Investing in lung research

Making the UK a lung research superpower

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Take a deep breath. Unless you're one of the six million people who can't.

An incurable lung condition means over six million people in the UK can't always catch their breath, or deliver enough lifegiving oxygen to their body and muscles. They can't lead a normal life. And too often, their lung condition will kill them.

It's time this changed. By investing ambitiously in UK research and innovation, we can save and change people's lives and improve the health and wealth of the whole of the UK.

Over the past two years, the world has witnessed what medical research can achieve to confront a devastating respiratory virus. The UK led the global research and development of COVID-19 vaccines. Our scientists saved millions of lives and demonstrated the scale of what can be achieved when there is collaboration between government, the NHS, and industry.

This scientific innovation during the pandemic, delivered at a time of great turbulence, highlighted the UK's position as a leader in life sciences. We can't afford to lose the progress and momentum created. Chronic respiratory conditions claim the lives of almost four million people every year across the globe[2], and the burden of chronic respiratory conditions, including asthma, chronic obstructive pulmonary disease (COPD), bronchiectasis, and interstitial lung disease, continues to grow.

The virtual Lung Research and Innovation Institute can build on the scientific successes from COVID-19 to make advances in respiratory science, and to improve how we diagnose, treat, and manage respiratory conditions for people in the UK and worldwide.

Respiratory conditions are the third biggest cause of death in the UK[3]

In the UK around one in five people will get a respiratory condition[4]

Respiratory conditions cost the UK £11 billion each year[5]

It's now thought that one in five people suffer from a respiratory condition in the UK[6], meaning that the potential savings to the NHS from new diagnostics and treatments are significant. The UK spends just £47 million per year from the public purse on research into respiratory conditions – a paltry 1.8% of the total £2.56 billion spent on health research[7]. We want this to increase to £150 million per year to bring public funding in line with the proportionate impact of respiratory conditions on the nation's health.

In order to make progress we need both to increase funding and to stimulate a favourable environment for respiratory research and development. The Lung Research and Innovation Institute can do that. A collaboration between public and private funders can create an ecosystem that is more than the sum of its parts, which will lead to significant breakthroughs in how we diagnose, treat, and manage respiratory conditions.

"An incurable lung condition means over six million people in the UK can't always catch their breath."

Such breakthroughs could hugely reduce the number of attacks, hospitalisations, and deaths caused by respiratory conditions. This could in turn bring significant savings to the NHS – never more needed when respiratory conditions currently cost the UK economy £11 billion every year[8].

Lung conditions are also an area of huge inequality, with the biggest impact falling on the poorest communities. The Lung Research and Innovation Institute would channel investment and improvement in respiratory research and innovation, with significant focus on the opportunities to improve health inequalities in the UK.

Harnessing the potential within respiratory science is critical in realising the UK's prospect as a global science and technology superpower. In 2021 the global respiratory treatments market was worth $143 billion[9], the respiratory diagnostics market was worth $7.45 billion[10], and the global digital respiratory devices market was worth $36.2 billion[11]. It's time we seized this opportunity to make the UK the best place in the world to do respiratory research.

This is why Asthma + Lung UK is championing the Lung Research and Innovation Institute.

Sarah Woolnough
Chief Executive, Asthma + Lung UK

Professor Sir John Bell GBE FRS
Regius Professor of Medicine, University of Oxford

Lung conditions are an area of huge inequality, with the biggest impact falling on the poorest communities.

Executive summary

Asthma + Lung UK is committed to making the UK the best place to do respiratory research and innovation. With the right investment to develop new cross-sector collaborations, research and innovation can play a vital role in saving and improving the lives of 6 million people in the UK currently suffering from a lung condition.

This report is a call to action: for government, academia, industry, the NHS and the technology sector to join our taskforce, and for UK public investment to increase from £50 to £150 million a year, with the aim of bringing the blueprint for a Lung Research and Innovation Institute to life.

Our vision of a new virtual Lung Research and Innovation Institute will transform the way the UK does respiratory science through:

- Building a platform for respiratory data
- Creating cutting-edge diagnostic tools
- Accelerating the development of lifesaving treatments
- Driving patient-centred innovation to transform self-management
- Understanding early disease progression and targeting underlying causes.

The Institute will be underpinned by a data platform for respiratory research and innovation which leverages the UK's unique assets in the NHS. It will create a world-leading model for industry collaboration on technology and data, and enable the research community to coalesce on the most promising cross-disease opportunities. It will connect researchers, wherever they are based.

