

Developing the Lung Research Grand Challenges

A detailed methodology by Asthma + Lung UK and the Lung Research and Innovation Group.

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Introduction

The burden of respiratory disease is both profoundly and persistently underappreciated in global health funding and research.¹ In 2019, chronic respiratory diseases – such as asthma, chronic obstructive pulmonary disease, and interstitial lung disease – were the third largest cause of death worldwide, responsible for more than four million deaths.² Despite its high mortality and morbidity rates, research expenditure on respiratory conditions continues to be deprioritised by major global funders.³

The outlook for respiratory research in the UK continues to mirror the global trajectory. The UK has the second highest death rate for respiratory conditions in Europe⁴ and the highest prevalence rate in the WHO European Region.⁵ More than 12 million people (1 in 5) in the UK are expected to develop a lung condition during their lifetime,⁶ with those conditions responsible for 6% of the UK's health burden⁷ and the biggest single contribution to emergency hospital admissions and NHS winter pressures.⁸ Yet, research into lung disease receives only 2.5% of UK public research funding.⁹ To address this discrepancy, Asthma + Lung UK began calling for a tripling of public investment in respiratory research, from £47 million to £150 million a year, to not only better support people with lived experience of a lung condition but to enable the UK to become the best place in the world to do respiratory research.¹⁰

To build momentum behind this work, Asthma + Lung UK convened the [Lung Research and Innovation Group](#) (LRIG) in 2022. Its members include eminent researchers and expert organisations (Appendix A) determined to drive progress in lung research to deliver better outcomes for people living with a lung condition. In addition to advocating across public and private sectors for increased investment, the LRIG's priorities include mapping the research and innovation landscape to identify gaps and opportunities, and fostering collaboration among key stakeholders to efficiently allocate funding to maximise outcomes for patients.

In an effort to meet these goals, the LRIG have come together to propose the development of a 'grand challenges' framework for respiratory research that would provide the unifying mechanism to galvanise the research community around focused goals and to transform future funding conversations by prioritising areas for investment.

The following report details the process undertaken by Asthma + Lung UK and the LRIG to develop the [Lung Research Grand Challenges](#) (LRGCs). For broader context on the need and potential impact of the LRGs see our accompanying editorial article in Thorax.¹¹

Process

The development of the LRGCs has progressed over several years and is grounded in cross-sector consultation on unmet research need, alongside the iterative engagement of all key stakeholder groups, including people with lived experience of a lung condition.

This process comprised of four distinct phases: defining priority areas for research investment, evaluation of the 'grand challenge' framework as a potential solution, deliberative consultation with stakeholders, and finalisation of the challenges and their underlying goals (Figure 1).

