective exacerbations and emergency hospital admissions due to those exacerbations’ (NHSE b, 2021).

Pulmonary rehabilitation:

- Pulmonary rehabilitation has been proven to improve patients’ exercise capacity, symptoms and quality of life (GOLD, 2022). Discuss referral with patient, to include:
 - Exercise training.
 - Education: risk factor management, breathlessness, written action plan.
 - Self-management intervention: behaviour change designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote long-term adherence to health-enhancing behaviours (GOLD, 2022).

Recommended duration: 6-8 weeks.

Further resources:

Who to refer for pulmonary rehabilitation: [NG115](#)

Patient information leaflets: TARGET [Respiratory tract infection resource suite](#)

Asthma + Lung UK: [COPD](#)

3.3.2 Treatment of COPD exacerbations

For comprehensive information on the treatment of COPD exacerbations refer to:

- NICE guideline [\[NG115\]](#) ‘Chronic obstructive pulmonary disease in over 16s: diagnosis and management’
- GOLD guidance [\[2022 Reports\]](#)

3.3.2.1 Inhaled therapies

Consider increasing dose and/or frequency of inhaled short-acting bronchodilator therapy (GOLD, 2022).

To note: Inhaled long-acting bronchodilator therapy with or without corticosteroids are first line pharmacotherapy for the prevention of exacerbations.

3.3.2.2 Mucolytics

Not usually initiated at exacerbation.

- ‘Consider mucolytic drug therapy for people with a chronic cough productive of sputum’.
- ‘Only continue mucolytic therapy if there is symptomatic improvement (for example, reduction in frequency of cough and sputum production)’ (NICE, 2019).

3.3.2.3 Oral corticosteroids

In the absence of significant contraindications, consider oral corticosteroids for people in the community who have an exacerbation with a significant increase in breathlessness that interferes with daily activities (NICE, 2019). COPD exacerbations can be treated with oral corticosteroids and/or antibiotics depending on exacerbation severity and symptoms (Wedzicha JA, 2008).

- The recommended steroid dose is 30mg oral prednisolone daily for 5 days (NICE, 2019). There is no need to taper the dose when used in this way.
- COPD exacerbations treated with prednisolone resulted in faster recovery of peak expiratory flow rate and increased median time to the next exacerbation compared to exacerbations treated without steroids (Seemungal TAR, 2000).
- Shorter steroid courses were as beneficial as longer courses with lower risk of adverse effects (Wedzicha JA and Donaldson G, 2003).
- Five-day steroid courses were noninferior to 14-day courses (Leuppi JD *et al.*, 2013).

3.3.2.4 Antibiotics

COPD exacerbations can be triggered by a range of factors including viral infections and smoking, thus not all exacerbations will respond to antibiotic therapy (GOLD, 2022; NICE a, 2018).

- A prospective study identified that 23% of exacerbations were associated with human rhinovirus through polymerase-chain reaction of sputum or nasopharyngeal samples (Seemungal TAR *et al.*, 2000).
- Only around 50% of COPD exacerbations are thought to be bacterial (Vollenweider D *et al.*, 2018).

Before prescribing an antibiotic to a patient with acute COPD exacerbation (NICE a, 2018), take into account the patient's:

- Severity of symptoms, particularly sputum colour changes and any increases in volume or thickness beyond the person's normal day-to-day variation.
 - If sputum is persistently present and purulent, obtain a specimen of sputum for culture to identify any organisms present (NICE, 2019).
- Need for hospital treatment.
- Previous exacerbation and hospital admission history, and risk of developing complications.
- Previous sputum culture and susceptibility results.
- Risk of antimicrobial resistance with repeated courses of antibiotics.

If bacterial infection is suspected and antibiotic therapy indicated, the choice of antibiotic agent should be based on local guidelines and bacterial resistance patterns. The recommended antibiotic duration is 5 days (NICE a, 2018).

- Consider longer antibiotic duration if patient has co-existing bronchiectasis (NICE b, 2018).
- Offer patients standby oral antibiotics and oral corticosteroids 'if they have had an exacerbation within the last year and remain at risk of exacerbations, understand and are confident about when and how to take these medicines and their associated benefits and harms, and know to tell their healthcare professional when they have used the medicines and to ask for replacements' (NICE, 2019). For further information on standby antibiotics see **Section 3.3.3.1**.