The Institute has the potential to cement our scientific prowess in a shifting global context, to reduce health inequalities, and to drive economic growth through our NHS. But we need people to join our taskforce to make it a reality. We're calling for governments, academia, industry, the NHS, and the technology sector to commit to participating in this initiative with funding, expertise, and support in order to raise annual UK public investment in respiratory research and innovation to £150 million.

Five priorities, one vision

Lung Research and Innovation Institute

The “Lung and Innovation Institute” is a virtual institute focused on transforming lung research by tripling funding to reduce respiratory morbidity and mortality by 20% and secure the position of the UK as a leader in respiratory science. This provides an overarching vision and messaging, but will be realised across five priority areas of action.

1

Platform

Make the UK the best place to do lung research and innovation by joining up our unique datasets and including respiratory biomarkers in large-scale cohort studies.

2

Diagnostics

Develop objective tests and, where relevant, identify new biomarkers, that can accurately differentiate between lung diseases and can be measured remotely through partnering with health technology companies.

3

Treatments

Accelerate the development of new drug target product profiles and make the UK the best place for large-scale digital clinical trials.

4

Digital management

Drive health innovation and attract commercial investment by partnering with the NHS to enable the testing and implementation of disease management optimisation solutions.

5

Prevention

Reduce emergency admissions by 20% in the 20 worst affected areas through targeting underlying causes of lung morbidity and mortality.

The Lung Research and Innovation Institute

The Lung Research and Innovation Institute is a virtual institute focused on transforming respiratory research. It will be centrally managed and coordinated but it will not be a physical building. This means a large proportion of extra funding can go directly into critical research initiatives to address the greatest unmet needs and improve the lives of people with lung conditions. The Institute and its components will link up various parts of the country, with the aim of radically improving the health and wealth of the nation.

The Institute aims to:

- Reduce respiratory morbidity and mortality by 20%
- Secure the position of the UK as a leader in respiratory research
- Attract £100m investment – triple the current amount – from governments, academia, industry, the NHS, and the technology sector.
- Asthma + Lung UK have engaged a range of stakeholders – including industry, academia, public funders and charities – to develop a vision for the Institute.
- The Institute is built around five priority areas of research, delivered through four connected areas, all underpinned by a new data platform. By tackling the greatest challenges in respiratory conditions on five fronts we believe that we can save and improve millions of lives.

The Lung Research and Innovation Institute will:

- Attract significant investment across the UK life sciences industry and help make the UK a science superpower
- Facilitate partnerships with industry and other sectors, enabling access to the broadest number of experts in a quick and efficient way
- Increase the competitiveness of the respiratory sector in attracting further funding by having a shared infrastructure
- Create a world-class environment to train and develop future generations and leaders of respiratory research, helping to future proof against new respiratory conditions in years to come
- Provide opportunities to share ideas, knowledge and expertise between researchers and disciplines, and work towards the same shared goal
- Drive health and economic benefits to deprived areas by making the UK the best place in the world to do respiratory research and development.

"At AstraZeneca, we are fully committed to respiratory disease as an area of huge unmet need and significant economic impact. Now the government has prioritised respiratory disease in its Life Science Vision, we need to see continued support and increased public investment to achieve this change and progress across the five areas set out in Asthma + Lung UK's concept document."

Sir Mene Pangalos
BioPharmaceuticals R&D, Astra Zeneca UK

Funding for an advanced data capacity platform would enable greater use of both NHS and real-world data.

1. A platform for lung research

Without a commitment to build the best platform for conducting and connecting research, millions of people will be left struggling to breathe.

Challenge:

The lack of data-sharing in respiratory has undermined our ability to understand the long-term progression of diseases like chronic obstructive pulmonary disease (COPD). Poorly connected datasets reduce our ability to stratify risk and inform population health management. This is especially relevant for the 5.4 million people with asthma, the vast majority of whom receive healthcare at an annual review.

Opportunity:

By bringing together vast datasets, developing new approaches to trials and having close alignment with the NHS, the Institute will represent an unprecedented offer for international collaborators, including global researchers, to ensure that the UK is the best place to do respiratory research and innovation.

How do we make this happen?

Funding for an advanced data capacity platform would enable greater use of both NHS and real-world data in respiratory research and innovation. This will enable us to better understand the current burden of disease, identify factors that increase risk, and track the outcomes of people affected.