Developing the Lung Research Grand Challenges

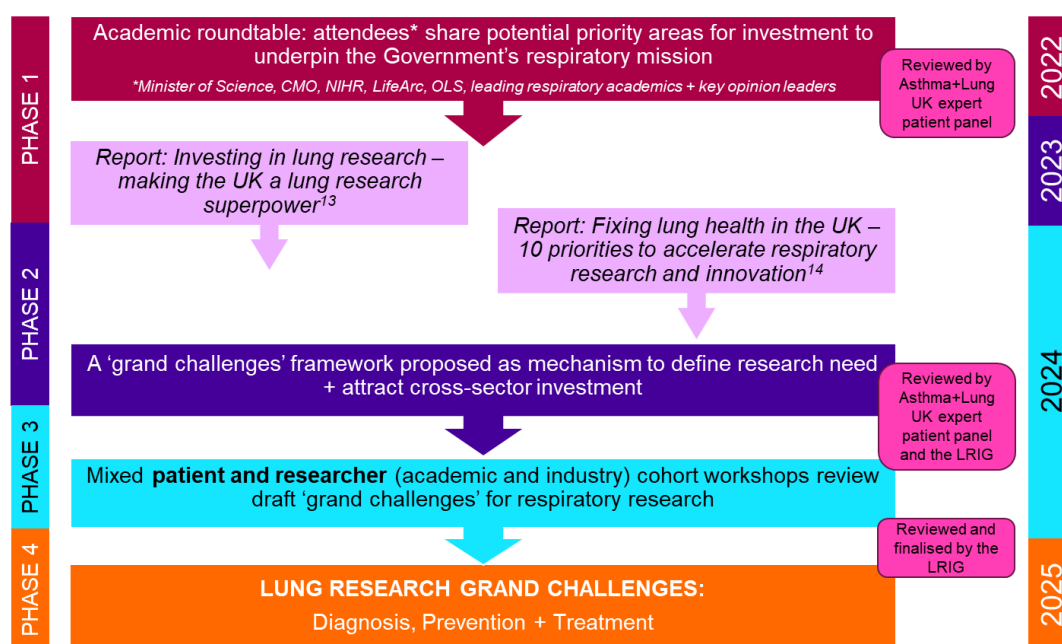


Figure 1. Overview of the development of the Lung Research Grand Challenges: Chief Medical Officer (CMO), National Institute for Health and Care Research (NIHR), Office for Life Sciences (OLS) and Lung Research and Innovation group (LRIG).

Phase 1 – Defining priority areas for research investment

In 2021, the UK Government announced a series of condition-specific 'missions'¹², yet unlike other areas (e.g. mental health), the respiratory mission was not accompanied by financial investment. To address this gap, in early 2022 Asthma + Lung UK convened a roundtable of leading respiratory academics and public health experts, including the Minister of Science, the Deputy Chief Medical Officer and representatives from the Office for Life Sciences, to share expertise on potential priority research areas that could underpin delivery of the mission. Additional input was sought from the charity's Expert Patient Panel and through one-to-one interviews with the wider academic community. Together, this process culminated in the report *Investing in Lung research – Making the UK a Research Superpower*¹³. The report served as a visionary blueprint for structural reform, positioning respiratory at the heart of the UK's science superpower agenda and centred on the idea of establishing a dedicated respiratory research institute.

Despite the ambition of this vision, the initiative did not gain traction within government. Recognising this, Asthma + Lung UK adapted its approach later in 2022, broadening the coalition of voices involved and reframing the scope of the argument. The Lung Research and Innovation Group (LRIG) was established, bringing together research charities, public funding bodies and leading researchers. Drawing on cross-sector perspectives of diverse membership the LRIG expanded this vision beyond

simply identifying research priorities, to include investment in infrastructure and skills as essential enablers of progress. This new strategy was crystalised in May 2024 with the report *Fixing Lung Health in the UK – 10 Priorities to Accelerate Respiratory Research and Innovation*¹⁴. Developed in light of a shifting health policy agenda, the report recognised the varied barriers to progress in respiratory research and laid the groundwork for a long-term, field-defining research agenda shaped by both patient and researcher consultation. Underpinning these barriers was the absence of a unifying research framework, that has been impactful in other fields, with the potential to knit together a fragmented, underfunded field into something greater than the sum of its parts.

Phase 2 – Understanding the value of ‘grand challenges’ as a mechanism to define research need and attract cross-sector investment

With lasting change in mind, LRIG systematically reviewed ambitious research frameworks through which other fields have stimulated coordinated action from academics, funders, and policy-makers and successfully transformed their research funding environments. Unlike priority-setting partnerships, which focus on condition-specific, patient- and clinician-driven questions that are immediately answerable, ‘grand challenges’ frameworks set broad, transformative research priorities across diseases and disciplines. Evidence from the fields of cardiovascular disease,¹⁵ cancer,¹⁶ and mental health¹⁷ revealed that setting ‘grand challenges’ is a successful model for transforming bold, actionable goals into coordinated research action, the de-risking of multi-sector investment, and engagement of the patient population (see reference 11 for more detail).

The ‘grand challenges’ framework was identified as a powerful tool to:

- Galvanise the research community and focus efforts
- Demonstrate alignment of the respiratory research community around clear priorities
- Transform future funding conversations by prioritising areas for investment
- Convey unmet research need to a wide range of audiences

Consultation with the Asthma + Lung UK Expert Patient Panel reinforced the view that a ‘grand challenges’ framework for improving lung health would emphasise the need for timely and accurate diagnostics and improve options for self-management. Four initial draft challenges, building on content from previous work^{13,14}, and associated rationale and specific goals were taken forward to the next stage of development (Table 2).

