How do the UK's guidelines on imaging for suspected lung cancer compare with other countries?

INTRODUCTION

The disappointing performance of cancer outcomes compared with other high-income countries has been a focus of health policy in the UK for decades.[1] Lung cancer is the leading cause of cancer death both worldwide and in the UK. Although improvements have been achieved in recent years, with the UK 5-year net survival for lung cancer increasing from 7.2% (95% confidence interval [CI] = 7.0% to 7.3%) in the period 1995–1999 to 14.7% (95% CI = 14.5% to 15.0%) in the period 2010–2014, these remain the poorest outcomes among comparable countries studied in an International Cancer Benchmarking Partnership (ICBP) study.[2] Possible explanations for this disparity of the UK include adverse comorbidity and deprivation,[3] longer durations before which patients seek assessment for symptoms (patient interval),[4] and a greater reluctance among clinicians to organise investigations for symptoms.[5] An additional possible factor is lower availability of computed tomography (CT) and greater reliance on the less sensitive chest X-ray (CXR), which might contribute to later-stage diagnosis in the UK.[6,7]

Guidance from the National Institute for Health and Care Excellence (NICE) advises GPs to investigate all patients with potential lung cancer with a CXR,[8] other than those aged over 40 years with unexplained haemoptysis, for whom immediate referral on an urgent suspected cancer pathway is advised. In the UK, screening using CT to investigate asymptomatic patients aged 55–74 years identified as high risk because of smoking history has recently been approved by the National Screening Committee.[9] Some have questioned whether symptomatic patients should have to rely on CXR given that the test may not identify approximately 20% of lung cancers, and whether CT should be made available as a first-line test for those presenting with symptoms, as well as a screening test.[10,11]

> *"Some have questioned whether symptomatic patients should have to rely on CXR* [chest X-ray] *… and whether CT* [computed tomography] *should be made available as a first-line test for those presenting with symptoms, as well as a screening test."*

While we have a limited understanding of the performance of CT for detection of lung cancer in symptomatic patients compared with CXR,[12] this is known for asymptomatic populations from the National Lung Screening Trial. The trial demonstrated a sensitivity and specificity of 93.8% and 73.4%, respectively, for CT compared with 73.5% and 91.3% for CXR.[13] The performance of CT in symptomatic patients may differ from the screening context because of differences in lung cancer prevalence and severity of disease presentations. It should also be noted that these sensitivities were determined with reference to cancer diagnosis within 1 year. Therefore they could overestimate sensitivity, for example, if cancers were present at time of investigation but were not diagnosed within 1 year.

IS THE UK AN OUTLIER IN RELYING ON CXR?

We identified primary care guidelines on first-line investigation for suspected lung cancer with the help of colleagues worldwide and through guideline databases including the National Guideline Clearinghouse, Trip, and the World Health Organization (Table 1). Where possible we included guidelines from national bodies equivalent to NICE. Where none were identified, we included guidance from jurisdictions from within countries and guidance issued from primary care professional associations or consensus statements. Guidelines issued from April 2012 to April 2022 were considered.

The guidelines identified were remarkably consistent in advocating CXR as the initial investigation, aside from Danish guidance (Table 1). These included countries that utilise CT more readily than the UK, such as Australia and the US.[14]

Australian[15] and Canadian (British Columbia)[16] guidelines encourage immediate CT if there is a strong clinical suspicion of lung cancer. These guidelines, along with the US guidance,[17] also advocate follow-up investigation with CT if symptoms persist or are unexplained following the CXR. Australian and New Zealand guidelines also make provision for repeat CXR if symptoms persist, for example, beyond 6 weeks. Australian guidance in particular confers a great deal of autonomy to GPs in the selection of appropriate testing strategies based on clinical intuition that includes CT, and CXR with or without repeat imaging of either modality.

By contrast, NICE guidance, which pertains to England and Wales, does not outline further steps to be taken by GPs following an unremarkable CXR in the context of persistent or concerning symptoms. However, Scottish guidelines do advise that, *'Referral to the respiratory team is required if risk factors and symptoms raise the possibility of cancer even if the chest X-ray is normal.'*[18,19] A recent report has called for NICE to issue additional safety-netting advice to GPs that *'should make clearer what should be offered to patients who have ongoing, unexplained symptoms after a negative chest X-ray'*.[11]

None of the guidelines addressed how decisions about investigation for symptoms might, or should, be influenced by participation in lung cancer screening with CT. For example, if a patient has had a recent negative CT screen and subsequently

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Table 1. Summary of identified primary care guidance on initial investigation for suspected lung cancer[a]

