



National Audit Office



Test and trace in England – progress update

Department of Health & Social Care

REPORT

**by the Comptroller
and Auditor General**

SESSION 2021-22

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Test and trace in England – progress update

Department of Health & Social Care

Report by the Comptroller and Auditor General

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Gareth Davies
Comptroller and Auditor General
National Audit Office

21 June 2021

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Key facts

£13.5bn

expenditure by NHS Test and Trace Service (NHST&T) in 2020-21, compared with a budget of £22.2 billion

964

contracts, worth £14.1 billion, let to public and private organisations for suppliers, services and infrastructure to support test and trace services in 2020-21

102m

number of NHST&T tests done in community settings between November 2020 and April 2021, the majority of which, 69 million, were rapid-result lateral flow device (LFD) tests, rolled out from October 2020

90% proportion of those tested in person in the community (under Pillar 2 of the testing system) who received their PCR results within 24 hours, for the last week of April 2021, up from 38% in the last week of October 2020 and a low of 17% during December 2020

84% – 94% the proportion of close contacts of people testing positive for COVID-19 that NHST&T reports having reached and advised to self-isolate, which was achieved for each week starting from 3 December 2020 to 29 April 2021. In May 2020, the Scientific Advisory Group for Emergencies advised that an effective test and trace system should reach at least 80% of close contacts of index cases

45% average utilisation rate for NHST&T laboratories between November 2020 and April 2021 compared with NHST&T's safe utilisation threshold of 80%

11% – 49% range of daily utilisation rates for NHST&T telephone tracers and contact centre staff between November 2020 and May 2021, compared with an average utilisation rate target of 50%

November 2020 the last month that NHST&T was able to calculate its key performance indicator for the percentage of new infections it identifies through its testing. In December the Office for National Statistics paused publication of the estimates it was based on, for methodological reasons

14% the percentage of lateral flow tests registered as used by 26 May 2021. NHST&T had distributed 691 million tests and results had been recorded for 96 million of them

Summary

Introduction

1 This is the second of our reports on government’s approach to test and trace services in England and it covers the period from the beginning of November 2020. It follows a December 2020 interim publication, which reported on NHS Test and Trace (NHST&T) from its creation in May 2020 until October 2020.

2 Between the start of the COVID-19 pandemic and the end of April 2021 there have been over 4 million confirmed infections and 131,600 deaths involving COVID-19 in England. Test and trace services are designed to play a core role in government’s response to the pandemic, which has also included restrictions on social contact, travel, retail, workplaces and educational establishments, and from December 2020 the roll-out of the vaccination programme. Test and trace programmes for COVID-19 aim to reduce infections by identifying individuals with the virus, tracing their contacts and isolating them to limit further transmission.

3 NHST&T, part of the Department of Health & Social Care (the Department), was created on 28 May 2020 to lead on the government’s test, trace and contain approach. Its overall purpose is to “help break chains of COVID-19 transmission and enable people to return to a more normal way of life”. NHST&T works in conjunction with Public Health England (PHE), local authorities, and commercial and academic providers. Together, they provide:

- testing services, through a combination of testing sites and home testing, that include PCR (polymerase chain reaction) tests for people with symptoms, which are processed by laboratories, and regular asymptomatic testing for communities, workplaces, education, health and social care settings and the wider public mostly using LFD (lateral flow device) tests that do not require laboratory processing;
- laboratories to process PCR results and identify and track new variants using genomic sequencing;
- tracing services to trace people who test positive and their contacts and providing a legal instruction for them to self-isolate;
- support to people self-isolating, including financial support and other practical assistance; and
- Research, data analysis and insight to support local and national decision-making through the Joint Biosecurity Centre.

4 The government published the *COVID-19 Winter Plan* on 23 November 2020, setting out plans to tackle the next stage of the pandemic. NHST&T has been responsible, with its partners, for delivering many of these including the introduction of mass asymptomatic testing and closer working with local authorities.

5 On 24 March 2021, the government announced that NHST&T would form part of the newly created UK Health Security Agency (UKHSA). This transition is intended to complete by the end of October 2021. NHST&T and UKHSA will therefore be implementing these structural changes, alongside leading test and trace as part of government's ongoing COVID-19 response.

Scope of this report

6 This second report provides an update, focusing on the period from November 2020 to April 2021. It is factual and does not present a full value-for-money assessment. This reflects the time period covered and the changing and ongoing response to the pandemic. The report covers:

- major developments in the test, trace and isolate programme from November 2020 (Part One);
- funding and spending for the programme in 2020-21, including its use of contracts, consultants and its utilisation rates (Part Two);
- the performance and effectiveness of test and trace services up to the end of April 2021 (Part Three); and
- current plans for the future delivery of test and trace services, including transition arrangements to the new UKHSA, and securing a longer-term benefit from the investment into test and trace services (Part Four).

Key findings

Developments in test and trace from November 2020

7 NHST&T significantly increased its testing and tracing capacity and activity to manage the surge in infections in December 2020 and continues to operate in an environment of uncertain and fluctuating demand for its services. Levels of COVID-19 infections rose sharply between the end of November 2020 and the end of December 2020, resulting in more demand for testing and tracing services. Between the end of November 2020 and the end of December 2020, the number of people tested by NHST&T increased by more than 50%, and tracing activity more than quadrupled. NHST&T expanded the total theoretical processing capacity for PCR tests from 500,000 per day at the end of October to 800,000 by January 2021. NHST&T is working in a very uncertain environment where it is difficult to make predictions about the future prevalence of COVID-19 and the resulting demand on testing and tracing. NHST&T, working with departments across government, had to set up a testing service for hauliers at very short notice over Christmas 2020. Stakeholders told us that they were very satisfied with how the service was implemented (paragraphs 1.7, 1.10, 1.11, 2.15, 3.5, 3.7, 3.10, 4.1, 4.6 and 4.7).

8 NHST&T has rolled out regular asymptomatic testing, using rapid-result LFD tests, to try to identify cases of COVID-19 among people without symptoms. Only a small proportion of the tests distributed have been registered as used. LFD tests provide much faster results in detecting COVID-19 than laboratory-processed PCR tests but are less likely to detect the virus at the beginning or end of an infection. Asymptomatic testing was initially targeted at more vulnerable groups (for example, care home residents) or where infection levels were likely to be higher. Eligibility has since been expanded so that the whole population of England is eligible for two LFD tests each week. NHST&T forecast that between 1 March and 30 May 2021, 655 million tests would be used in the UK. However, by 26 May, of the 691 million tests it has distributed in England, only 96 million (14%) had been registered as used. Of tests not yet registered, it is not possible for NHST&T to know how many tests have been used or not. NHST&T has now started research to understand why the registration of test results is so low (paragraphs 1.12 to 1.16, 2.18 and 2.19).

9 NHST&T has developed a programme of work to identify and contain variant forms of COVID-19, and currently screens all viable positive PCR tests for variants. It has made an important contribution to international efforts to track new variants.

Variant forms of COVID-19 may pose different levels of risk in terms of the transmission or severity of illness. NHST&T has developed a strategy to identify and contain variants. It screens all viable positive PCR tests for variants (not all tests contain enough material to allow screening to take place) and by April 2021 had worked with local authorities to carry out surge testing in 39 areas of England where cases of variants have been identified. NHST&T also provides testing and tracing services in support of border controls, aiming to minimise the entry of new variants to the country. The UK has made a very significant contribution to international understanding of variants: about 30% of genomic sequencing results shared internationally come from the UK, making it the largest single contributor. Samples are collected by NHST&T and processed by the COVID-19 Genomics Consortium, Wellcome Sanger Institute and the public health agencies of the four nations (paragraphs 1.18 to 1.24).

10 Local authorities' involvement in testing and tracing has increased significantly in line with NHST&T's December Business Plan commitment, but challenges to effective partnership working remain.

The Business Plan set out an ambition for NHST&T to strengthen its partnerships with local authorities, including through expanding their role in testing and tracing. Nearly all local authorities now run their own contact tracing schemes for harder to reach cases, and some areas are piloting taking on all contact tracing. Local stakeholders reported that NHST&T's data sharing and engagement with local authorities has improved, but that they and other partners (for example, home care providers) cannot yet access all the information they need when they need it. NHST&T continues to work to improve access to data for local authorities and now provides data on positive test results including detailed demographic and other information for positive cases. It has recognised the need to continue to develop its approach to share data faster, more widely and more easily, with local authorities and others (paragraphs 1.16, 1.22, 1.23, and 1.25 to 1.28).

Update on test and trace spending and contracts

11 Based on unaudited data, NHST&T spent £13.5 billion out of a £22.2 billion budget in 2020-21, an underspend of £8.7 billion (39%). Of this, NHST&T spent £10.4 billion on testing (77% of total spending), £1.8 billion on ‘contain’ activities (to identify local COVID-19 outbreaks and support local responses to the pandemic, 13% of total spending), and £0.9 billion on tracing activities (7% of total spending). Of this 2020-21 spend, it paid out local authority grants of £2.2 billion, primarily for ‘contain’ activities. NHST&T underspent its budget by £8.7 billion, or 39%, primarily in testing, specifically asymptomatic LFD testing, and laboratories and associated costs (£7.9 billion, 91% of the underspend). NHST&T told us this is because the high level of demand for testing forecast for January and February 2021 did not materialise, in part due to national lockdown measures. The roll-out of mass testing was delayed from January to March, and eventual uptake was much lower than expected, which also contributed to the underspend. Savings from price reductions and renegotiations on committed volumes and projects also contributed to some £2.2 billion of the underspend. The National Audit Office is currently undertaking the 2020-21 financial audit of the Department, which includes NHST&T. The Department expects to publish its audited accounts later in 2021 (paragraphs 2.1 to 2.4).

12 NHST&T has introduced more flexibility into its contracts but with average utilisation rates of its testing and tracing capacities remaining low, it is paying for capacity it does not use, and is still using emergency measures to procure without competition. Since November 2020, NHST&T has built more flexibility into its contact centre contracts to allow it to adjust capacity, and from September 2021 it plans to use staff more flexibly across different services. Between November 2020 and May 2021, the utilisation rate for its contact tracers and other contact centre staff (the percentage of paid time they spent working) has generally remained well below the 50% target, peaking at 49% in January 2021 and falling to around 11% in February. For its laboratory testing facilities, it does not have a target utilisation rate but sets a threshold of 80% beyond which a laboratory does not operate safely or reliably; the average utilisation rate was 45% between November 2020 and April 2021. NHST&T awarded fewer contracts using emergency regulations in the period January to March 2021 than in April to June 2020. However, the value of the contracts awarded under emergency regulations more than doubled from £1.1 billion (April to June 2020) to £2.6 billion (January to March 2021). The largest contract NHST&T awarded using emergency powers in January to March 2021 was for LFDs for self-tests (£1.9 billion). NHST&T told us that only one supplier had secured regulatory approval to supply these tests, so it was not possible to run a competition. The absence of competition and normal regulatory processes brings risks to value for money (paragraphs 2.8 to 2.11, and 2.14 to 2.17, Figure 13).

13 NHST&T continues to rely heavily on consultancy support. NHST&T relied on management consultancy to staff up its organisation quickly. In November 2020, NHST&T outlined plans to reduce the number of consultants it employed. However, it employed more consultants in April 2021 (2,239) than in December 2020 (2,164), and as at mid-April, consultants still accounted for 45% of NHST&T's central staff. NHST&T told us that reducing its use of consultants has been made more difficult because of skills shortages in certain areas in the civil service, uncertainties with the transition to UKHSA and comparatively low salaries in the civil service (paragraphs 2.20 to 2.23).

Overall performance and effectiveness of test and trace

14 While NHST&T's performance against operational targets generally improved between the end of October 2020 and April 2021, it fell well below target when cases rose sharply in December. NHST&T provided results for 90% of PCR tests taken in person in the community within 24 hours at the end of April 2021. This was up from 38% at the end of October 2020, and a low of 17% during December. NHST&T also met targets for the overall proportion it reaches of people testing positive (90%) in mid-March 2021, and of identified contacts (85%) from the start of December 2020. However, performance slipped a little below both targets during April. In April 2021, NHST&T reached 81% of people who had tested positive for COVID-19 within 24 hours compared with 72% at the end of October 2020 (paragraphs 3.6 and 3.8 to 3.11).

15 NHST&T has reduced the time taken between a test being booked and contacts being traced, a key measure of system effectiveness, for in-person PCR tests. It is less clear whether the wider system is operating as quickly as it needs to be fully effective. The UK Scientific Advisory Group for Emergencies (SAGE) advises that, for test and trace to be effective, it is desirable that no more than 48 hours should elapse between identification of an index case and their contacts self-isolating. NHST&T has interpreted this as the time between booking a test and contacts being reached, and initially set itself a target for this to be within 72 hours in 80% of cases, subsequently revising that to within 48 hours. NHST&T met the 72-hour target for in-person PCR tests from January 2021 onwards, and the 48-hour target during March 2021. In-person PCR tests represent a declining minority of tests (37% over the period May 2020 to April 2021, 16% of PCR tests in March and April 2021). NHST&T does not have an equivalent timeliness target for other PCR tests, for example home test kits or tests supplied to care homes for regular testing of staff and residents. We have also examined wider timeliness of all PCR tests from the point of symptom onset (before booking a test) to an individual contact being reached. SAGE has not offered a view on this, but other international evidence suggests a timeframe of not more than 48 – 72 hours. The median time between a case developing symptoms and an individual contact being reached for all PCR tests from people with symptoms ranged between 74 and 97 hours for each week starting 14 January to 29 April 2021 (paragraphs 3.13 to 3.20).

16 The overall effectiveness of the test and trace process relies on public compliance, which is still low or variable. NHST&T is responsible for addressing low levels of public compliance. Academic and scientific experts have noted the importance of public compliance with the requirements of test and trace systems for them to be effective, and the need to consider behavioural issues and how these can be addressed, for example through public health messaging. NHST&T has less direct influence over the very start of the process, before someone books a test. A key performance indicator for NHST&T is the proportion of new infections it identifies through testing, but it has not been able to measure this since November 2020. The available survey-based evidence suggests that only a minority of people who develop symptoms request a test. It also finds that 43% of all people with symptoms, and 82% – 86% of people who test positive say they fully comply with self-isolation requirements. NHST&T has no target relating to compliance with self-isolation requirements. It is funding and evaluating several pilot approaches to improve compliance with self-isolation (paragraphs 1.33 and 3.18 to 3.23).

17 NHST&T has worked to produce modelled estimates of the impact of its activities, which is an inherently challenging analytical task. It is difficult to establish the impact that NHST&T activities by themselves have on reducing transmission, as they work in conjunction with a range of other measures intended to reduce infections (such as social distancing). Initial model analysis by NHST&T estimated that, in October 2020, the combination of testing, tracing and self-isolation resulted in a reduction in the R number of 18%-33%, with most of the reduction accounted for by self-isolation upon onset of symptoms by individuals. The Department also funded a study to evaluate the impact of the COVID-19 app on reducing transmissions, which estimated that, based on two models, between October and December 2020, approximately 100,000 to 900,000 cases could have been prevented by the app. As with any such analysis, the estimates will depend on the structure of the model, any counterfactual used, and assumptions about key parameters (for example compliance levels with self-isolation). Our review highlighted some uncertainties in these estimates: for example, we noted that the initial model estimated the impact of NHST&T's activities by comparison to a scenario with only social distancing and no self-isolation; any departure from this assumption would reduce the estimated impact (paragraphs 3.24 to 3.28).

18 NHST&T has made very limited use of its data to assess whether differences exist in access to test and trace services for groups at higher risk of COVID-19 infection, and whether these might contribute to inequalities in outcomes.

The Department had previously identified that certain disadvantaged groups could have difficulty accessing test and trace services. NHST&T has taken further steps to address inequalities in access and outcomes since October 2020, for example, expanding the coverage of translation services and running targeted campaigns to raise awareness of lateral flow testing amongst higher risk groups. NHST&T's regular internal management reporting includes some limited metrics aimed at tracking diversity and inclusion. It has also undertaken limited analysis of the number of lateral flow tests registered by men and ethnic minority groups. However, NHST&T has not yet made use of the data it collects to understand if differences in access to symptomatic testing and tracing services exist for vulnerable groups, and if so, how they could be contributing to poorer COVID-19 outcomes for these groups. Our analysis of local authority data suggested wide variations in levels of testing but it is not clear whether this has impacted levels of infections (paragraphs 3.29 to 3.32).

Future plans and the transition to the UK Health Security Agency

19 NHST&T will transition to the new UK Health Security Agency (UKHSA) between April and October 2021 and there is a risk that NHST&T's attention will be diverted away from efforts to contain the spread of the virus.

UKHSA was formally established in April 2021 to protect people from infectious diseases and external health threats. It will subsume NHST&T, including the Joint Biosecurity Centre, and the health protection functions of PHE when fully operational from October 2021. NHST&T staff who transfer to UKHSA will need to plan and implement the restructuring alongside their work to contain the spread of the virus (paragraphs 4.1 and 4.14 to 4.16).