Table 2. Draft 'healthy lung grand challenges'

DRAFT Grand Challenge	Goals
Diagnostics – Research to create accurate, simple and affordable tests for better diagnosing and monitoring lung conditions	Create a tool to help people understand their lung health and track any changes to it.
	Develop simple, accurate, and low-cost tests for GPs and pharmacies to detect early signs of lung disease and lung infections, so people affected can get further care.
	Create easy-to-carry-out and accurate diagnostic tests to tell the difference between various lung conditions and their subtypes to guide further treatment.
Prevention – Research how lungs develop and keep them healthy throughout life	Find out how experiences like childhood infections, prematurity, poor diet, living in a lower income household and pollution affect lung growth and identify ways to help children with poor lung growth catch up and improve their lung health.
	Understand more about how genes affect lung health and find ways to reduce risk for those at high risk of developing lung problems.
	Determine if lung health screening has a role in keeping the nations' lungs healthy and how this could be carried out.
Self-management – Develop tools and services to help people with lung conditions to live well	Transform self-management of lung conditions through the development of effective and accessible digital tools.
	Evaluate and improve non-drug support that improves day-to-day quality of life for people with a lung condition, especially for those who may find it difficult to access health and care services.
	Find better ways to identify and treat severe lung symptom flare-ups (exacerbations), especially those caused by viral infections, work environments, and air pollution.
Treatment – Research to develop new treatments for lung conditions and their symptoms	Find targets for new drug treatments to act upon.
	Develop new treatments for lung conditions to reduce ill health and death.
	Identify biomarkers (something in the body that can be measured to tell if you are healthy or sick) to tell if a person is responding well to drug treatments.

Phase 3 – Deliberative stakeholder review to incorporate the voices of the patient and research communities

To maximise their impact and longevity, the draft 'healthy lung grand challenges' were put through a process of deliberative stakeholder review and revision, consulting with patient, scientific and clinical representatives. The primary aims of this phase of review were to:

- Incorporate the views of people with lived experience of lung conditions, to understand how the draft challenges resonate with them and reflect their needs and priorities.
- Understand from researchers in relevant academic and industry sectors how notable areas of scientific unmet need and areas with substantial potential impact for people living with lung conditions are encapsulated by the challenges.

Workshops were selected as the primary method of engagement in order to capture a broader diversity of perspectives and to facilitate the co-construction of a more comprehensive understanding of the potential and significance of the challenges through real-time collective discussion.

Recruitment process

In Summer 2024, Asthma + Lung UK commissioned an external agency¹⁸, to bring together people with lung conditions, their carers, and respiratory researchers who could share their views and propose revisions to the draft 'healthy lung grand challenges' (Table 2). Deliberately involving these groups ensured the challenges are rooted in lived experience and the realities of respiratory research, enabling them to have the maximum impact.

Participants were recruited to the workshops from across the UK in two main ways.

- People with lived experience (Table 3) were recruited by Acumen through social media posts, local recruiters, community groups, charities and research databases.
- Researchers (Table 4) were recruited through Asthma + Lung UK's researcher network, ensuring representation by a mix of research seniority, paediatric and adult-focus, a range of lung conditions, and research sector (academic, NHS, industry).

Table 3. Characteristics of workshop participants with lived experience of a lung condition

Characteristics	Participants with lived experience (n=23)*
Age range	19 to 88 years
Gender	10 women, 9 men, and 1 non-binary individual
Ethnicity	10 White British/Irish, 1 Black British, 4 British Asian
Lung conditions represented	Asthma, chronic obstructive pulmonary disease, cystic fibrosis, bronchiectasis, sarcoidosis, idiopathic pulmonary fibrosis
Other	Perspectives varied regarding effectiveness of condition management and level of interest in health research

*not all participants shared demographic information

Table 4. Characteristics of researcher workshop participants

Characteristics	Researcher participants (n=20)
Gender	11 women, 9 men
Career stage	Early, mid-career, senior researchers
Research type	Basic, translational, clinical, modelling, health services
Life-stage focus of research	17 adult-focus, 3 paediatric
Research sector	17 university or joint NHS + university 3 industry (Smart Respiratory, GSK, Invivio)

Consultation process

After receiving and reviewing text and animated summary versions of the draft 'healthy lung grand challenges' in advance, participants attended one of three online agency-facilitated workshops: workshop 1 – lived experience, workshop 2 – clinicians/researchers, workshop 3: mixed lived experience and clinician/researchers. The mixed workshop fostered dialogue between lived and research experience, generating a more comprehensive understanding of research needs and potential avenues for improvement.

Workshops opened with a presentation recapping the draft challenges, detailing the development process, the associated goals, and underlying rationales, followed by an open Q&A session. Participants were then divided into small groups (6 to 7 individuals) for facilitated discussions. Summary discussion guides are provided in Appendix B. Once concluded, the workshop transcripts were reviewed, analysing and deriving insights to propose revisions to the four draft 'healthy lung grand challenges.'