Whether an antibiotic is given or not, discuss follow-up plan with the patient and circumstances in which to seek medical help, for example if:

- Rapid or significant worsening in symptoms.
- No symptom improvement within the agreed timeframe (e.g., 2-3 days).
- Patient becomes systemically unwell (NICE a, 2018).

3.3.3 Antibiotic prescription strategies

3.3.3.1 Antibiotic for use in acute exacerbation

Review previous exacerbation and antibiotic use history, including:

- Any therapy that may have been obtained from out of hours services.
- Hospital admissions for COPD exacerbation.
- Number of antibiotic courses issued.
- Duration of each course.
- Any antibiotic courses remaining at home.
- Use of standby antibiotics (also known as antibiotic rescue pack).

If antibiotic rescue pack available to patient, counsel patient on its use, including:

- To respond promptly to exacerbation symptoms by following their action plan e.g., 1) adjust short-acting bronchodilator therapy, 2) take steroid rescue pack if breathlessness interferes with activities of daily living, 3) add antibiotic rescue pack if sputum colour changes or increases in volume or thickness compared to normal day-to-day variation, and 4) tell their healthcare professional (NICE, 2019).
- Adverse effects of antibiotic treatment.
- Possibility that symptoms may not be fully resolved on antibiotic course completion.
- Importance of seeking medical help if symptoms deteriorate rapidly/significantly, or do not improve within a few days of starting antibiotics, or patient becomes systemically unwell (NICE a, 2018).

For choice of standby antibiotics refer to NICE guideline [\[NG114\]](#) 'Chronic obstructive pulmonary disease (acute exacerbation): antimicrobial prescribing'. Narrow spectrum antibiotics should be chosen where possible, considering individual patient factors such as allergy, resistance profile and drug interactions.

Include antibiotic management in patient's individualised exacerbation action plan and check patient's understanding of:

- How and when to use rescue packs.
- Strategy for replacing used rescue packs.
- Follow-up interval.

To note: Consider removing rescue packs from the repeat medication list and adding as acute issues to prompt clinical review.

3.3.3.2 Continuous antibiotic prophylaxis

Studies have shown a reduction in COPD exacerbations in patients on prophylactic azithromycin (Albert RK *et al.*, 2011; Uzun S *et al.*, 2014) or erythromycin (Seemungal TAR

et al., 2008) compared to standard care. In patients with one or more exacerbations in the preceding year, prophylactic antibiotics were associated with a significant reduction of 14% in the risk of exacerbations (NICE, 2019).

Regarding azithromycin, no reduction in COPD exacerbations was seen in patients who were active smokers (Han MK, 2014). Thus, the NICE committee recommended restricting the use of prophylactic antibiotics to ex-smokers and non-smokers. Prophylactic azithromycin can cause QTc prolongation and a small risk of hearing loss and tinnitus (GOLD, 2022). Patients should be made aware of this risk (NICE, 2019).

For patients on antibiotic prophylaxis:

- Ensure self-care measures are followed and inhaler therapy is optimised.
- Review long-term macrolide after the first 3 months of treatment initiation and every 6 months thereafter (NICE, 2019), consider:
 - Face-to-face consultations
 - Online review
- Discuss the risk of developing antimicrobial resistance with the patient. Consider:
 - For how long has the patient been on long-term and/or repeated antibiotics?
 - Are there any susceptibilities available?
- Only continue treatment if a meaningful reduction in frequency of exacerbations or improvement in quality of life outweigh risks of treatment (NICE, 2019) or as part of a shared care agreement with COPD specialist team.
 - Prophylactic antibiotics should be 'restricted to those individuals where they are safe and likely to be effective, and to avoid the risk of widespread overuse that could raise AMS concerns' (NICE, 2019).
- For acute exacerbations, continuous antibiotic prophylaxis treatment can continue with the addition of an acute course of antibiotic treatment belonging to a different therapeutic class.

3.3.4 Referral to specialist care

Referral to COPD specialist:

- Prior to starting long-term prophylactic antibiotic.
- Frequent exacerbations.

