

Policy briefing: CT-first pathways for diagnosing lung disease

This policy briefing has been written by the CT scan and chest X-ray sub-group of the Taskforce for Lung Health's Diagnosis Working Group.

The purpose of this briefing is to:

- Outline the Taskforce's position on the use of CT-first pathways in diagnosing lung disease
- Make recommendations for improving rapid access to CT, based around patient need
- Provide an overview of the main issues with current models for diagnosing lung disease, from a patient perspective.

Overview:

Timely and accurate diagnosis is critical for people presenting with symptoms of lung disease. Diagnosing conditions at the earliest opportunity means that people get access to the best available treatments to manage their symptoms, cure or slow the progression of their disease. For lung diseases early diagnosis is essential for improving outcomes, but this is particularly critical for lung cancer and interstitial lung disease (ILD).

In order to improve the diagnosis of lung disease, the Taskforce for Lung Health has developed a [patient pathway](#) for use in primary care. At the core of this model is the principle that all patients with suspected lung disease must have access to the best available diagnostic tests, performed as quickly and efficiently as possible.

Respiratory symptoms for different conditions overlap and it is often not easy to reliably exclude diseases. For patients where lung cancer or ILD is suspected, or their symptoms do not fit into criteria for common lung conditions, their GP should be able to secure them a CT scan without the need for a chest X-ray first. This would be the best and most sensitive test available.

In the short term, we believe there is an immediate need to set a clear criteria for patients who should be referred through a CT-first pathway, alongside guidance and training for clinical teams. These criteria would triage patients based on factors such as smoking history, age and symptoms. However, there should be a long-term ambition for all respiratory patients who would benefit to have rapid access to CT scans. One in six people who die of lung cancer are never smokers, and because of this they face extreme challenges in securing a timely diagnosis.¹² By implementing a CT-first pathway for a clear set of patients, we will start to develop the evidence for extending CT-first for all patients with suspected lung disease who would benefit.

There is a wide range of evidence which support the use of CT-first pathways as best practice for improve timely and accurate diagnosis. However, in order to deliver this significant investment is required to appoint more specialist staff and purchase equipment, as highlighted within the Richards Review of diagnostics.³ Capacity is a huge issue and the Richards Review recommends CT scanning capacity should be expanded by 100% over the next five years to

meet increasing demand. This is essential and without investing significantly in hardware as well as radiographers and radiologists, we will not be able to sufficiently improve outcomes for people with respiratory disease. However, we believe that to ensure sustainability we should not just expand to meet current patterns of exponentially increasing work, but instead change referral patterns to use CT earlier in patient pathways.

Currently, the number of appointments, interactions with health services and other tests required before patients can receive an initial CT scan is inefficient and slows the process for everybody involved. For people who have a chest X-ray which fails to pick up their cancer or lung condition, the outcomes can be devastating. Ensuring rapid access to CT would streamline this process for patients by reducing the number of tests they need to have, save time attending hospitals, reduce overall time taken to get an accurate diagnosis, and potentially save the NHS costs in the long-term by reducing unnecessary tests and reducing late diagnosis.

The diagnosis pathway for patients must be streamlined and ensuring rapid access to CT scans is one part of this.

Summary of recommendations:

Implementing CT-first pathways

- Local pathways for diagnosing respiratory conditions should enable GPs to refer patients, within set criteria, through a CT-first pathway
- Guidance, training and support for GPs must all be put in place to aid referral practice, and funding should be made available for local implementation
- NHS England to invest in sufficient workforce and equipment in line with recommendations of the Richards Review of diagnostics.

Aligning clinical guidelines

- NICE to review the evidence behind CT-first approach for lung cancer and ensure its guidance for diagnosing lung cancer ([NG12](#)) facilitates CT-first pathways from primary care
- The National Optimal Lung Cancer Pathway should be amended to include guidance on appropriate models of CT-first pathways from primary care, and the optimal pathway should be adopted universally
- Clinical guidelines for diagnosing ILDs and bronchiectasis should be reviewed to consider CT-first pathways.

Building evidence

- NHS England to commission a review of the costs and cost-effectiveness of different CT-first pathways, including for suspected ILD, and include consideration of how the wider workforce could be impacted by increased diagnosis of different lung conditions.

Discussion:

We want all patients who need a diagnosis for suspected lung disease to quickly access the best diagnostic tests for them, including rapid access to CT scans. CT scans form part of clinical guidelines for the diagnosis of a variety of lung diseases, including lung cancer, idiopathic pulmonary fibrosis (IPF) and other forms of ILD, and bronchiectasis, but patients are usually referred for other tests before they are offered a CT scan.