Workshop feedback

Workshop participants agreed on the need for increased and improved research into lung conditions, and the centrality of diagnosis, prevention, and treatment to this goal (Table 5). While the breadth of the draft 'healthy lung grand challenges' was generally welcomed, participants raised concerns that the challenges lacked specificity and did not present explicit challenges for lung health, such as the pursuit of cures. Both individuals with lived experience and researchers emphasised the importance of crafting a compelling narrative, to accompany the grand challenges so that they will effectively engage government, funders, and the wider research community.

Participants identified several opportunities that could be realised by the proposed challenges, including:

- A mechanism through which to address the awareness gap within government, often attributed to limited political recognition of the scale and impact of poor lung health in the UK.
- Encouraging renewed engagement from the pharmaceutical industry in the respiratory sector, following what is perceived as a historic lack of interest.
- Promoting a more holistic, collaborative and attractive research environment for lung research.

Table 5. *Illustrative quotations from workshop discussions*

Draft challenge theme	Illustrative feedback quote
General feedback	"It's the removal of that internal competitiveness and the coming together around a problem. We've got to generate a community that's much more collaborative, much more interdisciplinary, and much more respectful of everybody's skills and talents. Now, that is an institutional thing, and you said that's not included in this, but to me, it's absolutely fundamental if you want to make some of these big changes that I think everybody would like to see." – Researcher
	"You can have all the diagnosis that you want, but if you don't have any treatment and you don't have any self-management and you don't have any early prevention, then none of the rest-- they're all interlinked. To me, they all matter equally." – Person with a lung condition
Diagnosis	"The grand challenge for me is this one, I think it is absolutely critical to the delivery of respiratory care. If we really changed the way we looked at respiratory diseases, then it might really change the way we look at diagnostics, I would say that the first challenge with diagnostics is actually detecting breathlessness and detecting the impact on a patient because we've got patients with us, I'm sure they'd say, "Well, I had symptoms and problems weeks, months, years before I ever had a test or even saw somebody when I think back to it." – Researcher
Prevention	"I do think they should invest more in going down the genetic line. I know they do in other areas of the body. My mum died the year before of bowel cancer and I was taken straight in for the screening because it's a genetic trait. She did have asthma, but none of us kids were ever tested for it. I do think that they should broaden their horizons on the genetic link." – Person with lived experience
Treatment	"Something about the multi-morbidity and multi-treatment interactions, I think, would be very ambitious in terms of research because it's hard to research, but also important for the patients that we spoke to." – Researcher
	"I think since we are setting research challenges for researchers, I think we should be ambitious. We should actually aim to find a cure. whether we can do that within the next five years, I don't think so. If we don't start doing research to attempt that, we'll never get there." – Joint workshop participants
	"What I really did like, for me, regarding cystic fibrosis, it also includes the symptoms. To treat the side effects of my condition, there are so many symptoms there that need treatment as well. That is such a huge part of future treatments and current treatments." – Person with a lung condition

Both researchers and people with lived experience verified **diagnosis** as an area urgently in need of additional research and innovation, with many highlighting the need for a lung equivalent of the blood pressure test. Participants wanted this challenge to focus on early detection, supporting research that could develop the tools needed to understand the disease journey from its earliest stages (e.g. identifying biomarkers, exploring new methods to access the lung space for the assessment of lung health).

During the workshops, several participants emphasised that the **prevention** challenge should encompass both stopping the occurrence of lung conditions and preventing the worsening of existing lung conditions. Feedback on the first prevention goal (Table 2) suggested that this focused too much on early life and should be extended to include impacts throughout the life course including during neonatal and maternal health. Participants also felt a strong need to convey how developing understanding of the link between life course events and lung disease would translate into actionable prevention. Whilst the third prevention goal on screening was recognised as important, it was considered to align more closely to the diagnosis challenge as this would enable early disease detection.

The **self-management** proposal was the most polarising, with some participants, particularly researchers, arguing that the underlying goals could be incorporated into other challenges (e.g. self-management as a form of secondary prevention), and that presenting three challenges would be more attractive to funders. In contrast, other participants argued for a distinct challenge on self-management, highlighting that: an ageing population with lung conditions makes self-management increasingly important; it is already a recognised focus area for the National Institute for Health and Care Research; and that it is distinct from the other challenges due to the emphasis on non-drug approaches.

