



A blueprint for change
How changes in chronic airways disease care can support the development of a more sustainable and resilient health system.

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Disclaimer: This blueprint has been funded and developed by AstraZeneca with input from and consultation with leading chronic airway disease experts. It aims to set out the urgent need to implement changes in chronic airway disease care and the need for renewed political commitment to support the delivery of that change. We are delighted to have the input of:



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Executive summary

The burden of chronic airway diseases (including asthma, bronchiectasis and COPD) is significant and expected to increase over time, challenging both the sustainability of healthcare system improvement and resilience to external shocks.

The past two decades have seen the emergence of three major coronavirus pandemics (SARS-CoV, MERS-CoV and SARS-CoV-2) that impact the respiratory system. The frequency of these events may increase in the coming years, fuelled in part by increasing ecological damage and societal interconnectivity. The occurrence of any future pandemics can be expected to coincide with growth in the prevalence of chronic airways diseases.

The current COVID-19 pandemic has led to significant disruptions in respiratory disease care, compounding many existing issues with chronic airways disease management. In Northern Hemisphere countries, the marked increase in COVID-19 cases as a 'second wave' has commenced in winter, where capacity pressures from chronic airway disease-related admissions and types of pneumonia are typical. This combination poses a genuine risk to the effective functioning of healthcare systems, the consequences of which could be felt for many years to come.

Sustainably strengthening care provision for chronic airway disease patients has a vital role to play in relieving pressure on healthcare systems now and in the future. COVID-19 must serve as the trigger for governments and health systems to upgrade and reset approaches, in line with the latest evidence and establish global recommendations on best practice. Doing so will require the overcoming of long-standing complacency around the care of chronic airway diseases. A return to the pre-pandemic status quo is not an option.

Chronic airway disease reform must be designated as a top priority within plans for peri- and post-pandemic reset and recovery. Sustained political commitment at the highest levels will be necessary to realise the long-overdue transformation required in this important area. This blueprint, funded and developed by AstraZeneca in consultation with leading chronic airway disease experts, makes the case for such a commitment and calls for:

Priority ask: Creation or update of national/regional chronic airway disease strategy

Objectives

What should a chronic airway disease strategy seek to achieve?

- Restarting disrupted services & eliminating COVID-related treatment backlogs
- Reducing avoidable infections and exacerbations
- Reducing disease mortality
- Reducing referral delays
- Increasing access to, and uptake of, best-practice treatments
- Increasing uptake of remote diagnostics and monitoring

Focus reform areas

What should governments include within a chronic airway disease strategy?

- Healthcare system governance & prevention
- Supporting earlier diagnosis
- Focusing on clinical pathways which prioritise disease control
- Ensuring continuity of care

Introduction

Chronic airway diseases, most commonly asthma, chronic obstructive pulmonary disease (COPD) and (non-cystic fibrosis) bronchiectasis, represent a significant and growing burden on individuals, health systems and societies around the world. This growing burden threatens healthcare systems' resilience to external challenges and its capacity to recover and improve sustainability over time.

The past two decades have seen the emergence of three major coronavirus pandemics (SARS-CoV, MERS-CoV and SARS-CoV-2) that impact the respiratory system. The frequency of these events may increase in the coming years, fuelled in part by increasing ecological damage and societal interconnectivity. The occurrence of any future pandemics can be expected to coincide with a growth in the prevalence of chronic airways disease.

The COVID-19 pandemic has placed immense pressure on all health systems. Even before the pandemic, there was clear evidence of deficiencies in the care of people with chronic airway diseases. As health systems rapidly shifted focus to respond to the pandemic, access to basic respiratory services changed dramatically, threatening the delivery of high-quality care and treatment. Typically, the SARS-CoV-2 virus is at peak prevalence in the winter months, a period typically characterised by significant capacity pressures from chronic airway disease-related admissions. This combination poses a very real risk to the effective functioning of healthcare systems, the consequences of which could be felt for many years to come.

Attention is now moving towards health system reset and recovery. In doing so, health systems must prioritise improvements in chronic airway diseases care, to tackle the care backlog caused by COVID-19 and reduce the future burden of disease. At a time when health systems are heavily stretched, new approaches to enable patients to control their condition better, to reduce hospitalisations, and to decrease pressure on health systems are needed.

This blueprint sets out:

- The growing burden of chronic airway diseases
- The key challenges facing chronic airway disease care
- Why renewed political commitment on chronic airway diseases is needed to support the development of a more sustainable and resilient health system

Section 1: The growing burden of chronic airway diseases

The overall burden of chronic airway diseases

Uncontrolled chronic airway diseases are characterised by daily symptoms of breathlessness, cough, sputum and wheeze. They are associated with airway inflammation, airflow limitation and hyperresponsiveness (Global Initiative for Asthma [GINA] 2020; Global Initiative for Chronic Obstructive Lung Disease [GOLD] 2020) (See Appendix 1 for detailed disease background).

These symptoms impact an individual's ability to perform everyday tasks, impair their quality of life and increase their predisposition to acute deteriorations, known as exacerbations, which can lead to significant ill-health and premature mortality (GINA 2020; GOLD 2020) (See Appendix 2).

More than 1 billion people are living with chronic airway diseases globally (World Health Organization [WHO] 2017), and this burden is expected to grow significantly over the next ten to twenty years (Khakban et al. 2017; Lotvall et al. 2012). The actual burden of chronic airway diseases is likely underestimated, due to challenges associated with diagnosis – many people remain un- or misdiagnosed (Ho et al. 2019).

People with these diseases also have an increased risk of developing other conditions such as cardiovascular disease and lung cancer (Ingebrigsten et al. 2020). They can also face mental health issues like anxiety and depression (Pumar et al. 2014). In addition, the use of oral corticosteroids to treat exacerbations, which can be relatively common in chronic airway diseases, is associated with increased risk of conditions such as diabetes mellitus, hypertension and osteoporosis (Choo & Pavord 2016).