Funding a new £10 million a year lung patient cohort would unpick the mechanisms causing diseases like asthma, emphysema, and lung fibrosis, generating new hypotheses for the causes, management, and treatment of lung conditions. Measuring lung function from its peak in the early twenties over a lifetime will provide a more complete picture of lung function decline, disease onset and progression – and more opportunities for prevention.

Case study: Breathe Hub

The UK has already developed an advanced data capacity platform to drive new understanding of the causes, long-term progression, and unequal burden of respiratory conditions. Building on the progress of the BREATHE Hub could shift the dial in enabling greater use of data to inform how to treat and cure respiratory conditions.

BREATHE is part of a network of Health Data Research Hubs, funded through UK Research and Innovation's Industrial Strategy Challenge Fund, and coordinated by Health Data Research UK.

It's a unique not-for-profit collaboration between patients and the public, universities, third sector organisations and industry from across the UK and globally. Together, they are driving the use of health data in research to deliver improvements in respiratory health.

They work with a range of organisations and individuals to provide support on the use of health data for respiratory research, including academic researchers, charities and third sector organisations, small- and medium-sized enterprises, and larger industry partners.

2. Centre for diagnosis of lung conditions

No one should be left struggling to breathe without a timely diagnosis that can ensure they receive appropriate, expert care and treatment.

Challenge:

Diagnosis is complex, slow, inaccurate and relies on invasive tests that can't be performed at home. The lack of early-stage diagnostic capability contributes to a failure to develop early-stage treatment options. For some conditions, such as idiopathic pulmonary fibrosis (IPF), a diagnosis is effectively a death sentence for patients, as there are no meaningful treatments.

One in five people experience symptoms of a respiratory condition for over a year before seeking a diagnosis[8]

One person every minute is diagnosed with a respiratory condition in the UK[9]

Opportunity:

COVID-19 transformed public attitudes and understanding of at-home diagnostic tests, demonstrating a huge market for potential innovations.

A centre for diagnosis of respiratory conditions has the potential to use the UK's existing capabilities to lead the world market in developing globally saleable diagnostic tools. It could develop objective tests that can accurately differentiate between respiratory conditions, and can be measured and monitored remotely through partnering with health technology companies. The global respiratory diagnostics market was valued at $7.45 billion in 2021 and predicted to grow to $13.78 billion by 2029[15].

"The Life Science Vision rightly recognised the high unmet need for people living with respiratory conditions such as asthma and COPD in the UK. At Sanofi, we believe it's now time to turn this vision in to a reality for the patients waiting on advances in diagnosis and treatment. The Government must ensure that the respiratory mission receives the public investment required to progress its own ambitious vision and that put forward in Asthma + Lung UK's concept document."

Rippon Ubhi
General Manager at Sanofi Specialty Care

How do we make this happen?

- Multi-year investment of £3 million could enable small- and medium-sized enterprises to develop novel respiratory diagnostics.
- Longer-term investment of £10 million per year could drive the identification of new biomarkers and development of tests.
- Further investment and a partnership between the Engineering and Physical Sciences Research Council, the Medical Research Council and industry could focus on artificial intelligence and expanding Northern based -omics capabilities. An -omics base for researchers would radically improve the UK's diagnostics capabilities and be a step towards making the UK the best place to do respiratory diagnostics.

Case study: The East Midlands Breathomics Pathology Node (EMBER)

EMBER was one of the six Medical Research Council and Engineering and Physical Science Research Council-supported molecular pathology nodes, hosted at the University of Leicester in partnership with Loughborough University and industry.

EMBER's goal is to develop novel breath-based systems for molecular pathology. Exhaled breath contains volatile organic compounds (VOCs) that reflect biological processes occurring within the lung and, via the vena cava, more distant organs. Analysis of VOCs in the breath provides opportunities for rapid at-patient and in-clinic non-invasive diagnosis, phenotyping, and stratification.

Further investment in diagnostics would help to identify different types of disease faster and more accurately, resulting in better outcomes for patients.

The therapeutic approach for COPD hasn’t changed in more than 30 years.

3. Centre for new treatments for lung conditions

No stone should be left unturned when it comes to finding a treatment, cure or a better way to diagnose and manage respiratory conditions.

Challenge:

Patient access to innovative treatments is falling because of a reduced ability to recruit for and conduct clinical trials in the UK, with companies turning to other countries instead.

Lung conditions are the third biggest cause of death in the UK, after cancer and cardiovascular disease[16]

Opportunity:

A connected trials platform would bring together existing funding infrastructure to enable new drugs to be tested efficiently across UK centres. This will create a favourable environment for the development of new respiratory drugs to improve lives and save the NHS money.