Referral to hospital:

- Signs and symptoms suggesting co-morbidity (e.g., bronchiectasis).

Referral to mental health services:

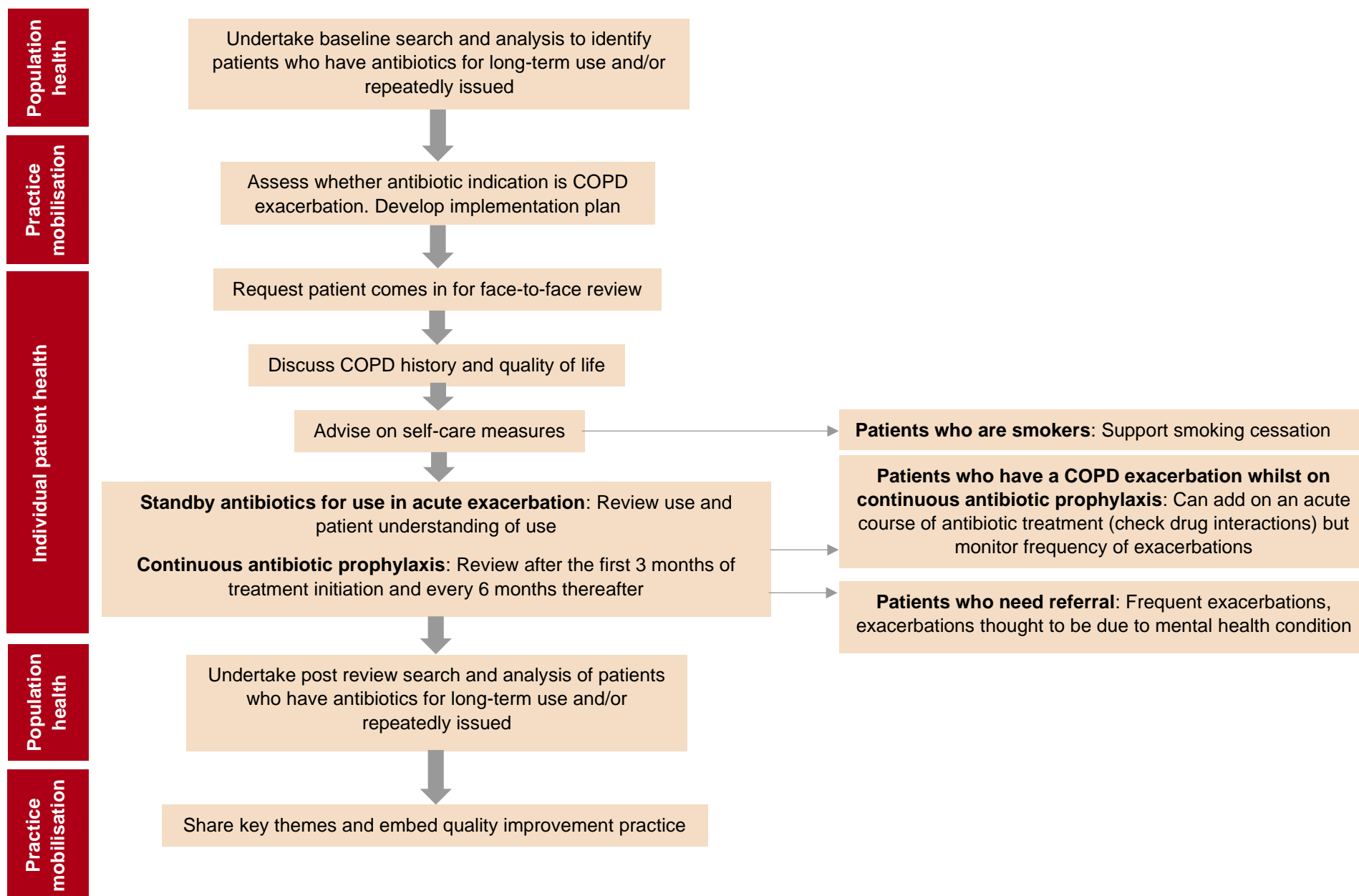
- Exacerbations thought to be due to a mental health condition as opposed to COPD disease progression, e.g., breathlessness due to anxiety attacks.