Furthermore, chronic airway diseases are intrinsically linked to health inequalities and environmental factors. Low socioeconomic status - measured by education and income levels - is associated with increased prevalence of asthma and COPD (Kanervisto et al. 2011). Environmental degradation (for example, land clearing, urbanisation and carbon-intensive manufacturing) is a significant risk factor in the development and exacerbation of asthma (Amato et al. 2014) and COPD (Sarkar et al. 2019).

These factors, combined with growing and ageing populations, have led to a significant increase in the burden of chronic airway diseases in recent decades (GBD Chronic Respiratory Disease Collaborators 2020) which is set to increase further in the coming years (Chandrasekaran et al. 2018).

The impact of COVID-19

Even before the pandemic, evidence showed that urgent improvements were needed in the management of people with chronic airway diseases, many of whom are currently missing out on basic care (Elbehairy et al. 2019; Philip et al. 2019). The importance of preventing infections and maintaining disease control in this patient cohort is well established; however, respiratory admissions continue to drive seasonal pressures on hospital services worldwide.

The arrival of the COVID-19 pandemic has served only to highlight shortcomings in existing approaches. Those living with chronic airways diseases have faced immense disruption to routine care. These include routine access to medication, clinical consultations and diagnostics. Many systems are not well-positioned to pivot rapidly to new, remote models of care. In Northern Hemisphere countries, many of these challenges have been compounded by the marked increase in COVID-19 cases as a 'second wave' has commenced in winter, when capacity pressures from chronic airway disease-related admissions and cases of pneumonia are typical.

Chronic airway diseases can pre-dispose patients to suffer severe COVID-19 infections. Early studies show COPD patients are 60 per cent more likely to die of the disease, as they are 63 per cent more likely to develop severe COVID-19 illness than the general population (Alqahtani et al. 2020). As more evidence emerges, this link will likely grow. The ability to prevent and treat chronic airway diseases is critical to ensuring the population is resilient to future threats akin to COVID-19.

As a result, patients with chronic airway diseases and other at-risk populations have been encouraged to isolate, both disrupting their care (The Health Foundation 2020) and restricting economic productivity. Indeed, in March 2020, 48 per cent of countries responding to the World Health Organization (WHO) reported that COVID-19 had already disrupted asthma services (WHO 2020a). During the early stages of the pandemic, the use of spirometry was discouraged as it was considered aerosol-generating (ARTP COVID19 Group 2020), impacting on the ability to diagnose and monitor chronic airway diseases and delaying referrals to specialist care where needed. Additionally, much of the respiratory workforce has been redirected to support COVID-19 care efforts, making it challenging to provide the necessary routine care for chronic airway diseases.

Care disruptions are likely to have significant consequences for patients and systems. An Asthma UK survey of over 8,000 patients with lung disease found 35 per cent had their respiratory care delayed or cancelled during the initial lockdown response in the UK to COVID-19 – a quarter of whom had respiratory symptoms worsen due to care delays or because they chose to avoid using a health service (Asthma UK and British Lung Foundation 2020a). Restoring and strengthening chronic airway disease services will be crucial to ensure that systems can deal with the significant care backlog post-pandemic.

The longer-term impact of COVID-19 is not yet known, but preparations are needed to ensure respiratory services can respond to increased demand. Studies are beginning to suggest COVID infection may cause long-term lung damage in some patients, which might require investigation and additional care or rehabilitation (Polastri et al. 2020). Research on so-called 'Long COVID' has also been initiated (Mandal et al. 2020), but further studies are needed to understand the impact of these conditions on patients and the services they rely upon. There is also emerging evidence on the effect of infection control measures, including social distancing and mask-wearing, on reducing disease mortality in respiratory patients (Chan et al. 2020). It will be vital to learn from such measures moving forward.

Prioritisation of chronic airway diseases

There is a well-established perception that clinical and political complacency hinders the delivery of high-quality airway disease care (Partridge 2003). Despite progress in airway disease treatment and care over the past few decades, chronic airway diseases are often under-prioritised within public health efforts and have not received the attention proportionate to their personal and population burden (Global Alliance against Chronic Respiratory Diseases 2020). While national chronic disease plans often reference the need to prioritise smoking cessation (European Commission 2017; Public Health Agency of Canada 2013), there is often limited focus on chronic airway diseases as a significant and growing burden. Over decades, chronic airway diseases have historically received less attention and clinical research investment than other well-known conditions (Gross et al. 1999; Gillum et al. 2011).

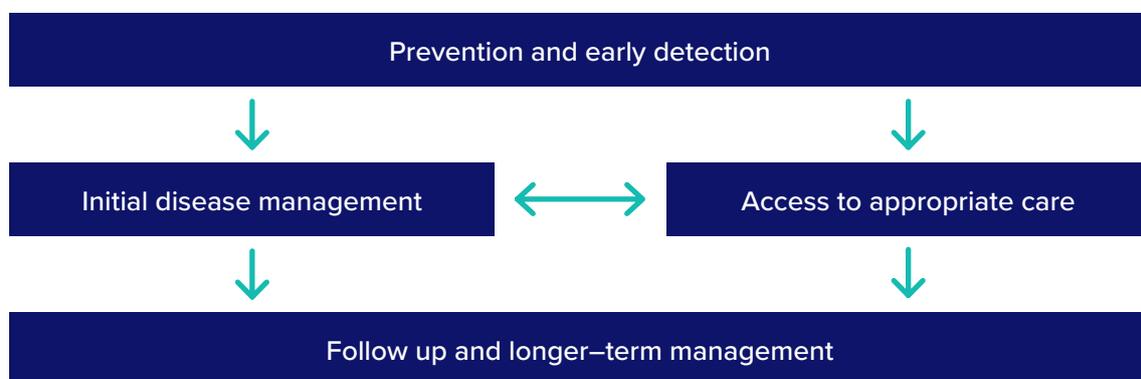
Progress in improving chronic airway disease care remains slow, and improvement in outcomes has largely stagnated over the past decade (Commissions from The Lancet Journals 2017). This is despite scientific advancements and new technologies which are creating opportunities to transform the diagnosis, treatment and management of these conditions — the disruption of care due to COVID-19 risks a further setback in this important area.

