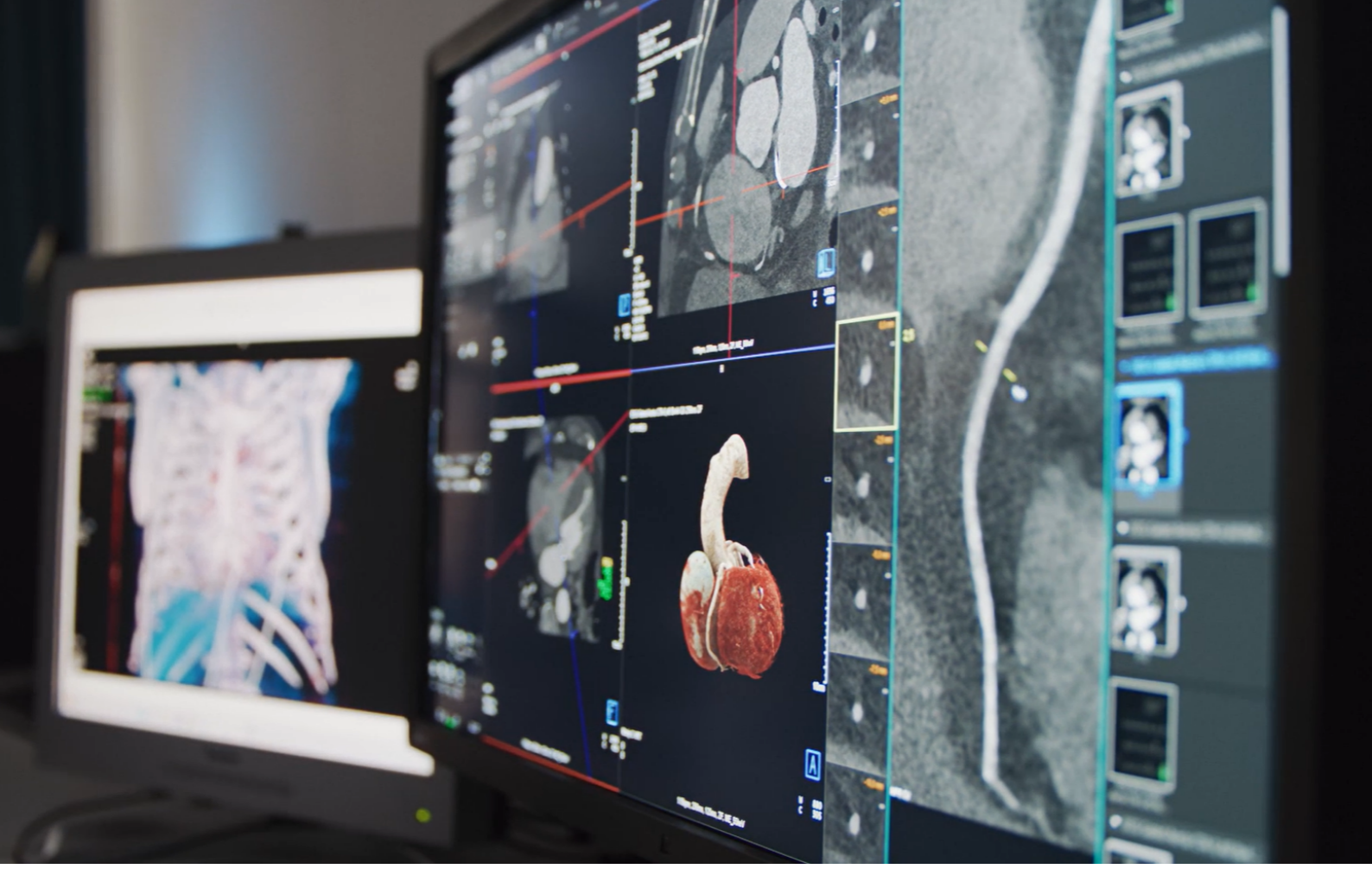

# Improving CVD mortality rates with a CT-first approach

## UK statistics at the ICB level

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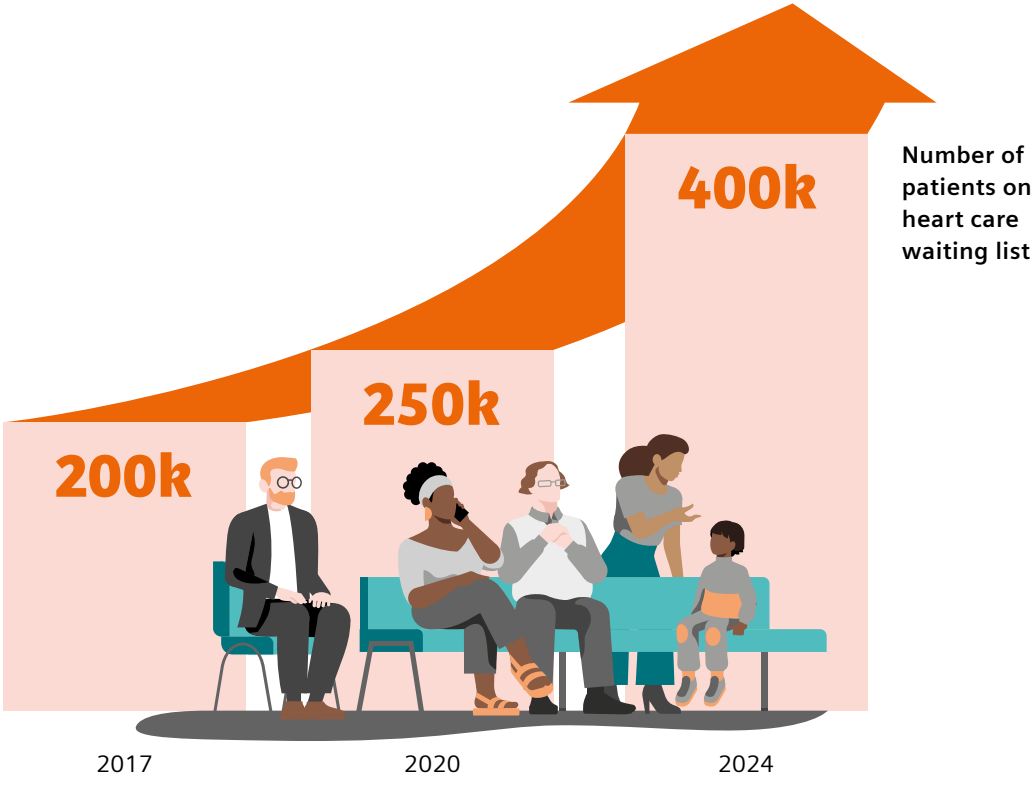
# Cath labs under strain

The catheterisation laboratory (cath lab) is central to diagnosing and treating coronary artery disease (CAD). As the core hub of CAD management, efficient cath lab utilisation is critical to ensuring timely, high-quality care and optimising patient outcomes.

According to NHS England, over 425,000 patients are currently awaiting essential cardiovascular care.[1] A major contributor to this backlog is that much of cath lab activity remains diagnostic, limiting access for patients who truly require revascularisation or structural interventions. Waiting times for elective cardiovascular procedures have increased substantially in recent years. Compared to 2019/20, the average wait has risen by nearly three weeks, with some patients waiting even longer depending on location and case complexity.[2] This raises an important question: can the CT-first model serve as an alternative diagnostic pathway to help relieve pressure on cath labs while improving clinical outcomes?

