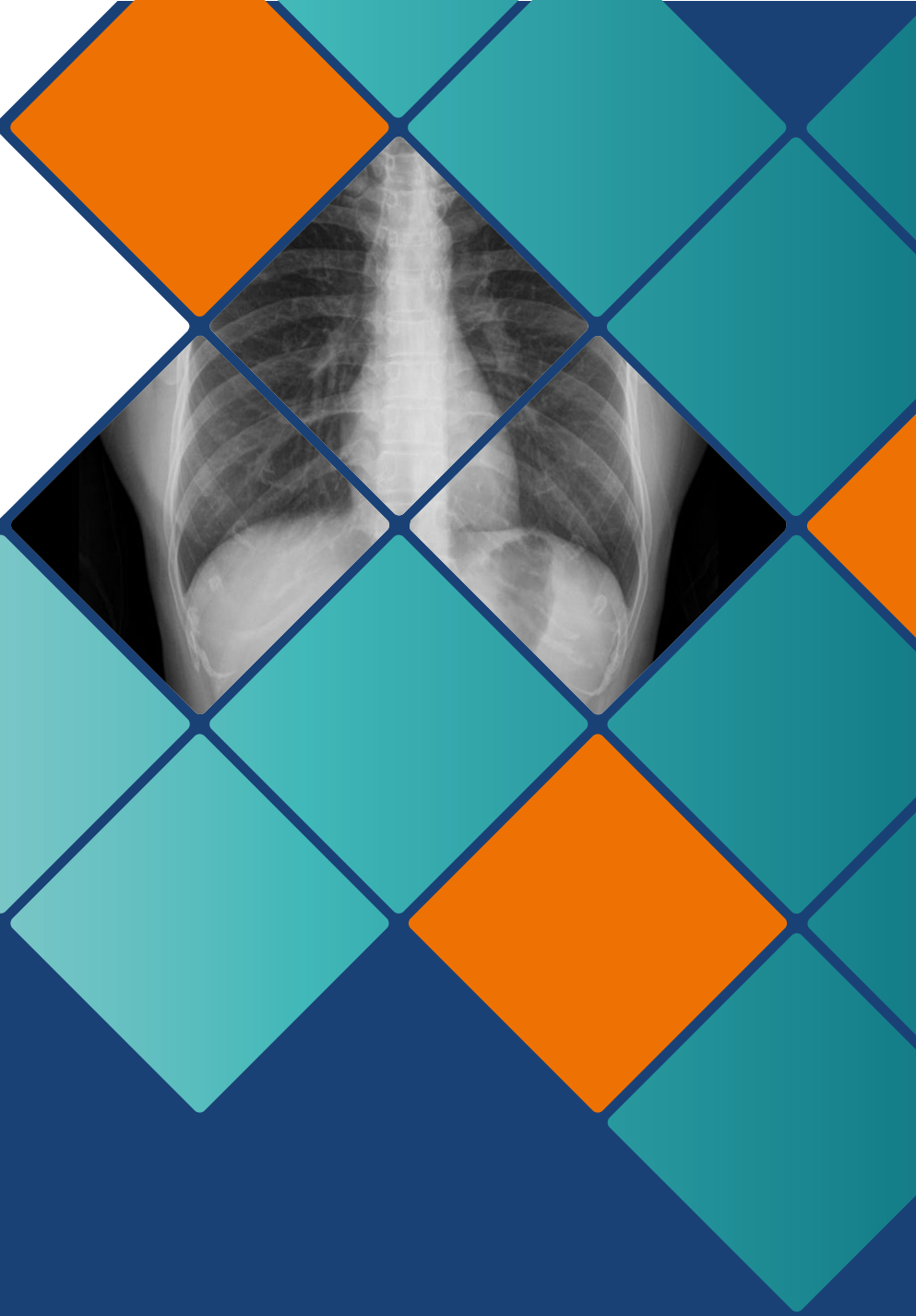




HEALTHCARE SAFETY
INVESTIGATION BRANCH



Summary

Missed detection of lung cancer on chest X-rays of patients being seen in primary care

Independent report by the
Healthcare Safety Investigation Branch NI-000836

October 2021

Providing feedback and comment on HSIB reports

At the Healthcare Safety Investigation Branch (HSIB) we welcome feedback on our investigation reports. The best way to share your views and comments is to email us at enquiries@hsib.org.uk or complete our online feedback form at www.hsib.org.uk/tell-us-what-you-think.

