



# PCRS Position Statement

## Antibiotics and sputum

March 2025

### Introduction

The Primary Care Respiratory Society (PCRS) advocates that:

- All healthcare professionals have a duty to maintain antibiotics stewardship;
- Healthcare policy makers need to invest in ways to ensure antibiotics are prescribed appropriately;
- Antimicrobial stewardship should be a measure of quality of healthcare service provision;
- Commissioners should prioritise measures that improve decision-making regarding antibiotic prescribing;
- Research into all respiratory infection especially tuberculosis (TB) and multidrug-resistant TB (MDR-TB) should be supported;
- There should be increased public awareness and education around antimicrobial resistance (AMR) and the risks associated with this; and
- There should be further research and development of guidelines on the best practice in prescribing antibiotics and the importance of sputum for managing respiratory infection in primary care setting.

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### Sputum and antibiotic prescribing

- Antibiotic prescribing in respiratory infection should be guided by clinical assessment and the available diagnostic tools, taking into consideration the risk of antibiotic resistance and the overall clinical picture.
- Microbiology culture and sensitivity (M C and S) is not routinely recommended unless it is a moderately severe community-acquired pneumonia.
- In the case of COPD exacerbation, antibiotics should be considered if there is a considerable change in the colour and amount of sputum. Consider the use of point of care CRP testing to support the decision and use previous results of sputum M C and S to guide treatment.
- Bronchiectasis should be suspected in patients with daily productive sputum. Send sputum for M C and S diagnosis before starting antibiotic treatment and before starting prophylactic antibiotic treatment. Do not delay antibiotic therapy awaiting the results and change accordingly if the results are different.
- If TB is suspected, early morning sputum on 3 CONSECUTIVE DAYS should be sent for acid-fast bacilli C and S and specialist molecular and sensitivity tests.
- In palliative care there are multiple causes of increased sputum production. A purulent, thick or green sputum could be considered as infective and treated according to the overall clinical picture.

### Background

Antibiotics are crucial for managing infectious diseases and preventing complications like pneumonia or sepsis. However, antimicrobial resistance (AMR) poses a growing global health threat, contributing to over 3 million deaths annually.<sup>1</sup> While resistance can occur naturally, the misuse and overuse of antibiotics significantly accelerate this process, rendering treatments less effective or ineffective.<sup>2</sup> Patients with resistant infections face higher mortality risks within 30 days compared to those with antibiotic-sensitive infections.<sup>3</sup> This increases the spread of disease, severe illness and mortality rates.<sup>1</sup> In England, the UK Health Security Agency (UKHSA) reported a 12.8% rise in antibiotic-resistant infections, from 59,171 in 2018 to 66,730 in 2023. Deaths from severe antibiotic-resistant infections also rose by 27.9% between 2019 and 2022. Addressing AMR requires urgent efforts to promote responsible antibiotic use and develop effective strategies to combat resistance.<sup>3</sup>

AMR imposes significant financial and operational burdens on healthcare systems and national economies. It drives the need for more expensive and intensive treatments and reduces productivity by extending hospital stays for patients and increasing caregivers' demands.<sup>1</sup> Notably, data indicate that individuals living in more deprived communities are 42.6% more likely to experience antibiotic-resistant infections

compared to those in the least deprived areas, highlighting the unequal impact of AMR on vulnerable populations.<sup>3</sup>

72% of most antibiotics are prescribed in general practice in England, compared to 20% in hospital inpatient and outpatient settings, making it critical to address antimicrobial overuse in general practice to effectively combat AMR.<sup>3</sup> Acute respiratory tract infections (RTIs) are the most managed condition globally in primary care, though the majority of RTIs are viral. Current UK guidelines for respiratory diseases advocate selective antimicrobial prescribing strategies for most patients.<sup>4-8</sup> Evidence shows that, for RTI in patients without underlying lung disease (e.g. asthma, chronic obstructive pulmonary disease (COPD)), antibiotics yield minimal benefit, reducing illness duration by less than one day in a typical course.<sup>9,10</sup>