**Cardiology backlog is growing**



**This paper aims to provide insights into this question across two key chapters:**

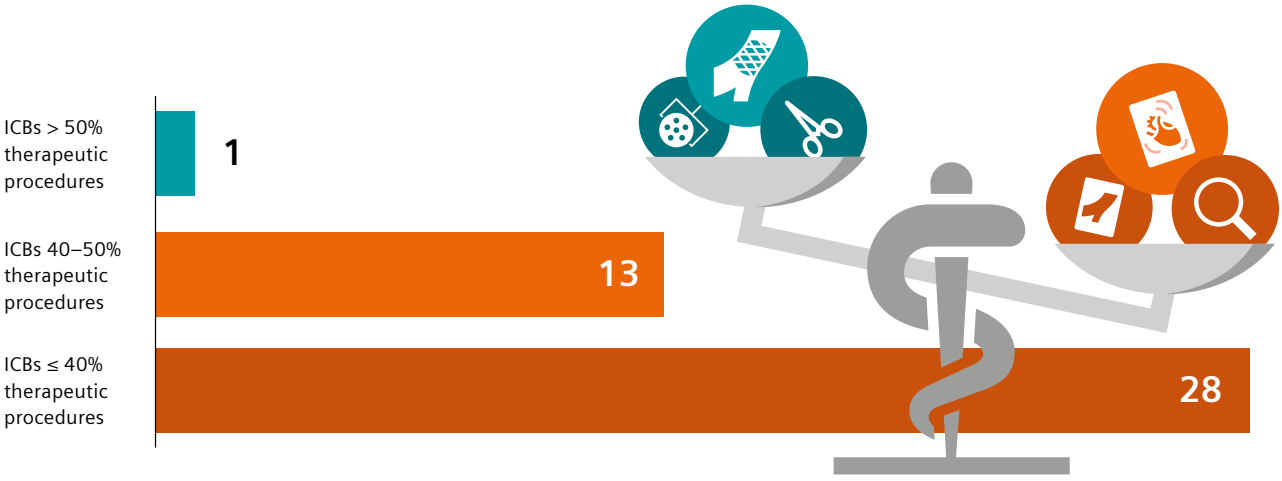
*Can the CT-first model reduce strain on cath labs?*

*Can the CT-first model help lower CVD mortality rates?*

Drawing on data from all 42 Integrated Care Boards (ICBs) which are established to plan and deliver health services, manage budgets, and meet local health needs across England, this report examines the potential of a CT-first approach to improve clinical outcomes and optimise cath lab capacity.

## Low therapeutic procedures in most ICBs

The overwhelming majority of ICBs use the cath lab primarily for diagnostic procedures. Only in one ICB do therapeutic procedures account for more than 50 per cent of the total cath lab activity.



# Can the CT-first model reduce the strain on cath labs?

**What is the CT-first model?**

The CT-first model is an approach in which CT coronary angiography (CTCA) serves as the initial diagnostic test for patients with stable chest pain, rather than relying primarily on stress testing or invasive angiography. CTCA's non-invasive nature, rapid turnaround, and cost-effectiveness support a potentially earlier diagnosis and a more efficient allocation of cardiology resources.

**Benefits of the CT-first model**

The National Institute for Health and Care Excellence (NICE) guidelines recommend that all patients with new-onset chest pain of suspected cardiac origin (typical or atypical angina), or those with non-anginal chest pain and an abnormal resting ECG, should be offered CTCA as the first-line investigation.

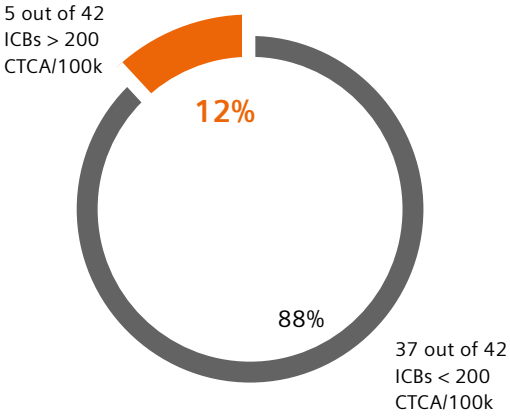
Studies have demonstrated that this approach not only enhances diagnostic accuracy but also improves patient outcomes. For instance, the SCOT-HEART[3] trial, conducted in patients with stable chest pain, revealed that a CT-first strategy led to a significant reduction in myocardial infarction rates and improved long-term survival compared to standard care.

Moreover, the cost-effectiveness of CTCA has been well documented. A comprehensive review indicated that CTCA is a cost-effective strategy for both low-risk acute chest pain patients presenting to the emergency department and low-to-intermediate-risk stable chest pain outpatients.[4] This aligns with findings from the NICE guidelines, which highlighted CTCA's low cost and high sensitivity as key factors in its recommendation as the non-invasive test of choice in the evaluation of stable angina.