20 The level of future COVID-19 infections is highly uncertain, but NHST&T has not yet made a whole-system plan for beyond July 2021. NHST&T, and from October 2021 UKHSA, needs to plan for a range of scenarios that could involve an overall reduction in infection levels, while at the same time managing the risk of localised outbreaks or an overall resurgence of COVID-19. It has sought to improve its understanding of future testing and tracing requirements by undertaking modelling and scenario analysis. However, there is still uncertainty about what testing and tracing capacity it needs to maintain, and what role asymptomatic testing will play beyond July 2021. UKHSA has started to plan its future operating model, although it has not completed this work. Local stakeholders told us that there is a lack of clarity about the future role national and local bodies will play and how the model will incorporate flexible resourcing to respond to local outbreaks (paragraphs 4.3, 4.4, 4.6 to 4.13 and 4.15).

21 NHST&T does not yet know how it will secure the promised benefits from the laboratory infrastructure it has established. In its November 2020 business case for the £10 billion expansion of testing in 2020-21, NHST&T stated that the £150 million investment in laboratory infrastructure would provide diagnostic preparedness for future infectious disease emergencies, as well as early diagnostics for diseases such as cancer. However, NHS England and NHS Improvement told us that it was not informed of the business plan commitment to use the Test and Trace laboratories for this purpose at the time the commitment was made. It has now started to have conversations with NHST&T about potential legacy opportunities. NHST&T considers that there are various potential benefits from investment in early diagnostics, including the ability to treat patients sooner and job creation in the life sciences industry. In its November 2020 business case NHST&T committed to drawing up a detailed benefits realisation strategy by the end of December 2020, but it has not yet done so (paragraphs 4.17 and 4.18).

Concluding remarks

22 The primary goal of NHST&T is to help break chains of COVID-19 transmission and enable people to return towards a more normal way of life. Since it was established in May 2020 there have been two national lockdowns and more than four million confirmed cases. In order to break chains of transmission, SAGE advises that it is desirable that no more than 48 hours should elapse between identification of an index case and their contacts self-isolating, and that 80% of these contacts would need to be reached. NHST&T now reaches around 85% of all contacts, and has reduced the elapsed time to trace contacts for in-person PCR tests. However, in-person PCR tests make up a declining minority of tests, and it is less clear whether the wider system is operating as quickly as it needs to. Since November, it has rolled out a national asymptomatic testing programme to seek to identify those people who do not know they have COVID-19. Only a small minority of the tests it has bought have been registered as used, and NHST&T is now undertaking research to understand the reasons for this with a work programme underway to bring about improvements. The success of the test and trace programme relies on the public coming forward for tests when they have symptoms, carrying out asymptomatic tests when they do not, and complying with instructions to self-isolate where necessary. NHST&T is responsible for driving up public compliance, but research suggests that only a minority of people who have COVID-19 symptoms come forward for testing. It has no target for increasing this, the uptake of LFD testing or compliance with self-isolation.

23 NHST&T was set up at speed with a workforce heavily reliant on consultants. It had planned to reduce its dependency on consultants but has not yet done so. NHST&T operates in an environment of high uncertainty, where demand for testing and tracing can be affected at short notice by new variants, case numbers and policy decisions (for example, national lockdowns). It is therefore challenging to forecast costs with precision. However, there is a very wide margin between the underspend of around 10% that NHST&T discussed with the Committee of Public Accounts in January 2021, and the 39% underspend of its 2020-21 budget that it reported two months later. It has taken steps to increase the flexibility of its contracts for contact tracing and future laboratory use and has generally improved its provision of data to and engagement with local authorities. However, local authorities still struggle to get timely access to the data they need to deal with localised outbreaks of COVID-19, and they are unclear on the planned operating model after July 2021. To achieve value for money NHST&T must be able to demonstrate both that the interventions it delivers are effective in achieving its objective, and that the mix of interventions is the most cost-effective use of public resources.

Recommendations

- 24** To continue to improve test and trace performance and give NHST&T and its successor bodies the best chance of securing their intended impact:
- a** The Department, through NHST&T, and UKHSA if responsible, should, by the end of July 2021, develop and agree with its partners a clear strategy for integrated national and local service delivery once England is no longer in lockdown. This should set out the operational barriers faced by all partners (including access to data, funding, scalability, workforce and public compliance) and responsibilities and timetable for addressing them.
 - b** The Department and UKHSA should, by the end of December 2021, assess what standing capacity and infrastructure needs to be retained from NHST&T for future emergency responses, alongside plans for how this could be scaled up and down as needed, setting out clearly the roles of national and local bodies in providing standing and additional capacity.
 - c** As overall speed, reach and levels of public compliance still constrain the effectiveness of the test and trace approach, by October 2021, the Department, through NHST&T and working with relevant delivery partners, must set out plans for improving and monitoring the overall process for these areas, and which national and local bodies are responsible. In particular, it should address how government can best support and encourage citizens in coming forward for tests, and complying with self-isolation requirements. This could encompass further process improvement and redesign, public health messaging, financial or practical support, or other levers available to national and local bodies.

- d** The Department, through NHST&T, should fill gaps in its data and make full use of this information to identify which groups are not engaging with the system at each stage and why. It should, by October 2021, publish its assessment of differential engagement with each stage of the process, the reasons for it and plans to address it.
- e** The Department, through NHST&T, and UKHSA if responsible, should agree with NHS England and NHS Improvement whether and how the laboratory capacity built up for COVID-19 tests will be used by the NHS. It should publish by March 2022 a plan for this legacy, including details of who will own the laboratories or contracts, and how flexibility arrangements will work to allow them to be diverted to COVID-19 or other urgent testing.
- f** NHST&T, and in due course UKHSA, should provide regular assurance to its board and other stakeholders about how it plans to deliver the £2.9 billion of efficiency savings required in 2021-22 and manage the other £3.4 billion of financial risk. This should distinguish between savings from reduced volumes and efficiency savings.

Part One

Update on the government’s test and trace approach in England

1.1 This part of the report provides:

- an overview of the NHS Test and Trace Service (NHST&T);
- the main developments in the pandemic and government’s approach since the end of October 2020;¹ and
- the development of NHST&T’s approach including identifying asymptomatic cases, identifying and containing new variants, developing its approach to contact tracing and improving support for self-isolation.

Overview of the NHS Test and Trace Service

1.2 Test and trace programmes are a core public health response in epidemics that can be used alongside wider measures to reduce infections. The basic principles of test and trace are identifying individuals, or groups of individuals, with an infectious disease and tracing their contacts to limit further transmission.

1.3 From 28 May 2020, NHST&T, part of the Department of Health & Social Care (the Department), has led the government’s test, trace, contain and enable approach. Its overall purpose is to “help break chains of COVID-19 transmission and enable people to return to a more normal way of life”. NHST&T works in conjunction with several public and private bodies, in particular:

- Public Health England (PHE) carries out some laboratory testing and contact tracing for higher-risk cases in liaison with local authorities;
- local authorities run local community testing schemes, can set up contact tracing in partnership with NHST&T, and support people self-isolating; and
- a range of commercial and academic providers hold contracts to provide specific functions and services.

¹ This report should be read in conjunction with our December 2020 *report The government’s approach to test and trace in England – interim report*, which covers the set-up of NHST&T in more detail, and approaches to test and trace prior to this.

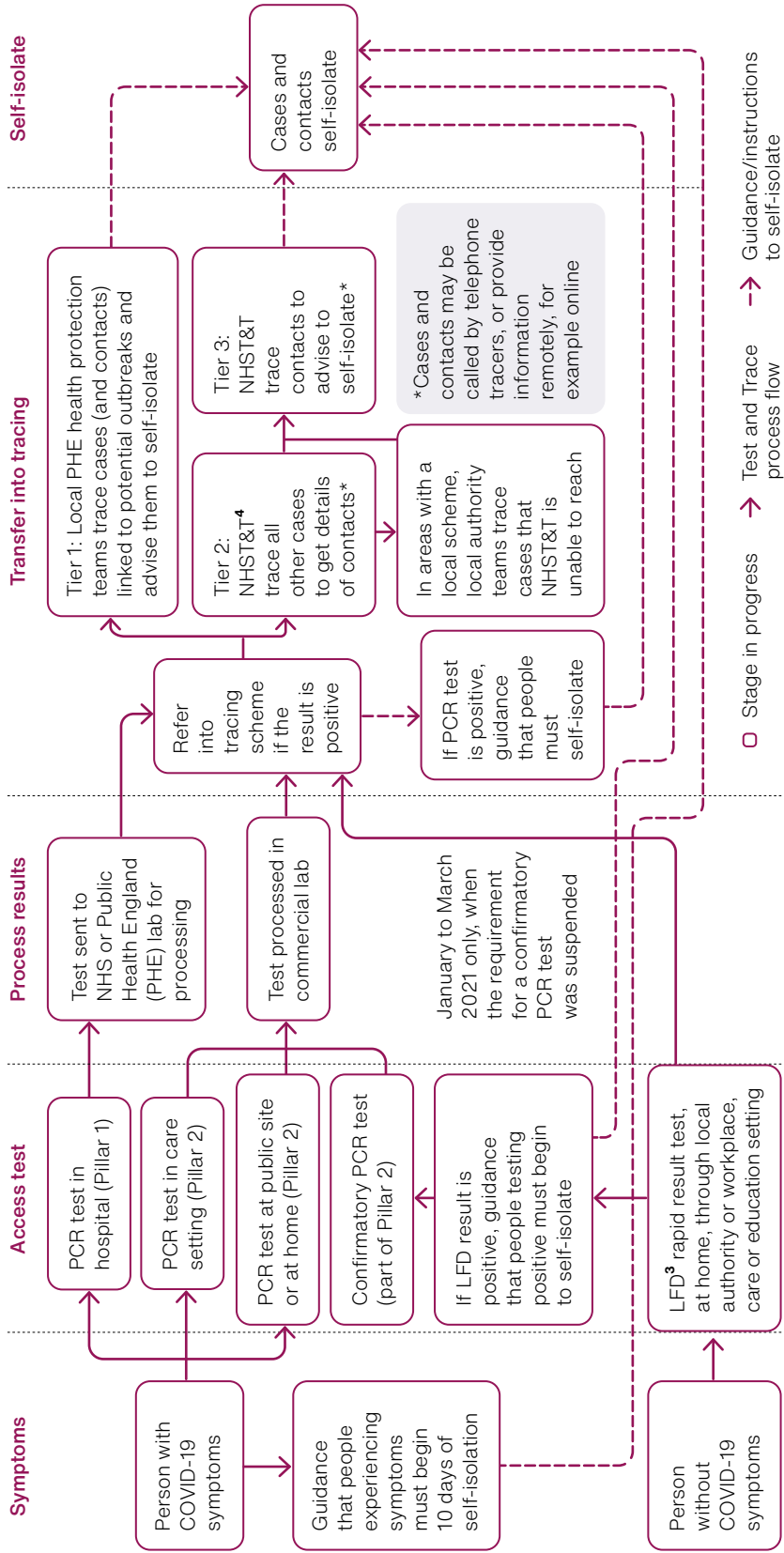
1.4 In addition to testing and tracing activities, NHST&T provides data analysis and insight through the Joint Biosecurity Centre (JBC), which was established on 1 June 2020. The role of the JBC is to combine epidemiological expertise and analytical capability to provide evidence-based, objective analysis and insight on the status of the COVID-19 epidemic in the UK and the drivers and risk factors of transmission. The JBC, led by a director-general, comprises four boards;

- a** the ministerial board contributes to oversight, ensuring the JBC is delivering its objectives effectively for all four nations;
- b** the steering board sets the strategic direction, monitors performance and holds the JBC's director-general to account;
- c** the technical board ensures JBC products have clinical and scientific rigour; and
- d** the data science advisory board ensures the JBC can work to the highest standards of reliability and reproducibility, and to inform the JBC's prioritisation for integration of new data science models and techniques.

1.5 The JBC's objective is to work with partners to provide targeted, timely and actionable information to aid local and national decision-making in response to COVID-19 outbreaks. It carries out work to inform action on testing, contact tracing and local outbreak management. For example, it analyses epidemiological data to produce a weekly watchlist of coronavirus cases by local authority, which supports the understanding of how infection rates are changing in local areas. It also supports the assessment of risks from inbound international travel and advises on the COVID-19 alert level. For example, it has developed a risk assessment methodology which informs ministerial decisions on red, amber and green list countries and territories.

1.6 **Figure 1** overleaf provides an overview of the current process of testing, tracing and self-isolating.

Figure 1
 Overview of the test, trace and isolate process, as at April 2021
 There are several different possible user journeys through the process



Notes

- 1 This is a summary overview of the test and trace process and does not show all possible routes through the stages.
- 2 Government's testing strategy is organised under several 'pillars': Pillar 1 comprises PCR tests (polymerase chain reaction tests, which require processing in a laboratory) processed by NHS and PHE laboratories, primarily for NHS staff and patients with a medical need. Pillar 2 comprises tests processed by lighthouse and other public, private and academic laboratories primarily for the wider population, including care homes.
- 3 LFD tests refer to lateral flow device tests, which give results within 30 minutes, introduced from October 2020.
- 4 NHST&T refers to National Health Service Test and Trace.
- 5 Published guidance sets out when a person must self-isolate, such as if experiencing COVID-19 symptoms, if they test positive for COVID-19, if somebody in a childcare/support bubble tests positive and the individual has been in close contact with them since or 48 hours before the test, if the individual is told by NHS T&T or the NHS COVID-19 app they have been in close contact with someone testing positive, or if the individual has arrived from abroad.

The COVID-19 pandemic in the UK since November 2020

1.7 Our last report covered the period up to the end of October 2020. Since then, there has been a very substantial increase and subsequent reduction in COVID-19 infections and resulting deaths, as shown in **Figure 2** overleaf. Office for National Statistics estimates of the percentage of people testing positive for COVID-19 between the last week in November and last week of December more than doubled, while deaths related to COVID-19 peaked during January 2021. The number of people testing positive through NHST&T almost quadrupled between the last week in November (around 98,000) and last week in December 2020, when it peaked at around 390,000. Overall test and trace activity increased sharply in December. The number of people tested by NHST&T increased by 56% between the end of November and the end of December, and the number of cases and contacts reached more than quadrupled over the same period. Between 28 May 2020 and 5 May 2021, 4.1 million people in England tested positive for COVID-19.

1.8 On 23 November 2020, the government announced its COVID-19 Winter Plan. Its objectives were to:

- bring the R number (the average number of people infected by someone with the virus) below one and keep it there on a sustained basis;
- find new and more effective ways of managing the virus and enabling life to return closer to normal: including vaccination, improved medical treatments and the roll-out of rapid testing to identify and isolate cases quickly; and
- minimise damage to the economy and society, jobs and livelihoods by ensuring the right support is available for jobs and education settings are safe for students to learn.

1.9 The main developments over winter 2020 are set out in **Figure 3** on page 21.

Developments in NHST&T's approach since November 2020

1.10 The main developments in NHST&T's approach over this period relate to:

- significantly **increasing testing capacity** (paragraph 1.11 and covered in more detail in paragraphs 2.8 to 2.14, Figure 12 and 3.5 to 3.11);
- extending its work to **identify asymptomatic cases** (paragraphs 1.12 to 1.17);
- **identifying and containing new variants** of COVID-19 (paragraphs 1.19 to 1.25);
- **developing partnership working with local authorities** (paragraphs 1.26 to 1.29);
- **developing the use of the NHS COVID-19 app** (paragraphs 1.30 to 1.32); and
- piloting new approaches to **support self-isolation** (paragraphs 1.33 and 1.34).

Figure 2

Indicators of COVID-19 infections and deaths, and test and trace activity in England, November 2020 to April 2021

During December 2020, test and trace activity increased sharply at the same time as the substantial rises in levels of COVID-19 infection

Indicator	Weekly estimate as at end:					
	November 2020	December 2020	January 2021	February 2021	March 2021	April 2021
Estimated percentage of people testing positive for COVID-19 (%)	0.88	2.06	1.28	0.37	0.30	0.08
Deaths where COVID-19 recorded on certificate	2,728	4,464	5,872	1,531	348	102
NHS Test and Trace Service activity:						
– Positive cases identified through testing (000s)	98	390	149	45	29	13
– Number of people tested (000s)	1,658	2,593	3,071	3,143	4,868	4,608
– Cases reached and asked for contacts (000s)	80	342	131	40	23	9
– Contacts of cases reached and advised to self-isolate (000s)	169	683	248	90	75	33

Notes

- 1 All data apply to England only.
- 2 Data on positive cases identified through testing, number of people tested, and number of cases and contacts reached come from weekly published statistics for the NHS Test and Trace Service (England), for weeks commencing 26 November 2020, 31 December 2020, 28 January 2021, 25 February 2021, 25 March 2021 and 29 April 2021. Figures on the number of people tested may differ from other analyses in the report, which examine the number of tests. This analysis is based on the weekly data published on 13 May 2021; figures may be revised in future releases.
- 3 Office for National Statistics (ONS) data on estimated percentage of people testing positive for COVID-19 come from the Coronavirus (COVID-19) Infection Survey, for weeks commencing 29 November 2020, 27 December 2020, 31 January 2021, 28 February 2021, 28 March 2021 and 26 April 2021.
- 4 ONS data on deaths with COVID-19 recorded on the death certificate come from weekly provisional counts of registered deaths, for weeks ending 4 December 2020, 1 January 2021, 5 February 2021, 5 March 2021, 2 April 2021 and 30 April 2021. These are rounded to the nearest thousand and calculated by summing the deaths where usual region of residence is England.