We recognise there are a number of issues blocking rapid access to CT scans which must be addressed:

- Pathways for direct access to CT from general practice are generally not in place and, as a result, there's likely to be a lack of awareness and confidence within the workforce to make effective referrals
- There is hugely insufficient capacity in the imaging workforce to carry out and interpret scans, creating a pressure on current services
- Clinical guidelines for diagnosing lung cancer are inconsistent about straight to CT pathways
- Clinical guidelines for diagnosing other relevant lung conditions, in particular ILD and bronchiectasis, do not currently recommend straight to CT pathways

Below we discuss these areas and how the straight to CT approach fits with the current health policy landscape.

1. Sensitivity of CT scans compared to chest X-rays:

Chest X-ray is a first-line investigation for many suspected lung conditions. Although more accessible and cheap to do as a standalone test, chest X-rays are less sensitive than CT scans. Sending a symptomatic patient for a chest X-ray only to have to follow up with a CT scan is unnecessary duplication, more costly, and creates a delay in making the diagnosis. For patients, having to be sent back for additional tests can cause anxiety, takes up their time, impacting on things such as work and childcare, and in the worst situations outlined below, a falsely reassuring chest X-ray can leave them with undiagnosed lung disease.

CT scans for lung cancer:

There is a developing evidence base identifying the limitations of using chest X-rays to diagnose lung cancer.

A systematic review conducted in 2019 to review the sensitivity of chest X-rays found that while evidence is fairly limited, the highest quality-studies available suggest CXR only identifies approximately 77 - 80% of cases of lung cancer – and so misses 1 in 5 patients with lung cancer.⁴ The [Scottish Referral Guidelines for Suspected Cancer](#) states clearly that a normal

chest X-ray does not exclude a diagnosis of lung cancer, however there is no similar caution in NICE guidance.⁵

A recent publication concluded that chest X-ray is insufficient as a screening tool for lung cancer.⁶ They conducted a retrospective review of all lung cancers diagnosed at the trust between June 2018 and May 2019 and found a significant number of patients presenting with a 'normal' chest X-ray actually have advanced cancer at diagnosis. They also found that patients presenting with normal (CX1 code) or indeterminate (CX2 code) chest X-ray appearances went on to experience significant increases in overall time taken to diagnosis, time from the chest X-ray to CT request, and time from CT scan to diagnosis; when compared to patients presenting with CXRs with change highly suspicious for lung cancer (CX3). Their data shows that for these patients, having a chest X-ray first slowed their diagnosis.

The SUMMIT study, which is the largest lung cancer screening study of its kind in the UK, is examining the feasibility for detecting lung cancer earlier through large-scale national lung screening. Initial findings from the study where participants are given a CT scan show that 70% of growths detected in people's lungs were identified at stage one or two.⁷ Within the general population, around three-quarters of lung cancer cases are currently diagnosed at a late stage.⁸ The SUMMIT study will publish its final findings later in 2021.

CT scans for other lung conditions:

Rapid access to CT scans could also have significant benefits for diagnosing lung disease beyond lung cancer.

In order to confirm a diagnosis of bronchiectasis a CT scan is required.⁹ Patients with bronchiectasis do not get immediate access to a CT, despite a recognition in the British Thoracic Society (BTS) guideline that chest X-rays have limited sensitivity and specificity in diagnosing bronchiectasis – particularly in mild disease - and that a CT scan can additionally aid identification of the underlying causes of bronchiectasis.¹⁰

For patients who have ILD, chest X-rays may show an apparently normal radiograph, because the sensitivity for identifying the ILD through chest X-ray is 80% compared to 94% for high-resolution CT.¹¹ ILDs can be aggressive lung conditions which require urgent access to diagnostic tests, but Action for Pulmonary Fibrosis found many patients with IPF – the most common form of ILD – had to wait two years or more to receive a firm diagnosis.¹² The median survival rate for people with IPF in the UK is just 3 years from diagnosis.¹³

CT scans are necessary for diagnosing IPF, but the majority of patients seen in general practice will first be sent for a CXR to rule out other conditions before having a CT scan, slowing down the diagnostic process and increasing the overall number of tests the patient has to go through. Rapid access to CT for patients with suspected pulmonary fibrosis would allow patients to be seen by a multidisciplinary team more quickly which is necessary for diagnosis.

The BTS guideline for ILD explains that high resolution CT is valuable in detecting ILD in patients with a normal chest X-ray: 'Whether or not a patient with clinical features suggestive of

ILD has a normal or questionably abnormal chest radiograph, high-resolution CT has a valuable role in confirming or refuting the presence of ILD, particularly given the low false positive rate for high-resolution CT.' The guideline also states: 'High-resolution CT is significantly superior to chest radiography in identifying and determining the correct diagnosis of ILD and the optimal site of biopsy for patients requiring a tissue diagnosis. However, high-resolution CT interpretation is a specialised task and requires an understanding of the clinical and pathological aspects of ILD.