In this workflow, low-to-intermediate-risk patients undergo CTCA to rapidly confirm or exclude coronary artery disease, while high-risk cases are directed straight to invasive care. CTCA, often enhanced with AI analysis and CT-FFR, guides whether patients need reassurance and risk factor management, preventive therapy, or referral for invasive angiography. By shifting stable chest pain evaluation to non-invasive CT coronary angiography (CTCA), cath labs can concentrate on patients who truly require invasive intervention, allowing them to evolve from primarily diagnostic facilities into high-value therapeutic suites.

This shift means that cath labs can prioritise complex interventions, structural procedures, and high-risk cases, rather than using capacity on routine diagnostic angiography that could safely be deferred or avoided.

## CTCA underuse in many ICBs




Only **12%** of ICBs are meeting the NICE recommendation of 200 CTCAs per 100,000 population.

**Challenges of implementing the CT-first model**

However, there are also significant challenges to implementing a CT-first strategy. The most pressing is that the potential demand for CTCA is substantial.

In 2010, when the UK NICE guidelines were published, it was already recognised that approximately 120,000 referrals were being made to Rapid Access Chest Pain Clinics (RACPCs) in England. This alone would correspond to around 200 CTCAs per 100,000 population if 90 per cent of patients were referred for CTCA, and – when other referral pathways are included – the total annual requirement may be as high as 523 CTCAs per 100,000 population.[5]

These estimates are likely to have increased even further over the past 15 years. Despite this early guidance, many ICBs continue to fall well short of recommended CTCA volumes, highlighting a persistent gap between guideline recommendations and real-world practice. In addition, shortages of trained imaging staff and reporting capacity remain a major barrier to scaling CTCA services nationally, further limiting the ability of ICBs to meet the growing demand.

If the need for CTCA continues to rise, ICBs may struggle to keep pace, risking prolonged diagnostic delays, widening inequalities, and missed opportunities for early prevention.

### Impact of the CT-first model on cath lab utilisation

Addressing these challenges will require targeted investment – including expanding CT scanner capacity, increasing the number of trained imaging personnel, and streamlining referral and reporting pathways. Accelerating implementation and investing strategically across all ICBs is therefore essential to reduce strain on cath labs, enabling three major benefits that can transform cath lab utilisation.

### 1. Transforming cath labs from diagnostic to high-value therapeutic pathways

Using CTCA as a frontline tool for stable chest pain can support more appropriate referral to invasive angiography, helping to prioritise cath lab capacity for patients most likely to benefit from intervention. Emerging technologies such as photon-counting CT further advance this approach by providing ultra-high resolution images at lower radiation doses. This is particularly valuable in complex cases, including patients with heavy coronary calcification, stents, or suspected in-stent restenosis, which have traditionally been challenging to assess non-invasively.

By offering high-resolution anatomical information, photon-counting CT strengthens the role of CTCA in routine pathways and supports more accurate decision-making earlier in the care process. In a photon-counting CT study by Hagar et al., "CTCA correctly ruled out CAD in 37 participants, signifying that 37 of 68 (54%) participants would not have required additional invasive coronary angiography."[6] Each non-invasive alternative reduces procedural risk, accelerates recovery, and helps shorten hospital stays.

### 2. Shifting focus towards high-value interventions

Alongside advances in imaging, modernising cath lab infrastructure and workflows enables clinical teams to focus on complex, high-impact procedures – such as chronic total occlusion or valve replacement – by reducing time spent on low-yield diagnostic cases. By shifting lower-risk patients to non-invasive pathways, cath lab resources can be better directed towards those with the greatest clinical need, supporting a more efficient and sustainable model of care. A CT-first strategy also supports procedural planning, particularly for interventions like percutaneous coronary intervention (PCI), where CT-guided insights can aid clinical decision-making and preparation.