It could accelerate the development of new therapeutic targets for drug development to reduce morbidity and mortality for the most fatal and life-limiting respiratory conditions, making the UK the best place for large-scale digital clinical trials.

The global respiratory disease treatments market was worth $143 billion in 2021 and is predicted to grow to $300 billion by 2028[9].

"The asthma attacks I suffered were so severe that by the time I was 22 I was questioning whether I'd make it to my next birthday. Then I was offered a new treatment of a biologic drug, Omalizumab, for severe asthma, which has been a life-changer."

Poppy Hadkinson
Living with Asthma

Biologics have been a gamechanger for patients with severe asthma, highlighting the possibility of scientific breakthrough. But respiratory is far behind other disease areas. The therapeutic approach for COPD – the UK's second most common lung condition, affecting some 1.2 million people – hasn't changed in more than 30 years[13]. And there are many people with asthma for whom there are no meaningful treatments[19]. We need to see more investment in research to see more innovative treatments.

How do we make this happen?

- Multi-year investment of £4 million could increase opportunities revitalise experimental medicine research. It could implement new technologies to support drug target identification, as well as validate and scale up new remote monitoring technology in late-phase trials to allow for innovative trial design.
- Working with the ABPI, industry and Research Reset would ensure respiratory interventional clinical trials of new medicines are accelerated and not adversely affected by declines in patient access.
- In the longer-term, investment could be focused outside the 'Golden Triangle' to increase capacity in technologies such as artificial intelligence, quantum computing, and regenerative medicine to identify novel drug targets. Partnerships could extend beyond pharma, including Nvidia (Cambridge-1), Microsoft Quantum, Chan Zuckerberg Initiative (Human Lung Cell Atlas), Benevolent.AI and Healx.

4. Centre for the management of lung conditions

No one who has difficulty breathing should look back and think that, with better care, they could have had a better life.

Challenge:

Respiratory disease is an area of huge inequality, with the biggest impact falling on the poorest communities. Air pollution contributes to around 36,000 early deaths. Long-term exposure to PM2.5 and NO2 is associated with increased incidence of COPD exacerbations and asthma attacks, with people in large polluted urban cities more likely to develop COPD and 15% of asthma episodes attributable to road traffic-related pollution[21].

Of the 20 worst clinical commissioning group (CCG) areas in England for respiratory emergency hospital admissions, 19 are in the north[22]

An estimated 25% of COPD deaths could be prevented with better routine care[29]

Over 60% of asthma deaths could be prevented with better routine care[24]

Ten of those CCG areas are in the top 20 areas for deprivation score, and 17 are in the top 40 (out of the 191 CCGs in the 2019 Index of Multiple Deprivation)[25]

Opportunity:

A centre for the management of respiratory conditions would develop the tools to enable people with lung disease to take charge of their health. Working alongside patients and the NHS to develop and pilot the right technologies to support patients in their own homes, the centre could speed up the rate of innovation and maximise the economic opportunity from the global medical technologies sector, whilst also minimising healthcare usage.

The global digital respiratory devices market was valued at $36.2 billion in 2021 and is predicted to grow to $304.3 billion by 2030[26].

How do we make this happen?

- An investment of £3 million to focus on rapid feasibility assessment and piloting of smart, data-enabled tools, would allow people to better manage and track their symptoms and access care at the right time – resulting in far fewer unplanned NHS admissions.
- A multi-year investment of £5 million could develop technology-enabled remote care pathways which utilise data in the most effective ways. By assisting shared decision making in this way, everyone receives the level of care they need.
- A partnership could leverage the expertise of major technology companies, such as Google, Amazon and Apple. All of which are currently developing expertise in healthcare and could result in digitally enabled, learning health systems.

Case study: SENTINEL Plus initiative for asthma

While developments are already underway to improve the management of respiratory conditions, the UK has a long way to go.

The UK has the third highest level of reliever inhaler use[27], with 38% of asthma patients potentially over-reliant on this medicine[28]. Reliever inhaler over-reliance is associated with poor asthma outcomes, an increased risk of asthma exacerbations, and premature death.

The SENTINEL Plus programme aims to optimise the use of anti-inflammatory preventer inhalers, which treat the underlying inflammation of asthma, while reducing the reliance on and prescribing of reliever inhalers.