The reasons why chest X-rays remain the preferred diagnostic test are largely to do with perceived cost and capacity within imaging. It is essential to get an overview of the overall costs of different approaches. A review of the costs and cost-effectiveness of different diagnostic pathways should be done to make the business case for straight to CT alongside the effect on patient outcomes.

Recommendation: Local pathways for diagnosing respiratory conditions should enable GPs to refer patients, within set criteria, through a CT-first pathway

Recommendation: NHS England to commission a review of the costs and cost-effectiveness of different CT-first pathways, including for suspected ILD, and include consideration of how the wider workforce could be impacted by increased diagnosis of different lung conditions

Recommendation: Clinical guidelines for diagnosing ILDs and bronchiectasis should be reviewed to consider CT-first pathways.

2. Inconsistent clinical guidelines for diagnosing lung cancer:

Currently the majority of people seen at GP practices who have suspected lung cancer are sent for a chest X-ray, which is in line with current NICE guideline (NG12).¹⁴ NICE recommends when a person presents to their GP and lung cancer is suspected, GPs should use a suspected cancer pathway referral via a 2 week wait (2WW) referral. An urgent chest X-ray should be offered within the 2 weeks to check for lung cancer and mesothelioma.

The National Optimal Lung Cancer Pathway (NOLCP), produced by the Lung Clinical Expert Group established by NHS England in 2017, aims to diagnose patients more quickly and at an earlier stage.

NOLCP recommends that people with suspected lung cancer who are seen by their GP are referred for a chest X-ray, followed by a CT scan (either urgent or within 72 hours) if the chest X-ray is abnormal. It also facilitates access to CT for GPs to immediately flag when requesting a chest X-ray that a patient may need a CT scan, and this aims to speed up diagnostic process. Whilst we strongly recommend NOLCP is adopted universally, we believe the optimal pathway should provide a clearer pathway of straight to CT from general practice.

The NICE [2019 evidence review](#) for the NG12 guideline assessed one study into the use of low-dose CT scan in primary care (Guldbrandt LM et al. 2015), identifying no differences in terms of diagnosis stage and time to diagnose. However, low-dose CT scans were commonly mentioned as an area of interest by the experts involved in the NICE review and further evidence has since become available. We urge NICE to review this new evidence and consider how the guideline could align with NOLCP and review the benefits of CT-first.

We recognise that there will be an immediate need to agree the criteria to refer patients through a CT-first pathway. However, we strongly believe there should be a long-term ambition for all patients who would benefit to have rapid access to CT.

Recommendation: NICE to review the evidence behind CT-first approach for lung cancer and ensure its guidance for diagnosing lung cancer ([NG12](#)) facilitates CT-first pathways from primary care

Recommendation: The National Optimal Lung Cancer Pathway should be amended to include guidance on appropriate models of CT-first pathways from primary care, and the optimal pathway should be adopted universally.

3. Symptomatic vs non-symptomatic pathways:

Patients who are experiencing symptoms of lung disease are currently not getting access to the same tests as someone who lives in an area with a Targeted Lung Health Check programme, and this is both unfair and unclear to patients, and creates inequality.

NHS England are currently running the Targeted Lung Health Check programme. People living within the 14 pilot areas who are between the ages of 55-75 and have a history of smoking will be invited to attend a lung health check over the course of the programme, where those assessed as high-risk will be offered a low-dose CT scan.

Whereas patients who approach their GP with symptoms of lung cancer are likely offered a chest X-ray and a slower diagnosis, compared to those who do not have symptoms of lung disease, but live in an area with a lung health check, and get rapid access to a CT scan.

As the National Screening Committee hopefully move towards supporting a national programme for identifying lung cancer through the use of CT, it becomes increasingly untenable to maintain a pathway for patients with symptoms of lung cancer which is slower and less effective than for those with no symptoms.

COVID-19 has also likely exacerbated the existing health inequalities facing people with lung cancer. Early government advice to not seek non-urgent medical care, patient reluctance to seek medical attention, and an over-burdened health system has created a significant backlog in lung cancer diagnosis.¹⁵ Urgent referrals for lung cancer remain the most impacted amongst all cancers in England, and it's estimated the COVID-19 pandemic could lead to an additional 1,372 deaths due to lung cancer.¹⁶ There is an understandable focus on ensuring the full restart

of the Targeted Lung Health Check sites. But in light of COVID-19, access for patients experiencing symptoms must also be supported to meet this need.

How to deliver change for patients:

Our position on CT-first aligns with the current health policy landscape.

We've already outlined how implementation of an updated National Optimal Lung Cancer Pathway would facilitate rapid access to CT and reduce delays in diagnosis. NHS England's Long Term Plan similarly outlines the ambition to transform outcomes in the UK for people with lung disease to equal, or better, internal counterparts.¹⁷ Within the plan it's explained that the NHS will do more to detect and diagnose respiratory problems earlier. The implementation of NHS England's Targeted Lung Health Checks programme – another key commitment of the Long Term Plan - has shown how successful CT-first approaches can be, and has certainly increased interest in this area.