We aim to provide a response to all correspondence within five working days.

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About HSIB

We conduct independent investigations of patient safety concerns in NHS-funded care across England. Most harm in healthcare results from problems within the systems and processes that determine how care is delivered. Our investigations identify the contributory factors that have led to harm or the potential for harm to patients. The safety recommendations we make aim to improve healthcare systems and processes, to reduce risk and improve safety.

We work closely with patients, families and healthcare staff affected by patient safety incidents, and we never attribute blame or liability.

Considerations in light of coronavirus (COVID-19)

We have adapted some of our national investigations, reports and processes to reflect the impact that COVID-19 has had on our organisation as well as the healthcare system across England. For this report, the way we engaged with staff was revised.

A note of acknowledgement

We would like to thank Tracey whose experience is central to this investigation. Tracey was open with the investigation about what had happened and her reflections on what might have made a difference. Information shared by Tracey helped to inform the investigation and provided invaluable insight into the impact of such incidents. Tracey hopes her story might promote change.

In accordance with her wishes, Tracey is referred to by name throughout this report.

We also thank the healthcare staff and subject matter advisors who gave their time to provide us with information and expertise which contributed towards this report, and the stakeholder organisations and professional bodies who supported the investigation.

About Tracey

There is a little plaque on the windowsill in Tracey's house that says 'I can do anything, but not everything'. It is not true. Tracey does everything. She is the full-time carer for two family members, she is actively involved with a lung cancer support group, she has lots (and lots and lots) of friends and groups that she meets regularly and goes on holidays with most years. And then there are the three dogs, monster cat, two guinea pigs and a tortoise. And the plan for a camper van for adventures ahead. So, Tracey is a busy - very busy - person. She is also courageous, kind, optimistic and you will usually find her laughing. Her view on life? "You've got to be positive."

About this report

This report is intended for healthcare organisations, policymakers and the public to help improve patient safety in relation to the delayed diagnosis of lung cancer.

Our investigations

Our investigators and analysts have diverse experience of healthcare and other safety-critical industries and are trained in human factors and safety science. We consult widely in England and internationally to ensure that our work is informed by appropriate clinical and other relevant expertise.

We undertake patient safety investigations through two programmes:

National investigations

Concerns about patient safety in any area of NHS-funded healthcare in England can be referred to us by any person, group or organisation. We review these concerns against our investigation criteria to decide whether to conduct a national investigation. National investigation reports are published on our website and include safety recommendations for specific organisations. These organisations are requested to respond to our safety recommendations within 90 days, and we publish their responses on our **website**.

Maternity investigations

We investigate incidents in NHS maternity services that meet criteria set out within one of the following national maternity healthcare programmes:

- Royal College of Obstetricians and Gynaecologists' 'Each Baby Counts' report
- MBRRACE-UK 'Saving Lives, Improving Mothers' Care' report.

Incidents are referred to us by the NHS trust where the incident took place, and, where an incident meets the criteria, our investigation replaces the trust's own local investigation. Our investigation report is shared with the family and trust, and the trust is responsible for carrying out any safety recommendations made in the report.

In addition, we identify and examine recurring themes that arise from trust-level investigations in order to make safety recommendations to local and national organisations for system-level improvements in maternity services.

For full information on our national and maternity investigations please **visit our website**.

Executive Summary

Background

This investigation explores the issues contributing to delayed diagnosis of lung cancer. Specifically, it explores delays resulting from missed detection of possible lung cancer on chest X-rays of patients being seen in primary care.

As an example, which is referred to as 'the reference event', the investigation considered the experience of Tracey, who saw her GP on multiple occasions with respiratory symptoms over the course of a year. Tracey had three chest X-rays during this time which did not identify a possible lung cancer.

The investigation's findings, safety recommendations and safety observation aim to facilitate the timely diagnosis of lung cancer and so improve care for patients across the NHS. Some of the findings and conclusions may also be applicable to other cancers and conditions

The reference event

Tracey contacted her general practice with symptoms of cough and shortness of breath which she had had for several months. She was initially prescribed antibiotics by a nurse practitioner for a presumed chest infection.

As Tracey's symptoms did not improve, she saw a GP who referred her for a chest X-ray. This X-ray, and a subsequent one, did not identify a possible lung cancer. Tracey was at low risk of lung cancer as she was 49 years old and had never smoked. Over the next 7 months, Tracey was seen at the GP practice on multiple occasions with an ongoing cough and shortness of breath without a cause being identified.