At the heart of this project is the basic principle of good clinical education to encourage clinicians and asthma patients to manage their condition proactively, reducing asthma attacks. Further research in this space could improve outcomes by championing local disease management approaches.

5. Centre for prevention of lung conditions

No one should live struggling to breathe because of a condition that could have been prevented. However, a lack of investment in respiratory science means that we know very little about what people can meaningfully do to stop the onset of debilitating conditions such as asthma and COPD.

Challenge:

Despite an association between respiratory disease and factors such as air pollution and diet, evidence that these factors affect the onset of diseases like asthma and COPD remains limited. Without proper investment into understanding the primary causes of respiratory disease, they will continue to be a significant multi-billion-pound burden on the UK's national health.

Opportunity:

Stopping people from getting respiratory conditions would be globally transformative, helping millions of people to never have to struggle to breathe.

How do we make this happen?

- Multi-year investment of £10 million into environmental drivers of disease could help to understand the mechanisms that cause an exacerbation driven by air pollution and seek to better understand the lung microbiome. This would have the potential to catalyse -omic technologies and lung-on-a-chip platforms.

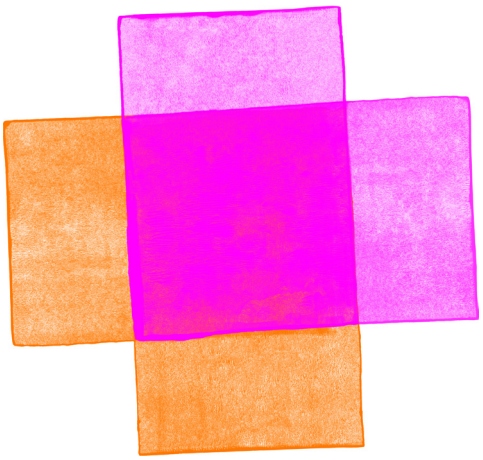
Asthma + Lung UK are committed to making the UK the best place in the world to do respiratory research, and to fight for better respiratory outcomes.

But we can’t do this alone.

Join our taskforce alongside government, academia, industry, the NHS and the technology sector to bring the blueprint for the Lung Research and Innovation Institute to life. All of us have a key role to play in supporting the next wave of lung science by bringing expertise to the table and collaborating for the greater good.

We’re calling for governments, academia, pharmaceutical and medical technology companies to all play a part so we can collectively deliver the most impact for health outcomes and economic growth. By committing to participate in this initiative with funding, expertise and support, we could drive an increase in UK annual investment in lung research and innovation to £150 million.

An additional £100 million in funding per year for the Lung Research and Innovation Institute would bring funding in line with the proportionate impact of lung conditions on the nation’s health and counter their devastating impact on millions of people across the UK.