Though less polarising, the draft **treatment** challenge was heavily critiqued. Many researchers felt it was too generic, noting that simply removing the word 'lung' would make its goals applicable to any disease area. It was argued the challenge lacked focus and did not serve as a compelling 'call to arms' for researchers or funders. Several participants also wanted greater clarity as to whether the challenge should focus exclusively on new drug treatments or include the repurposing and reassessment of existing treatments, as well as non-drug approaches.

Participants suggested the treatment challenge goals should include research into disease pathophysiology, drug-delivery mechanisms and adherence, and poly-pharmacy and multi-morbidity with focus on drug interactions. Feedback on this challenge also recommend including different treatment approaches such as personalised and precision medicine, reducing reliance on antibiotics and steroids, and supporting end-of-life care (e.g. low-dose morphine for breathlessness).

Phase 4 – Finalising the 'Lung Research Grand Challenges'

To conclude the deliberative consultation process, the findings from the facilitated patient and researcher workshops were summarised and shared with the LRIG at a day long workshop, with the final feedback from members summarised in Table 6.

Table 6. Final feedback on ‘healthy lung grand challenges’ draft from the LRIG

Draft challenge theme	Summarised LRIG feedback
Diagnosis	• Endorsement of the need for a stronger focus on earlier diagnosis. • Highlighted the critical role of biomarkers and recommended their explicit inclusion in the challenge’s goals. • Urged the integration of data-driven approaches and AI to enhance diagnostic research.
Prevention	• Agreed ‘prevention’ should include secondary and life-long prevention. • Consensus around the need to include a goal (per the above) focused on the development of digital health tools to improve the monitoring of lung conditions, particularly for those most in need.
Self-management	• Majority agreed the components of this challenge should be dispersed within the other challenge areas. • Some dissented, arguing self-management is a unique aspect of living with a lung condition and should be addressed separately.
Treatment	• Small group discussions took multiple different directions, ranging from strengthening collaboration across the respiratory research environment to attempting to define the scope of ambition and search for ‘cures.’ • Improving drug delivery mechanisms are important but it was felt do not fit within the remit of these challenges.

As a result of the LRIG members’ discussions there was a change from four to three challenges by merging the goals previously attributed to self-management into the relevant areas of diagnosis, prevention, and treatment. It should be noted some members disagreed with this decision, emphasising that self-management is a distinct aspect of living with a lung condition. However, the majority agreed the goal of evaluating and improving non-drug support and services – aimed at enhancing the day-to-day quality of life for people living with a lung condition, their carers, and families, especially for those who face barriers accessing health and care services – should be retained within the broader set of challenges.

This iterative process concluded with the revision of the ‘healthy lung grand challenges’ into the ‘Lung Research Grand Challenges’ (Table 7), which were finalised and ratified by LRIG during its October 2024 session.

Table 7. Finalised wording of the ‘Lung Research Grand Challenges’

Challenge	Goals
Diagnosis: Halve the number of people living with undiagnosed lung diseases so they can live longer and healthier lives	• Identify biomarkers for the early detection of lung disease and find new ways of measuring lung health. • Determine the role screening has in the early detection of disease, particularly for those who are most at-risk and therefore most likely to benefit. • Use data driven approaches (including AI) to develop diagnostic tests to distinguish between different lung conditions and their subtypes to guide personalised treatment early in the disease journey. • Develop simple, accurate, and low-cost tests for individuals and community health care professionals to detect early signs of lung disease and lung infections, so people affected can get the right care at the right time.
Prevention: Reduce the number of people with preventable lung diseases and halve avoidable hospital admissions	• Keep lungs healthy throughout life by reducing the impact of early life and environmental factors and predicting and preventing disease progression. • Understand more about how genes affect lung health and how they can be used to identify and reduce risk of developing lung problems. • Prevent emergency hospital admissions by developing and implementing digital health tools to transform monitoring and guidance, especially for those facing deprivation.
Treatment: Discover cures for lung diseases and new treatments that significantly reduce symptoms	• Find new classes of drugs and pathways that can act on specific targets to cure lung diseases or reduce symptoms. • Improve quality of life by reducing the impact of multiple health conditions on lung disease – across day-to-day living, exacerbations and end of life. • Develop biomarkers to optimise treatment decisions and delivery.

To maximise the impact and uptake of the LRGCs among the research and funding communities, Asthma + Lung UK and the LRIG developed a compelling narrative that communicates to key stakeholders the urgency, importance and cross-community support for driving forward these challenges. This narrative, including the Asthma + Lung UK and the LRIG co-authored editorial article in Thorax ‘*Lung Research Grand Challenges: transforming respiratory research*’¹¹ publicly launched the LRGCs in Autumn 2025. This academic publication was accompanied by ongoing broader communication of the LRGCs to different stakeholder groups using infographics (Figure 2) to emphasise the need, ambition, and potential impact of the LRGCs as a research framework.