Our recommendations also align with the principles of the [Richards Review of Diagnostics](#). Professor Sir Mike Richards' independent review of diagnostic services commissioned by NHS England and published in November 2020 recommends the need for new diagnostic models, the need to make significant investment in imaging, and highlights that CT is essential for diagnosing lung cancer, ILD and bronchiectasis.

The Richards Review highlights a number of key recommendations and principles relevant for straight to CT:

- It highlights that major efficiency gains will be delivered through: bulk buying of imaging equipment; reduced installation costs in non-acute sites; avoidance of duplication of imaging between hospitals; reductions in outsourcing of image acquisition and reporting; efficiencies of patient throughput; skill-mix initiatives; and significant reduction in acute admissions and lengths of stay
- It calls for CT scanning capacity to be expanded by 100% over the next five years to meet increasing demand and to match other developed countries
- It recommends that regions should oversee work to complete the establishment of the imaging networks. One of the key drivers for imaging networks is to facilitate sharing of images between providers to avoid duplication and allow reporting to be done where there is spare capacity
- It also highlights that rapid access to CT scans and other diagnostic tests, and to their results, will be essential if the new 28-day Faster Diagnosis Standard is to be achieved for lung cancer

The government's recent spending review made a commitment of £325 million of new investment in NHS diagnostics equipment which could go some way to support these ambitions, but clarity is needed as to where this funding is going.

Recommendation: NHS England to invest in sufficient workforce and equipment in line with recommendations of the Richards Review of diagnostics.

Sub-group membership:

Name	Organisation/role representing
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Alison Cook	Taskforce for Lung Health
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Dr Vidan Masani	Royal United Hospitals Bath
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Dr Jonathan Rodrigues	British Society of Thoracic Imaging
Diana Ribeiro	Janssen

¹ Peake, M. et al, *Lung cancer in never-smokers: a hidden disease*. Journal of the Royal Society of Medicine. 2019. <https://journals.sagepub.com/doi/full/10.1177/0141076819843654>

² <https://www.theguardian.com/society/2021/may/02/gps-urged-to-be-more-alert-in-diagnosing-lung-cancer-in-non-smokers>

³ Professor Sir Mike Richards, DIAGNOSTICS: RECOVERY AND RENEWAL Report of the Independent Review of Diagnostic Services for NHS England. Available online at: <https://www.england.nhs.uk/wp-content/uploads/2020/11/diagnostics-recovery-and-renewal-independent-review-of-diagnostic-services-for-nhs-england-2.pdf>

⁴ Bradley, S., Abraham, S., Callister, M. et al. *Sensitivity of chest X-ray for detecting lung cancer in people presenting with symptoms: systematic review*. British Journal of General Practice. 2019. <https://pubmed.ncbi.nlm.nih.gov/31636130/>

⁵ www.cancerreferral.scot.nhs.uk/lung-cancer/?alttemplate=Guideline

BMJ Best Practice, Non-small cell lung cancer. <https://bestpractice.bmj.com/topics/en-gb/1082>

⁶ Eur Radiol. 2021 Jan 30. doi: 10.1007/s00330-021-07708-0 <https://pubmed.ncbi.nlm.nih.gov/33517491/>

⁷ <https://www.theguardian.com/society/2021/feb/14/ct-scan-catches-70-of-lung-cancers-at-early-stage-nhs-study-finds>

⁸ <https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/lung-cancer#heading-Zero>

⁹ <https://cks.nice.org.uk/topics/bronchiectasis/management/suspected-bronchiectasis/#management>

¹⁰ <https://www.brit-thoracic.org.uk/quality-improvement/guidelines/bronchiectasis-in-adults/>

¹¹ [BTS Guideline for Interstitial Lung Disease \(1\).pdf](#)

¹² Action for Pulmonary Fibrosis, Patient Survey Report 2018: giving patients a voice (2019)

¹³ NICE, Idiopathic pulmonary fibrosis in adults: diagnosis and management (CG163).

¹⁴ NICE guideline, <https://www.nice.org.uk/guidance/ng12>

¹⁵ [https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(20\)30388-0/fulltext](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(20)30388-0/fulltext)

¹⁶ <https://scienceblog.cancerresearchuk.org/2021/02/02/cancer-services-during-covid-19-40000-fewer-people-starting-treatment/>

[https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(20\)30691-4/fulltext](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(20)30691-4/fulltext)

¹⁷ <https://www.longtermplan.nhs.uk/online-version/chapter-3-further-progress-on-care-quality-and-outcomes/better-care-for-major-health-conditions/respiratory-disease/>