The focus on resetting and rebuilding health systems offers a significant opportunity to address the challenges facing chronic airway disease care and deliver improvements which will support overall health system sustainability and resilience. Delivering pathway redesign in chronic airway diseases can unlock a more flexible and effective model for managing chronic diseases, capable of withstanding the pressures of future shocks and growing population burdens. Realising this ambition requires a fundamental challenge to long-standing complacency around the care of chronic airway diseases and renewed political leadership and commitment.

Section 2: The key challenges facing chronic airway disease care

Despite significant differences between the conditions, there is an overlap in the routine care provided for patients with chronic airway diseases (Figure 1). Patients with chronic airway diseases all experience chronic inflammation of the airways (see Appendix 1). However, these conditions have different outcomes and affect different groups (Athanasio 2012), and therefore require different treatment and levels of care. Standard care needs include monitoring through regular reviews, ensuring the correct use of inhaler devices, development and review of personalised action plans, and interventions like pulmonary rehabilitation (an evidence-based education and exercise class) and smoking cessation (Asthma UK and British Lung Foundation 2020b).

Figure 1: Generic, simplified patient pathway for chronic airway diseases



There is broad consensus from the respiratory community about the issues facing the delivery of high-quality care for chronic airway diseases through the patient pathway (Figure 1). These are explained in more detail below. There is also general agreement on what optimal care should look like, with global quality standards, national disease management programmes and integrated care pathways in place.

Prevention and early detection

Prevention of avoidable risk factors, through strategies like smoking cessation programmes and clean air initiatives, is critical to addressing the expected increase in disease burden. This is both the case in lower-income countries, where multiple exposures occur, but true prevalence is difficult to discern owing to poor epidemiology and marked underdiagnosis, and in higher-income countries, despite the greater availability of healthcare services (GBD Chronic Respiratory Disease Collaborators 2020). In OECD countries, health promotion and prevention accounts for just 3 per cent of total health spending (Michalopoulos 2020) despite the WHO describing this as ‘the underpinning of primary health care policy development’ (WHO 2018).

Early detection, including regular health checks with an effective respiratory component as well as lung health assessments, enables clinicians to take the necessary steps to improve disease outcomes and modify progression – thereby minimising costs and the burden to health systems and society (National Emphysema Foundation 2020; Seol et al. 2019). It is challenged by stigma (for example in COPD due to the link with smoking [Shahab et al. 2006]), lack of awareness of symptoms and their severity (Leidy et al. 2015; Akindele et al. 2019) and mis- or late diagnosis (Aaron et al. 2018; Johns et al. 2014).

Initial disease management

Effective clinical pathways lead to the sustainable and affordable management of chronic airway diseases (Mortimer et al. 2015). However, challenges associated with disease diagnosis and initial management remain.

Best-practice clinical guidelines, like the Global Initiative for Asthma (GINA) and the Global Initiative for Obstructive Lung Disease (GOLD), exist to support improvements in treatment but are not routinely implemented. A range of factors can cause this, including an absence of political commitment, funding or incentives (Partridge 2003; Lingner et al. 2017; Keeley & Baxter 2018; Roghmann & Sexton 1999). Research has also shown issues with country-specific guidelines, which can be inconsistent in their recommended care pathways (Drake et al. 1999) and sometimes lag behind global guidelines. Diagnosis can be delayed and inadequate treatments given as a result. For example, global guidelines recommend spirometry to identify the presence of airflow obstruction in symptomatic people, but spirometry performance in most primary care settings is low.

Treatment often has a short-term focus. Priority is given to managing exacerbations rather than treating the underlying cause of the disease and optimising care to prevent further exacerbations (GINA 2020; Reddel et al. 2017; O’Byrne et al. 2017). This can often result in an over-reliance on medications such as oral corticosteroids (OCS) and short-acting beta-agonists (SABA) (GINA 2020; Suissa et al. 2002).

Systems are not optimised to identify patients in need of review. Whether uncontrolled or at risk of over-reliance on their current treatment, the absence of routine alerts, effective data flows and/or patient-owned healthcare records can mean that patients seeing multiple healthcare professionals at different times are missed.

Access to appropriate care

Following an accurate diagnosis using tools like spirometry, in many cases, mild and moderate chronic airway diseases can be managed effectively in the primary care setting, some patients require specialist management. Best-practice guidelines and global consensus positions developed by the respiratory community (Hurst et al. 2020a; Menzies-Gow et al. 2018) recommend that those with severe disease and/or frequent or life-threatening exacerbations receive access to appropriate specialist care. Where such services are not available in primary care, a referral is required. While such referrals have a substantial impact on disease prognosis and the patient’s health status (Price et al. 2017), several challenges exist with their practical use.

In some countries, it can take patients between 10 and 20 years to be referred to a respiratory specialist, with a lack of clear thresholds or alerts to trigger a referral (Menzies-Gow et al. 2018). Appropriate, cost-effective interventions, like pulmonary rehabilitation, remain inaccessible due to under-provision, low awareness of its benefits and low referral rates (Marques et al. 2019).

There is often a lack of capacity to deliver specialist care and specialised services. While this is especially apparent in low- and middle-income countries (Obaseki et al. 2020), some issues apply across all countries. For example, a recent global survey of pulmonary rehabilitation providers has shown that most centres are capable of processing only relatively small numbers of patients (Spruit et al. 2014). Service capacity across all specialist services has been further challenged by the COVID-19 pandemic, which has put renewed and increased pressure on respiratory services and the respiratory workforce in the short-term. This may impact on the capacity of services in the longer-term. As mentioned earlier, 48 per cent of WHO-surveyed countries report care disruption in asthma services (WHO 2020b).

Patients may have to travel a considerable distance to access specialist chronic airway disease care, especially if they live in rural or remote locations. Evidence suggests this places patients in a difficult position in which they must balance travel costs against the benefits of specialist care (Majellano et al. 2019). The cost expended to seek and undergo specialist evaluation may be difficult to justify, and treatments recommended by a specialist may be subject to significant co-pay and/or not readily available to all (McConnell et al. 2014).