Referral to smoking cessation services:

- Patient on continuous antibiotic prophylaxis and unable to stop smoking.

(NICE 2018; NICE 2019)

3.3.5 Flowchart to review long-term and repeated antibiotic use in COPD exacerbations



3.4 Step 4: Undertake post review search and analysis

Analyse general practice data for long-term and/or repeated antimicrobial prescribing for COPD exacerbation prevention and treatment (see **Appendix 5.4** for a sample 'Search strategy') and benchmark against baseline.

To note: Suggest undertaking 3-6 months after Step 1 baseline search and analysis.

3.5 Step 5: Share key themes and embed quality improvement practice

Share key themes identified from both baseline and post review searches with the primary care team and embed quality improvement through staff learning.

3.5.1 Learning for staff

To support staff learning:

- Ensure all patients are coded with 'COPD exacerbations'.
- Review practice data on ePACT (or otherwise available reports) for long-term and repeated antimicrobial prescribing for COPD exacerbations.
- Discuss outcomes and learnings for practice.
- Introduce a proactive strategy to identify potential health inequalities amongst patient populations in accessing treatment, coming forward for diagnosis and following self-care measures.
- Best practice points to discuss:
 - Recognition that even antimicrobial treatment started in specialist settings requires review and/or shared care agreements.
 - Manage patient expectations for antimicrobial treatment.

Further resources

- eLearning for antimicrobial prescribing
 - [Health Education England: Antimicrobial Resistance and Infections](#)
- eLearning for COPD exacerbation management
 - [Centre for Pharmacy Postgraduate Education](#)
 - [Health Education England: COPD and non-invasive ventilation](#)
 - [Primary Care Respiratory Academy](#)
 - [Royal College of General Practitioners](#) (registration required)
 - [The Primary Care Respiratory Society](#)

4 Future work

This 'How to...?' booklet is in its first edition. The authors recognise future work may be required to further optimise the booklets. Future work to include:

- A checklist document (less than 2 pages in length) for primary care teams to work through with patients during a consultation
 - To act as an aide memoire of steps that should be considered to avoid or reduce the risk of infection and alternatives to antibiotics before prescribing rescue packs or continuing long-term antibiotic prophylaxis.
- A pilot of booklet use by primary care teams across the UK
 - To ensure booklet relevance and usefulness for the review of patients on long-term and repeated antibiotics.
- Ongoing multi-disciplinary consultation, particularly with respiratory specialist nurses and physiotherapists, consultant respiratory physicians and GPs with a special interest in COPD.
 - To incorporate specialist knowledge and widen practice perspective.
- Definition of repeated antibiotic courses particular to COPD
 - To capture patients who would most benefit from review.

Information collated via the feedback form (see link in **Appendix 5.5**) will be used to inform revisions and update future editions.

5 Appendix

5.1 The 'How to...?' series

The 'How to...?' series focuses on supporting healthcare professionals in primary care teams on how to review patients on long-term and repeated antimicrobials as part of AMS initiatives. The series supports the ambitions of the UK's five-year national action plan for antimicrobial resistance 2019-2024, as outlined in **Appendix 5.2**.

Booklet development involved:

- 1) Identification of gaps in primary care AMS interventions to inform a novel AMS intervention focused on long-term/repeated antimicrobials
- 2) Retrieval and analysis of primary care data to determine common indications that have high use of long-term/repeated antimicrobials
 - Local source data from Primary Care Networks
 - National source data from OpenSAFELY
- 3) Completion of booklet draft per identified common indication
- 4) Involvement of stakeholders in booklet feedback via questionnaire and email correspondence
- 5) Completion of final booklet draft based on received feedback
- 6) Governance submission of booklets to:
 - English Surveillance Programme for Antimicrobial Utilisation and Resistance Oversight Group
 - NHS England
 - Royal College of General Practitioners
 - UK Health Security Agency

Each booklet within the series can be used for individual patient consultations, as well as wider initiatives such as:

- Practice prescribing audits
- Quality improvement projects
- Local projects to tackle antimicrobial resistance
- Community pharmacy projects

The booklets in the 'How to...?' series are not intended to replace national guidance, but to be used alongside guidance and other resources highlighted within individual booklets.

