The Health Policy Partnership

[research, people, action]

Lung cancer screening

Building resilience and sustainability of healthcare systems

March 2021

This case study was developed by The Health Policy Partnership. It is endorsed by the Lung Ambition Alliance and the International Association for the Study of Lung Cancer.

The LungAmbition Alliance

IASLC INTERNATIONAL ASSOCIATION FOR THE STUDY OF LUNG CANCER

Contents

Introduction

In 2013, in the wake of the first UN Global Summit on Non-Communicable Diseases, governments around the world committed to reducing premature mortality due to non-communicable diseases (NCDs) by one third by 2030. This goal was later integrated into the UN Agenda for Sustainable Development, with Sustainable Development Goal 3.4 focused on reducing mortality from NCDs.[1]

Reducing the burden of cancer is an essential pillar of achieving this goal. Cancer accounts for one in every six deaths globally and for one third of all premature deaths due to NCDs in people aged 30 to 69.[2] In 2017, governments marked their commitment to accelerating action on cancer by adopting the World Health Assembly resolution WHA70.12.[2] Many governments, as well as the European Mission on Cancer, have set themselves a target of reducing cancer deaths by one third by 2030.[2-5]

Yet despite these commitments, only 12 countries around the world are currently on track to achieving this target[2] – and disruptions in cancer care during the COVID-19 pandemic may have further stalled progress.[6]

Apart from prevention, early detection presents the greatest opportunity to reduce premature mortality from cancer. Early detection allows clinicians to identify cancer at an early stage, before it has spread through the body and when effective treatment is still possible. Not only does this reduce patients' risk of death and poor quality of life, but it also significantly lowers healthcare costs.[1 7-10]

This case study looks at early detection of lung cancer, with a focus on screening, as an important example of how to build resilience and sustainability in our future healthcare systems. It presents key considerations for countries on how to prepare their healthcare systems for the successful implementation of lung cancer screening programmes at scale and prevent disruptions in the event of another crisis or public health emergency.[6]

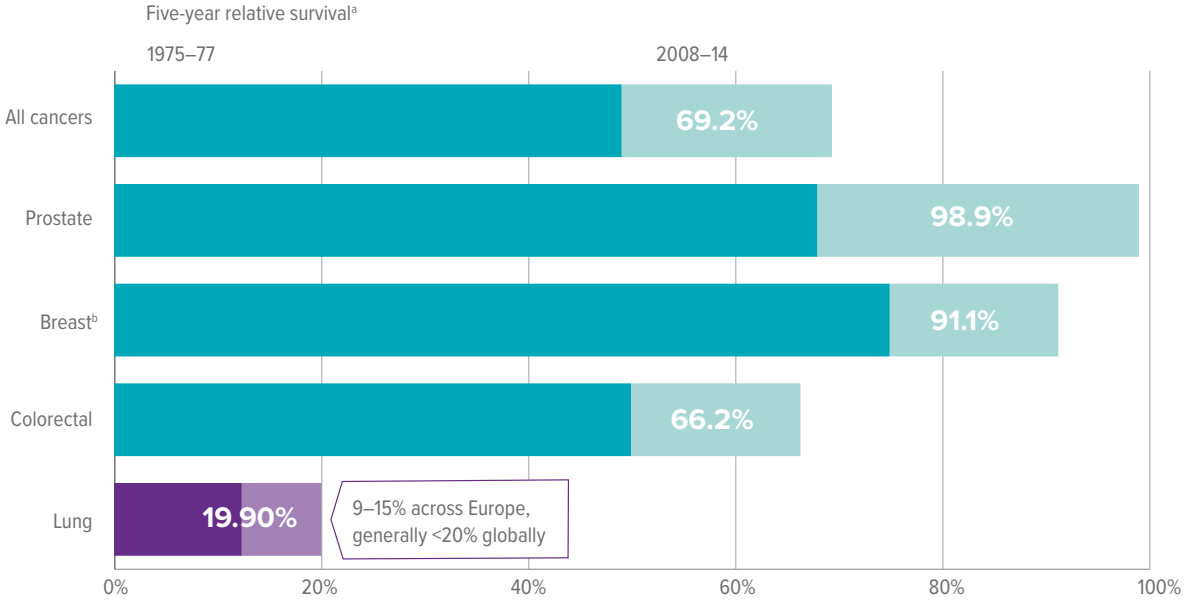
Lung cancer: the potential of early detection

Poor prognosis compared with other cancers

Lung cancer is the leading cause of cancer deaths worldwide, but, historically, it has received less political attention than other common cancers. Trends in incidence and mortality vary between countries, but globally lung cancer is the most common type of cancer and it is responsible for one in every five deaths from cancer.[11] Therefore, any ambitions to reduce cancer deaths should include specific plans related to lung cancer.