Follow up and longer-term management

Chronic airway diseases are, by definition, long-term conditions that require long-term management to ensure optimal disease control and reduced risk of exacerbations.

Evidence shows that continuity of care significantly improves the quality of life (Bikmoradi et al. 2019).

Management of chronic airway diseases should, as much as possible, be proactive and joined up, however, all too often this is not the case. Best practice care should start with an accurate diagnosis, assess severity, determine the best treatment, and develop an action plan to manage or prevent worsening of symptoms and reduce the risk of future exacerbations. However, some evidence suggests that reviews are either not conducted or are simply a 'tick-box' exercise when they do take place (Early et al. 2019; Asthma UK 2020). In addition to routine planned reviews, healthcare professionals should review treatment after a change in medication or an exacerbation (GINA 2020) and tailor support accordingly. However, exacerbations are frequently unreported or inadequately monitored (Xu et al. 2010; Adlington & Beasley 2007). This makes it difficult for a follow-up review to take place, despite it being essential to determine whether the exacerbation is resolved, to optimise treatment, and to identify and manage modifiable risk factors to mitigate the likelihood of future exacerbations (National Heart Lung and Blood Institute 2007).

Section 3: Why renewed political commitment on chronic airway diseases is needed to support the development of more sustainable and resilient health systems

The COVID-19 pandemic has brought into sharp focus the importance of respiratory health to individuals, health systems and society at large. For the chronic airway disease community, the pandemic has presented significant direct and indirect challenges, worsening many long-standing deficiencies in healthcare.

The pandemic has also fostered and accelerated several significant advancements, including the increased use of telehealth and virtual monitoring, as well as infection control measures, which can potentially serve as the foundations of a renewed and reformed approach to these long under-prioritised conditions. Despite the challenging fiscal outlook as a consequence of the pandemic, these advancements must be prioritised to build a sustainable and resilient health care system, and in turn, drive economic improvements.

Set out below is a high-level global blueprint for the measures that governments and health systems must consider if they are to build on and sustain the improved approaches to chronic airway disease care seen during the COVID-19 pandemic, to drive future health system resilience and sustainability. These map to the framework for health system sustainability and resilience set out by the Partnership for Health System Sustainability and Resilience, which is set out in more detail in section 4.

Priority ask: Major political commitment and action to challenge complacency in chronic airway diseases – through creation or update of national/regional chronic airway disease strategies

Given the long-standing complacency and under-prioritisation in this area (Tanday 2014), international authorities, governments, and healthcare systems must publicly commit to, and deliver, high-level measures to combat the burden of chronic airway diseases.

- **Creation or update of national/regional strategies to advance care in chronic airway diseases.** Either as a standalone publication or a dedicated section within National Chronic Disease Strategies (see Appendix 3), these must be based on existing best-practice guidelines and include stretching improvement as well as published, measurable targets. The goals of these strategies should include:
 - Restarting disrupted services & eliminating COVID-19-related treatment backlogs
 - Reducing avoidable infections and exacerbations
 - Reducing disease mortality
 - Reducing referral delays
 - Increasing access to, and uptake of, best-practice treatments
 - Increasing uptake of remote diagnostics and monitoring

Effective delivery of these strategies will require accountable leadership, aligned workforce strategies and appropriate investment.

Key reform areas: To be considered within development or revision of chronic airway disease strategies

Subsequent recommendations in this document set out a range of reforms across the chronic airway disease pathway that should be considered for inclusion and prioritised based on local needs.

Healthcare system governance and prevention

Strengthening the governance and data flows within a healthcare system is vital to bringing about the scale of change needed in chronic airway diseases. Measures required in this area include:

- **Improvement of the collection and publication of system performance data.** The establishment of improvement goals at a national or regional level, alongside improved collection and publication of system performance data, offers a unique opportunity for domestic and international organisations (including non-governmental organisations, scientific societies, guideline authorities and patient organisations) to evaluate progress.
- **Safeguarding of efforts to tackle significant risk factors for chronic airway diseases and other noncommunicable conditions.** Governments and healthcare systems must ensure tobacco control strategies are fully implemented, provide appropriate investment for public health to tackle obesity and reduced physical activity and prioritise policies that seek to limit the impact of climate change, including air pollution. These measures all form part of WHO's recommended Global Action Plan for noncommunicable diseases and will deliver health and societal gains (WHO 2020b). Despite the challenging global fiscal outlook, public health prevention measures must be ringfenced from cost containment within government and health system budgets.

Supporting earlier diagnosis

Supporting earlier diagnosis can help to ensure patients receive the care and treatment they need at the optimal time. There are several ways that earlier diagnosis can be improved, including:

- **Implementation of a minimum standard for access to diagnostics services and tests,** including access to spirometry, peak-flow testing, essential medicines and associated training. This is particularly important in low-resource settings where access to testing methods, such as spirometry, can be limited and underutilised (Global Asthma Network 2018). Such tests should be considered an essential component of routine health screening and assessment. More advanced healthcare economies should consider the inclusion of a broader assessment range, including biomarker assessments necessary to enable the delivery of personalised care (GINA 2020).
- **Rapid validation and reimbursement of remote diagnostics and adherence assessment in more established healthcare economies.** Home-based telehealth spirometry and smart-inhaler technologies have the potential to improve diagnosis and reduce issues in accessing care (see Appendix 3), as well as to support the delivery of care outside a hospital setting. With the COVID-19 pandemic causing significant backlogs in patient assessment and referral, rapid validation and scaling up of such technologies will be vital to meeting patient demand and reducing hospital-based activity, with the recognition that virtual care is not preferred or feasible for some.

Key to scaling-up will be ensuring effective collaboration with private partners to make integration simpler and accelerate the uptake of innovation. Additionally, it will be crucial that subsequent reimbursement does not financially penalise services that pivot to remote models which support initiatives to yet further broaden access.