5.2 UK's five-year national action plan for antimicrobial resistance 2019 to 2024

Part of the UK's five-year national action plan for antimicrobial resistance 2019 to 2024 states:

'To strengthen stewardship programmes, the UK will:

- **Develop** a patient-level prescribing and resistance data source (including health and infection outcome and impact data) with timely access at point of care to support clinical decision making along with access to NICE guidance.
- **Enhance** the role of pharmacists in primary care to review the dose and duration of antimicrobial prescriptions (especially long-term or repeat ones) and work with prescribers to review those that are inappropriate through evidence-based, system-wide interventions.
- **Raise public awareness** to encourage self-care and reduce expectations of antibiotics.'

5.3 The NHS long-term plan

Primary Care Networks (PCNs) are ‘an essential building block of every Integrated Care System, and under the network contract Directed Enhanced Service, general practice takes the leading role in every Primary Care Network’ (NHSE a, 2019).

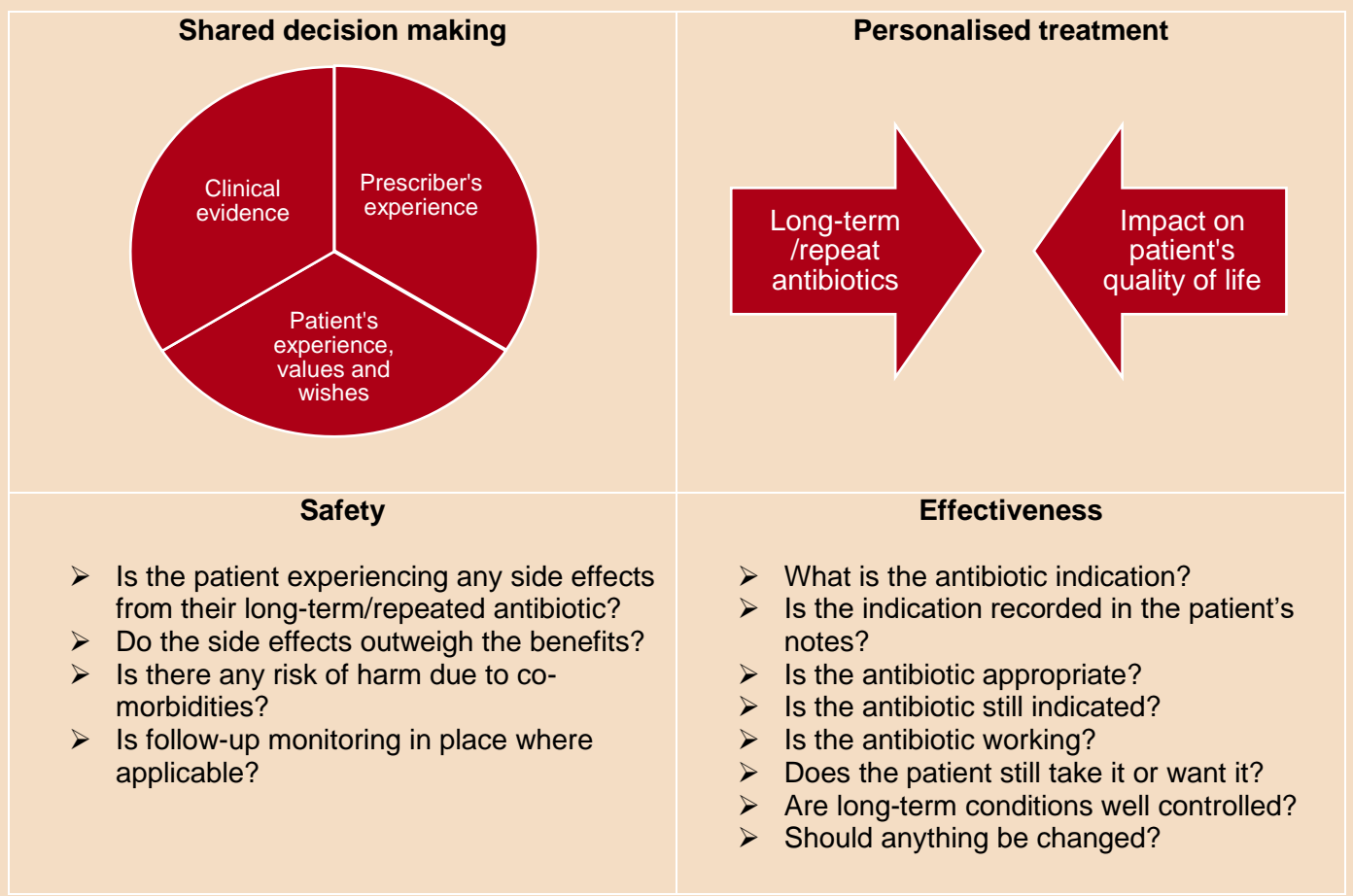
5.3.1 Network contract Directed Enhanced Service

