Whitepaper

# Transforming lung cancer care in Greater Manchester

Co-designing an innovative Diagnostic and Treatment Centre for Lung Cancer

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# Executive summary

Lung cancer is a key healthcare challenge in Greater Manchester, where it is the most common cause of death in those under 75.[1]

Early-stage diagnosis can enhance patient outcomes. However, in the UK, just 20% of people are diagnosed with lung cancer at stage I, when the likelihood of surviving five years is 68-92%, while more than 40% of people are diagnosed at stage IV, when the likelihood of surviving five years is under 10%.[2]

The Lung Health Check pilot in Manchester, diagnosed 79% of patients at stage I in its second round, demonstrating the transformative impact of earlier screening in shifting stage diagnosis for lung cancer.[3] The success of the pilot incited the development of The Targeted Lung Health Check programme (subsequently renamed the NHS Lung Cancer Screening Programme), which is set to facilitate lung cancer screening across the UK for all high-risk patients by 2030.[4]

In Greater Manchester, where the NHS Lung Cancer Screening Programme is already live, earlier diagnosis is generating increased referrals for further diagnostics and treatment.

To support this demand, Wythenshawe Hospital, part of Manchester University NHS Foundation Trust, and Greater Manchester Cancer Alliance, in partnership with The Christie NHS Foundation Trust and Siemens Healthineers, have embarked on a pioneering journey to design an innovative Diagnostic and Treatment Centre for Lung Cancer for patients across Greater Manchester.

This whitepaper will provide an insight into the centre's innovative approach to lung cancer care and explore how it is set to transform patient outcomes.

## Highlights:

- Targeted lung health checks are enabling earlier diagnosis of lung cancer
- The ground-breaking Diagnostic and Treatment Centre for Lung Cancer is a response to Greater Manchester's urgent healthcare challenges
- The Diagnostic and Treatment Centre for Lung Cancer aligns with national and local recommendations, offering early, proactive care to improve patient outcomes
- Experience-based co-design enabled a patient-centred facility and clinical pathway model, aligned to real operational and clinical needs
- Simulation modelling translated demand requirements into a robust, future-proofed service and estate design
- Co-located teams support improved patient outcomes and foster collaboration among healthcare professionals

## Contents

# Seizing opportunities and overcoming challenges

Lung cancer is an international public health issue, responsible for the loss of 1.8 million lives globally.[5] In the UK, lung cancer causes the loss of the most quality adjusted life years (QALY) for patients compared to all other cancers.[6]

Earlier diagnosis can help to unlock better prognoses for patients, and control costs for healthcare providers. However, the NHS is still navigating the long-term impact of the COVID-19 pandemic on the lung cancer care pathway, where diagnosis and access to treatment were inhibited. These delays in diagnosis are expected to result in an 11.2% increase of stage IV diagnoses of lung cancer, affecting lung cancer survival rates.[7]

Establishing pathways to earlier diagnosis is crucial, particularly in areas with high-risk populations. North and South Manchester have some of the highest rates of lung cancer in the UK and a high-mortality rate for the condition linked to socio-economic challenges.[8]

## Achieving earlier diagnosis with the Lung Health Check pilot

The Lung Health Check pilot in Manchester marked the start of a transformative journey towards early diagnosis for lung cancer.

The pilot aimed to assess the efficacy of Low Dose CT (LDCT) scanning in enabling early diagnosis for high-risk groups.


The Lung Health Check pilot was nurse-led and offered high-risk patients in socio-economically deprived communities annual LDCT screening over two screening rounds. Mobile screening units were deployed in partnership with Siemens Healthineers and Cobalt Health in convenient retail locations.

The results were compelling, demonstrating both clinical effectiveness and cost-effectiveness.