- **Investment in training and education on airway disease signs and symptoms** to enhance the ability of healthcare professionals to establish a diagnosis, review and refer when needed, make appropriate management decisions and restore confidence amongst patients to engage services after the pandemic.
- **Support for patient empowerment by improving engagement with primary care healthcare professionals** with the aim of patients owning their health data, including through the use of smartphone apps, and initiating appointments with their healthcare professionals (see Appendix 3).

Focusing on clinical pathways which prioritise disease control

Effective clinical pathways focusing on disease control will lead to the sustainable and affordable management of chronic airway diseases (Mortimer et al. 2015). There are several ways disease control can be prioritised, including:

- **Review uptake of, and support measures to implement, best practice clinical guidelines for chronic airway diseases.** There is a need for guideline authorities to develop accessible resources to support implementation that allows busy healthcare professionals to manage complex long-term conditions such as chronic airway diseases. This should include a straightforward narrative on disease control and critical events to drive changes in patient treatment and care, including access to innovative treatment. Such resources should be used to engage with medical students earlier in the education process on the assessment and management of chronic airway diseases. Additional measures, such as the publication of quality standards that align to guidelines, that are incentivised via pay for performance models, should be considered by governments and health authorities to drive improved care (see Appendix 3).

Global quality standards need to be implemented, monitored and continually updated at a national level. Particular focus is required on:

- **Regular treatment reviews:** At a minimum, annual reviews are an essential means of ensuring patients receive treatments that address the underlying cause of their condition(s), rather than only manage exacerbations. Particular focus should be given to the use of rescue or reliever medications by the patient within the past 12 months, and excessive use considered an essential trigger for review (see Appendix 3).
- **Post-discharge or care change reviews:** In addition to a routine planned review, treatment should be reviewed after a treatment change or an exacerbation; this review should be tailored to offer ongoing education, training and support.

Policymakers must ensure appropriate funding and incentives are in place to enable the implementation of these best-practice guidelines.

Ensuring continuity of care

Evidence shows that continuity of care significantly improves the quality of life for patients living with chronic airway diseases (Global Alliance against Chronic Respiratory Diseases 2020). Continuity of care can be improved by:

- **Upgrading infrastructure and systems to prioritise consistent recording of data across all clinical environments** to allow stratification, monitoring of deterioration and impact of changes in care, and to highlight any early increase in the frequency of exacerbations and will enable the initiation of targeted intervention where appropriate (NHS Improvement 2011). From a practical perspective, wholly-owned patient records should be considered a key route to achieving this.
- **Supporting expanded adoption and reimbursement of care delivery closer to home,** including home and community-based pulmonary rehabilitation and home administration of treatment, as well as telehealth appointments (see Appendix 3). As with other virtual proposals, the key to scaling will be ensuring that their reimbursement does not financially penalise services which pivot to remote care delivery and that sufficient support is in place to broaden access, including external partnerships and education. It will also be crucial to determine when a face-to-face appointment is necessary compared to virtual care.

Section 4: how chronic airway disease reform delivers sustainability and resilience

This blueprint puts forward a comprehensive proposal for how the transformation of chronic airway disease care can support the development of more sustainable and resilient healthcare systems. At its core is the assertion that for heavily stretched systems, a new approach is needed. This new approach must enable earlier diagnosis, prioritise disease control and ensure continuity of care, to relieve pressure on physical healthcare services.

Importantly, however, these proposals should not exist in isolation and must be considered in line with the context and trends shaping national healthcare reforms. As part of the work of the Partnership for Health System Sustainability and Resilience (PHSSR), a series of country assessments are underway to explore common themes related to sustainability and resilience.

Consideration is given below to how the chronic airway disease reform agenda aligns to three significant national trends:

Optimising the location of care

In many cases, mild and moderate chronic airway diseases can be managed effectively in the primary care setting. However, some patients with uncontrolled or more severe disease may require specialist management. Where such services are not available in primary care, a referral is required. These referrals have a substantial impact on disease prognosis and the patient's health status (Price et al. 2017). However, in some countries, it can take patients between 10 and 20 years to be referred (Menzies-Gow et al. 2018). There is often a lack of capacity to deliver specialist care or specialised services, and patients may have to travel a considerable distance for access (Majellano et al. 2019).

Access to care has been challenged significantly during the COVID-19 pandemic. With many patients opting to avoid in-person care interactions, issues with the use of diagnostic technologies (including spirometry), and the capability (virtual/remote care) and capacity of sites to see non-COVID patients, there has been a substantial impact on care. **Ensuring that healthcare systems can be more resilient to external shocks in future will require an essential 'digital pivot' to move care closer to home. Reforms should seek to drive the broad and rapid uptake of home-based telehealth spirometry, virtual consultations, remote monitoring services and, where appropriate, at- or closer-to-home care provision** (see Appendix 3 for examples). Research will be needed to ascertain the impact of these changes and to address gaps in care if they occur.

Effectiveness of care

Treatment for chronic airway diseases can often have a short-term focus, with priority given to managing exacerbations rather than treating the underlying cause of the disease (GINA 2020; Reddel et al. 2017; O’Byrne et al. 2017). This can often result in an over-reliance on medications such as oral corticosteroids (OCS) and short-acting beta-agonists (SABA) (GINA 2020; Suissa et al. 2002). Systems are not optimised to identify uncontrolled patients or those at risk of over-reliance on their current treatment.

Improving the uptake of best practice clinical guidelines is key to the improvement of care for chronic airway diseases. For policymakers, support must be provided for the adoption of measures to drive implementation and adherence, such as the publication of aligned quality standards. Such standards will need to be matched with well-designed incentives (e.g. via pay for performance models). Improvements to data sharing and connectivity, including from smartphone apps, will also have an important role to play in ensuring that electronic alerts can be utilised to support the identification of patients in need of review and escalation.

Adjustments to skill-mix

Early detection of chronic airway disease enables clinicians to take the necessary steps to improve disease outcomes and modify progression – thereby minimising costs and burden to health systems and society (National Emphysema Foundation 2020; Seol et al. 2019). To do this effectively, however, healthcare professionals must be equipped with the appropriate training and tools to identify these conditions.