Source: National Audit Office analysis of Department of Health & Social Care and Office for National Statistics data

Figure 3

Key developments in test and trace and wider COVID-19 context, November 2020 to April 2021

Several events have significantly impacted the NHS Test and Trace Service's operating environment

Date	Event
5 November 2020	New national restrictions to stay at home apart from a limited set of reasons.
16 November 2020	Further expansion of testing to vulnerable people, carers, bi-weekly testing for NHS staff, pilot for testing care home visitors and 83 local authorities signed up to receive rapid-result lateral flow device (LFD) tests.
23 November 2020	COVID-19 Winter Plan announced including deployment of LFD tests across NHS staff, to carers and to care homes to allow visitor testing. Plans also include testing for prison staff, food manufacturers and those administering vaccines, community testing in the worst affected areas and trialling frequent testing to avoid the need to self-isolate.
26 November 2020	Community testing programme starts roll-out, initially in Tier 3 areas. ¹
30 November 2020	Roll-out of LFD testing in universities.
2 December 2020	First vaccine approved by Medicines and Healthcare products Regulatory Agency (Pfizer BioNTech).
10 December 2020	Eligible NHS COVID-19 app users in England, who have been instructed to isolate via the app, can claim the £500 Test and Trace Support Payment.
10 December 2020	First surge testing operation, for all secondary school-aged children in the worst affected areas in London, Kent and Essex.
14 December 2020	Government announced the new Alpha variant, first identified in Kent, as a “variant of concern”, which may be associated with faster spread. It was first sequenced in UK in September 2020.
30 December 2020	LFD testing expanded to all secondary school pupils and all university students to be offered two LFD tests as they return.
4 January 2021	National lockdown announced.
10 January 2021	Community testing for people without symptoms open to all local authorities.
18 January 2021	Temporary close to international travel corridors. Negative test taken within 72 hours must be shown before flying back to the UK.
8 February 2021	Workplace testing expanded to all businesses that have more than 50 employees and are currently open.
6 March 2021	Workplace testing available to all businesses, including those with fewer than 50 employees.
8 March 2021	Step One of the Roadmap: ² all pupils return to face-to-face education. Twice weekly rapid LFD testing made available for households and bubbles of school pupils and staff of primary school, secondary school and colleges.
9 April 2021	Twice weekly LFD testing made available to everyone in England.

Notes

- 1 Tier 3 areas: On 12 October the Prime Minister announced a tiered approach to local COVID-19 alert levels. There were three tiers: Tier 1 (medium), Tier 2 (high) and Tier 3 (very high). Tier 4 was announced on 19 December 2020 with a “Stay at Home” alert level.
- 2 The Roadmap is the plan for lifting restrictions published by government on 22 February 2021.

Source: National Audit Office analysis of gov.uk announcements and NHS Test and Trace documents

Significantly increasing testing capacity

Providing testing facilities for hauliers

1.11 We cover the increase in overall levels of testing and tracing capacity in more detail in Parts Two and Three of this report. In addition to this overall level of increase, over Christmas 2020 government had to set up at speed COVID-19 testing capacity for hauliers, following an announcement by the French Government on 20 December suspending all travel from the UK for 48 hours, and subsequent to that requiring a recent COVID-19 test as a condition of entry. NHST&T worked with the Department for Transport and other departments across government to provide testing facilities as well as sanitary and other facilities to hauliers caught in the backlog. We spoke to the Road Haulage Association, who told us it was very satisfied with how government engaged with the industry and did not see how anyone could have done a better job. Government was responsive to feedback, for example, providing testing sites further inland to ease congestion at the border.

Identifying asymptomatic cases

1.12 NHST&T has relied mainly on two types of tests to identify COVID-19, polymerase chain reaction (PCR) tests and lateral flow device (LFD) tests. PCR tests are more reliable but also more expensive and take longer to provide results. LFD tests can be conducted by people at home, work or school with results available within 30 minutes. LFD tests are highly sensitive when the viral load is high, however, they are less likely to detect COVID-19 when the viral load is low, for example, at the beginning or end of an infection (**Figure 4**).

Roll-out of LFD tests

1.13 Since October 2020, NHST&T has introduced LFD tests to detect infections in people without symptoms. Asymptomatic testing was initially targeted at more vulnerable groups (for example, care home residents) or where infection levels were likely to be higher, and has since been introduced in various settings (**Figure 5** on pages 24 and 25). In December 2020, government introduced the Community Testing Programme, which distributed LFDs to local authorities for large-scale, locally-led asymptomatic testing. It was initially only offered to authorities in England in Tiers 3 and 4, but eligibility was extended to all local authorities across England in January. The scheme is set to run until at least the end of June 2021.

1.14 As of 9 April 2021, all households in England are eligible for free twice-weekly LFD tests. By 26 May, 691 million test kits had been sent out, with 96 million (14% distributed) tests reported, of which 223,000 are positive (Figure 5). NHST&T has now started research to understand why the registration of test results is so low. Informed by the findings, a programme of work is underway to bring about improvement including by raising public awareness, streamlining the user journey and tracking distributed devices. As at 26 May 2021, schools, colleges and nurseries had registered the greatest number of tests used.

Figure 4

Types of COVID-19 tests

There are two main types of tests to identify COVID-19 infection

	Lateral flow test (LFD)	Polymerase chain reaction test (PCR)
How are the results obtained?	Tests can be processed by the person taking them.	Tests are sent to laboratories for processing.
How quickly are results available?	Results are available in around 30 minutes.	Most results are returned within 24 hours.
How accurate is the test in identifying the virus? ¹	Most sensitive when viral load is high and most infectious, but not as sensitive when the viral load is low and the person is less likely to be infectious, particularly at the beginning or towards the end of an infection. A negative test does not signify that the person is not infected with the virus. Published evidence indicates that, when used by laboratory or health care workers, LFD tests can have a sensitivity of 76.8% relative to PCR tests (broadly, if 100 people test positive with a PCR test, 77 of them will return a positive result with an LFD test) and a specificity of 99.7% (broadly, if 100 people test negative with an LFD test, there is a 0.3% chance that its PCR result will be positive).	Highly sensitive, even when the viral load is low and the person has recovered from the virus and may be less infectious. A recent meta-analysis estimates that PCR tests have a sensitivity of 94% (if 100 people are infected with the virus, 94 will test positive with a PCR test, but this can range from 42–98). Specificity is usually assumed as 100% (all those testing negative with PCR are assumed not to have the virus).
What are the tests used for?	Used for people who are not displaying symptoms of COVID-19.	Used to test people who are displaying possible COVID-19 symptoms or who are at high risk of contracting it or contracting a variant form of COVID-19.
Can the test show if the person has contracted a variant of COVID-19?	No. While the test can produce a positive or negative result for currently circulating variants, it does not provide information about which variant of COVID-19 a person has contracted as the sample is not currently shared for further processing.	Yes with further processing. The material in PCR tests can be examined using genomic sequencing to identify new variants or tested against a pre-determined list of variants.

Note

- 1 LFD test specificity and sensitivity included here reflects the estimates used by NHS Test and Trace Service when the decision was made to roll out LFD tests for asymptomatic testing in schools and other settings. However, for both LFDs and PCRs, test sensitivity and specificity are affected by the level of prevalence and this may not be true as the COVID-19 prevalence level decreases. In times of very low prevalence false positives become more of an issue as the proportion of false positives out of all positive results will increase although the proportion of false positive results out of all tests remains the same.

Source: National Audit Office review of Department of Health & Social Care and Public Health England information

Figure 5

Roll-out of asymptomatic testing using lateral flow device (LFD) tests across various sectors in England up to and including 26 May 2021

Nurseries, primary schools, secondary schools and colleges have registered the greatest number of tests used as at 26 May 2021

Distribution			
Dispatch channel	Start date for test dispatch	Number of LFD tests dispatched	
Community testing	October 2020	21,571,850	
Higher education	October 2020	8,607,497	
Private sector workplace testing	November 2020	56,163,071	
Public sector workplace testing	November 2020	14,128,767	
Nurseries, primary schools, secondary schools and colleges	November 2020	241,007,658	
NHS	November 2020	107,310,553	
Adult Social Care	November 2020	78,031,654	
Universal Offer ¹	February 2021	159,676,960	
Other known settings	October 2020	4,263,914	
Total		690,761,924	

Registration			
Sector	Date tests became available to the sector	Number of tests registered as used	Number (%) of registered test results that are positive
Community testing	October 2020	6,695,624	60,437 (0.90)
NHS Staff	16 November 2020	15,563,625	50,496 (0.32)
Care homes	16 November 2020	10,522,558	23,898 (0.23)
Education			
Higher education	30 November 2020	1,613,044	3,915 (0.24)
Nurseries, primary schools, secondary schools and colleges ^{2,3}	18 January 2021	50,735,822	49,197 (0.10)
Workplace testing⁴			
Private sector	08 February 2021	1,569,408	2,815 (0.17)
Public sector	08 February 2021	866,012	1,108 (0.13)
Other known settings	November 2020	345,793	2,062 (0.60)
Other unknown settings	November 2020	9,701,162	29,718 (0.31)
Total⁵		96,334,294	222,880 (0.23)

Figure 5 *continued*

Roll-out of asymptomatic testing using lateral flow device (LFD) tests across various sectors in England up to and including 26 May 2021

Notes

- 1 Universal offer refers to everyone in England being able to take a free rapid coronavirus test twice a week. It comprises tests distributed through pharmacies, community collect, and regional, local and surge testing sites and home test kit requests.
- 2 Asymptomatic testing was made available to staff of schools-based and maintained nurseries on 18 January 2021. Private, voluntary and independent nurseries, childminders and wraparound care providers from 22 March 2021.
- 3 The NHS Test and Trace Service considered using LFD tests as an alternative to self-isolation for contacts of confirmed COVID-19 cases. It decided against this in January 2021 following concerns raised by the Medicines and Healthcare products Regulatory Agency. This approach is now undergoing trials for effectiveness.
- 4 Roll-out based on number of employees (Figure 3). Free LFD tests available for employees until July 2021. As of 12 May 2021, no decision had yet been taken on the policy for employer testing; currently available until July.
- 5 Figures for number of tests used and positive test results sum to more than the total row, which is drawn from published data. Figures for individual settings come from a mixture of different published and internal data sources, which do not sum to the total.
- 6 Tests distributed via one channel could have been registered against a different channel, for example home delivery channel tests can be used by school bubbles or workplaces. It is therefore not possible to directly map distributed tests to registered tests or calculate the percentage of distributed tests that have been used, for individual channels.

Source: National Audit Office analysis of stakeholder meeting notes and the NHS Test and Trace Service documents, internal information and published statistics

1.15 Several stakeholders have voiced their concerns over the wider use of LFD tests in the community and their perceived high risk of false negatives, which could provide false assurance to those testing negative. As noted in Figure 4, LFD tests are more sensitive when viral load is high and people are most likely to be infectious, and relatively less sensitive when viral load is low. The Medicines and Healthcare Regulatory Agency has approved the use of LFD tests to identify asymptomatic cases and NHST&T considers LFD tests useful for identifying additional COVID-19 cases from asymptomatic individuals that would not otherwise have been tested and identified. NHST&T is clear that LFDs are not a replacement for PCR tests, and individuals with symptoms should continue to get a PCR test.

Challenges with mass testing

1.16 Sector representative bodies we spoke to voiced common challenges they faced around mass testing.² These included:

- local bodies did not always receive relevant or timely data. For instance, home care employers told us they did not receive information on what proportion of their staff had taken tests and reported the results to NHST&T, and tracing data reported by universities went to the national contact tracing system before being shared with local public health staff. Local authority representatives said that they are not always told in advance about testing taking place in their area (for example at workplaces) which made it difficult to ensure there were resources in place to support the cases that were identified. They also noted that each time a new approach to testing was introduced (for example in schools or for international travellers) they had to make the case to be given access to the data, rather than being included in the planning.
- tracing often fell to staff of local bodies, and the additional time and effort required put a strain on resources; which may not be sustainable in the long term; and
- risk of low uptake of testing. This may relate to poor communications and concerns around the efficacy of tests. A positive result requires self-isolation with limited financial support, which may be a disincentive, particularly for those on lower incomes.

Wastewater testing

1.17 Testing wastewater allows NHST&T to identify areas with COVID-19 cases (including new variants) without relying on individuals to take and record the results of tests. Wastewater monitoring is therefore useful for monitoring total COVID-19 levels, including asymptomatic cases and symptomatic cases where individuals have not taken a test. Testing takes place at sewage treatment works, network sites within cities (for example, manholes) and at a number of near-source sites including prisons, managed quarantine facilities and food preparation sites. A national monitoring programme is now in place that samples and tests wastewater from every region, covering approximately 70% of the population of England. Where COVID-19 is identified, this can be followed up with more targeted local testing. The wastewater monitoring work is led by the JBC and delivered as part of its £1.1 billion budget in 2021-22.

² These include representatives of the following sectors: education, health and social care, employers, public health and local government.

Identifying and containing new variants

1.18 On 14 December, NHST&T announced the sequencing of a new variant of COVID-19, which was first identified in Kent in September and appeared to spread more rapidly than previous strains. Variant forms of COVID-19 may pose different levels of risk in terms of the transmission or severity of illness. As the impact of such variants became clear, NHST&T and partners across government started work on a strategy to identify and contain them. This strategy has three elements:

- **Minimising importation** through travel restrictions.
- **Detecting variants in the UK and containing them.**
- **Considerations about when and how to procure new vaccines.**
NHST&T contributes intelligence on the level and type of variants but is not otherwise involved in this work.

Minimising importation

Quarantine and testing for international travellers

1.19 Government imposed restrictions on international travellers entering the UK from 15 February 2021. NHST&T supports this work by processing test kits and providing telephone support to travellers from lower-risk countries, who are required to quarantine at home. All travellers must carry out two PCR tests. If these tests are positive, their quarantine is extended, and the results are screened for variant forms of COVID-19. NHST&T also traces the contacts of international arrivals who test positive, which it told us can involve large numbers per case. The JBC has risk-assessed more than 250 countries and territories, to inform ministerial decisions on red, amber and green list countries and the associated border measures.

Screening for variants

1.20 NHST&T has two methods to screen for new variants of COVID-19: genomic sequencing and the use of a reflex assay. Genomic sequencing sequences the genetic material in the virus. This information can be used to identify and track the spread of variants and to understand the properties of the different variants (for example, whether vaccines are likely to be effective against them and whether they are likely to be more or less transmissible than other variants). In May 2021 genomic sequencing took on average 6.4 days from the point at which the test was taken to providing the result. Laboratories also use an ‘early variant calling’ algorithm to flag where a test contains any known variant. Early variant calling provides an indicative result and automatically alerts the tracing team within six days for 90% of viable tests. NHST&T prioritises tests from the NHS and international travellers: it aims to provide results for samples from the NHS within four days (and in the near-term within two days), and international travellers’ tests should have an early variant call within 96 hours and full sequencing within 144 hours. The reflex assay screens test samples against a shortlist of identified variants and can provide results within 48 hours. Both methods are now used to screen all viable positive test samples. Not all samples are viable: they may not contain enough material for screening to be carried out.

1.21 Genomic sequencing in the UK is coordinated by the COVID-19 Genomics Consortium. This brings together government bodies, laboratories and UK public health bodies, participating universities and others. NHST&T collects the samples through its testing programme and the NHS collects samples from those people in hospital. These are then processed and analysed by NHST&T-contracted laboratory providers, including the Wellcome Sanger Institute, and the public health agencies of the four nations. This overall genomic sequencing has made a significant contribution to international efforts to track new variants of COVID-19. As at 22 June around 30% of the logs for new variants shared among the international community have been provided by the UK, making it the largest single contributor.

Detecting and containing variants in the UK

1.22 From 1 February 2021, the government started carrying out surge testing, working with local authorities in areas where COVID-19 variants had been detected. Surge testing is carried out using PCR tests, with positive tests sent for genomic sequencing. The aim is to monitor and suppress the spread of new variants. As of 21 April 2021, surge testing had been undertaken in 32 local authorities and was currently ongoing in seven.

1.23 The approach to surge testing has evolved since February. Initially, it was focused on door-to-door testing within affected postcodes. NHST&T now seeks to make more use of intelligence-led testing and local authorities' knowledge. Local authority sector representatives told us that in general data for testing and contact tracing had improved. However, some challenges remained, for example, getting access to information about which individuals have contracted variant strains of COVID-19, and receiving routine testing data (including on uptake of testing in different communities or settings) which would allow them to identify hotspots more quickly.

1.24 By April 2021, 219,735 cases of variants had been identified, of which 99.7% related to variants first identified in the UK (with 99% of these being the 'Kent variant'). In addition, by that date, there had been 670 cases of the variant first identified in South Africa, 132 cases of the variant first identified in India, and 119 cases of the variant first identified in Brazil.