The past few years have seen considerable advances in treatment options for lung cancer, yet prognosis remains very poor.[12] Fewer than 20% of people with lung cancer survive up to five years after diagnosis, compared with over 90% of people diagnosed with breast cancer (**Figure 1**).[13]

Figure 1. Five-year relative survival for common cancers over the past 30 years (US data)[13]



a. Five-year relative survival rates show the percentage of people who will be alive five years after diagnosis. They do not include people who die from other diseases (Cancer.net). Relative survival rates account for the fact that not all people diagnosed with a certain cancer type will die of that cancer.
b. Women only.

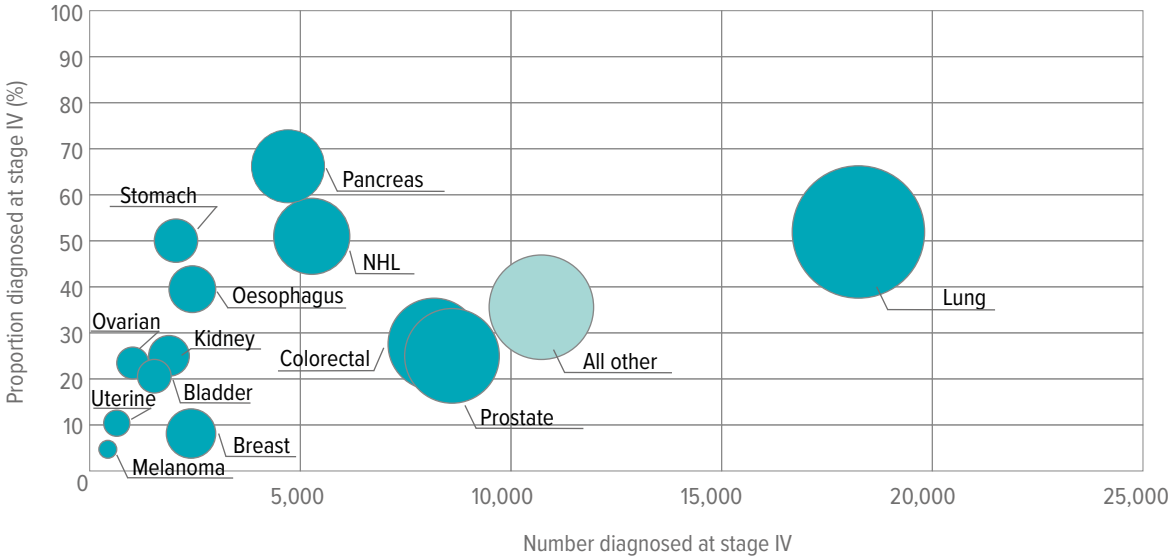
Source: Zappa and Mousa 2016. Data from https://seer.cancer.gov

One of the main reasons for poor prognosis is that a large proportion of lung cancer cases is detected at an advanced stage, when treatment options are limited. Prognosis for lung cancer is highly dependent on the stage at which the illness is diagnosed. A person diagnosed with stage IV lung cancer has a 15% chance of surviving one year, compared with 68–80% if detected at stage I.[14]

Delays in diagnosis of lung cancer may occur due to a combination of factors. Symptoms may be difficult to recognise for individuals, and people may only present to their physician once the disease has progressed. Similarly, primary care physicians may not recognise symptoms of lung cancer; by the time an accurate diagnosis is made, patients may no longer be eligible for effective treatments.

Achieving earlier detection of lung cancer could thus significantly reduce mortality rates, effectively shifting it from an incurable to a curable condition. And because it is so common, any reduction in lung cancer deaths will have a significant impact on decreasing the number of deaths from cancer as a whole (**Figure 2**).

Figure 2. Number and proportion of cancer cases diagnosed at stage IV, England (2017 data)[15]



NHL, non-Hodgkin's lymphoma. The size of the circles shows the relative weight of each cancer type in terms of its contribution to the total number of cancers detected at advanced stage.

Figure reproduced with permission of the United Kingdom Lung Cancer Coalition (UKLCC).

It is also important to recognise that the past decade has seen important progress in treatment options for lung cancer patients. A better understanding of the biological and genetic basis for lung cancer has led to advances in diagnosis, which have been matched with the development of targeted therapies with demonstrated effectiveness. Therefore, if treated early, people with lung cancer can access an increased array of treatment options and have better chances of survival.