With COVID-19 fundamentally altering public perceptions of common respiratory symptoms, governments, educational and professional bodies and healthcare systems must invest in training and education on airway disease signs and symptoms. This will enhance the ability of healthcare professionals to make appropriate decisions and restore confidence amongst patients to engage with services after the pandemic. Tests such as spirometry should be considered an essential component of routine health screening and assessment in all countries. More advanced healthcare economies should consider the inclusion of a broader range of evaluations, including biomarker assessments necessary to enable the delivery of personalised care. (GINA 2020)

Considering broader opportunities for sustainability and resilience

To deliver the needed reforms to care for chronic airway disease, action is required across each of the domains of PHSSR’s framework for health system sustainability and resilience, from health system governance to financing, service delivery, the workforce, and social determinants of health, as Table 1 shows. This highlights the need for a joined-up, multi-stakeholder approach underpinned by robust and sustained political commitment.

Table 1: Action required across each of the PHSSR Framework domains

	1: Health system governance	2: Health system financing	3: Workforce	4: Medicines and technology	5: Service delivery	6: Political support and acceptability	7: Social determinants of health	8: Population health	9: Environmental sustainability of the health system
Creation or update of national or regional strategy to advance care in chronic airway diseases	✓	✓	✓	✓	✓	✓	✓	✓	✓
Healthcare system governance & prevention									
Improvement of the collection and publication of system performance data	✓				✓	✓			✓
Safeguarding of efforts to tackle significant risk factors for chronic airway diseases and other noncommunicable conditions						✓	✓	✓	✓
Supporting earlier diagnosis									
Implementation of a minimum standard for access to diagnostics services and tests	✓	✓	✓	✓	✓				
Rapid validation and reimbursement of remote diagnostics and adherence assessment in more established healthcare economies				✓	✓				✓
Investment in training and education on airway disease signs and symptoms			✓		✓		✓		
Support for patient empowerment by improving engagement with primary care healthcare professionals			✓		✓				
Focusing on clinical pathways which prioritise disease control									
Review uptake of, and supporting measures to implement, best practice clinical guidelines for chronic airway diseases	✓	✓	✓	✓	✓				✓
Ensuring continuity of care									
Upgrade infrastructure and systems to prioritise consistent recording of data across all clinical environments			✓	✓	✓				
Support expanded adoption and reimbursement of care delivery closer to home			✓		✓				✓

Conclusions

Health systems around the world are heavily stretched, both by COVID-19 and seasonal pressures on services. New approaches to enabling patients to control their condition better, to reduce hospitalisations, and ultimately to decrease pressure on health systems are needed.

For too long chronic airway diseases have not received the attention needed. They have often been under-prioritised within public health efforts to improve the prevention and control of chronic diseases overall (Global Alliance against Chronic Respiratory Diseases 2020). The absence of change in treatment outcomes and disease control highlights that more effective implementation of proven management strategies, together with novel approaches, is required to achieve further reductions in mortality and, more generally, to lessen the burden of airway diseases.

Airway disease pathway redesign presents the most significant opportunity to support patients living with these diseases to stay well, reducing premature mortality and limit health system and societal costs. These changes should be tailored to the healthcare context in question; for example, in developed health economies, new models of care might include the adoption of remote or virtual care whereas, in developing health economies, efforts may focus on greater use of technology such as smartphone apps.

The past two decades have seen the emergence of three major coronavirus pandemics (SARS-CoV, MERS-CoV and SARS-CoV-2) that impact the respiratory system. It is projected that the frequency of these events may increase in the coming years, fuelled in part by increasing ecological damage and societal interconnectivity. This is occurring at a time when the prevalence of chronic airways disease is also expected to grow rapidly.

COVID-19 must serve as a trigger to upgrade and reset approaches, in line with the latest evidence and global recommendations. This requires a concerted effort from Governments. However, they are not alone in driving change. Stakeholders from across the respiratory community - including patient groups, educational institutions, professional societies and the pharmaceutical industry – have a responsibility to work together in partnership. Collectively, all stakeholders can create the change required to deliver better outcomes for patients living with chronic airway diseases, a more resilient population better equipped to deal with future pathogen threats and economies with the ability to build back better.

This will require a fundamental challenge to long-standing complacency around the care of chronic airway diseases. A return to the old status quo is not an option.

Priority ask: Creation or update of national/regional chronic airway disease strategy

Objectives What should a chronic airway disease strategy seek to achieve?	Focus reform areas What should be included within a chronic airway disease strategy?
<ul style="list-style-type: none">• Restarting disrupted services & eliminating COVID-related treatment backlogs• Reducing avoidable infections and exacerbations• Reducing disease mortality• Reducing referral delays• Increasing access to, and uptake of, best-practice treatments• Increasing uptake of remote diagnostics and monitoring	<ul style="list-style-type: none">• Healthcare system governance & prevention• Supporting earlier diagnosis• Focusing on clinical pathways which prioritise disease control• Ensuring continuity of care

Appendix 1: Defining chronic airway diseases

Chronic airway diseases – most commonly asthma, chronic obstructive pulmonary disease (COPD) and (non-cystic fibrosis) bronchiectasis – are categorised by daily symptoms causing breathing difficulties, including airway inflammation, limitation and hyperresponsiveness (GINA 2020; GOLD 2020).

Asthma

Asthma is a chronic inflammatory disease with fluctuating levels of inflammation (cause) and episodic symptoms (consequence) (GINA 2020), typically shortness of breath, cough and wheeze, varying from mild and short-lived to persistent and severe. Asthma affects over 339 million people around the world (Global Asthma Network 2018). Annually, over 176 million exacerbations occur globally (AstraZeneca data on file), some of which can be life-threatening (Royal College of Physicians 2014).

There was global progress in reducing asthma mortality between the early 1990s and 2006, but improvements plateaued by 2012 (Ebmeier et al. 2017) with approximately 489,000 deaths per year, which is about 1,300 deaths per day (GBD Mortality and Causes of Death Collaborators 2016). The majority of deaths are in low-income countries (GINA 2020).