Developing partnership working with local authorities

1.25 In November 2020, NHST&T concluded that its approach would benefit from being less centralised. Its December 2020 business plan outlined a key objective to strengthen its partnerships with local authorities and allow more local direction and control over testing and tracing. We set out above how local authorities' role has expanded in relation to testing (paragraphs 1.13, 1.14 and 1.22 to 1.24).

1.26 Since the end of October, the number of local authority-run tracing schemes has increased. As of March 2021, 149 of 151 upper tier local authorities had a local scheme compared with 60 in October. Initially, only complex cases that the national service could not reach were passed over to local authorities, but more routine cases are now also passed to them. NHST&T provides training, resources and funding to support local authorities. Since March 2021, it has also been piloting the Local Zero scheme whereby local authorities undertake all contact tracing in their area.

1.27 In the interim report, we noted that NHST&T intended to replace the existing contact tracing software system (CTAS) in January 2021. As of May 2021, it had begun to roll out the new Integrated Trace System (ITS). On 30 April 2021, a local authority flagged concerns about low numbers of cases being passed to it for contact tracing. Further investigation by NHST&T uncovered a system error which meant that 789 cases across eight local authorities had been mistakenly transferred to ITS, rather than CTAS for contact tracing. This led to a delay in tracing contacts for about half the cases who were still within the 10-day isolation period. For the other half, beyond the 10-day isolation period, contacts were not traced, unless the case tested positive for a variant of concern. As per standard procedures, these cases were passed to the local PHE team for follow-up and tracing. NHST&T told us it had resolved the error and was now making a number of improvements to the process, including proactively monitoring the flow of cases into the contact tracing system, which it planned to implement by 21 June.

1.28 Local government representatives we spoke to said that general engagement and data-sharing had improved between NHST&T and local authorities, but that challenges remained. They highlighted difficulties with securing access to data for mass testing (paragraph 1.16) and testing uptake for surge testing (paragraph 1.24). NHST&T continues to work to improve access to data for local authorities and now provides data on positive test results including detailed demographic and other information for positive cases. It has recognised the need to continue to develop its approach to share data faster, more widely and more easily, with local authorities and others. Local government representatives also raised concerns with us about a lack of clarity and understanding about local roles and responsibilities, delays in the national service passing over responsibilities to local authorities, and multiple un-coordinated pilots and funding streams for local authority activity.

The NHS Test and Trace app

1.29 NHST&T launched its NHS COVID-19 app in September 2020, which includes contact tracing features. This followed earlier efforts by NHSX to build the app in-house, which had been abandoned on 18 June. In 2020-21, £76 million was spent on the app, including spend by NHSX. There are two ways the app can alert people that they have been near someone tested positive for COVID-19:

- **Contact tracing:** The app uses Bluetooth to know when it has come into close contact with another device that is running the app. If the users of those nearby devices later test positive for coronavirus and report it on the app, the app receives an alert with advice on what to do (for example, self-isolate or get a test). It does not identify individuals and no data are passed to the national or local contact tracing systems.

- **Venue check-in:** When an app user checks into venues using the app and official NHS QR code posters, these data are held on their phone. If people who were there on the same day later test positive for coronavirus, the app user may get an alert. The venue check-in feature works independently of the contact tracing feature.

1.30 By 28 April 2021 in England and Wales the app had been downloaded 23.3 million times, and it had sent 1.8 million contact tracing alerts in England. In the week beginning 22 April, 16.0 million people had the app fully or partially enabled on their phone (which is one of several methods used to estimate how many people are regularly using the app). NHST&T funded an external assessment on the app’s effectiveness which estimated, based on a number of assumptions, that it may have prevented 100,000 to 900,000 cases from October to December 2020.³ There were 1.89 million COVID-19 cases confirmed by a test over that period. More detail of this assessment is at paragraph 3.27.

1.31 By the same date, venues in England and Wales had created 876,037 QR code posters to allow people to check in to venues using the app. It had been used to check in 119.6 million times in England (including around 14 million since the reopening of hospitality businesses from 12 April). Across England and Wales, 304 venue alerts had been sent out (including 22 since 12 April).

Supporting self-isolation

1.32 The support available to people asked to self-isolate has been increased since autumn last year, and work is underway to identify what else could be done. From September 2020, individuals who meet a specific set of criteria became eligible to claim a £500 payment to support them to self-isolate. In addition, NHST&T provides a discretionary amount that local authorities can distribute to those outside of the prescribed criteria. This was set at £15 million per month for all local authorities, which increased to £20 million per month from February 2021. The scheme, which had been due to close on 31 January, has been extended “into the summer”. In March 2021, the scope of the scheme was extended to include parents and guardians of children asked to self-isolate.

1.33 In March 2021, NHST&T launched a medicine delivery service to support people self-isolating and allocated £3.2 million per month to deliver the provision. NHST&T also provides funding and evaluation tools for 14 pilots examining other ways to increase support to people self-isolating. These pilots are expected to complete in summer 2021.

³ The analysis was carried out by researchers from the University of Oxford and the Alan Turing Institute. Two methods were used to estimate the number of cases prevented: one estimated 284,000 and the other 594,000.

Part Two

Funding and spending for test and trace

Overview of funding and spending

2.1 In this section, we report on NHS Test and Trace Service's (NHST&T's) funding and spending, based on unaudited management data. The National Audit Office is currently undertaking the financial audit of the Department of Health & Social Care (the Department), which includes NHST&T. The Department expects to publish its audited accounts later in 2021. The data in this report may differ from audited data included in the Department's annual accounts for 2020-21. Where this is the case, the audited figures should be preferred.

Funding and spending in 2020-21

2.2 Following additional funding in the November 2020 Spending Review, the government allocated a total of £22 billion for NHST&T in 2020-21. By the end of March 2021, NHST&T had spent £13.5 billion (**Figure 6**). Of this, £10.4 billion (77%) was on testing, including £4.2 billion on mass testing and £3.1 billion on laboratories and associated costs. NHST&T had also spent £1.8 billion (13%) on 'contain' activities (to identify local COVID-19 outbreaks and support local responses to the pandemic), and £0.9 billion (7%) on tracing activities.

2.3 In 2020-21, NHST&T underspent its budget by £8.7 billion, or 39%. Testing, in particular asymptomatic lateral flow device (LFD) testing, and laboratories and associated costs accounted for most of the underspend (£7.9 billion, 91% of underspend). NHST&T told us that a high level of forecast demand for tests in January and February did not materialise, in part, due to the introduction of the national lockdown and other measures from December. In addition, the roll-out of LFD tests for asymptomatic testing initially planned in January did not start until March due to national lockdown and eventual uptake was much lower than expected. NHST&T told us that £2.2 billion savings from its improved contract management and procurement have also contributed to the underspend. This include around £1 billion through price or rate reductions and some £1 billion through cancelled project or reductions in committed volumes.

Figure 6

The NHS Test and Trace Service 2020-21 budget and spend, by main programme area

The NHS Test and Trace Service underspent £8.7 billion in 2020-21 against a budget of £22.2 billion, due mainly to a £7.9 billion underspend on testing activities

Programme area	2020-21 Budget	2020-21 Spend	Variance
	(£m)	(£m)	(£m)
Joint Biosecurity Centre	108	59	49
Corporate services	456	135	321
Contain ²	1,719	1,779	(60)
Digital and data	386	155	230
Innovation and partnerships	19	22	(3)
Testing, made up of: ³	18,331	10,431	7,900
Mass testing	7,560	4,205	3,355
Pillar 1 – NHS swab	841	424	417
Pillar 2 – community, delivery, channels, supply chain and logistics	1,444	1,205	239
Pillar 3 – antibody testing	220	36	184
Pillar 4 – prevalence surveys	920	772	148
Community (local authority-led) testing	820	228	592
Laboratories	5,691	3,145	2,546
Supply and logistics	835	411	424
Testing – other	0	4	(4)
Tracing	1,100	911	189
Trace app	76	35	41
Total	22,194	13,527	8,667

Notes

- 1 Figures are based on internal financial reports and have not been audited. Figures may not sum due to rounding.
- 2 'Contain' refers to activities to identify local COVID-19 outbreaks and support local responses to the pandemic.
- 3 Swab, or PCR (polymerase chain reaction) tests are organised under several 'pillars': Pillar 1 comprises tests processed by NHS and Public Health England laboratories, primarily for NHS staff and patients with a medical need. Pillar 2 comprises tests processed by lighthouse and other public, private and academic laboratories primarily for the wider population, including care homes. Pillar 3 is antibody testing. Pillar 4 refers to the Office for National Statistics survey to ascertain the prevalence of COVID-19 in the population. Mass testing refers to the roll-out of lateral flow device (LFD) tests: unlike PCR tests, which require processing in a laboratory, these give results within 30 minutes.

Source: National Audit Office analysis of the NHS Test and Trace Service financial information

2.4 Out of its total spend, NHST&T paid out grants totalling £2.2 billion to local authorities for various activities. Most of this grant funding, £1.7 billion, was for ‘contain’ activities: this accounted for nearly all of NHST&T’s £1.8 billion spend on such activities. NHST&T also provided £176 million for test and trace support payments, and £13 million for practical support for self-isolation. It paid £149 million for rapid testing in adult social care, £121 million for community testing, and £3 million to 27 local areas for surge testing.

2.5 In November 2020, NHST&T set out a business case for increasing its budget by £10 billion to £22 billion for 2020-21, as allocated in the 2020 Spending Review. The additional funding was intended to support the establishment of mass population testing (primarily through LFD tests), with an expansion in the number of tests to 2.5 million to 4.5 million tests a day from December 2020. The majority of this funding, £4.2 billion, was for testing supplies such as test kits, followed by laboratory processing (£1.1 billion), logistics (£729 million), and digital, call centre and marketing (£689 million).⁴ The business case described mass testing as the next stage of NHST&T’s development, furthering its aim to reduce transmission of the virus, thereby resulting in fewer infections, hospitalisations and deaths, and allowing society and the economy to reopen and remain open. It noted that “mass testing, driven by new technologies, may be faster than creating a vaccine or an anti-viral drug, and may help to avoid lengthy and costly lockdowns”. A third national lockdown in England started on 4 January 2021, with restrictions eased in stages from 8 March 2021.

Budget and plans for 2021-22

2.6 The November 2020 Spending Review allocated £15 billion to NHST&T for 2021-22. As of May 2021, NHST&T was working to a planned budget of £14.2 billion, which is reliant on achieving efficiency savings of £2.9 billion. It told us that HM Treasury had made an accounting adjustment of £807 million to its Spending Review allocation of £15 billion.⁵ NHST&T was planning to request that this is added back to bring its budget up to the originally notified £15 billion.⁶ It anticipated spending £13.1 billion, 73% of the budget, on testing, including £4.7 billion on mass rapid-result testing, £3.8 billion on laboratory costs and £3.6 billion on laboratory-processed tests (**Figure 7**). However, there remain many uncertainties about the future course of the virus and the consequences for test and trace services and spend. NHST&T also flagged the risk of additional spending of around £3.4 billion. This reflected the possibility of higher transport and storage costs if more LFD tests than forecast are needed, particularly if these are imported from outside the UK, as well as contract costs related to mass testing.

4 The business case also included an adjustment for optimism bias of £2.3 billion.

5 NHST&T told us that under HM Treasury guidelines, the stock purchases are accounted for as capital spend with consumption reflected as revenue spend. NHST&T estimated a 2021-22 year-end stock value of £140 million, £1,260 million lower than the opening stock value of £1,400 million. This creates an overall negative capital budget value of £807 million in 2021-22, net of other capital spend of £454 million. This was offset against the published £15 billion budget.

6 Assuming no major policy changes, HMT expects expenditure to remain within the allocation provided to NHST&T in 2021-22.

Figure 7

Estimated budget for the NHS Test and Trace Service for 2021-22, by main programme areas, as at May 2021

The NHS Test and Trace Service has a forecast spend of £17.9 billion for 2021-22 but it plans to make £2.9 billion worth of savings

Programme area	2021-22 Budget (£m)
Joint Biosecurity Centre	1,117
Corporate services	1,779
Contain ²	848
Testing, made up of: ³	13,077
Mass testing	4,696
Swab testing, delivery, supply and logistics and antibody testing	3,597
Laboratories	3,812
Community testing	420
Testing – other	553
Tracing	749
Contingency	322
Required efficiency savings (reductions in spending)	-2,891
Spending Review allocation	15,000
Treasury adjustment (reduction in budget)	-807
Total budget	14,194

Notes

- 1 Figures are based on internal plans, as at May 2021. Figures may not sum due to rounding. Cost categories differ from those used for 2020-21 budget and spend in Figure 6.
- 2 'Contain' refers to activities to identify local COVID-19 outbreaks and support local responses to the pandemic.
- 3 Swab, or PCR (polymerase chain reaction) tests require processing in a laboratory and were the primary test in use prior to November 2020. Mass testing refers to lateral flow device (LFD) and other rapid-results tests: these do not require processing in a laboratory and give results within 30 minutes.
- 4 Corporate costs relate to chief executive officer, chief operating officer, customer, commercial, finance, information and policy functions.

Source: National Audit Office summary of the NHS Test and Trace Service internal information

Contract spend and management

2.7 By the end of March 2021, the Department had signed 964 contracts with 454 suppliers across the private and public sector for activity related to NHST&T (**Figure 8**). The total value of the contracts was £14.1 billion. Testing accounted for £12.7 billion, or 90% of the total contract value. Tracing accounted for £1 billion, 7% of the total contract value. Ten of the largest suppliers account for more than half (£7.3 billion, 52%) of the total contracts value (**Figure 9**).

Figure 8

Number and value of contracts signed by the NHS Test and Trace Service by programme areas, as of the end of March 2021

Ninety percent (90%) of contracts by value are for COVID-19 testing including supply of test kits, testing equipment, consumables, laboratories, logistics and new testing technologies such as lateral flow device testing kits

Category	Total number of contracts	Percentage of total number of contracts	Total value of contracts	Percentage of total value of contracts
		(%)	(£m)	(%)
Test	549	57.0	12,695	90.4
Trace	88	9.1	998	7.1
App	93	9.6	67	0.5
Joint Biosecurity Centre	29	3.0	37	0.3
Contain	7	0.7	5	0.0
Technical/Corporate	198	20.5	248	1.8
Total	964	100	14,051	100

Notes

- 1 These contracts include seven contracts with zero committed values.
- 2 Test contracts include contracts for testing infrastructure, laboratories, new testing technology, for example, lateral flow device testing, and testing related consumables, reagents and equipment. Technical/corporate contracts include contracts for the Chief Information Officer function, operations, finance, customer, commercial, people, medical advisor and policy programme areas.
- 3 There are 271 contracts with a total value of £1.3 billion for professional services. These contracts cover services across different programme areas and are included in the relevant programme areas. We also identified an additional £130 million of contract value which was not included in this analysis due to data issues.
- 4 There are 454 suppliers to the 964 contracts as many suppliers have multiple contracts with NHS Test and Trace.
- 5 In addition to the initial contracts, there have been 166 extensions to 117 contracts and 85 variations to 62 contracts.
- 6 Percentages may not add up to 100% due to rounding.

Source: National Audit Office analysis of contracts data provided by the NHS Test and Trace Service

Figure 9

The 10 suppliers with the total highest contract values signed by the end of March 2021

The total value of contracts for the 10 suppliers with the total highest contract values is £7.3 billion

Supplier name	Programme area	Contract value (£m)
Innova Medical Group Inc	Testing – lateral flow device test kits	3,196
Office for National Statistics	Testing – infection prevalence surveys	637
Life Technologies Limited	Testing – laboratory equipment and consumables	626
Serco Limited	Testing and tracing – contact tracing and test sites	623
Randox Laboratories Limited	Testing – laboratory infrastructure	522
Royal Mail Holdings PLC	Testing-Logistics	396
Medacs Healthcare PLC	Testing-Workforce	350
Tanner Pharma UK Limited	Testing-lateral flow device test kits	348
Optigene Limited	Testing – supply of machines and tests	323
Deloitte LLP	Testing, tracing and workforce – professional consultancy services, digital and technology	298
Total		7,318

Notes

- 1 Contract durations and payment terms vary. Some of the contracts cover financial years 2021-22 and beyond. We have not reviewed the individual contracts listed.
- 2 The actual spending on these contracts may be greater or smaller than what is reported here.
- 3 Figures may not sum due to rounding.

Source: National Audit Office analysis of contracts data provided by the NHS Test and Trace Service

2.8 Of the £14.1 billion total contract value, £7.5 billion (or 53% of the total contract value) was awarded directly under emergency regulations without competition, while £3.4 billion was awarded under existing frameworks and £3.1 billion through other routes (**Figure 10** overleaf). NHST&T let, extended or varied fewer contracts using emergency regulations in the period January to March 2021 (28 contracts or 6% of contracts), than in April to June 2020 (51 contracts, or 46% of contracts) (Figure 10). Over the same timeframe, the value of contracts let, extended or varied under emergency regulations decreased as a proportion of all contracts (from 76% down to 52%), but the absolute value more than doubled (from £1.1 billion to £2.6 billion). The increase in the absolute value was mainly due to a £1.9 billion contract for LFD test kits with Innova Medical Group Inc awarded in the period January to March 2021.