### 3. Staff well-being and better capacity planning

Workforce well-being is also a critical consideration. Two recent studies show that 28 per cent of interventional cardiologists are dissatisfied with their work-life balance, and 69 per cent report symptoms of burnout.[7] Similarly, registered nurses and cardiac invasive specialists working in catheterisation and electrophysiology labs experience elevated burnout levels.[8] A streamlined CT-first pathway may help reduce staff workload, improve scheduling predictability, and ease the strain on already overstretched teams.

# Can CT-first help lower CVD mortality rates?

CTCA has the potential to reduce cardiovascular mortality by supporting earlier detection of coronary artery disease. Combined with coronary calcium scoring, CTCA provides valuable information to help clinicians evaluate disease burden and plan patient care. Evidence is growing – with studies like SCOT-HEART[9] demonstrating reductions in myocardial infarction and improved long-term outcomes through a CT-first approach.

Recent national data reveals a clear correlation between longer CTCA wait times and higher cardiovascular mortality.[10] Prolonged delays in access can lead to missed or late diagnoses, delaying the initiation of preventive therapies and increasing the likelihood of adverse cardiac events. For patients with underlying coronary disease, even a few weeks of delay may translate into significantly greater risk. The average waiting time from test request to CTCA appointment is 66 days, whereas the time from diagnostic test to report issuance is only 4 days. This significant discrepancy suggests that the primary capacity limitation lies in the scheduling process rather than in reporting.

## National average waiting times for cardiac CT angiogram

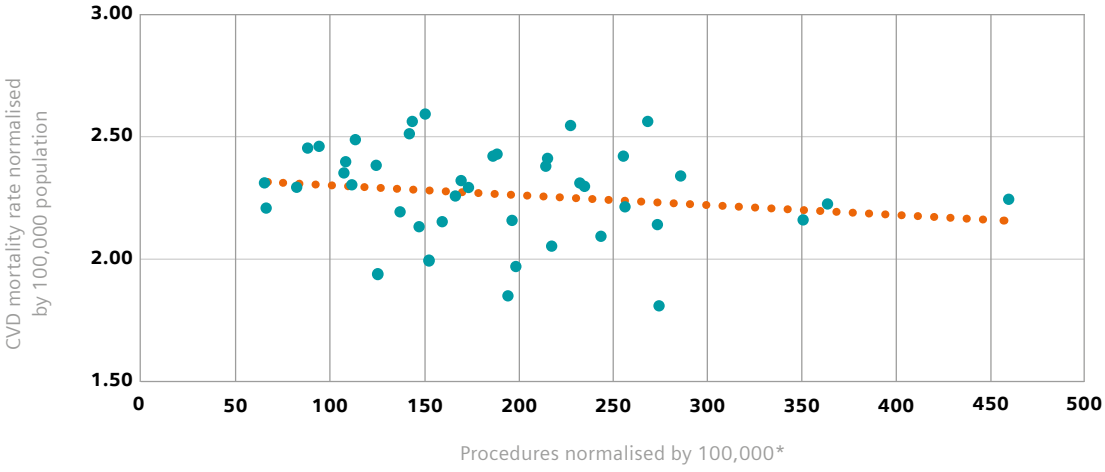
**90%** of ICBs fail to meet the NHS target of issuing CTCA reports within six weeks, with only 4 of 42 achieving this. Enhancing CTCA capacity and access represents an important opportunity to improve pathway efficiency and support timely clinical decision-making.