Asthma is estimated to have a high economic impact due to the burden it places on individuals, health systems and society (Global Asthma Network 2018). While there is a clear cost impact due to time lost from work and early mortality, direct costs such as hospital and emergency visits, admissions, medication, and tests are estimated to account for 50–80 per cent of total asthma costs (Nunes et al. 2017). Approximately 15 million disability-adjusted life years are lost annually due to asthma. Asthma, therefore, represents one per cent of the total global disease burden (Masoli et al. 2004). Research has shown that lower socioeconomic position is associated with a higher prevalence of asthma (Accordini et al. 2013).

Costs vary between those who have well-controlled disease and those who do not. A one-year prevalence-based cost-of-illness study showed that the mean total cost per patient ranged from €509 in controlled asthma to €2,281 in uncontrolled disease. As a result, uncontrolled patients have 4.5-times higher costs than controlled patients (Accordini et al. 2013).

Bronchiectasis

Bronchiectasis is a condition in which sections of the airways become abnormally widened, leading to a build-up of mucus that leaves the lungs more vulnerable to infection, together with a long-term cough. It causes loss of lung function, results in chronic symptoms, and may contribute to premature death (King et al. 2005). Mortality is higher than in the general population, with the average age of death lower than in the general population (Quint & Smith 2019).

Bronchiectasis and COPD share common symptoms and may overlap, which contribute to diagnostic delay and, in turn, potentially worsen disease severity and impede optimal management (Hurst et al. 2015).

Prevalence is increasing; it currently ranges from 67 to 566 per 100000 inhabitants in Europe and North America to 1200 per 100000 inhabitants among those aged 40 years or older in China (Lin et al. 2016). Globally, certain demographic groups have an increased risk for the development of bronchiectasis, including individuals with poor access to healthcare or high rates of pulmonary infection in childhood (Barker 2002; Singleton et al. 2000).

As an age-associated disease, a marked increase in prevalence, particularly in severe disease, is expected to continue to influence the overall burden of bronchiectasis. However, the burden of bronchiectasis remains poorly understood in comparison to that of COPD and asthma (Chandrasekaran et al. 2018). Incidence, prevalence and mortality remain less well documented in China (Lin et al. 2016), India (Natarajan & Rudrawar 2014) and Latin America, where the economic burden of bronchiectasis remains challenging to quantify.

A systematic review of the literature identified 26 publications and reported the economic burden of bronchiectasis in society is significant (Goeminne et al. 2019), and that it is likely to be significantly underestimated as most studies so far have ignored outpatient burden and cost, and instead focused solely on hospitalisations. Bronchiectasis severity correlates with increased total expenditure; most expenditure stems from in-hospital management with bronchodilators, inhaled steroids and inhaled antibiotics (particularly for a severe exacerbation) (de la Rosa et al. 2016).

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) is a progressive disease that is characterised by persistent respiratory symptoms (chronic cough, shortness of breath and sputum production), airflow limitation, and/or chronic hyperinflation (GOLD 2020). COPD affects an estimated 384 million people worldwide (Adeloye et al. 2015), disproportionately impacting socioeconomically disadvantaged populations (Pleasant et al. 2016), and is the third leading cause of death globally (Quaderi & Hurst 2018). Despite this, it is significantly under-reported, under-diagnosed and undertreated (Ho et al. 2019; Diette et al. 2015).

COPD is frequently diagnosed late when the disease has already progressed. This is associated with higher exacerbation rates and increased comorbidities and costs than those diagnosed earlier (Larsson et al. 2019).

The global burden of COPD continues to grow. COPD is the third leading cause of death, after ischaemic heart disease and stroke, and before cancer (GOLD 2020; Murray & Lopez 1997). In 2015, 3.2 million people died from COPD worldwide, an increase of 11.6 per cent compared with 1990 (GBD Chronic Respiratory Disease Collaborators 2017).

Patients with COPD are susceptible to acute deteriorations in respiratory health called 'exacerbations' that are usually caused by respiratory infection. COPD exacerbations lead to lung function decline which, in some patients, may not recover to pre-exacerbation levels (Watz et al. 2018). Approximately 40 per cent of COPD patients take no immediate action when having an exacerbation (Barnes et al. 2013). For those that do take action, only 25 per cent of patients received maintenance therapy, to prevent or reduce symptoms after an exacerbation and reduce risk of future exacerbations (Dalal et al. 2012).

The personal, societal and economic burdens are significant. COPD-related costs are estimated to be more than US\$100 billion per year globally, which is mainly attributable to the cost of exacerbations (GOLD 2020; Chen et al. 2016; Blasi et al. 2014). This mirrors other leading causes of mortality worldwide, such as heart failure (estimated to cost \$108 billion per year globally) (Lesyuk et al. 2018). COPD is associated with significant reductions in quality of life at all stages of disease severity but particularly those with GOLD Stage 3 and 4 diagnoses (Jones et al. 2011).

Appendix 2: The burden of chronic airway diseases

The prevalence of chronic airway diseases is growing	Mortality remains high	The societal and economic burden is growing
<ul style="list-style-type: none"> • More than 1 billion people are living with chronic airway diseases globally (WHO 2017). • Between 2010 and 2030, the total number of patients diagnosed with COPD is predicted to rise by approximately 155 per cent (Khakban et al. 2017). • By 2050, asthma will affect approximately 1 billion, or 10 per cent, of the world's population (Lotvall et al. 2012). 	<ul style="list-style-type: none"> • Approximately 3 million people die of COPD each year, making it the third leading cause of death worldwide (Lortet-Tieulent et al. 2019). • More than 400,000 people die of asthma each year (WHO 2016). 	<ul style="list-style-type: none"> • In the United States, direct and indirect costs associated with COPD are estimated to be almost \$50 billion (Ford et al. 2015). • Costs associated with asthma are estimated to be over \$80 billion (Nurmagambetov et al. 2018). • In 2013, COPD was ranked as the fifth leading cause of disability-adjusted life-years (DALYs) lost globally. • In 2016, asthma across all ages contributed 24.8 million DALYs globally (WHO 2017).
Chronic airway diseases are linked to health inequalities	There is an intrinsic link between chronic airway diseases and the environment	The data gap for bronchiectasis means prevalence and associate burden could be underestimated
<ul style="list-style-type: none"> • Low socioeconomic status measured by education and income levels is associated with increased prevalence of asthma and COPD (Kanervisto et al. 2011). 	<ul style="list-style-type: none"> • Environmental degradation, such as land clearing, urbanisation and carbon-intensive manufacturing, is a significant risk factor in the development and exacerbation of asthma (Amato et al. 2014) and COPD (Sarkar et al. 2019). • Efforts are underway to reduce the environmental impact of certain inhalers (Pangalos 2020) (the propellants used currently containing small quantities of a type of greenhouse gas), whilst ensuring that disease control remains optimised. 	<ul style="list-style-type: none"> • There is a lack of global data on incidence, prevalence and mortality associated with bronchiectasis (Quintet al. 2016).