Resources

1. Asthma + Lung UK. (2017). Lung Disease in the UK: Big Picture Statistics. Available at: Lung disease in the UK – big picture statistics | British Lung Foundation (blf.org.uk)
2. Li X et al. (2020). Trends and risk factors of mortality and disability adjusted life years for chronic respiratory diseases from 1990 to 2017: systematic analysis for the Global Burden of Disease Study 2017. BMJ. 368:m234. Available at: https://doi.org/10.1136/bmj.m234
3. NHS England. (2019). The NHS Long Term Plan. Available at: https://www.longtermplan.nhs.uk/wpcontent/uploads/2019/08/nhs-long-term-plan-version-1.2.pdf
4. British Lung Foundation. (2017). The Battle for Breath – the impact of lung disease in the UK. Available at: The battle for breath - the impact of lung disease in the UK | Asthma + Lung UK (blf.org.uk)
5. v Ibid
6. British Lung Foundation. (2017). The Battle for Breath – the impact of lung disease in the UK. Available at: https://www.blf.org.uk/policy/the-battle-for-breath-2016?_ga=2.159596734.262781203.1669112592-640660288.1664874981
7. UK Clinical Research Collaboration. (2018). UK Health Research Analysis. Available at:https://hrcsonline.net/reports/analysis-reports/uk-health-research-analysis-2018/
8. British Lung Foundation. (2017) Estimating the economic burden of respiratory illness in the UK. Available at: www.blf.org.uk/policy/economic-burden
9. Zion Market Research. (2022). Chronic Respiratory Disease Treatments Market – Global Industry Analysis. Available at: https://www.zionmarketresearch.com/report/chronic-respiratory-diseases-treatment-market
10. PR News Wire. (2022). Respiratory Diagnostics Market. Available at: https://www.prnewswire.co.uk/newsreleases/respiratory-diagnostics-market-to-garner-usd-13-78-billion-with-growing-cagr-of-8-00-share-size-trends-demandrevenue-and-key-players-by-2029-870453619.html
11. Grand View Research. (2022). Digital Respiratory Devices Market Size, Share and Trends Analysis Report. Available at: https://www.grandviewresearch.com/industry-analysis/digital-respiratory-devices-market-report
12. Asthma and Lung UK. (2022). Lung Conditions Kill More People Than Anywhere in Europe. Available at: https://www.asthmaandlung.org.uk/lung-conditions-kill-more-people-in-the-uk-than-anywhere-in-western-europe/
13. Taskforce for Lung Health (2021). Available at: www.blf.org.uk/taskforce/press-release/respiratory-backlog
14. British Lung Foundation. (2017). The Battle for Breath – the impact of lung disease in the UK. Available at: https://www.blf.org.uk/policy/the-battle-for-breath-2016?_ga=2.159596734.262781203.1669112592-640660288.1664874981
15. PR News Wire. (2022). Respiratory Diagnostics Market. Available at: https://www.prnewswire.co.uk/newsreleases/respiratory-diagnostics-market-to-garner-usd-13-78-billion-with-growing-cagr-of-8-00-share-size-trends-demandrevenue-and-key-players-by-2029-870453619.html
16. NHS England. (2022). Respiratory Disease. Available at: https://www.england.nhs.uk/ourwork/clinical-policy/respiratorydisease
17. Zion Market Research. (2022). Chronic Respiratory Disease Treatments Market – Global Industry Analysis. Available at: https://www.zionmarketresearch.com/report/chronic-respiratory-diseases-treatment-market
18. Stolz et al. (2022). Towards the Elimination of Chronic Obstructive Pulmonary Disease. Available at: https://doi.org/10.1016/S0140-6736(22)01273-9
19. Asthma UK. (2019). Asthma Still Kills. Available at: https://www.asthma.org.uk/support-us/campaigns/publications/asthmastill-kills
20. Office for Health Improvement & Disparities. (2022). Air Pollution: applying all our health. Available at:https://www.gov.uk/government/publications/air-pollution-applying-all-our-health/air-pollution-applying-all-ourhealth#:~:text=The%20annual%20mortality%20of%20human,and%2036%2C000%20deaths%20every%20year
21. Lee et al. (2021). Effects of Air Pollutants on Airway Diseases. Available at:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8465980
22. Office for Health Improvement and Disparities. (2022). Inhale – Interactive Health Atlas of Lung Conditions in England. Available at:https://fingertips.phe.org.uk/profile/inhale/data#page/8/gid/8000003/pat/15/par/E92000001/ati/167/are/E38000006/iid/93575/age/1/sex/4/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1/page-options/ovw-do-1_car-ao-1_car-do-0

23. Ministry of Housing, Communities and Local Government. Indices of Multiple Deprivation Data. Available at: https://datacommunities.opendata.arcgis.com/datasets/indices-of-multiple-deprivation-imd-2019/about

24. Royal College of Physicians. (2015). National Review of Asthma Deaths. Available at:www.rcplondon.ac.uk/projects/national-review-asthma-deaths

25. NHS England. (2014). Overview of potential to reduce lives lost from Chronic Obstructive Pulmonary Disease (COPD). Available at: https://www.england.nhs.uk/wp-content/uploads/2014/02/rm-fs-6.pdf

26. Grand View Research. (2022). Digital Respiratory Devices Market Size, Share and Trends Analysis Report. Available at: https://www.grandviewresearch.com/industry-analysis/digital-respiratory-devices-market-report

27. Wilkinson, A et al. (2021). An assessment of short-acting β_2-agonist (SABA) use and subsequent greenhouse gas (GHG) emissions in five European countries and the consequence of their potential overuse for asthma in the UK.Thorax. 76:A19. Available at : http://dx.doi.org/10.1136/thorax-2020-BTSabstracts.32

28. Janson, C et al. (2021). SABINA: An Overview of Short-Acting β_2-Agonist Use in Asthma in European Countries. Adv Ther 2020; 37:3. 1124-1135. Available at: https://pubmed.ncbi.nlm.nih.gov/31981105/

29. NHS England. (2014). Overview of potential lives lost from Chronic Obstructive Pulmonary Disease (COPD). Available at: https://www.england.nhs.uk/wp-content/uploads/2014/02/rm-fs-6.pdf

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