Over both screening rounds, there was a high prevalence of lung cancer detection; equal to one cancer found in every 23 people screened. Significantly, 89% of these cancers were detected at an early stage, and patients were offered curative intent treatment.[9]

Cost-effectiveness in healthcare can be assessed using an incremental cost-effective ratio, which represents how efficiently a proposed initiative can produce additional quality-added life years (QALY). The Lung Health Check pilot resulted in a gain of 65.85 QALY, with an incremental cost-effective ratio of £10,069/QALY; this outcome was evaluated as a cost-effective use of NHS resources.[10]

Following the success of the pilot, the NHS Lung Cancer Screening Programme is set to expedite diagnosis for high-risk patients across the UK. While the programme is currently active in areas such as Greater Manchester, the first phase of the scheme aims to reach 100% coverage of the eligible population by March 2030.[11]

## Rethinking care delivery

The Targeted Lung Health Check programme is facilitating earlier diagnosis to achieve better patient outcomes. However, increased demand means the wider healthcare system must be prepared for accelerated treatment pathways. Delays in lung cancer treatment can impact cancer staging, counteracting the efficacy of earlier diagnosis while heightening costs.

Based on model forecasting, a 60% uptake from patients invited to attend a lung health check screening appointment over the next ten years in Greater Manchester will lead to increased referral volumes for MRI, CT and PET-CT exams, by 50%, 30% and 220% respectively.

In Greater Manchester, where the NHS Lung Cancer Screening Programme is already live, preparing for tertiary referrals is key - care delivery needs to adapt to improve clinical outcomes and save more lives.

Siemens Healthineers Consulting partnered with healthcare providers in the region to develop facility and pathway design for an innovative new Diagnostic and Treatment Centre for Lung Cancer. Alongside this, the consulting team developed strategic data-driven insights and recommendations to facilitate a strong business case for the creation of the centre.

*"The challenges of lung screening implementation taken together with the poor infrastructure and performance of the pathway mandate a significant change in the model of care."*

**Professor Richard Booton**
Clinical Director for Lung Cancer and Thoracic Surgery, Wythenshawe Hospital, Manchester University NHS Foundation Trust

# Bridging the gap: from screenings to swift diagnosis and treatment

Wythenshawe Hospital, part of Manchester University NHS Foundation Trust (MFT), is a major acute teaching hospital serving patients across Greater Manchester and the wider North-West of England.

MFT is involved in several national studies which are run at Wythenshawe Hospital's Thoracic Oncology Research Hub (TORCH), part of Cancer Research UK's Lung Cancer Centre of Excellence.

To address growing demand for lung cancer services, Greater Manchester Cancer Alliance, Manchester University NHS Foundation Trust and The Christie NHS Foundation Trust turned to Siemens Healthineers Consulting for support in designing a one-stop Diagnostic and Treatment Centre for Lung Cancer, serving the whole of Greater Manchester.

The Diagnostic and Treatment Centre for Lung Cancer will serve tertiary referrals from the screening programme and provide patients with all required treatments and diagnostic options under one roof.

Alongside this, the centre will have research facilities, including a training centre, to support the work of TORCH as a Centre of Excellence.

## Harnessing the benefits of co-location

The co-location of research, diagnostic and treatment services offer patients and staff the benefits of a multi-disciplinary care model.

Research suggests that multidisciplinary care, where a centralised clinic offers patients the opportunity to see appropriate specialists in the same location, is associated with improvements in patient outcomes, and adherence to guideline management. In particular, patients benefit from improved survival and enhanced utilisation of all treatment modalities.[12]