Patients living with uncontrolled chronic airway diseases are more likely to have a lower quality of life and may suffer from chronic breathlessness, fatigue and other symptoms. This can result in them becoming isolated, having difficulty maintaining full-time employment and incur financial challenges as a consequence of long-term illness (Booth & Johnson 2019).

Respiratory diseases represent pressure on health systems globally, particularly during the winter months (Donaldson & Wedzicha 2014). In the UK during the winter, up to 40 per cent of the pressure on hospital services is from respiratory conditions (Office for National Statistics).

Appendix 3: Examples of practical interventions in chronic airway disease treatment and care

Finland's National Asthma Programme (Nunes et al. 2017; Haahtela et al. 2006)

The Finnish National Asthma Programme ran from 1994–2004. It was overseen by the government and implemented by the Finnish Lung Health Association (Filha; a professional body and non-governmental organisation) to reduce the burden of asthma on individuals and society. The premise underpinning the campaign was that asthma is an inflammatory disease and requires anti-inflammatory treatment from the outset.

The action programme focused on the implementation of new knowledge, particularly within a primary care context, including the establishment of an effective network of asthma-responsible professionals and development of a post-hoc evaluation strategy.

At the programme's inception in 1994, an estimated 20 per cent of Finnish patients with asthma had severe or uncontrolled symptoms; by 2001, that proportion had halved, and by 2016 it was down to 2.5 per cent.

Supporting quality improvement in COPD through clinical audit review in the UK (Hurst et al. 2020b)

In the UK, 23 years of audit for hospitalised COPD exacerbations were summarised to understand better which features of audit design have had the most impact. The research team looked at pilot audits performed in 1997 and 2001, alongside national cross-sectional audits in 2003, 2008 and 2014 and continuous audit commenced in 2017.

The team found that under continuous audit, with quality improvement support, process indicators linked to financial incentives and provision of a discharge bundle improved more rapidly than those not linked.

Population-based case finding in Canada (Preteroti et al., 2020)

A study published in 2020 looked at the implementation of a population-based case-finding strategy to assess the prevalence of undiagnosed airflow obstruction (asthma or COPD) among adults with respiratory symptoms in Canada.

Adults without a previous history of asthma, COPD or lung disease were recruited using random digit-dialling and asked if they had symptoms. Those who answered affirmatively completed the Asthma Screening Questionnaire (ASQ), COPD-Diagnostic Questionnaire (COPD-DQ) and COPD Assessment Test (CAT). Those with an ASQ score of ≥ 6 or a COPD-DQ score of ≥ 20 underwent pre- and post-bronchodilator spirometry to diagnose asthma or COPD.

The study found that 20 per cent of randomly selected individuals who reported respiratory symptoms in Canada had undiagnosed airflow obstruction due to asthma or COPD.

General practice clinical education programme in Denmark (Ulrik et al. 2010)

In Denmark, two cross-sectional surveys were performed one year apart (2006 and 2007) before and after an educational programme for the participating general practitioners (GPs). A total of 124 GPs completed the study; 1716 and 1342 patients with GP-diagnosed COPD and no concomitant asthma, respectively, were included in the two surveys. The study aimed to understand if participating in an educational programme could improve adherence to guidelines, not least for diagnosis, staging, and treatment of the disease.

The study found that diagnosis and management of COPD within general practice in Denmark was not following guidelines. Still, substantial improvements can be achieved through focused education of GPs and their staff.

Ontario Severe Asthma Quality Standard (Health Quality Ontario 2020)

In September 2020, Health Quality Ontario (HQO) in Canada published an Asthma Quality Standard for Adults. The Quality Standard set out critical guidance about severe asthma care and included the use of systemic steroids for 50 per cent of the year to maintain asthma control as a reason for referral to a specialist. The Standard also highlights an outline of a multidisciplinary team for specialised asthma care, the need to consider severe asthma in patients who remain uncontrolled, and guides patients, clinicians and the healthcare system on the importance of referral networks.

The development of the Quality Standard included input from Asthma Canada and the Lung Health Foundation.

Rapid guidelines to maximise the safety of patients with severe asthma during COVID-19 in the UK

In April 2020, the National Institute for Health and Care Excellence (NICE) in the UK published rapid guidance on severe asthma care to maximise the safety of adults and children with severe asthma during the COVID-19 pandemic (while protecting staff from infection) (NICE 2020).

The recommendations brought together existing national and international guidance and policies and advice from specialists working in the NHS from across the UK. They included the need to minimise face-to-face contact, use alternative ways to deliver care (such as home care), perform routine monitoring remotely wherever possible, prescribe no more than 30 days' treatment at once, use bronchoscopy and lung function tests for urgent cases only and only have two senior clinicians needed to make decisions to initiate biological therapy.

Connecting patients with severe asthma with comprehensive support services in the UK

In the UK, a collaboration between a respiratory biologics manufacturer and the NHS provides a comprehensive home-care services to patients. Patients are provided with the skills and tools concerning their treatment and care through online coaching, educational resources and healthcare support. This includes personalised coaching calls with a trained nurse, reminders regarding medication and a helpline providing instruction on self-administration.

Adherence and outcomes data are captured and shared with prescribers to help ensure that patients' home administration is as effective as possible.

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