Figure 2. Example infographics used to communicate the urgency, importance, and ambition of the Lung Research Grand Challenges to the cross-sector respiratory research community, public, and private funders.

Summary

Asthma + Lung UK and LRIG present the LRGs as an ambitious, respiratory disease-agnostic set of priorities with the potential to deliver transformational change to lung research. Encompassing all respiratory health conditions, solving these grand challenges will require coordinated efforts from academia, industry, charities, and public funders. By uniting stakeholders across disciplines under the shared framework of the LRGs, there is a clear opportunity to improve health outcomes and reaffirm respiratory research as a critical and forward-looking discipline.

These priorities are intended to capitalise on existing resources and strategically leverage the strengths of the UK health and life sciences ecosystem to attract the sustained investment necessary to realise these ambitious objectives. If achieved, these goals envision a future where timely and accurate diagnostics are universally accessible, the incidence of lung conditions is significantly reduced, and those affected benefit from enhanced self-management tools. The development of therapies capable of halting or even reversing lung damage would mark a transformative advancement in disease management.

As evidenced by the LRIG's endorsements and the eager participation of respiratory researchers in the draft workshops, the research community is poised to harness the momentum generated by the LRGs. The demand for faster, broader, and more ground-breaking research outcomes is also clear from people living with lung conditions, whose voices have shaped this new research agenda.

Acknowledgements

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18. Hopkins Van Mil and their recruitment partner Acumen were commissioned to support with phases 3 and 4 of the development of the Lung Research Grand Challenges.

Appendices

Appendix A. Members of the Lung Research and Innovation Group

Member	
Organisation	Action for Pulmonary Fibrosis
	Association of British Health Tech Industries
	The Association of the British Pharmaceutical Industry
	Asthma + Lung UK (Conveners)
	British Association for Lung Research
	British Thoracic Society
	Cystic Fibrosis Trust
	Engineering and Physical Sciences Research Council
	LifeArc
	Medical Research Council
	NHS England
	National Institute for Health and Care Research (NIHR)
	NIHR Respiratory Translational Research Collaboration
	Office for Life Sciences
	The Primary Care Respiratory Society
	Pulmonary Fibrosis Trust
	Sarcoidosis UK
Research advisor*	Professor Eric Alton, Imperial College London
	Dr Lisa Brighton, King's College London
	Professor Hannah Durrington, University of Manchester
	Professor Clare Lloyd, Imperial College London
	Professor Jenni Quint, Imperial College London
	Professor Cliff Taggart, Queen's University Belfast

*correct at time of writing, October 2025.

Appendix B. Workshop discussion prompts

	People with lived experience of a lung condition only	Joint – people with lived experience of a lung condition + researchers	Researchers only
Challenge	Is the challenge clear?	Is this challenge important to address now? Why?/ Why not?	Is anything missing from these headline Challenges (noting we will explore goals and rationale shortly)?
	Is the challenge important to address now? Why?		On a scale of 1-5 (1 not at all ambitious) 5 (very ambitious) how would rate the draft Grand Challenges? Briefly, why?
			Is this challenge important to address now? Why? Why not?
Goals	Who will benefit from addressing the goals for this challenge? E.g. different populations, ages, conditions?	Is there anything missing from the goals?	Is there anything missing from the goals?
	Is there anything missing from the goals?		
	Does it feel relevant to your condition?		
Reasons why	Do they help explain why the goals are important? Why? Why not?	Does this rationale help explain why the goals are important? Why? Why not?	Does this rationale help explain why the goals are important? Why? Why not?
	How could they be improved? E.g. anything missing?	How could they be improved? E.g. anything missing?	How could they be improved? E.g. anything missing?
	Does this Grand Challenge help to address health inequalities, e.g. by prioritising the needs of those on lower incomes or living in less affluent areas?	Does this Grand Challenge help to address health inequalities, e.g. by prioritising the needs of those on lower incomes or living in less affluent areas?	Does this Grand Challenge help to address health inequalities, e.g. by prioritising the needs of those on lower incomes or living in less affluent areas?
	One thought you would like to share with those finalising the draft Healthy Lung Grand Challenges?	One thought you would like to share with those finalising the draft Healthy Lung Grand Challenges?	