Despite this, 80% of the prescribing of oral antibiotics for acute RTIs were prescribed often as a precaution.<sup>8</sup> In children, evidence strongly suggests that antibiotics such as amoxicillin are clinically ineffective for uncomplicated RTIs unless pneumonia is suspected.<sup>11</sup> Furthermore, patients prescribed antibiotics for RTIs in primary care have an increased risk of developing bacterial resistance to those antibiotics, particularly within the month following the course, with effects that can persist for up to a year. This not only escalates resistance to first-line antibiotics but also creates a need for second-line antibiotics within the community.<sup>12</sup>

There have been studies that have looked at the cause and relationship of the antibiotics prescribing for RTIs:

- Around 13% of patients in general practice who initially received antibiotics for RTIs are inclined to re-consult their general practitioner (GP) and receive a repeat prescription because of persisting symptoms, particularly for lower RTIs which typically last up to 28 days.<sup>9,13,14</sup>
- Consultation behaviour and prior antibiotic repeats were the main factors associated with repeat antibiotic prescriptions. Of the antibiotics prescribed, 50% were antibiotics in the same class.<sup>15</sup>
- Other studies have highlighted that clinicians working longer hours were 4–5 times more likely to prescribe antibiotics. This was also associated with GP practices with burnout symptoms, greater job dissatisfaction and turnover intentions.<sup>15</sup>
- Qualitative studies have also shown that GPs often find guidelines less usable in clinical situations and are pressured to prescribe antibiotics by patients, parents and certain settings.<sup>16</sup>

The UK AMR National Action Plan 2024–2029 has set an ambitious goal to reduce total antibiotic use in human populations by 5% from the 2019 baseline.<sup>17</sup> Achieving this target requires enhanced antimicrobial stewardship in primary care through the following strategies:<sup>17</sup>

- Clinicians providing clearer safety netting for patients when not prescribing antibiotics would instil confidence in patients returning appropriately which may warrant the prescribing of antibiotics.<sup>11</sup>
- Implementing local policies to support practices to help reduce antibiotic prescribing for RTIs.<sup>18</sup>
- Changing clinicians' behaviours surrounding prescribing antibiotics and understanding the long-term effects of using antibiotics.<sup>16,19</sup> NHS England has developed resources to support and educate clinicians in primary care on the risks of AMR.<sup>20</sup>
- Training to support primary care professionals to target the use of antibiotics to reduce AMR through Future Learn.<sup>21</sup>
- The use of delayed antimicrobial prescribing in RTIs is safe and effective for most patients including those in high-risk groups. This showed that it was less likely to lead to poorer symptom control and longer symptom duration than immediate antibiotic prescribing.<sup>22</sup>
- Improving the diagnostic coding for RTIs when prescribing antibiotics to highlight prescribing that falls in line with current guidance.<sup>19</sup>
- Improving public awareness, perceptions and understanding through better campaigns and patient resources

to help the public understand about the lack of benefit of antibiotics for most RTIs and addressing concerns about illness duration and severity.<sup>16,23</sup>

- o Treat Antibiotics Responsibly, Guidance, Education and Tools (TARGET) produced by the UK Health Security Agency (UKSHA) in collaboration with the Royal College of General Practitioners (RCGP) have provided tools and resources for primary care such as:
  - Clinical audits to review antimicrobial prescribing – for example, repeat and long-term prescribing of antibiotics in COPD.<sup>24</sup>
  - Webinars to support clinicians having conversations with patients about delayed antibiotic prescribing or why antibiotics may not be appropriate for them and how to improve the prescribing of antibiotics in RTIs.<sup>25,26</sup>
  - Patient-facing material to be used to help facilitate conversations with patients during consultations regarding their RTI.<sup>27</sup>
- Engaging teams to be involved in public health campaigns such as *World Antimicrobial Resistance Awareness Week*.<sup>28</sup>
- The use of C-reactive protein (CRP) point of care testing (POCT) in primary care has been shown to enhance the quality of the antibiotic prescribing decisions for patients with RTIs alongside good patient and clinician acceptability and cost-effectiveness.<sup>29,30</sup>