Figure 10

Value and number of new contracts, contract extensions and variations, by award route and date of contract signature up to March 2021

The NHS Test and Trace Service has reduced the number of contracts it awarded under emergency regulations since April to June 2020, but the reduction in the value of these contracts is much smaller

Value of new contracts, contract extensions, and variations (£m)						
	2019-20	2020-21				
	Before April 2020	April to June 2020	July to September 2020	October to December 2020	January to March 2021	Total value of contracts
Call off from framework	6	244	747	1,104	1,337	3,445
Direct award under emergency regulation	216	1,051	1,905	1,768	2,565	7,504
Other	0	81	680	1,349	992	3,102
Total	222	1,376	3,332	4,221	4,893	14,051
Proportion under emergency regulation	97%	76%	57%	42%	52%	53%

Number of new contracts, contract extensions and variations						
	2019-20	2020-21				
	Before April 2020	April to June 2020	July to September 2020	October to December 2020	January to March 2021	Total value of contracts
Call off from framework	9	36	94	235	327	703
Direct award under emergency regulations	8	51	45	58	28	190
Other	2	24	32	116	148	322
Total	19	111	171	409	503	1,215
Proportion under emergency regulation	42%	46%	26%	14%	6%	16%

Notes

- 1 The NHS Test and Trace Service can award its contracts through several different routes, including through framework agreements in place with the Government with or without bidding, direct awards to firms and partners under the power of emergency Regulation 32, or variations to existing contracts under Regulation 72. It also contracts with other Government or public bodies under arrangements such as memoranda of understanding and grants.
- 2 The award route can differ for the initial contract and any subsequent extensions or variations. Because of this, the table breaks down value and number of contracts separately for initial contracts, contract extensions and variations. The number of contracts total to more than the number of initial contracts, as shown in Figure 8.
- 3 Other includes grants, memoranda of understanding with other public bodies such as Office for National Statistics and universities, single-source contracts, public to public collaboration under Regulation 12 and contracts awarded under Regulation 14 as well as variations under regulation 72. It also includes directly awarded contracts with small (subthreshold) values awarded directly without competition.
- 4 Two contracts let off framework without commencing and signatory dates with a total value of (£6 million) are not included in the table.
- 5 Two contracts with an associated value of £6 million could not be allocated to a financial quarter, but are included in the overall totals. The quarterly figures in the 'call off from framework' and 'total' rows therefore do not sum to the total.

Source: National Audit Office analysis of contracts data provided by the NHS Test and Trace Service

2.9 NHST&T told us that given the emergency nature of the initial response and the need to scale up operations at speed, it had to use the private sector to respond quickly under power of the emergency regulation. The emergency arrangements bring risks to value for money due to a lack of competition and normal regulatory processes. However, for some contracts, NHST&T told us that there was only one possible supplier. This was the case for the Innova Medical Group Inc contract (paragraph 2.8), which was at that time the only supplier of LFDs for self-test approved by the Medicines and Healthcare products Regulatory Agency (MHRA). NHS T&T has put in place a more structured approach to contract management. For all contracts, teams must record a procurement strategy which includes justification for the route to market. This is then subject to review and approval by the NHST&T Approvals Secretariat, overseen by the Director of Commercial Operations.

Capacity and utilisation

2.10 In March 2021, the Committee of Public Accounts reported that a combination of challenges in matching supply and demand for NHST&T’s test and trace services and the inflexibilities in some of its contracts had led to either sub-standard performance or poor utilisation of the capacity it had paid to put in place. NHST&T needs to manage the balance between having spare capacity to meet unexpected surges in demand for services and making efficient use of its resources to deliver value for money. Below, we examine available information on capacity and utilisation across the test and trace process.

2.11 NHST&T told us that, between September and November 2020, it put in place a team with commercial and contracting expertise drawn from across government to strengthen its contract and operational management. Since November, it has built more flexibility into its contact centre contracts to allow NHST&T to adjust capacity. For example, it increased the amount by which it can adjust capacity from 20% to 25% and reduced the notice periods.

Laboratories and testing sites

2.12 NHST&T uses a variety of in-person and other routes to collect polymerase chain reaction (PCR) tests, alongside different types of laboratories to process them, including Lighthouse laboratories, partner laboratories and surge laboratories.⁷ At the end of April 2021, NHST&T was operating 1,756 testing sites (excluding 500 mobile and satellites testing sites) and nine Lighthouse laboratories. NHST&T has also commissioned one high-capacity ‘mega-laboratory’, which is not yet operational.

⁷ To scale up testing capacity, NHST&T built new “lighthouse laboratories” to process COVID-19 PCR tests, in partnership with universities, the NHS and commercial sectors across the country. It also established a new large-scale “mega lab” at Leamington Spa. Partnership laboratories are those laboratories which NHST&T does not own but has contracted with to process PCR tests on its behalf.

2.13 In February 2021, NHST&T estimated that the average end-to-end cost for a PCR test varied from £17 for samples collected through satellite sites and processed at Mega-labs to £52 for samples collected by local test services and processed at Lighthouse laboratories⁸. However, this assumed activity levels at testing sites and laboratories is in line with forecast capacity. As actual activity has been much lower than forecast capacity, the actual unit costs are likely to be higher than these estimates.

Testing sites

2.14 For in-person tests, NHST&T operates regional and local sites on a fixed basis, as well as setting up mobile test units in response to requests from local authorities. NHST&T has not set a target level of utilisation for these regional and local test sites, and on average, only around one-quarter of their capacity has been used (**Figure 11**).

Laboratories

2.15 NHST&T successfully expanded the total theoretical processing capacity for PCR tests from 500,000 per day at the end of October to 800,000 by January 2021 (**Figure 12** on page 38).⁹ For its laboratory capacity, NHST&T sets a threshold utilisation rate of 80% of its maximum daily testing capacity, beyond which a laboratory does not operate safely or reliably (**Figure 12** on page 38).¹⁰ NHST&T does not have a target utilisation rate for laboratories. In 2020-21 it aimed to have sufficient capacity to respond to a peak in infections on any day. Between November 2020 and April 2021, the average utilisation rate for laboratories was 45%, well below the recommended rate. It has fallen within this period too, from 53% between November and January to 38% between February and April. Between October 2020 and March 2021, average utilisation was 60% for Lighthouse laboratories and 26% for non-Lighthouse laboratories, which include partner laboratories. NHST&T is working with laboratory suppliers to update contracts and intends to close those that it no longer needs, including exiting all partner laboratories.

Contact tracers and call handlers

2.16 NHST&T outsources a range of contact centre services, primarily for tracing cases and contacts, as well as monitoring people who are self-isolating and staffing the 119 helpline. The national tracing service provides a central pool of telephone staff, alongside text, web and email communications. Its tracers are made up of health professionals who make initial contact with people testing positive (Tier 2) and call handlers who follow up with their identified contacts (Tier 3).

8 The unit cost includes cost for test kits, sample collection and courier costs, lab processing including reagents but does not include all costs associated with programme overheads and supporting functions, for example workforce, digital, call centre and marketing, or fixed or stepped costs (for example establishment of new facilities or fixed contractual costs for logistics). Different laboratories use different technologies, which also contributes to the differences in unit costs.

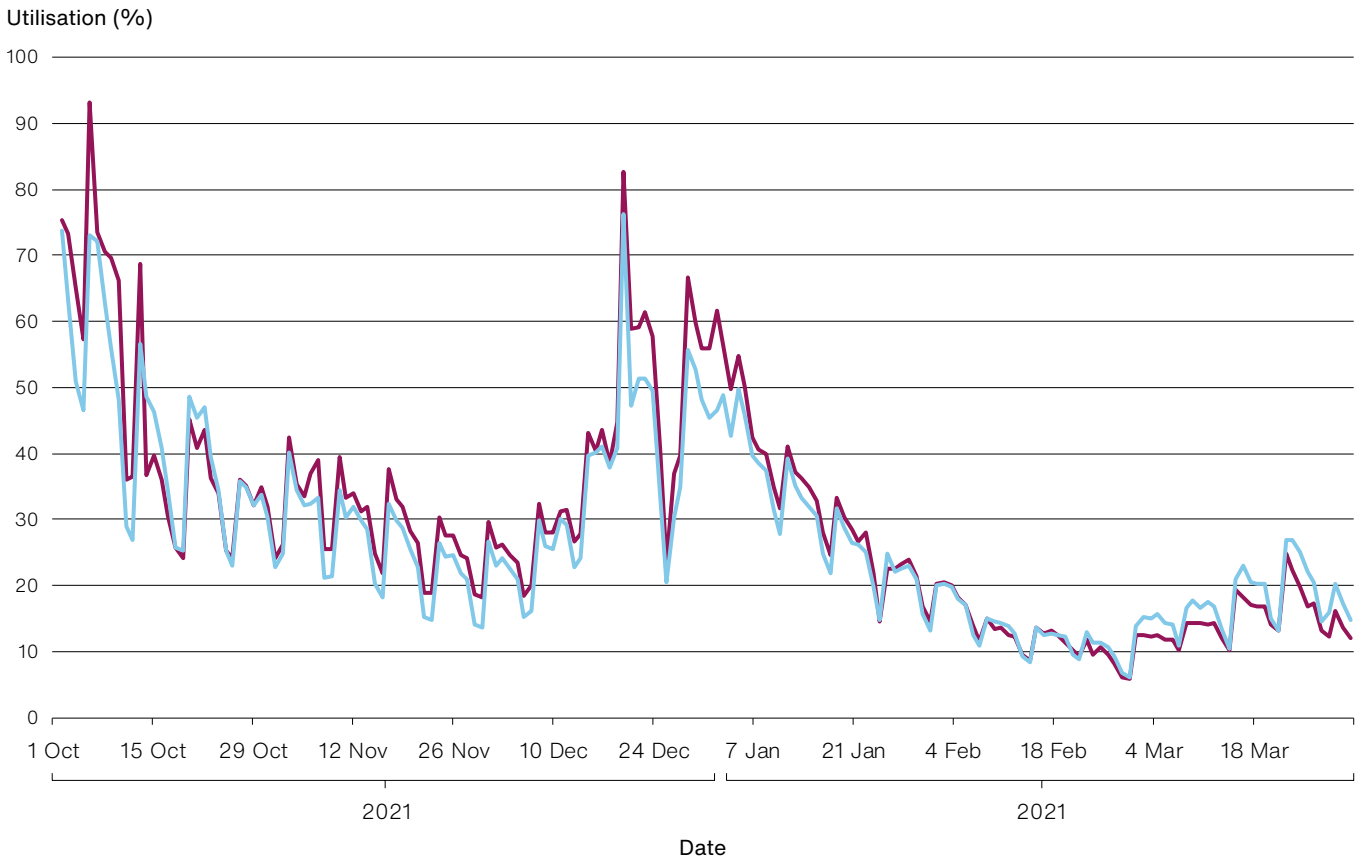
9 NHST&T manages all PCR laboratories on behalf of all UK nations. The total test capacity includes all PCR test capacities made available through NHST&T. When calculating the utilisation rate of PCR laboratories, we included all PCR tests carried out across the UK through NHST&T.

10 In our interim report published in December 2020, we noted that NHST&T recommends a utilisation rate of 85% of published capacity to ensure a safe and sustainable service.

Figure 11

Utilisation of COVID-19 test sites in England, 1 October 2020 to 31 March 2021

NHS Test and Trace Service’s regional and local test sites regularly operated at less than 30% of their capacity since mid-January 2021



- Regional test sites
- Local test sites

Notes

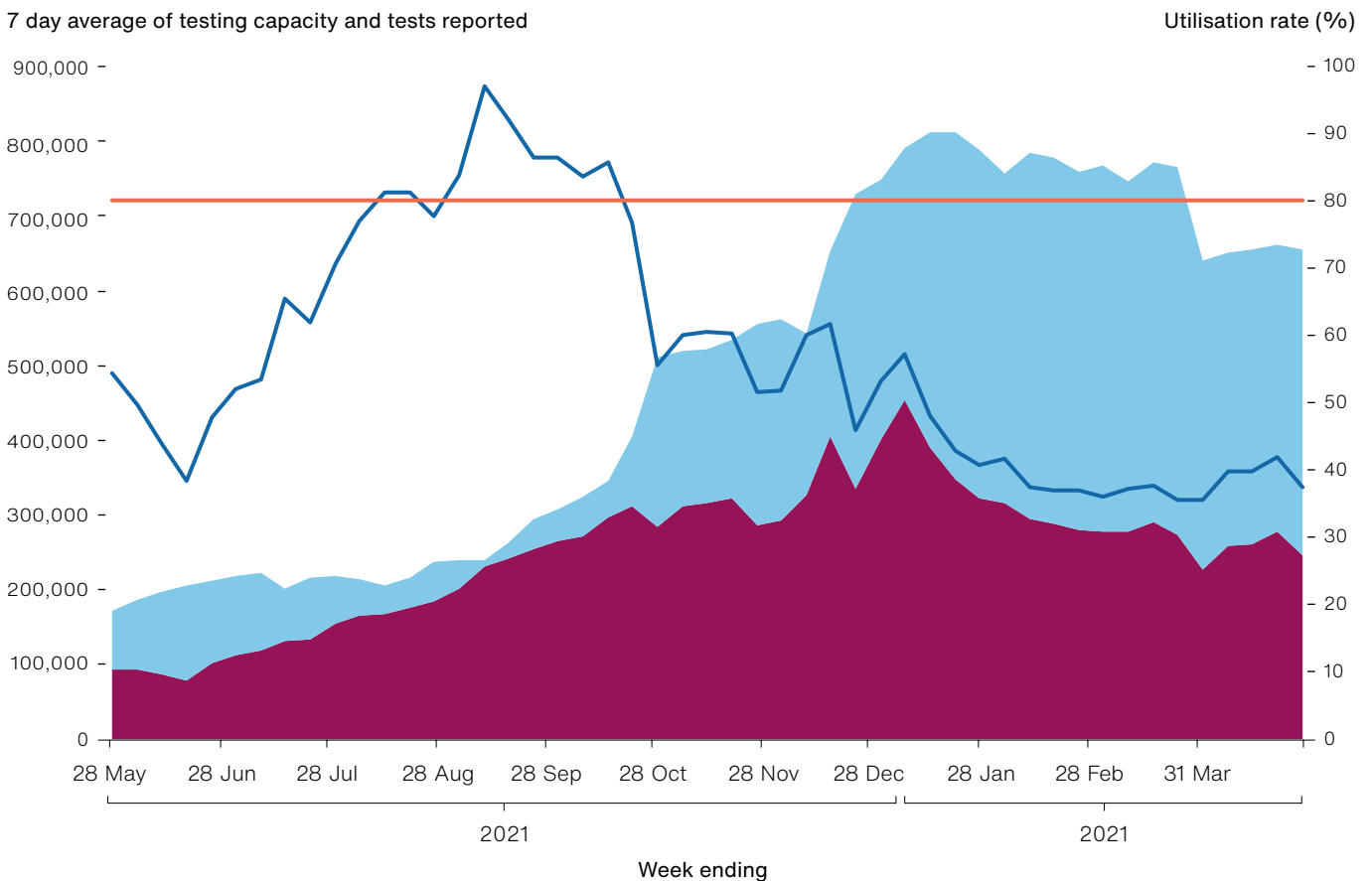
- 1 The NHS Test and Trace Service (NHST&T) collects test samples through its regional and local sites which are established on a fixed basis. These sites operate with a level of maximum daily capacity for sample collection agreed with NHST&T under contracts.
- 2 Utilisation rate is calculated by dividing the actual number of samples collected by the contracted maximum capacity.
- 3 NHST&T has not set a utilisation target for these sites.

Source: National Audit Office review of the NHS Test and Trace Service documents

Figure 12

Trends in COVID-19 polymerase chain reaction (PCR) tests capacity, the number of tests processed, and laboratory utilisation in the UK, 28 May 2020 to 5 May 2021

Between November 2020 and April 2021, the average utilisation rate of the theoretical PCR laboratory capacity made available was 45%, well below the safe utilisation threshold rate of 80%



- Number of daily reported PCR tests
- Theoretical laboratory capacity for PCR test processing
- PCR laboratory utilisation rate (%)
- The NHS Test and Trace Service recommended utilisation rate (80%)

Notes

- 1 PCR tests require processing in a laboratory and were the primary test in use for COVID-19 prior to November 2020.
- 2 PCR testing capacity is the seven-day daily average testing capacity reported by the NHS Test and Trace Service (NHST&T) laboratories for the corresponding period. It includes PCR capacities made available by NHST&T across the UK.
- 3 PCR laboratory utilisation rate is calculated by dividing the seven-day daily average number of tests carried out by the seven-day daily average theoretical capacity of laboratories for PCR tests across the UK.
- 4 NHST&T sets a threshold utilisation rate of 80% of its maximum daily testing capacity, beyond which a laboratory does not operate safely or reliably.