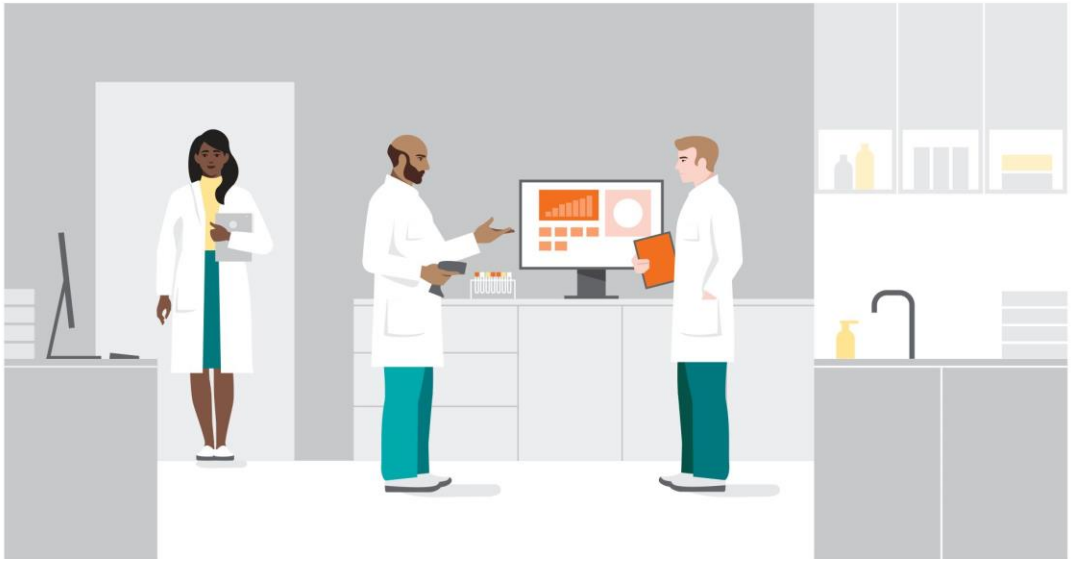
Wythenshawe Hospital's Diagnostic and Treatment Centre for Lung Cancer will offer patients the significant benefits of a co-located environment.

## Meeting national and local ambitions for lung cancer

The NHS Long Term Plan sets out a goal for 55,000 more people to survive their cancer for at least five years after diagnosis, every year from 2028.[13] To achieve this, earlier diagnosis has been identified as crucial, alongside proactive care for those diagnosed.

Meanwhile, Greater Manchester Cancer Alliance's strategy for 'Delivering an accelerated diagnostic and staging lung cancer pathway in Greater Manchester,' emphasises the importance of faster turnaround times for investigations post diagnosis.[14]

The Diagnostic and Treatment Centre for Lung Cancer will be key to meeting these national and local ambitions to unlock proactive, efficient lung cancer care to drive better outcomes for patients.



# Co-designing excellence through experience and data

The Diagnostic and Treatment Centre for Lung Cancer at Wythenshawe Hospital has the following goals:

- Provide patient-centric and equitable care
- Improve patient waiting times
- Futureproof operations
- Expand research capabilities
- Achieve cost-efficiency

To achieve this vision, the facility and pathway design work of Siemens Healthineers Consulting needed to be data-driven and representative of the needs of both staff and patients.

Siemens Healthineers Consulting worked in tandem with all key stakeholders throughout the project. From workshops with staff and patients, through to simulation modelling, the breadth of insights gathered helped to forge a holistic redesign of care pathways and facilities.

## Partnering with people through experience-based design

Using an experience-based design process, the consulting team ran a total of 80 workshops with over 200 stakeholders.

Workshops were run with a wide breadth of roles, from nurses and surgeons to management and patient representatives. These workshops were run in four stages, spanning:

1. Voice of patient and voice of staff
2. Co-design for operations
3. Facility flow design
4. Pathway flow design

These sessions led to the generation of 140 inputs from both patients and staff; providing a valuable source of insight that helped to shape the design of the facilities and pathways.

Iterative CAD drawings of the facility based on the outputs from the workshops were produced by the in-house international design team at Siemens Healthineers to enhance visualisation.

By actively co-creating with both patients and staff across these sessions, the consulting team was able to reflect key challenges and opportunities in the existing facilities and departments for lung cancer care, including Radiology, Oncology, Surgery, Pathology and the North-West Lung Cancer Research Centre, into the new facility design.

To support the work of TORCH as a Centre of Excellence, the consulting team integrated research capability throughout the facility and patient pathway design. The team also helped to design world-class training facilities with cutting-edge technology, into the centre.