All the steps above will help to reduce the consultation rates, AMR and overprescribing of antibiotics. Nevertheless, a 10% reduction of antibiotics in RTIs in primary care may have a slight increase in the incidence of treatable pneumonia and peritonsillar abscess. However, these numbers are still very small, with the incidence rate of 1.1 more cases of pneumonia each year and 0.9 more cases of peritonsillar abscess each decade based on an average practice size of 7000 patients.<sup>18</sup>

## Key issues

### Tuberculosis (TB)

TB is a major contributor to AMR. Multidrug-resistant tuberculosis (MDR-TB) arises when TB bacteria become unresponsive to isoniazid and rifampicin, the two most effective first-line TB drugs. While MDR-TB remains treatable and curable with second-line drugs, these alternatives are often costly, have toxic side effects, and may lead to further drug resistance in some cases, therefore limiting further treatment. The number of MDR-TB cases increased in 2023 compared with 2022, thus posing a critical public health threat. In 2022, only around

40% of those with drug-resistant TB accessed necessary treatment.<sup>1,3</sup>

### Safety concerns

Beyond concerns related to AMR, certain respiratory infections necessitate the use of fluoroquinolone antibiotics due to the specific nature of the causative organisms. The Medicines and Healthcare products Regulatory Agency (MHRA) has issued safety alerts to clinicians, emphasising the risks associated with fluoroquinolones, which can lead to disabling, potentially long-lasting, or irreversible side effects in patients. As a precaution, patients are now provided with information leaflets detailing these potential side effects.<sup>31</sup>

### Prophylactic antibiotics

Antibiotics such as azithromycin, used for prophylaxis in exacerbations, should be prescribed under specialist guidance as they require a comprehensive patient assessment to ensure efficacy and safety. Beyond its antimicrobial properties, azithromycin has demonstrated anti-inflammatory and immunomodulatory effects, making it a potential treatment strategy for various chronic inflammatory airway conditions.<sup>32</sup> Any prophylactic antibiotic should be annually reviewed as part of the patient's COPD review to ensure it is still effective and if it can be stopped with the advice of the specialist.<sup>33</sup>

### Rescue packs

Rescue packs, initially recommended by NICE for COPD patients at risk of exacerbations, have frequently been over-used without sufficient monitoring and patient education. Furthermore, they are often inappropriately prescribed for other respiratory conditions, also lacking adequate oversight. Rescue packs, which contain prednisolone and antibiotics, should be carefully assessed and prescribed only for COPD patients most likely to benefit – those at risk of frequent exacerbations (at least two per year) and capable of recognising early signs of exacerbation. Antibiotics should be initiated in COPD patients presenting with increased dyspnoea, sputum volume and sputum purulence, or with increased sputum purulence plus one of the other symptoms. GOLD recommends considering CRP testing to help identify patients most likely to benefit from antibiotic therapy.<sup>33</sup> Further information is available in the Appropriate use of Rescue Packs article which can be found in the November 2020 Primary Care Respiratory Update.<sup>34,35</sup>

## PCRS position

### For healthcare professionals

- Healthcare professionals have a duty to maintain antibiotics stewardship through their own prescribing

practice, patient education and campaigning for a change to reduce unnecessary antimicrobial prescription.

- Healthcare policy makers should invest in ways to ensure that antibiotics are prescribed for the right person and the right indications. This could be through public education about the risks of AMR, provision and availability of methods for accurate and early diagnosis and improving access to the right treatment and follow-up. This could be for COPD and RTI through diagnostic hubs, availability of point of care testing and improving access to education programmes and healthcare appointments for treatment and follow-up.
- Antimicrobial stewardship should be a measure of the quality of healthcare service provision.
- Commissioners should prioritise measures that improve decision-making regarding antibiotic prescribing including early and accurate diagnosis of common respiratory conditions, availability of a rapid testing tool to support the decision to prescribe and guidelines to support this.
- Support research into TB and MDR-TB.

### Sputum and antibiotic prescribing

- Please see Introduction on page 2.

### Policy recommendations

- Public awareness and education about AMR and the correct indications of antibiotics as well as the risks associated with the overuse of antibiotics including AMR, microbiome, etc.
- Research and development of guidelines on the best practice including point of care CRP testing and sputum colour chart, particularly in primary care.