Source: National Audit Office analysis of the NHS Test and Trace Service weekly statistics and daily dashboards

2.17 NHST&T aims for its contact centre staff to work to an average utilisation rate of 50% (the percentage of paid time spent working). However, daily demand for tracing and other services, and resulting utilisation rates, vary substantially, as shown in **Figure 13** (overleaf). The utilisation rate across different services peaked at 49% at the beginning of January 2021, before falling to around 11% by the end of February, although it has since improved to between 17% and 37% (25% on average) between April and May. The unit cost per contact traced went up from around £5 in October to £47 in February when the utilisation rate was at its lowest. Overall, however, utilisation rates have remained well below the target rate of 50% between November 2020 and May 2021. NHST&T told us it is challenging to match available staff to demand due to the very variable demand, and uncertainty in forecasts of infection levels. It said the main reason for lower utilisation in this period was because the expected high volume of infections did not materialise. It has since reduced the number of Tier 3 tracers from 18,000 (full-time equivalents) in October to 13,200 by 15 February and 10,700 by 8 March. NHST&T told us that some service lines, for example call handlers tracing contacts of international arrivals, frequently had a utilisation rate above 70%, but its current system made it difficult to move call handlers between services. It also told us that it intends to put new contracts in place from September, which will allow contractors to switch call handlers trained to work between different services and use staff more efficiently.

Rapid-result LFD tests

2.18 Since October 2020, NHST&T has started the roll-out of rapid-result LFD tests, as part of its plans for regular testing for people without symptoms (paragraphs 1.12 to 1.16). By the end of March 2021, the Department had purchased around one billion test kits at the cost of around £3 billion. NHST&T has distributed a total of 691 million LFD test kits through a range of channels by 26 May.

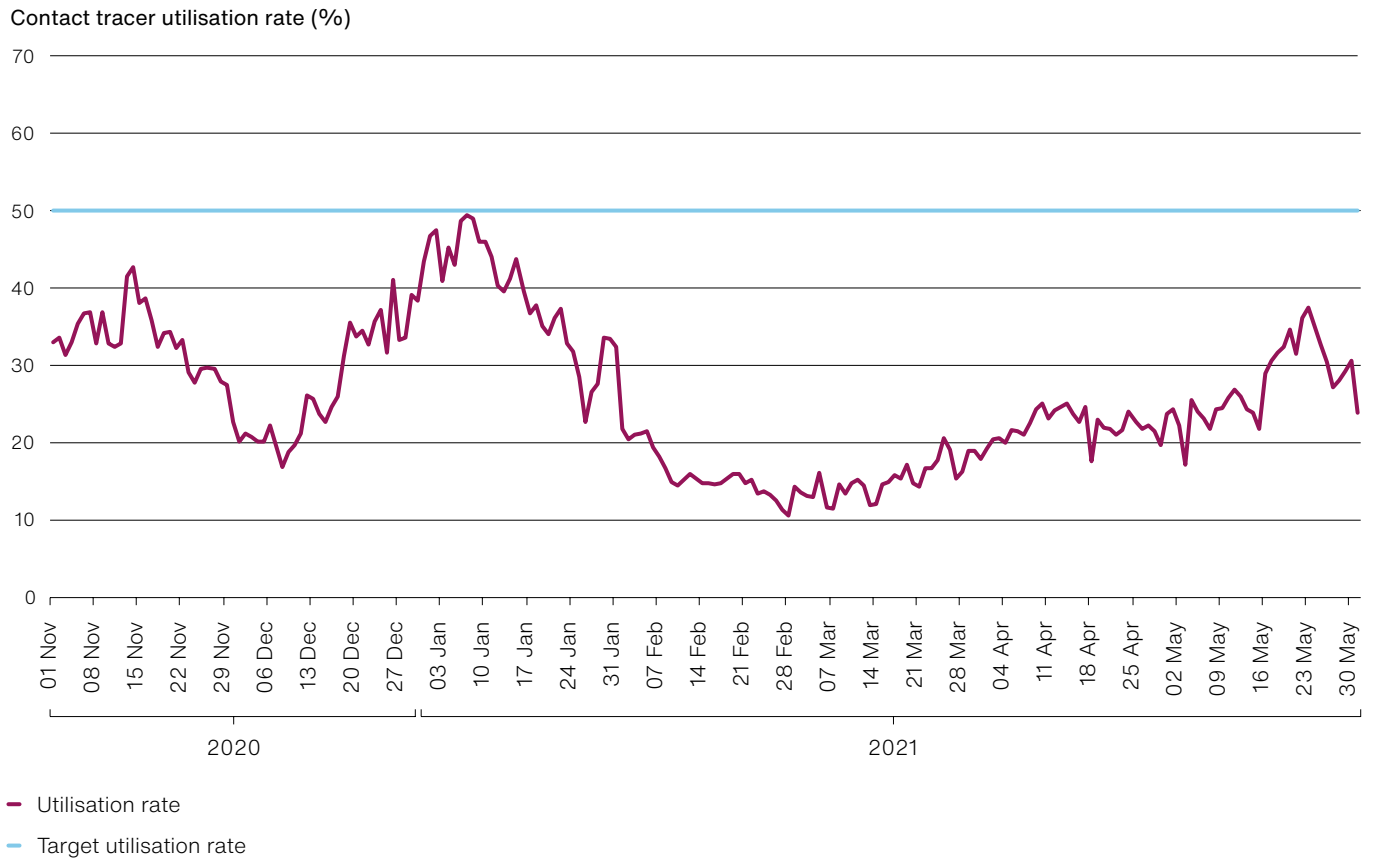
2.19 NHST&T assumed that up to 40 million people in England would be eligible for LFD tests, with a daily UK consumption of about six million when schools reopened on 8 March, rising to more than eight million a day towards the end of May. It forecast that between 1 March and 30 May, a total of 655 million LFD tests would be carried out across the UK.¹¹ However, the average weekly number of LFD tests carried out and reported to NHST&T in England has been below or around the forecast daily estimates, with 2.8 million per week between 31 December and 10 March, seven million before the Easter break, and 5.5 million between mid-April and the end of May, after tests were made available to everyone. The total number of LFD tests reported up to 26 May is 96 million, 14% of the 691 million distributed. It is not clear exactly how many other test kits have been used, because there is no system in place to monitor or ensure that everyone reports their test results once a test has been carried out. NHST&T told us that it believes a further 254 million tests could have been used but not registered and it is working to improve its dispatch and registration system to aid its understanding and close the gap.

¹¹ Adjusting for the population in England, this is equivalent to a forecast consumption of 550 million lateral flow device tests for England between 1 March and 30 May 2021.

Figure 13

Daily utilisation rates of national contact tracers and other contact centre staff in England, November 2020 to May 2021

The overall utilisation rates of contact centre staff have remained below the target of 50% between November 2020 and May 2021



Notes

- 1 Contact centre staff work on different services for the NHS Test and Trace Service (NHST&T) including tracing cases and their close contacts, including contacts of international arrivals, follow-up calls to people self-isolating, and staffing the 119 helpline. The utilisation rate is the overall utilisation rate across all service lines.
- 2 NHST&T set a 50% target for contact centre staff utilisation.
- 3 The utilisation rate is the amount of utilised time (in hours) divided by the number of paid hours.

Source: National Audit Office analysis of data provided by the NHS Test and Trace Service

Consultancy and workforce

2.20 To scale up services rapidly, NHST&T relied heavily on consultancy support at its central office. NHST&T told us that this is because many of the skills required were not available from the civil service within the timeframe, and some of the skills and capacities required are on a short-term basis to support the ‘build’ of the organisation. At the time of this report, NHST&T provisionally estimated that it had spent £372 million on agency and contractor staff and £195 million on consultancy fees, compared with £52 million on permanent and seconded staff in 2020-21. It had not yet completed its year-end checks, and anticipated that the amount recorded as consultancy spend would increase. Our separate enquiry on contract value and spend to the top 10 consultancies, indicated spend of around £300 million on these suppliers, with £174 million on the top supplier Deloitte (**Figure 14**).

Figure 14

Top 10 consultancies with the highest committed contract values with NHS Test and Trace and actual spending to the end of March 2021

The top 10 suppliers accounted for around £300 million of spend by the end of March 2021

Consultancy	Committed contract value (£m)	Spend to end of March, 2021 (£m)
Deloitte LLP	298	174
IBM United Kingdom Limited	46	21
Accenture (UK) Limited	30	18
The Boston Consulting Group UK LLP	30	28
PA Consulting Services Limited	30	10
Zuhlke Engineering Limited	25	12
Bramble Hub Limited	17	8
BAE Systems Applied Intelligence Limited	15	8
McKinsey & Company Inc. United Kingdom	14	12
Ernst and Young LLP	12	9
Total	516	300

Notes

- 1 Contract value committed is the value committed by the NHS Test and Trace Service (NHST&T) with consultancy firms for the full term of the contract, which may span across 2020-21 and 2021-22.
- 2 Contract durations and payment terms vary. We have not reviewed the individual contracts listed.
- 3 Figures may not sum due to rounding.
- 4 Estimates of spend based on NHST&T figures for invoices received and paid, with the exception of Deloitte and BAE systems which were adjusted to reflect accruals. Figures are unaudited and subject to revision.

Source: National Audit Office analysis of contracts data provided by the NHS Test and Trace Service

2.21 Consultants are much more expensive than civil servants or temporary staff from other public services. While access to consultancies has provided NHST&T with the skills and capacity needed to build up the test and trace capacities quickly, it may not, as NHST&T recognised itself, be the best use of public money to rely on consultancies to deliver the services on an ongoing basis. In November 2020, NHST&T outlined plans to reduce the number of consultants it employed. Between November 2020 and February 2021, consultants employed by NHST&T accounted for more than half of its staff (51%), reducing to 45% as at mid-April. However, the number of consultants employed in April (2,239) is still higher than that in December (2,164) (**Figure 15**). NHST&T set a target to reduce the ratio of consultants to civil servants to 60%, but between December 2020 and March 2021 this ratio remained at 76%. NHST&T also told us that, between January and March, it has increased the number of consultants employed due to the expansion of asymptomatic testing, reopening of international borders and tracking variants of concerns.

2.22 Its current plans to reduce its use of consultants include:

- not extending around a third of the 189 consultancy and contingent labour contracts expiring by the end of March 2021;
- replacing consultants with staff from Public Sector Resourcing (PSR);
- introducing a two-week notice period for all consultants; and
- appointing a Senior Responsible Owner for the reduction of the Deloitte contract, from 1,035 consultants in February down to 449 in September.

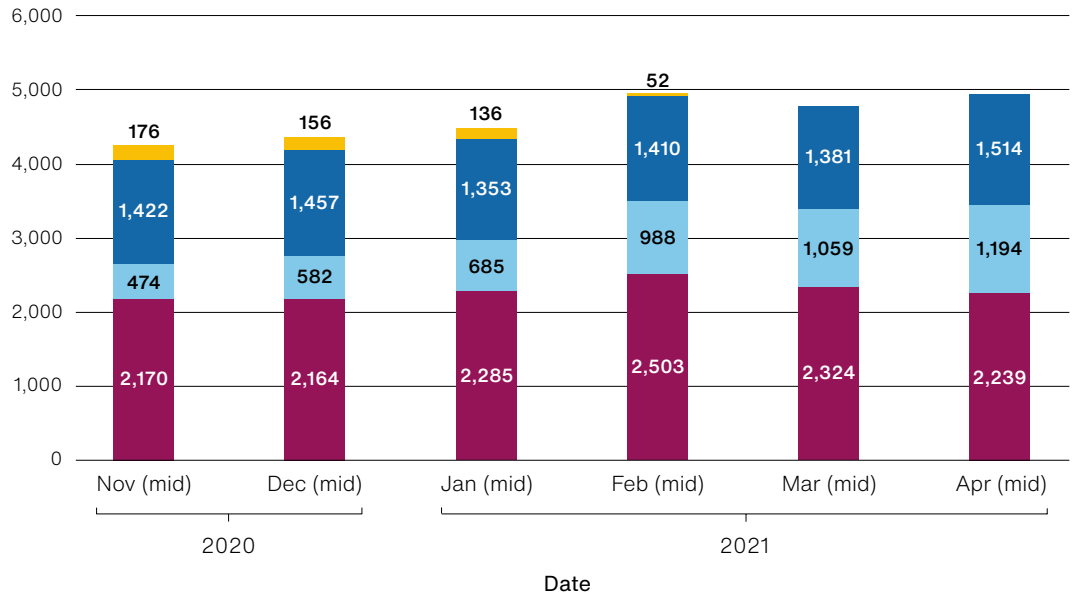
2.23 NHST&T also has an ongoing recruitment campaign to increase the number of staff it employs directly. However, NHST&T highlighted many challenges it is facing to achieve its plans, such as a shortage in specialist skills, for example, data scientists and technical architects, in the civil service, uncertainties associated with the transition to the new UK Health Security Agency and comparatively low salaries in the civil service. We note that many of these are common challenges faced by other government departments.

Figure 15

NHS Test and Trace Service central office staff head counts, November 2020 to April 2021

The number of consultants employed by NHST&T in April 2021 is higher than that in December 2020

Staff numbers



Date	Nov (mid) 2020	Dec (mid) 2020	Jan (mid) 2021	Feb (mid) 2021	Mar (mid) 2021	Apr (mid) 2021
Total	4,242	4,359	4,459	4,953	4,764	4,947

Type of Staff

- Consultants/contractors
- Other contingent staff
- Civil service and other non-contingent staff civil service
- Unknown

Notes

- 1 Main types of staff at the NHS Test and Trace Service (NHST&T) central office include civil servants (employed permanently by NHST&T or seconded from other government departments), contingent staff supplied to NHST&T by consultancy firms and other contractors as well as staff from Public Sector Resourcing.
- 2 Numbers reflect the full-time equivalent headcount on the day of reporting and will vary from day to day.

Source: National Audit Office review of the NHS Test and Trace Service documents

Part Three

Performance and effectiveness of test and trace

3.1 Part Three examines trends in the performance of test and trace, focusing on the period October 2020 to April 2021. It reviews the available measures of effectiveness of test and trace in relation to its overall aim of breaking the chains of transmission of COVID-19 and considers how access to, and outcomes from, services vary for different groups in the population.

Performance commitments and targets

3.2 In December 2020, the NHS Test and Trace Service (NHST&T) published its second business plan, which set out its objectives and priorities for the next four months. It detailed several specific commitments to improve performance and capacity, including:

- a Testing:** further expansion of testing, including through the scale-up of rapid lateral flow device (LFD) tests; improvements to the booking and delivery process to ensure access to tests and faster results; and increasing the number of test sites, so that most people can get a test within 1.5 miles or 30 minutes for walk-up facilities.
- b Tracing:** improvements to the tracing system to streamline and speed up the process for users, with targets, by the end of January 2021, to reach 90% of people who test positive and 85% of identified contacts; and, by March 2021, reach around 80% of contacts within 72 hours of booking an (in-person) test. NHST&T also had an objective to expand the role of local contact tracing, including helping to set up local tracing partnerships in up to 90% of local authorities by December 2020.
- c Support for self-isolation:** a range of actions intended to support and encourage self-isolation, including NHST&T making support payments available to people notified to self-isolate by the NHS COVID-19 app, using follow-up calls to help local authorities identify those needing support during self-isolation, and marketing campaigns and local collaborations to improve people's understanding of the need to self-isolate and available support.

3.3 The Executive Committee of NHST&T regularly reviews a range of key performance measures (**Figure 16**). From December, NHST&T identified six metrics as key drivers of reducing transmissions of COVID-19, with specified targets for four measures. We cover performance against these and other indicators in the following two sections.

Figure 16

Internal performance measures and targets

The NHS Test and Trace Service monitors a range of measures, some of which it identifies as key drivers of reducing transmission of COVID-19

Indicator	Target	Comments
	(%)	
Percentage of new infections identified	60	Identified as key driver of reduction in R number, not available from November (see paragraphs 3.18 to 3.20)
Percentage of index cases reached	90	Identified as key driver of reduction in R number
Percentage of contacts reached	85	Identified as key driver of reduction in R number
Time from test ordering to contacts reached (in-person tests only, percentage reached in 72 hours; median time also monitored)	80 for percentage reached	Identified as key driver of reduction in R number. In March 2021, the target was strengthened to 80% reached within 48 hours
R number estimate	Not set	
Number of positive cases	Not set	
Number of Pillar 2 tests processed	Not set	
Pillar 2 laboratory capacity	Not set	Up to the beginning of March 2021
Pillar 2 laboratory utilisation rate	Not set	
Number of positive tests	Not set	
Number of cases reached	Not set	Identified as key driver of reduction in R number
Number of contacts reached	Not set	Identified as key driver of reduction in R number
Isolation compliance	Not set	Not monitored on weekly basis from March
Lateral flow device (LFD) test kits registered	Not set	New indicator from mid-March

Notes

- 1 The R number is the average number of people infected by someone with the virus.
- 2 PCR (polymerase chain reaction) testing is organised under several 'pillars'. Pillar 2, which makes up the majority of PCR tests, comprises tests processed by lighthouse and other public, private and academic laboratories primarily for the wider population, including care homes.
- 3 Contacts refer to those covered by the national service and local authorities, excluding those covered by regional Public Health England teams.
- 4 Isolation compliance refers to an internal survey run by NHS Test and Trace.
- 5 Measures are for England, except for R estimates and Pillar 2 test measures, which are for the UK.