Possible approaches to early detection in lung cancer

Over the past few years, several countries have tried to identify effective ways to achieve early detection of cancers. This has included both early diagnosis of individuals who present with symptoms and screening of asymptomatic individuals.[10]

Early diagnosis

To address the risk of diagnostic delays, many countries have implemented specific pathways to achieve a rapid diagnosis of lung cancer. These include:

- **rapid referral pathways** to ensure patients who present to their primary care physician with possible lung cancer symptoms are referred to a specialist as quickly as possible.[16-18] Such pathways have been implemented in Australia, Canada, Denmark, Norway, Sweden and the UK.
- **incidental nodule protocols** for any suspicious lung nodules that are inadvertently detected through chest X-rays or imaging done for other reasons (e.g. screening for pneumonia).[19-22] These ensure patients are rapidly referred for diagnosis by a multidisciplinary team that includes a cancer specialist.

Screening

Given its prevalence, there have been multiple efforts to identify an effective screening tool for lung cancer. At present, the only approach which has demonstrated statistically significant benefits in large-scale, international clinical trials is low-dose computer tomography (LDCT) scans given to former or current heavy smokers.[23 24]

This approach is described in more detail in the next section.

Lung cancer screening

The role of smoking in causing lung cancer is well understood, and smoking cessation clinics play an important role in reducing smoking rates. However, approximately half of lung cancer cases occur in former heavy smokers,[25] whose risk of lung cancer remains four times higher than among people who have never smoked for up to 25 years after they have stopped smoking.[26] Targeting screening is needed in this population to reduce their risk of lung cancer through early detection. In current smokers, the roles of screening and smoking cessation are complementary, and all people invited to participate in lung cancer screening should be offered smoking cessation advice and encouraged to quit smoking.

Evidence demonstrating the effectiveness of targeted screening using LDCT scans in former and current heavy smokers has grown over the years. In 2011, the US-based National Lung Screening Trial (NLST) found that three annual LDCT screenings reduced lung-cancer-related mortality by 20% compared with screening using chest radiography.[27] Almost 53,500 high-risk individuals participated in the study. In response to the NLST, the US Preventive Services Task Force recommended that health services annually screen people aged 55 to 80 who are current or former heavy smokers. A national lung cancer screening programme was subsequently implemented in 2013, and the target age of participants expanded to include those aged 50 to 80.[28] However, current uptake of the programme remains very low, at approximately 6%. Pilot lung cancer screening programmes exist in a number of countries including Australia, Canada, Estonia, France, Italy, Japan, Poland, South Korea, Spain, Sweden and the UK, and nationwide programmes are being implemented in Croatia and elsewhere.

The evidence supporting lung cancer screening reached a turning point in early 2020, with the publication of the NELSON trial. NELSON (Nederlands Leuven Longkanker Screenings Onderzoek) was a randomised controlled trial to assess the 10-year impact of LDCT screening on 15,792 high-risk individuals.[24] It found a 24% relative reduction in mortality from lung cancer among men and a 33% relative reduction among women, although the latter difference was not statistically significant. The study also confirmed that screening can lead to much earlier detection: 58.6% of lung cancer cases detected in participants were in early stages (stage IA or IB) compared with 13.5% of those detected in the control group. Importantly, the number of false positives associated with screening was very low (1.2%), as was the number of unnecessary investigations.[24]

The strength of this updated evidence has led many experts to suggest that the case for governments to invest in targeted lung cancer screening programmes of high-risk populations is now indisputable.[29] Some even suggest that such screening could have a larger absolute benefit in terms of reduced cancer mortality than existing mass screening programmes for breast or cervical cancer.[29]

The challenge for governments is now to determine the most effective and cost-effective way of implementing high-quality targeted screening programmes in their national contexts.[19] An important first step is to identify the most appropriate risk prediction tools to select high-risk individuals to participate, and secure their attendance.[19 30] Other considerations include having the appropriate infrastructure, health information systems and workforce to be able to offer LDCT screening at scale.[19 30] Finally, screening programmes will only be effective if people are referred to high-quality lung cancer care pathways, where they receive comprehensive diagnosis and timely treatment[15] with input from a multidisciplinary team.[19]

Building resilience and sustainability in lung cancer screening and early detection: what does it mean?

The COVID-19 pandemic has had a dramatic impact on the early detection of lung and other cancers. In the first few months of the pandemic, screening programmes in many countries were suspended, diagnostic tests and procedures deferred and only the people with the most urgent symptoms were referred for diagnostic investigation. The ensuing delays in diagnosis have led to a high number of avoidable cancer deaths. A study in England estimated that these delays will lead to a 4.8–5.3% increase in avoidable lung cancer deaths over the next five years.[31] Even as healthcare systems emerge from 'crisis mode', they face a significant backlog of cases, which may further delay return to normal service levels.

Looking to the future, it will be vital to ensure lung cancer screening and early diagnosis pathways are protected from the impact of another public health crisis. There is also an important opportunity to create the ideal conditions for screening programmes to be as effective and cost-effective as possible,[6] thereby ensuring their sustainability.