### References

1. WHO. Antibiotics. <https://www.who.int/initiatives/gap-f/our-portfolio/antibiotics> (Accessed 9 November 2024).
2. Antibiotic resistant infections and associated deaths increase - GOV.UK. <https://www.gov.uk/government/news/antibiotic-resistant-infections-and-associated-deaths-increase> (Accessed 9 November 2024)
3. English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR) Report 2023 to 2024. <https://www.gov.uk/government/publications/english-surveillance-programme-antimicrobial-utilisation-and-resistance-espaur-report> (Accessed 19 November 2024)
4. NICE. Overview. Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use. Guidance. <https://www.nice.org.uk/guidance/ng15> (Accessed 9 November 2024)
5. NICE. Overview. Sore throat (acute): antimicrobial prescribing. Guidance. <https://www.nice.org.uk/guidance/ng84> (Accessed 9 November 2024)
6. NICE. Overview. Cough (acute): antimicrobial prescribing. Guidance. <https://www.nice.org.uk/guidance/ng120> (Accessed 9 November 2024)
7. NICE. Overview. Sinusitis (acute): antimicrobial prescribing. Guidance. <https://www.nice.org.uk/guidance/ng79> (Accessed 9 November 2024)

8. Hay AD, Bolhuis A, Huntley AL, Jones MD. Inhaled antibiotics for acute lower respiratory tract infections in primary care: a hypothesis. *Lancet Respir Med* 2022;10(8):731–2. doi: 10.1016/S2213-2600(22)00172-2
9. Little P, Stuart B, Moore M, et al. Amoxicillin for acute lower-respiratory-tract infection in primary care when pneumonia is not suspected: a 12-country, randomised, placebo-controlled trial. *Lancet Infect Dis* 2013;13(2):123–9. doi: 10.1016/S1473-3099(12)70300-6
10. Del Mar C. Antibiotics for acute respiratory tract infections in primary care. *BMJ* 2016;354:i3482. doi:10.1136/bmj.i3482
11. Little P, Francis NA, Stuart B, et al. Antibiotics for lower respiratory tract infection in children presenting in primary care in England (ARTIC PC): a double-blind, randomised, placebo-controlled trial. *The Lancet* 2021;398(10309):1417–26. doi: 10.1016/S0140-6736(21)01431-8
12. Costelloe C, Metcalfe C, Lovering A, Mant D, Hay AD. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis. *BMJ* 2010;340:c2096. doi: 10.1136/bmj.c2096
13. Thompson M, Vodicka TA, Blair PS, Buckley DI, Heneghan C, Hay AD. Duration of symptoms of respiratory tract infections in children: systematic review. *BMJ* 2013;347:f7027. doi: 10.1136/bmj.f7027
14. Lalmohamed A, Venekamp RP, Bolhuis A, et al. Within-episode repeat antibiotic prescriptions in patients with respiratory tract infections: A population-based cohort study. *J Infect* 2024;88(4). doi: 10.1016/j.jinf.2024.106135
15. Hodgkinson A, Zghebi SS, Kontopantelis E, et al. Association of strong opioids and antibiotics prescribing with GP burnout: a retrospective cross-sectional study. *Br J Gen Pract* 2023;73(733):e634. doi: 10.3399/BJGP.2022.0394
16. O'Doherty J, Leader LFW, O'Regan A, Dunne C, Puthooppambal SJ, O'Connor R. Over prescribing of antibiotics for acute respiratory tract infections: a qualitative study to explore Irish general practitioners' perspectives. *BMC Fam Pract* 2019;20(1):27. doi: 10.1186/s12875-019-0917-8
17. GOV.UK. Confronting antimicrobial resistance 2024 to 2029. <https://www.gov.uk/government/publications/uk-5-year-action-plan-for-antimicrobial-resistance-2024-to-2029/confronting-antimicrobial-resistance-2024-to-2029> (Accessed 19 November 2024)
18. Gulliford MC, Moore M V, Little P, et al. Safety of reduced antibiotic prescribing for self limiting respiratory tract infections in primary care: cohort study using electronic health records. *BMJ* 2016;354:i3410. doi:10.1136/bmj.i3410