Source: National Audit Office analysis of the NHS Test and Trace Service Executive Committee papers

Trends in NHST&T performance

3.4 This section examines indicators of activity and performance for NHST&T.¹²

Number and types of tests carried out

3.5 In its December Business Plan NHST&T set out an objective to expand testing capacity, including rapid-result LFD tests which became available in October. About 102 million tests were taken in community settings (under Pillar 2 of the testing programme) between the start of November 2020 and the end of April 2021 (**Figure 17**), with the weekly number increasing from 1.2 million to a high of 8.7 million in early March. Most of these tests, about 69 million, were LFD tests. LFD tests accounted for less than 1% of all tests in October but their use has expanded significantly, peaking at 88% of all tests (or 7.7 million LFD tests) in the second week of March. From November onwards, NHST&T required positive LFD results to be confirmed with a positive polymerase chain reaction (PCR) test before contact tracing began. Between November and April, around two-thirds of positive LFD results were followed up by confirmatory PCR tests. At the start of April, 76% of confirmatory PCR tests were positive.

Turnaround times for test results

3.6 For in-person PCR tests taken in the community, the turnaround time for people to receive test results after taking a test has improved.¹³ At the end of October, the proportion of people receiving results within 24 hours stood at 38%, increasing to 90% at the end of April. However, this proportion fell to a low of 17% during December (**Figure 18** on page 48).¹⁴ NHST&T told us this dip was mainly due to the unexpected increase in demand following the easing of lockdown and the emergence of the new Alpha variant, first identified in Kent. It also had to manage staff shortages in laboratories arising from COVID-19, a shortage in critical supplies affecting one laboratory, and IT failures delaying the uploading of test results to some laboratories. It said it attempted to mitigate the impact by increasing capacity through new Lighthouse and surge laboratories and expanding activity at existing ones. Over the period November 2020 to April 2021, 57% of people taking tests in-person (outside a hospital setting) received results within 24 hours, an improvement on the 41% we noted in our interim report for May to October 2020. Over the same period, 8% of people taking a home test kit received results within 24 hours.

¹² In this section, we refer to the period November-April. As performance data are published weekly, this covers the week commencing 5 November 2020 up to and including the week commencing 29 April 2021.

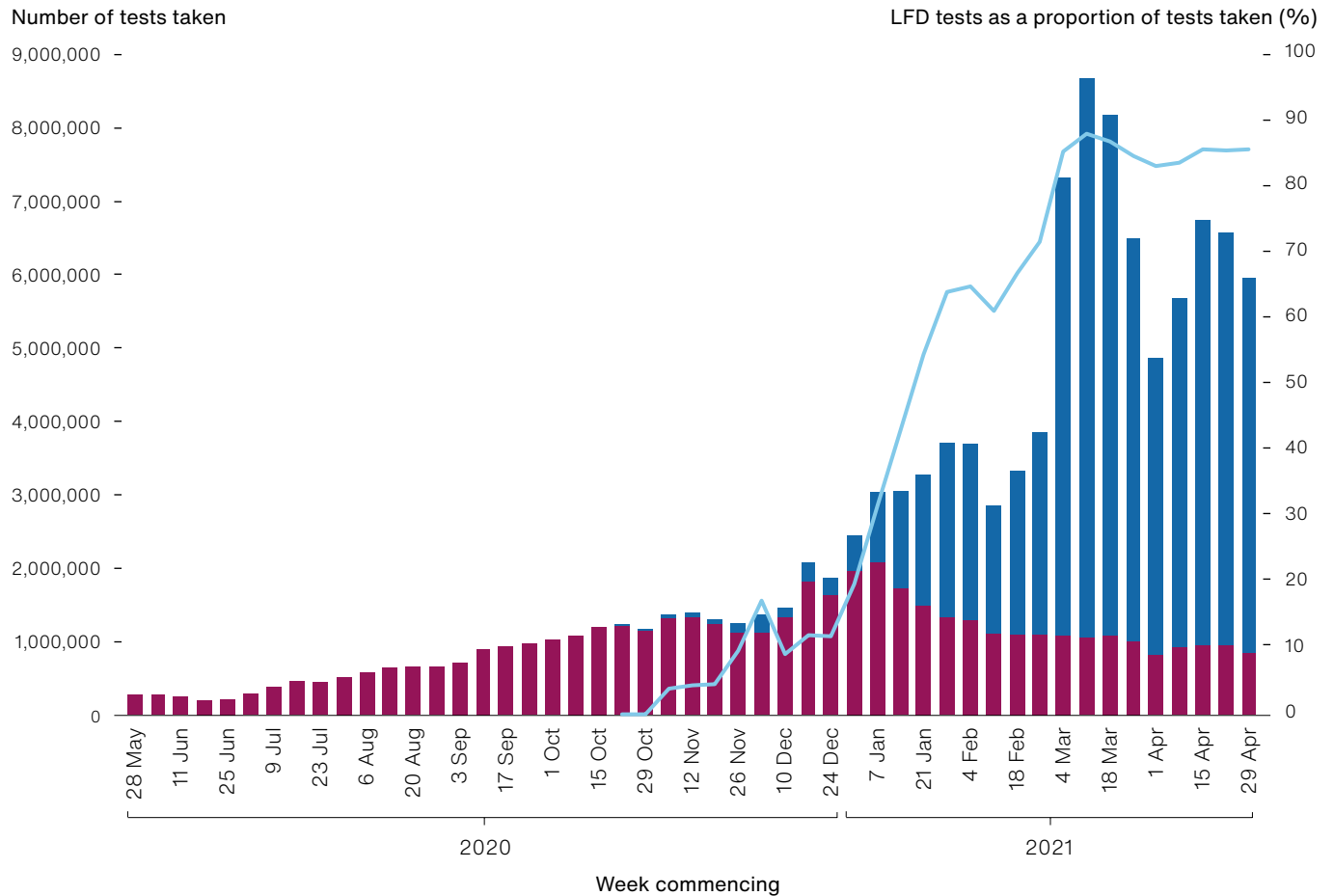
¹³ These are in-person tests taken in community settings under Pillar 2, which excludes tests in hospital settings (Pillar 1). For the period May 2020 to April 2021, in-person PCR tests account for 37% of all Pillar 2 PCR tests.

¹⁴ This analysis does not include LFD tests, which do not need to be sent off to a laboratory for processing.

Figure 17

Number of Pillar 2 polymerase chain reaction (PCR) tests and lateral flow device (LFD) tests taken, and the percentage of LFD tests, in England week commencing 28 May 2020 to 29 April 2021

LFD tests now account for the majority of all tests taken



- Number of PCR tests taken
- Number of LFD tests taken
- LFD tests as a proportion of tests taken (%)

Notes

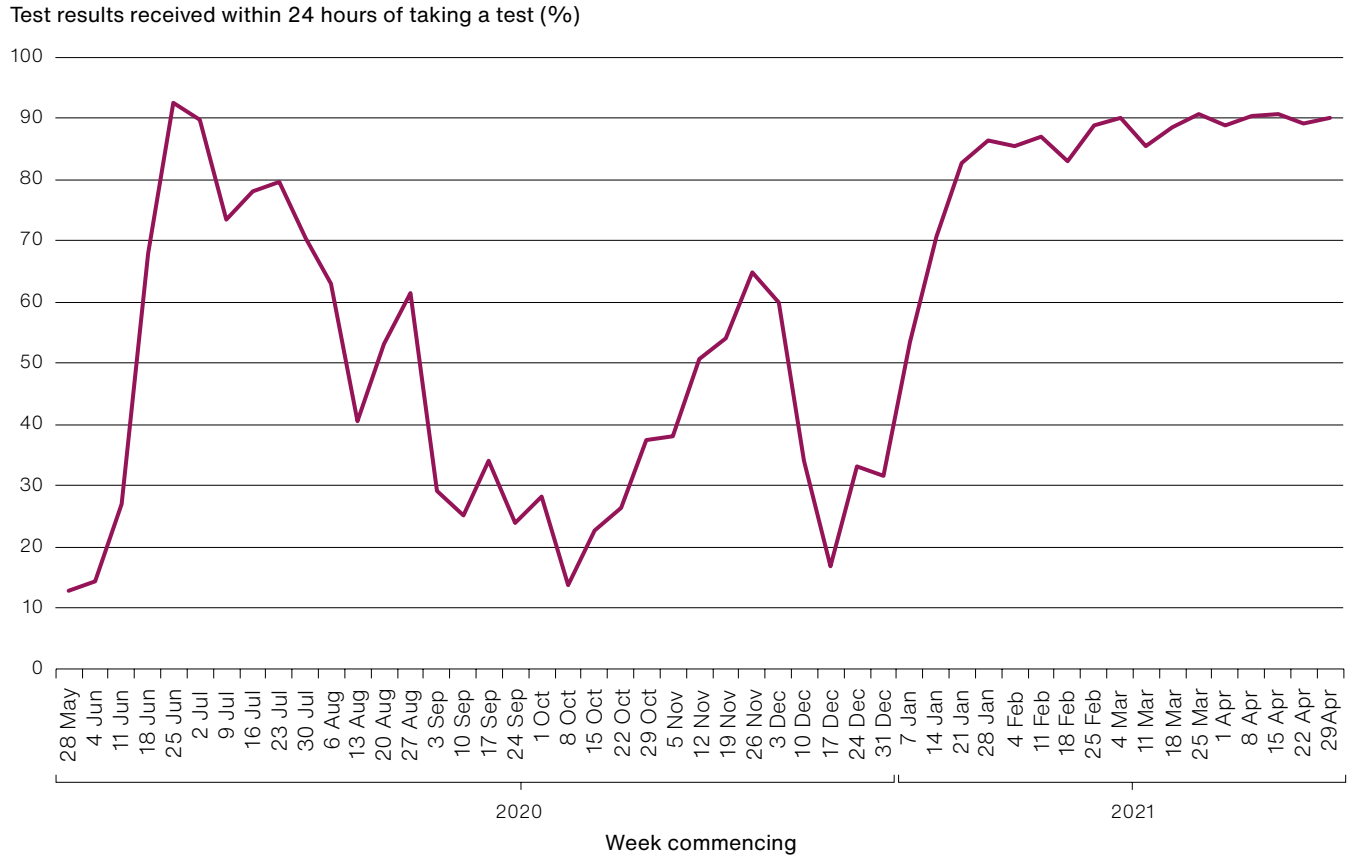
- 1 PCR tests look for the presence of the COVID-19 virus using a swab which is processed in a laboratory. They are predominantly used for symptomatic individuals, regular asymptomatic testing in social care, and to confirm a positive LFD test result. Most results are returned within 24 hours.
- 2 LFD tests, sometimes referred to as rapid tests, test for the presence of proteins (antigens) produced by the COVID-19 virus using swabs that give results in 30 minutes or less without the need for laboratory processing. They are used mainly for people without symptoms.
- 3 The number of tests includes all tests within the control of the NHS Test and Trace Service (including PCR and LFD tests) and tests sent out and subsequently returned for processing. It does not include LFD tests that were not registered through this route.
- 4 Pillar 2 comprises tests processed by lighthouse and other public, private and academic laboratories primarily for the wider population, including care homes.

Source: National Audit Office analysis of data published by the Department of Health & Social Care

Figure 18

Percentage of Pillar 2 COVID-19 test results received within 24 hours in England, week commencing 28 May 2020 to 29 April 2021

The timeliness of Pillar 2 test results has improved since October 2020, excluding a dip in December 2020



Notes

- 1 Pillar 2 comprises tests processed by lighthouse and other public, private and academic laboratories primarily for the wider population, including care homes. The metric shown only covers in-person Pillar 2 tests, ie taken at a regional, local or mobile testing site.
- 2 Polymerase chain reaction (PCR) tests look for the presence of the COVID-19 virus using a swab which is processed in a laboratory. They are predominantly used for symptomatic individuals, regular asymptomatic testing in social care, and to confirm a positive lateral flow device test result. Most results are returned within 24 hours.

Source: National Audit Office analysis of data published by the Department of Health & Social Care

Tracing cases (people testing positive for COVID-19)

3.7 NHST&T transferred 3.2 million positive cases to its tracing service between November and April (**Figure 19** overleaf).¹⁵ The numbers transferred each week largely reflect trends in positive cases. There was a very sharp increase in weekly numbers during December to a high of 388,150 in the last week of that month, before numbers steadily decreased to 9,615 by the end of April.¹⁶

3.8 By the end of January, NHST&T aimed to reach 90% of people testing positive for COVID-19. The proportion of cases reached by the tracing service each week improved from 86% in October to meet the 90% target in mid-March 2021. The target was subsequently met for most weeks up to the end of April, apart from the first and third weeks of that month when performance dipped slightly.¹⁷

3.9 The time taken by the national service to reach cases improved during November to April.¹⁸ In the last week of October, 72% of these cases were reached within 24 hours, increasing to 81% by the end of April (**Figure 20** on page 51).

Tracing contacts (close contacts of those testing positive for COVID-19)

3.10 Since December 2020, NHST&T has had a target to reach 85% of contacts.¹⁹ During October 2020, the percentage reached was relatively stable at around 60% each week (**Figure 21** on page 52). It then increased significantly during November, rising to 94% by the end of January and remaining above the 85% target until mid-April, when it fell to 84%.²⁰ The November increase may, in part, be attributed to changes NHST&T made to how household contacts were recorded from the middle of that month. Previously these contacts were counted as reached after being contacted individually. They were now deemed reached if the original case provided basic information about the contact and agreed to tell them to self-isolate.

15 Cases in the tracing system are managed either by the national tracing service, including harder to reach cases passed to local authorities, or by regional Public Health England (PHE) teams for those linked to outbreaks. Since October, the proportion of people reached by regional PHE teams has accounted for a very small proportion (1% – 5%) of all cases covered by tracing.

16 Between January and March 2021, because of high infection levels, NHST&T suspended the existing requirement for a confirmatory PCR test to trigger tracing for LFDs carried out at public testing sites, so that during this period a positive LFD result alone would trigger contact tracing. Confirmatory PCR tests were reinstated for these tests at the end of March. For LFD tests carried out elsewhere, the requirement for a confirmatory PCR test remained in place.

17 This target was previously set at 80%, as noted in our interim report. Strictly, the target applies only to cases managed by the national service, excluding the small percentage covered by the regional PHE teams.

18 This includes cases covered by national tracers, online channels, and hard to reach cases passed to local authority teams.

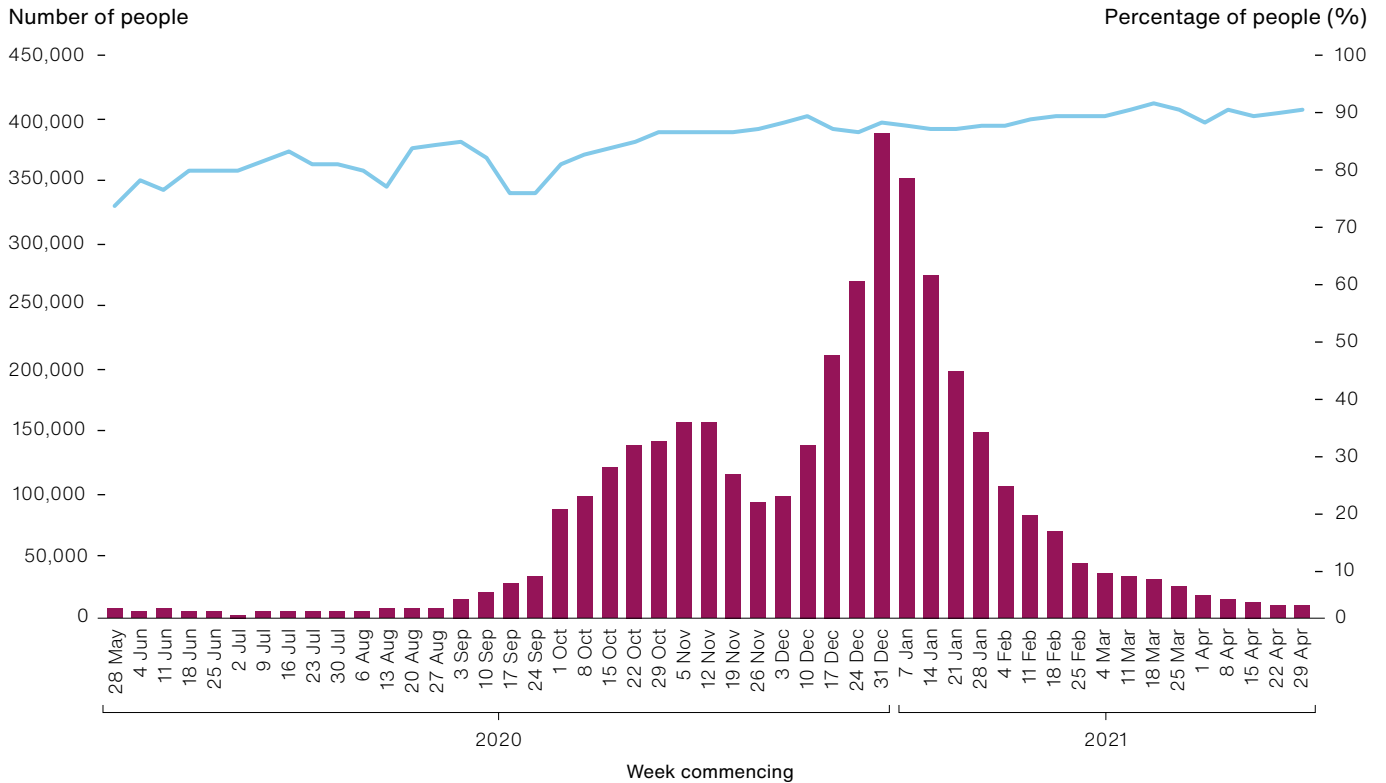
19 Contacts are managed either by NHST&T's national tracing service, or regional PHE teams if the original case is linked to an outbreak. Since the end of October, the proportion managed by regional health teams has been consistently low, varying between <1% and 8%.