This section builds on existing recommendations and reflections on the implementation of lung cancer screening[19 32 33] to offer a perspective on areas that will play a key role in ensuring the sustainability of lung cancer screening programmes.

Health system governance

Lung cancer screening programmes should be clearly inscribed within an overarching, national-level plan aiming to improve outcomes for lung cancer. This implies that a dedicated strategy for lung cancer is in place, which should outline measurable goals as well as a commitment to improve the entire lung cancer care pathway and enable early detection through screening as well as rapid diagnostic pathways. Screening programmes should also be built into existing public health priorities, particularly smoking cessation programmes, with close coordination between them.

A standardised national screening protocol and evaluation system should be put in place to ensure consistent quality of screening across different localised programmes. While local screening programmes need to adapt to local resources and circumstances in order to be effective, they all need to meet minimum essential requirements for coverage rates, quality of CT scans and follow-up protocols. A national coordination unit is needed. This should not solely serve as a monitoring and evaluation centre, but also provide opportunities for exchange of good practice and training between local screening programmes. Clear lines of accountability are needed between national and local structures as well.

Information systems

A key success factor for lung cancer screening programmes is securing high levels of attendance, and this hinges on having a reliable database of the entire population that includes smoking history. In most countries, there is no such database, so linkages between existing databases (e.g. GP registries, electronic health records, sickness fund members' data) may be needed. Solutions will depend on the information systems in each country. Interoperability of data systems, data privacy and governance issues will be important considerations in finding a viable approach.

High-quality cancer registries that allow monitoring of screening outcomes are also necessary. Such registries should record incidence, stage at diagnosis, recurrence and mortality of all lung cancer cases, and be linked to screening records. This will help to determine the impact of screening on achieving earlier detection and reducing lung cancer mortality.

Health system financing

A ring-fenced budget for screening is needed, based on a comprehensive evaluation of the total costs of implementation. The possible impact of COVID-19 on health budgets needs to be considered, and appropriate funding earmarked, to protect the continuity of screening, diagnosis and care services for lung cancer, taking a multi-year view.

Budgeting for screening should be based on a comprehensive evaluation of all components of screening programmes. This includes workforce needs, costs for coordination centres, information systems, training, quality assurance and patient information. Adequate resourcing of the entire lung cancer care pathway and smoking cessation services should be looked at in tandem, with careful consideration of the impact of any funding or resourcing gaps on the feasibility and sustainability of screening programmes. At the same time, it is important to carefully monitor the potentially positive impact of screening on reducing the overall costs of care for lung cancer through early detection.

Alternative sources of funding should also be considered for screening programmes. Some countries, for example, have looked at funding screening through increases in the price of cigarettes or direct contributions from the tobacco industry. The sustainability of such funding mechanisms should be assessed (e.g. in light of possible fall in smoking rates) and funding from multiple sources encouraged.

Workforce

Careful workforce planning is needed to deliver sustainable LDCT screening. In some countries, capacity to deliver the additional number of CT scans needed for screening must be created. It is currently recommended that, ideally, LDCT screening should be carried out in centres of excellence, but their availability varies between countries and a decentralised approach may in some instances be more feasible. Engagement of primary care physicians is also essential.

Service delivery

For screening to be effective, improvements are needed across the entire lung cancer care pathway. Clear protocols should be in place to refer all screening participants who have a suspicious lung nodule to multidisciplinary care teams. Early detection of lung cancer outside of screening programmes will also need to be strengthened to identify cases in people who fall outside of screening criteria (e.g. people who have never smoked). For example, all people who have a suspicious lung nodule detected incidentally as a result of a CT or chest X-ray for other respiratory conditions should be referred to a multidisciplinary care team that includes a lung cancer specialist.

Political support and public acceptability

A final consideration is the need to create political will and public support for lung cancer screening. Reducing mortality from lung cancer needs to be seen as a public health priority, and stigma surrounding lung cancer needs to be addressed through public awareness campaigns. Partnerships between the government, professional societies and civic society are crucial to convey the importance of early detection of lung cancer as a public health priority, and the role of screening within this. Such initiatives are likely to also help bolster receptiveness to screening in target populations and increase attendance rates.

Conclusion

Investment in targeted lung cancer screening programmes, coupled with fully integrated, multidisciplinary care pathways, presents a unique opportunity to shift the detection of lung cancer to an earlier stage and transform outcomes for millions of people worldwide. In light of the bitter lessons from COVID-19, we have a unique opportunity to do this right. We should take a long-term view, pre-empting possible challenges in implementation and building sustainable, highly effective screening programmes. The onus is now on policymakers, working closely with all relevant stakeholders, to join forces to make this a reality.

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We welcome any questions or comments about the issues raised here. Please email Suzanne Wait at **suzanne.wait@hpolicy.com**

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