The network contract Directed Enhanced Service (DES) outlines clinical responsibilities of pharmacy teams. Clinical pharmacists can ‘provide leadership on person-centred medicines optimisation (including ensuring prescribers in the practice conserve antibiotics in line with local antimicrobial stewardship guidance) and quality improvement’ and ‘actively work with its CCG in order to optimise the quality of local prescribing of antimicrobial medicines’. Pharmacy technicians can ‘support initiatives for antimicrobial stewardship to reduce inappropriate antibiotic prescribing’ (NHSEI a, 2020).

5.3.2 Conducting Structured Medication Reviews

Within the DES, a Structured Medication Review (SMR) and Medicines Optimisation service offers a framework for booklet implementation. A SMR encourages shared decision making and personalised treatment, considering safety and effectiveness of interventions (NHSEI b, 2020). See **Figure 2** for a summary for conducting SMRs proposed by booklet authors.

Figure 2. Proposed summary for conducting a Structured Medication Review for long-term and repeated antibiotics, adapted from ‘Network Contract DES – SMR reviews and medicines optimisation: guidance (NHSEI b, 2020)’.



5.4 Search strategy

You can access the search strategy documents outlined below by linking to this folder:

<https://app.box.com/s/xr294wnd7lf7izsmjr2gdqk6fn1mhzpa>

If you have difficulties accessing this folder, email: TARGETAntibiotics@ukhsa.gov.uk

5.4.1 EMIS



Guide for the using
the NHSEI antibiotic w



Emis antibiotic
searches.xml

Save this .xml file to your desktop and then follow the guide.

5.4.2 SystmOne



Guide for the using
the NHSEI antibiotic w



SystmOne antibiotic
searches.rpt

Save this .rpt file to your desktop and then follow the guide.

5.4.3 Vision

Coming soon

5.5 Providing ongoing feedback

For continual monitoring and update of the information included within this booklet, please provide feedback via this [link](#) or the QR code below.



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7 Acknowledgements

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David Ashton	Pharmacist	Parkwood PCN	Midlands
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Dr Funke Aguda	General Practitioner	Orsett Surgery, Stanford le Hope PCN	East of England
Gareth Malson	Pharmacist	Boughton Medical Group, Chester East PCN	North West
Jacqui Hodgson	Nurse	St Away Andrews Medical Practice, Barnet 2 PCN	London
Prof John Hurst	Professor of Respiratory Medicine	University College London	London
Karen O'Brien	Regional Chief Pharmacist and Controlled Drugs Accountable Officer	NHS England	North West
Meryl Davies	Lead Antimicrobial Pharmacist – Primary & Community Care	Public Health Wales	Wales
Muhammad Siddiqur Rahman	Pharmacist	Court View Surgery, Strood PCN	South East
Natalie Neal	Pharmacist	Shotfield Medical Practice, Wallington PCN	London
Dr Olatayo Ariba	General Practitioner	Windrush Medical Practice, Eynsham and Witney PCN	South East
Ms Ravijyot Saggi	Lead Respiratory Pharmacist	University College London Hospitals NHS Foundation Trust, Chair UK Clinical Pharmacy Association Respiratory Committee, Chief Pharmaceutical Officer's Clinical Fellow 21/22 at NHS England	National

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