Drawing on connections in the wider medical technology industry, the consulting team were able to link the Diagnostic and Treatment Centre for Lung Cancer with trusted technology partners to inform and support a future-ready design, including facilities to adopt robotic surgery.

## Data-driven methods to prepare for the future

Simulation modelling, a process whereby software can model and predict outcomes related to service reconfiguration, was used to stress-test patient pathways, maximise cost-efficiencies and create optimal staffing models that can adapt to forecasted increases in demand over time.

To provide an additional perspective on what the facility will look like once built, the facility design team at Siemens Healthineers generated a 3D fly through of the facility for stakeholders.

# Trailblazing the future of lung cancer care

The Diagnostic and Treatment Centre for Lung Cancer at Wythenshawe Hospital will support local communities by providing a patient-centred, co-located model of care that strengthens the positive impact of the NHS Lung Cancer Screening Programme.

Once the centre is live, the consulting team's design of the facilities and pathways indicate the following potential outcomes*:

**Up to 296 more lives saved p/a -** linked to improvements in mortality and survivorship

**Over £4m in financial benefits** – including income uplift, productivity savings and capacity released for Wythenshawe Hospital

**Improved patient throughput -** uplift of 100% for PET-CT, 11% for MRI, 35% for CT & Biopsy

**Patient satisfaction –** co-design with patients & families helps to create an environment that enhances experience and care

**Reduced patient waiting times -** 94% waiting time reduction for RAPID diagnostic clinic, 20% reduction for surgery, 12% reduction for lung function testing

**Staff wellbeing -** co-location eliminates travel, while session over-run is removed by flow-based pathways; design significantly improves staff experience

**Figures are based on implementation of all improvements & recommendations when new buildings are fully operational*

## Value contribution

To facilitate a strong business case for the creation of the centre, and design future-proofed facilities and pathways, Siemens Healthineers Consulting has collaborated closely with all stakeholders to establish an experience-led design and actionable insights.

In turn, these insights have both bolstered future operational strategy and helped to shape a cutting edge-model that could be developed for other cancers and diseases.

By reducing diagnostic and treatment backlogs, the design of the centre will help reach local ambitions and national targets for lung cancer care. Meanwhile, improvements across throughput, waiting times, staff morale, and patient satisfaction, are achieved.

The integrated research capability across the facility supports the rapid adoption of best practice treatments, while helping to attract high quality candidates and retain existing employees.

# Conclusion

In Greater Manchester, where lung cancer is a key healthcare concern, unlocking better outcomes for patients relies on shifting stage diagnosis to overcome the disparity in outcomes between early and late-stage diagnosis.

While initiatives like the NHS Lung Cancer Screening Programme are fundamental to addressing this challenge, future success in lung cancer care is tied to both earlier diagnosis and efficient treatment pathways to drive better outcomes, faster.

The collaborative efforts of Wythenshawe Hospital, Manchester University NHS Foundation Trust, Greater Manchester Cancer Alliance, The Christie NHS Foundation Trust and Siemens Healthineers, have culminated in the design of the Diagnostic and Treatment Centre for Lung Cancer; a co-located centre that aims to redefine care standards.

The goals for this innovative centre – patient centric and equitable care, reduced waiting times, operational futureproofing, expanded research capabilities and cost-efficiency – are not just aspirations, but benchmarks that represent a paradigm shift in lung cancer care.

Driven by insights from diverse stakeholders, the facility and pathway design from Siemens Healthineers Consulting translates the potential behind current challenges and opportunities into a future-ready design.

Melding experience-based design processes and cutting-edge technology, along with demand capacity simulation modelling, the design of the Diagnostic and Treatment Centre for Lung Cancer has laid the foundations for a pioneering model of cancer care delivery.

*"The challenges of lung screening implementation taken together with the poor infrastructure and performance of the pathway mandate a significant change in the model of care. The 'centre' concept, driven by staff and patients, and facilitated by the superb team at Siemens Healthineers, is key to seeing the required impact on patient experience and aftercare."*

**Professor Richard Booton**
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