Country (jurisdiction)	Guideline-issuing body	Guidance on initial investigation
Australia	Cancer Council Australia	Urgent CXR for unexplained, persistent symptoms and signs. If CXR is normal and symptoms persist, repeat CXR at 6 weeks. Offer CT if strong clinical suspicion of lung cancer to be completed within 2 weeks
Canada (British Columbia)	British Columbia Ministry of Health	Regardless of smoking history, arrange CXR for those with persistent, atypical, or otherwise unexplained cough or chest infection. If CXR is negative but symptoms persist, arrange CT. If there is *any* suspicion of a malignancy, arrange urgent CT
Canada (Ontario)	Cancer Care Ontario	CXR within 48 hours for all signs and symptoms causing suspicion of lung cancer. Refer for specialist consultation within 2 weeks along with CT chest (if available) for any of persistent haemoptysis, CXR findings suspicious for lung cancer, normal CXR but high suspicion of lung cancer based on clinical judgement
Denmark	Danish Lung Cancer Group	In those with smoking history aged >40 years with any listed symptoms/signs, consider CT chest and upper abdomen
New Zealand	Best Practice Advocacy Centre New Zealand	CXR, on same day if possible, for suspected lung cancer. Consider repeat CXR or referral for high-risk patients who have persistent symptoms or signs for >6 weeks even if initial CXR was normal. Arrange urgent referral to respiratory physician for persistent or unexplained haemoptysis in high-risk individuals aged >40 years and if there is a high clinical suspicion of cancer despite normal CXR
Republic of Ireland	Health Service Executive & National Cancer Control Programme	Arrange urgent CXR for patients with symptoms/signs suggestive of lung cancer and refer urgently those with haemoptysis, or other symptoms that are concerning or persistent, even if their CXR is normal
UK (England & Wales)	National Institute for Health and Care Excellence	Urgent referral (appointment within 2 weeks) for those aged >40 years with unexplained haemoptysis. CXR within 2 weeks in those aged >40 years with two listed symptoms, or one listed symptom in those who have smoked
UK (Scotland)	Scottish Intercollegiate Guidelines Network, Healthcare Improvement Scotland	A CXR should be performed on all patients being investigated for the possibility of lung cancer. Further investigation is recommended in patients with clinically suspected lung cancer even if the CXR is normal
US	American Academy of Family Physicians	Arrange blood tests (CBC, alkaline phosphatase, hepatic transaminase, calcium levels, electrolytes, urea and creatinine) and CXR. Normal findings on CXR do not rule out lung cancer. If suspicion remains high because a likely alternative diagnosis is not identified on the CXR, arrange CT

[a]A more comprehensive version of this table is available: https://osf.io/j9xav. This table is not suitable to inform clinical practice. CBC = complete blood count. CT = computed tomography. CXR = chest X-ray.

develops symptoms, how long, if at all, should a clinician wait until organising repeated investigation and with which modality?

CONCLUSION

Despite concerns that the UK strategy for symptomatic detection of lung cancer is excessively reliant on CXR, there is a remarkable degree of concordance in guidelines internationally. While guidelines are one factor informing practice, adherence is likely to vary within and between jurisdictions. The responsibility of GPs to exercise their own clinical judgement in addition to the result of CXR is explicitly referenced in several guidelines. Which presentations should provoke a high suspicion of lung cancer, aside from patients with haemoptysis, is not precisely defined within any of the guidelines identified. Deploying clinical intuition to identify those patients who warrant additional investigation is a core competency of GPs that cannot be replaced by protocols or algorithms. However, the challenge this presents is arguably greater in settings where access to CT is limited, thereby demanding careful stewardship of available radiology resource.

Although there is a surprising degree of consistency in the initial imaging recommended in the guidelines identified, it is likely the availability of CT affects investigation practice. Countries with fewer resource constraints, and with the ability to request investigations directly, permit GPs in those settings to undertake more liberal imaging strategies, in contrast to the UK where access is much more limited.

It is plausible that the propensity of doctors to arrange imaging for patients with possible lung cancer symptoms could affect outcomes. While no such evidence to our knowledge is available regarding CT, there is an equivocal evidence base with respect to CXR. O'Dowd *et al* found practices that used CXR most frequently had higher risk of death within 90 days of lung cancer diagnosis, while Kennedy *et al* did observe a beneficial stage shift corresponding to a symptom awareness campaign that led to increased utilisation of CXRs.[20,21] If increased CXR utilisation could help expedite lung cancer diagnosis, the success of such a strategy would require those tested to have some degree of risk, as manifested by symptoms, rather than being deployed indiscriminately.

The implementation of lung cancer screening in several countries, including the UK, will lead to earlier detection for some patients. However, it is crucial that patients and GPs recognise that asymptomatic screening will not lessen the need for prompt investigations to be arranged for those with symptoms. Even where screening programmes have been introduced, the majority of diagnoses are likely to continue to follow symptomatic

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presentation. This is because a large proportion of those with the disease would not have been eligible for screening, and only around half of those who are eligible participate in screening.[22,23]

The extent to which alternatives to CXR, such as CT, are accessible to GPs is likely to be a crucial determinant of the extent to which these are used. Whether the wider use of CT in symptomatic patients will yield sufficient benefits in terms of earlier diagnoses to offset the potential harms, such as overdiagnosis, and whether such policies would prove cost-effective remain unknown. This is an important policy question that warrants exploration in a clinical trial in symptomatic populations with comprehensive health economic analysis.

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