Nine months after Tracey's first visit to the practice with respiratory symptoms, she saw a GP because she was experiencing central chest pain in addition to her worsening breathlessness. The GP referred Tracey to the emergency department and ordered an urgent CT scan. Tracey had a chest X-ray in the emergency department; the report on this X-ray did not identify a possible lung cancer. The CT scan performed a few days later identified likely lung cancer which appeared to have spread throughout Tracey's lungs.

The respiratory consultant who saw Tracey to discuss her diagnosis was open about the fact that findings on the previous X-rays suggested that cancer may have been present but that this was not identified. The consultant referred the matter as a patient safety incident requiring investigation.

Tracey was referred to the oncology team (specialist cancer team) and, after further tests, began drug treatment for her cancer.

The national investigation

Delayed diagnosis of lung cancer is a nationally recognised patient safety risk. HSIB contacted the hospital where the reference event occurred. The Trust welcomed HSIB's involvement and collaborated with information gathering. After initial information had been gathered and evaluated against a set of patient safety risk criteria, HSIB's Chief Investigator authorised a national safety investigation.

Findings

- Lung cancer in people who have never smoked is increasing.
- Media messaging highlighting the close link between lung cancer and smoking, and the often non-specific symptoms of lung cancer, have created a significant diagnostic challenge for GPs.
- A chest X-ray is the recommended first test to assess whether a patient may have lung cancer. Chest X-rays are difficult to interpret and about one in five cancers are missed. A chest X-ray report that does not identify cancer has the potential to falsely reassure GPs.
- Evidence indicates that it may be beneficial to amend the safety netting advice for healthcare professionals in the National Institute for Health and Care Excellence guidance. In this context, safety netting advice refers to advice given to healthcare professionals on the precautionary measures they should take to mitigate the risk of missed diagnosis. The amended advice should make clearer what should be offered to patients who have ongoing, unexplained symptoms after a negative chest X-ray.
- CT scanning is a more accurate test to diagnose lung cancer and is used more widely in other developed countries which have better cancer survival rates. There is national recognition that major investment is needed in CT scanning equipment and workforce to perform and report scans.
- Using low-dose CT (a scan that exposes a patient to a smaller amount of radiation compared to conventional CT) to screen people at high risk of lung cancer, such as current or past smokers, has been shown to be beneficial. There is no significant evidence, and differing opinion, as to whether low-dose CT should replace chest X-ray as the first-line diagnostic test to assess for lung cancer in patients seeing their GP with non-specific symptoms. Research is needed to determine the clinical and cost-effectiveness of this.

- An increasing number of artificial intelligence products are being marketed to aid the detection of lung disease including cancer. There is variable testing and evaluation of these products.
- Expertise is an important factor in mitigating the risk of missed cancer on chest X-rays. There are educational platforms that can help the healthcare staff who review and interpret X-rays to develop their skills and assess their own performance. These may be helpful to assure quality and contribute to ongoing professional development.

HSIB makes the following safety recommendations

Safety recommendation R/2021/152:

HSIB recommends that NHS England and NHS Improvement works with research partners to explore options for commissioning research to address whether low-dose computed tomography (CT) is clinically and cost-effective for the diagnosis of lung cancer in symptomatic patients seen in primary care compared to chest X-ray.

Safety recommendation R/2021/153:

HSIB recommends that the National Institute for Health and Care Excellence reviews its current safety netting advice to healthcare professionals with respect to the investigation of possible lung cancer. The wording of the advice should be amended as required to make it clearer what should be offered to patients with ongoing, unexplained symptoms who have had a negative chest X-ray.

Safety recommendation R/2021/154:

HSIB recommends that NHSX, in collaboration with relevant stakeholders such as The Royal College of Radiologists and The Society and College of Radiographers, develops guidance to support independent benchmarking and validation of artificial intelligence algorithms for the identification of lung diseases such as cancer.

HSIB makes the following safety observation

Safety observation O/2021/129:

It may be beneficial if existing educational platforms were used to support healthcare staff who report on chest X-rays with their ongoing professional development and demonstration of the clinical quality of their work.



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Further information

More information about HSIB – including its team, investigations and history – is available at www.hsib.org.uk

If you would like to request an investigation then please read our **guidance** before contacting us.

 [@hsib_org](https://twitter.com/hsib_org) is our Twitter handle. We use this feed to raise awareness of our work and to direct followers to our publications, news and events.

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