**66 days**
from test request to diagnostic test

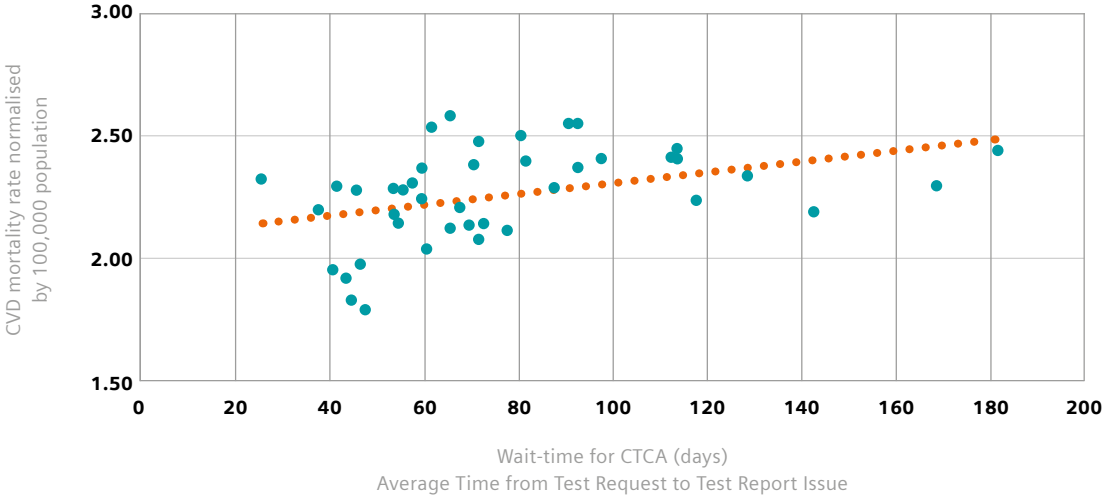
**4 days**
from diagnostic test to report

NHS data shows a clear link between longer CTCA wait times and higher cardiovascular mortality, highlighting the importance of reducing delays in access to care.[10] Prolonged waits can lead to missed diagnoses, delayed preventive treatment, and an increased risk of cardiac events. For patients with coronary disease, each week's delay raises risk. Speeding up CTCA access – especially for high-risk groups in capacity-constrained areas – could significantly cut avoidable cardiovascular deaths.

## Decreased mortality rate with increased CTCA volume




## Long CT wait time impacts CVD mortality




Integrated Care Boards in the UK  Trend

** Includes all CT procedures that can be linked to imaging of the coronaries or manifestation of Coronary Artery Disease.*

# Conclusion

The adoption of a CT-first approach represents a pivotal step in modernising cardiovascular care delivery. Early, non-invasive coronary CT angiography (CTCA) has been shown to support more targeted referral to invasive evaluation, promote earlier preventive action, and improve pathway coordination. Yet many ICBs still fall short of recommended CTCA volumes and reporting timelines, leaving cath labs under strain and patients exposed to avoidable delays and inequalities.

NHS data shows that regions with higher CTCA volumes and shorter wait times experience lower cardiovascular mortality – highlighting that earlier, non-invasive diagnosis enables faster triage, timely intervention, and better long-term outcomes.

Strategic investment in CT imaging infrastructure, specialist workforce, and streamlined referral pathways is therefore essential to meet rising demand and enable cath labs to transition from predominantly diagnostic facilities to high-value therapeutic suites.

A further critical consideration is the disparity in access between urban centres and rural or underserved regions, where patients often face delayed diagnosis and limited availability of advanced imaging. If CT-first pathways are deployed consistently across ICBs, they have the potential to reduce these inequalities by enabling earlier, standardised access to diagnosis regardless of geography. This would not only improve outcomes for patients in remote areas but also promote more equitable use of healthcare resources nationwide.

Taken together, these findings present a compelling case for prioritising investment in cardiac CT capacity as a core component of cardiovascular disease prevention strategies. Reducing CTCA waiting times and increasing scan volumes should not be seen as operational metrics alone, but as key levers for improving population health and reducing inequalities. Earlier, standardised access across all ICBs enables targeted preventive therapy, reduces unnecessary invasive procedures with the potential to saves lives. To fully realise this potential, CT-first care must be broadly and consistently adopted, embedded within integrated care pathways and supported by adequate resources.

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**[10]** Hospital Episode Statistics (HES) database. NHS England.

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[1] *Personalisation of diagnosis, therapy selection and monitoring, aftercare, and managing health.*

The conclusion stated are an interpretation from the data available. There are many different factors that need to be analysed to make a sound conclusion.

This work uses data provided by patients and collected by the NHS as part of their care and support. Secondary care data is taken from the English Hospital Episode Statistics (HES) database produced by NHS England, Copyright © 2024, NHS England. Re-used with the permission of NHS England. All rights reserved.

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