19. Smieszek T, Pouwels KB, Dolk FCK, et al. Potential for reducing inappropriate antibiotic prescribing in English primary care. *J Antimicrob Chemother* 2018;73(suppl\_2):ii36–ii43. doi: 10.1093/jac/dkx500
20. (28) A GP guide to antimicrobial resistance - YouTube. <https://www.youtube.com/watch?v=PkYQJettZVo> (Accessed 9 November 2024)
21. TARGET - Online Course. <https://www.futurelearn.com/courses/target-antibiotics> (Accessed 19 November 2024)
22. Stuart B, Hounkpatin H, Becque T, et al. Delayed antibiotic prescribing for respiratory tract infections: individual patient data meta-analysis. *BMJ* 2021;373:n808. doi: 10.1136/bmj.n808
23. McNulty CAM, Nichols T, French DP, Joshi P, Butler CC. Expectations for consultations and antibiotics for respiratory tract infection in primary care: the RTI clinical iceberg. *Br J Gen Pract* 2013;63(612):e429. doi: 10.3399/bjgp13X669149
24. Antibiotic stewardship tools, audits and other resources: How to...? Resources (repeat and long term antibiotics). RCGP Learning. <https://elearning.rcgp.org.uk/mod/book/view.php?id=12649> (Accessed 9 November 2024)
25. Discussing antibiotics with patients: Overview. RCGP Learning. <https://elearning.rcgp.org.uk/mod/book/view.php?id=12646> (Accessed 9 November 2024)
26. Learning resources for prescribers: Webinars. RCGP Learning. <https://elearning.rcgp.org.uk/mod/book/view.php?id=12650> (Accessed 9 November 2024)
27. Respiratory tract infection resource suite: Patient facing materials. RCGP Learning. <https://elearning.rcgp.org.uk/mod/book/view.php?id=12653> (Accessed 9 November 2024)
28. GOV.UK. World Antimicrobial Resistance Awareness Week (WAAW) and European Antibiotic Awareness Day (EAAD). <https://www.gov.uk/government/publications/european-antibiotic-awareness-day-resources-toolkit-for-healthcare-professionals-in-england/world-antimicrobial-awareness-week-waaw-and-european-antibiotic-awareness-day-eaad#worldantimicrobialawareness-week-2024> (Accessed 19 November 2024)
29. Cooke J, Butler C, Hopstaken R, et al. Narrative review of primary care point-of-care testing (POCT) and antibacterial use in respiratory tract infection (RTI). *BMJ Open Respir Res* 2015;2(1):e000086. doi: 10.1136/bmjresp-2015-000086
30. van der Velden AW, van de Pol AC, Bongard E, et al. Point-of-care testing, antibiotic prescribing, and prescribing confidence for respiratory tract infections in primary care: a prospective audit in 18 European countries. *BJGP Open* 2022;6(2):BJGP Open 2021.0212. doi: 10.3399/BJGPO.2021.0212
31. GOV.UK. Fluoroquinolone antibiotics: reminder of the risk of disabling and potentially long-lasting or irreversible side effects. <https://www.gov.uk/drug-safety-update/fluoroquinolone-antibiotics-reminder-of-the-risk-of-disabling-and-potentially-long-lasting-or-irreversible-side-effects> (Accessed 9 November 2024)
32. British Thoracic Society. Long Term Macrolide Use. Better lung health for all. <https://www.brit-thoracic.org.uk/quality-improvement/guidelines/long-term-macrolide-use/> (Accessed 9 November 2024)
33. GOLD. Global Initiative for Chronic Obstructive Lung Disease. 2024 GOLD Report. <https://goldcopd.org/2024-gold-report/> (Accessed 9 November 2024)
34. Primary Care Respiratory Update. The Appropriate Use of Rescue Packs. November 2022. <https://www.pcrs-uk.org/sites/default/files/pcru/articles/2020-Winter-Issue-21-Appropriate-Use-of-Rescue-Packs.pdf> (Accessed 9 November 2024)
35. Overview. Chronic obstructive pulmonary disease in over 16s: diagnosis and management. Guidance. NICE. <https://www.nice.org.uk/guidance/ng115> (Accessed 9 November 2024)