20 Strictly, the target applies only to contacts managed by NHST&T, excluding the small percentage covered by the regional PHE teams, but the trend including or excluding these cases is the same.

Figure 19

People transferred to the COVID-19 contact tracing system and percentage of people reached in England week commencing 28 May 2020 to 29 April 2021

Numbers of people transferred to the contact tracing system peaked during December and has since reduced



- Total number of people transferred to contact tracing system
- Percentage of people transferred to the system and reached

Note

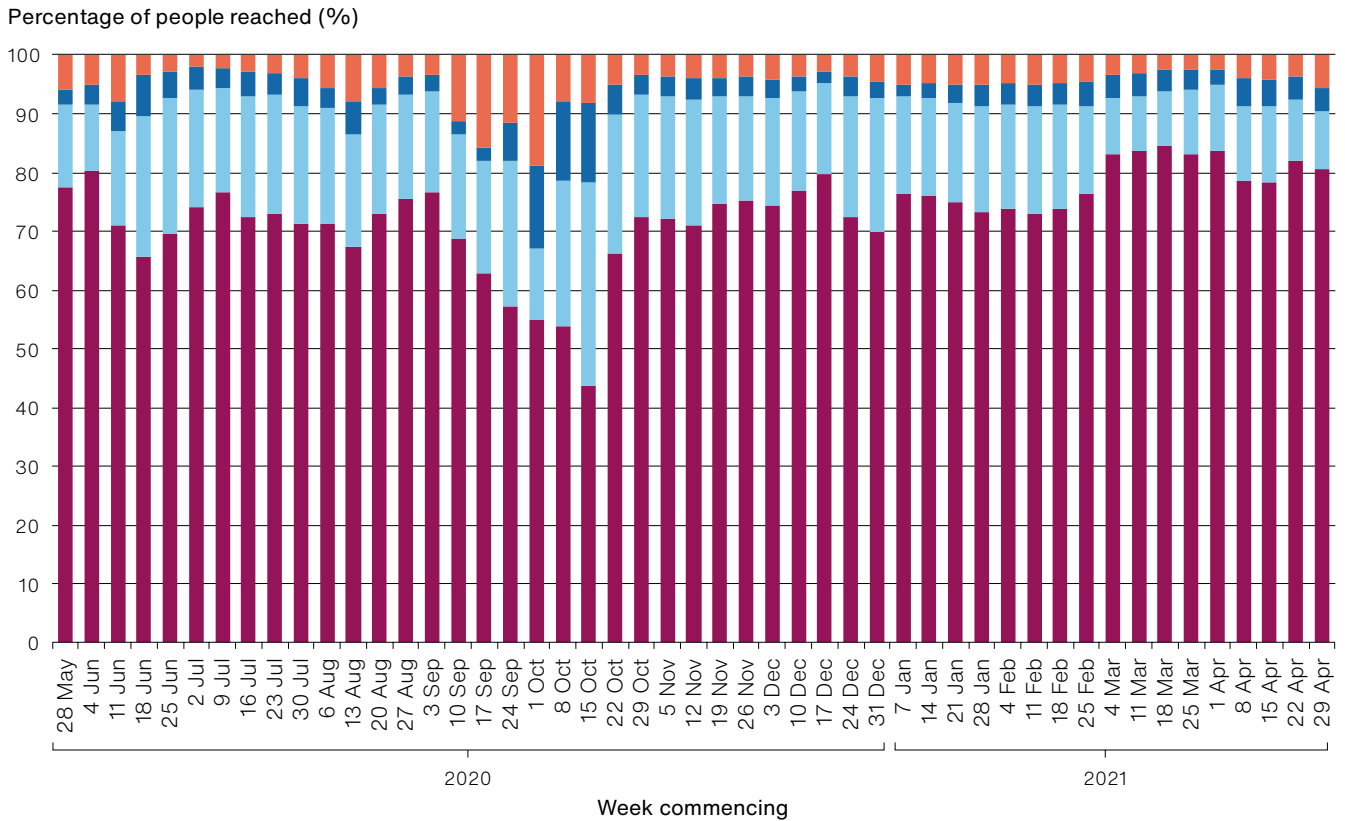
1 These figures refer to cases managed by the NHS Test and Trace Service, which includes hard to reach cases passed to local authorities, as well as cases managed by regional Public Health England teams.

Source: National Audit Office analysis of data published by the Department of Health & Social Care

Figure 20

Time taken to reach people testing positive for COVID-19, in England week commencing 28 May 2020 to 29 April 2021

The percentage of people reached within 24 hours who had tested positive for COVID-19 increased between November and April



- Percentage reached in under 24 hours
- Percentage reached between 24 and under 48 hours
- Percentage reached between 48 and under 72 hours
- Percentage reached after 72 hours

Note

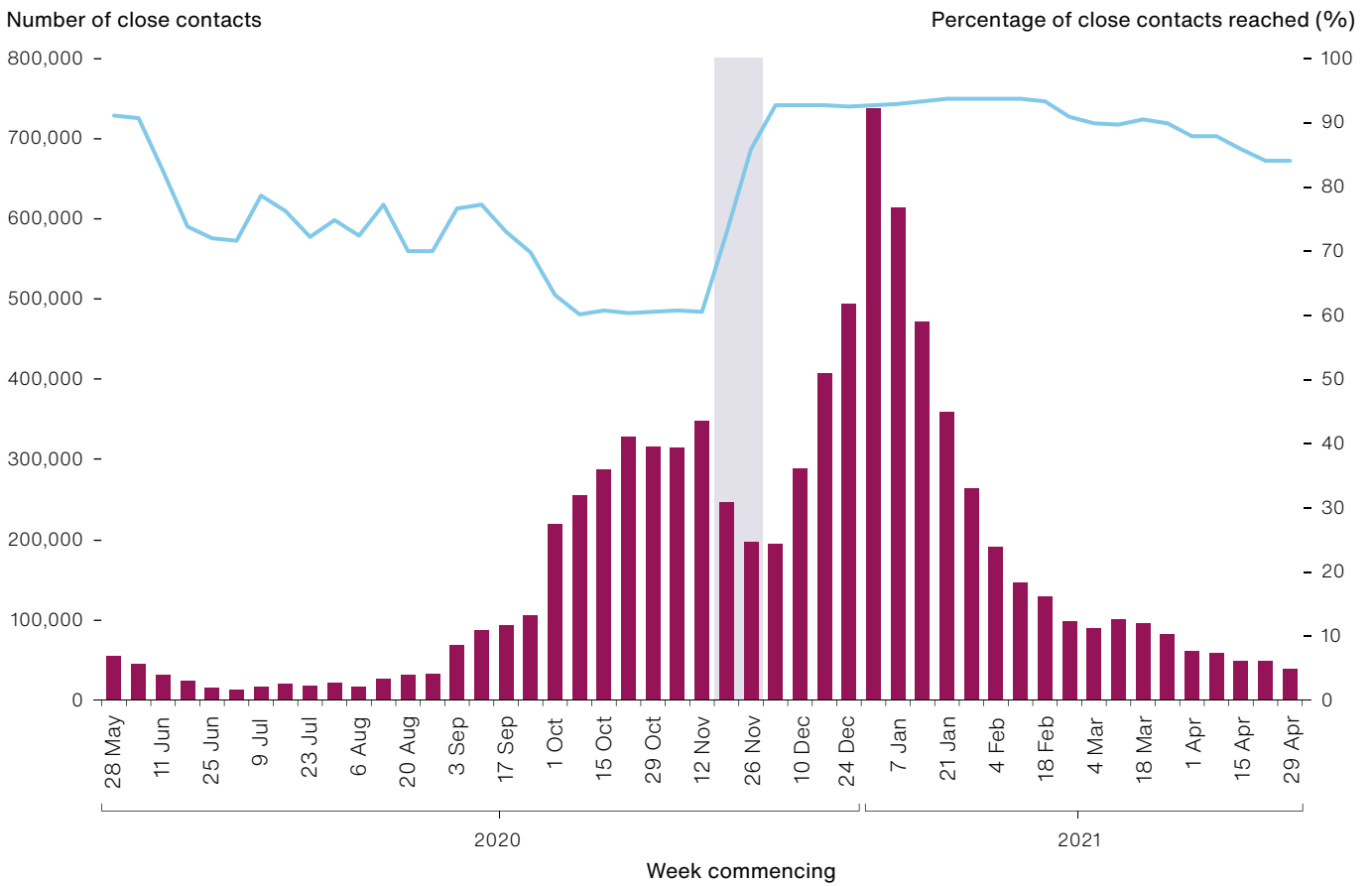
1 These figures refer to cases managed by the NHS Test and Trace Service which includes hard to reach cases passed to local authorities.

Source: National Audit Office analysis of data published by the Department of Health & Social Care

Figure 21

Total number of close contacts identified, and the percentage of close contacts reached, week commencing 28 May 2020 to 29 April 2021

The percentage of close contacts reached increased significantly during November 2020, in part due to changes in counting when household contacts are reached



- Number of close contacts identified
- Percentage of close contacts reached
- Changes in rules for reaching household contacts

Notes

- 1 These figures refer to close contacts managed by the NHS Test and Trace Service (NHST&T) which includes those passed to local authorities, and close contacts managed by regional Public Health England teams.
- 2 NHST&T made changes to how it recorded the household contacts it reached between 18 November and 27 November. Where household contacts were previously contacted individually by contact tracers, they were now deemed as reached if the original case provided basic information and agreed to tell them to self-isolate.

Source: National Audit Office analysis of data published by the Department of Health & Social Care

3.11 NHST&T committed to reaching contacts faster in its December 2020 business plan. Based on weekly performance data, NHST&T’s timeliness in reaching contacts improved from November to December 2020 but has since declined slightly. The metrics on the timeliness of reaching contacts are also affected by the November change in counting household contacts as reached (see paragraph 3.10). Following this change, for example, the proportion of contacts reached by the national service within 24 hours of the original case being transferred to contact tracing stood at 76% at the start of December. This increased to a peak of 79% in the middle of December, but subsequently declined, down to 53% for the last week of April 2021 (**Figure 22** overleaf).

Measuring the effectiveness of the overall system

3.12 The performance data published weekly on test and trace are helpful in understanding levels of activity and how well different parts of the test and trace process are working. However, as noted by the UK Statistics Authority in February 2021, they do not provide a clear view of the end-to-end effectiveness of the test and trace programme.²¹

3.13 In May 2020, the UK Scientific Advisory Group for Emergencies (SAGE) provided advice about the proportion of infected individuals and their contacts that would need to be reached, and in what timeframe, for a test and trace system to be effective. Our review of this and other sources confirms that the key determinants of effectiveness are the speed of the process; levels of access and reach; and public adherence and engagement (**Figure 23** on pages 55 and 56). Test and trace programmes are also more effective when overall infection levels are low and when they are able to target actions and interventions, particularly where different groups have higher risks or levels of transmission. These factors are not all necessarily within NHST&T’s direct control.

Effectiveness – speed of the process

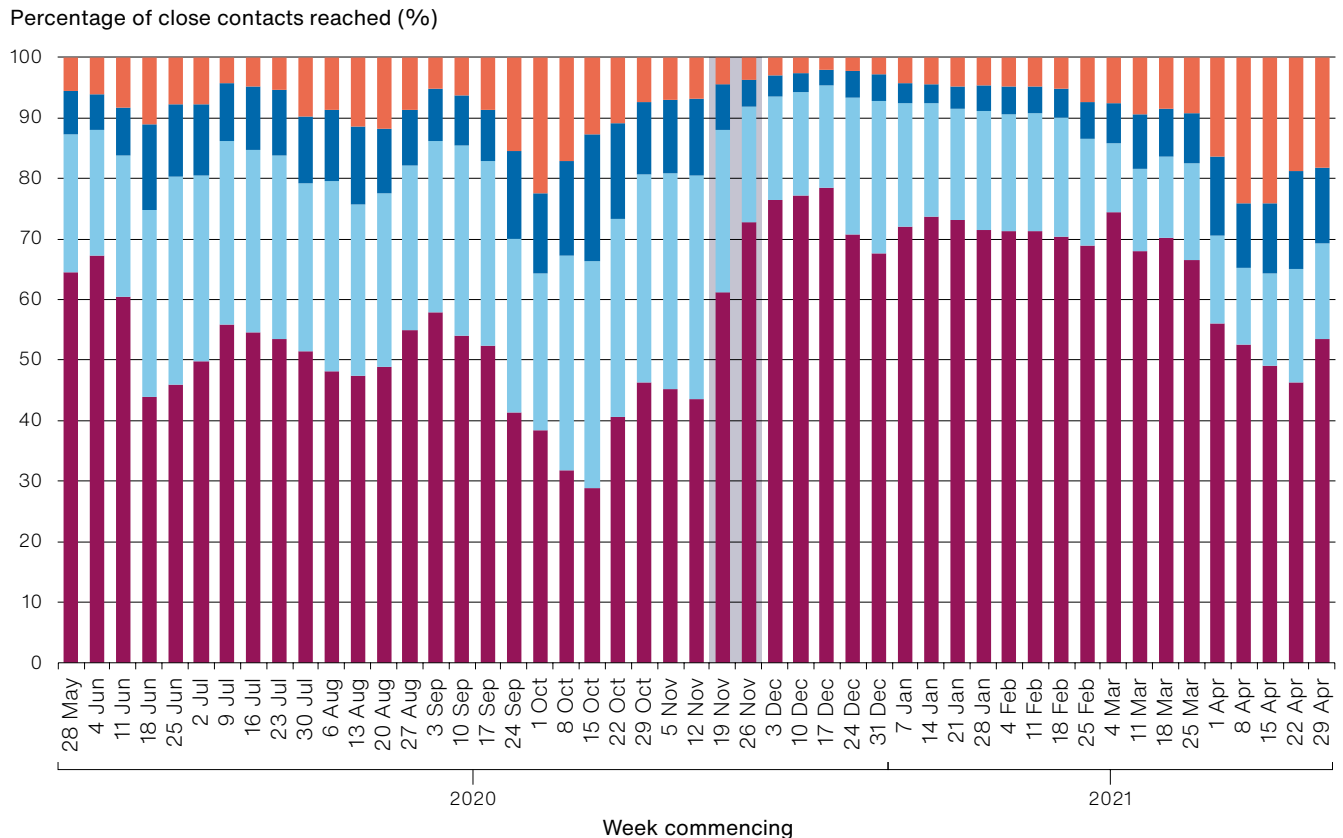
3.14 As noted in Figure 23, SAGE advises that, for test and trace to be effective, it is desirable that no more than 48 hours should elapse between identification of an index case and their contacts self-isolating. In May 2020, it had also noted that modelling suggested that any delay beyond 48–72 hours total before isolation of contacts resulted in a significant impact on the R number (the average number of people infected by someone with the virus), so the sooner done the better. An international systematic review in July 2020 found that to stop the spread of COVID-19, no more than 2–3 days should elapse from a new case developing symptoms to the isolation of the case and quarantine of at least 80% of associated contacts (‘cough to contact’ time). This explicitly includes the start of the process, before an individual engages with a test and trace system.

²¹ From written evidence provided to the Public Administration and Constitutional Affairs Committee, available at: <https://uksa.statisticsauthority.gov.uk/submission/uk-statistics-authority-and-office-for-statistics-regulation-written-evidence-for-the-public-administration-and-constitutional-affairs-committee-inquiry-on-data-transparency-and-accountability-covid/>

Figure 22

Time taken to reach close contacts of cases, in England week commencing 28 May 2020 to 29 April 2021

The percentage of close contacts reached within 24 hours peaked during December



- Percentage of people reached within 24 hours
- Percentage of people reached between 24 hours and under 48 hours
- Percentage of people reached between 48 hours and under 72 hours
- Percentage of people reached after 72 hours
- Changes in rules for reaching household contacts

Notes

- 1 These figures refer to close contacts managed by the NHS Test and Trace Service, including those passed to local authorities.
- 2 Time taken is between an identified contact being transferred to the contact tracing system and the contact being reached and advised to self-isolate.
- 3 The NHS Test and Trace Service made changes to how it recorded the household contacts it reached between 18 November 2020 and 27 November 2020. Where household contacts were previously contacted individually by contact tracers, they were now deemed to have been reached only if the original case provided basic information and agreed to tell them to self-isolate.

Source: National Audit Office analysis of data published by the Department of Health & Social Care

Figure 23

National Audit Office review of key determinants of the effectiveness of test and trace approaches for COVID-19

Our review found that the key determinants of effectiveness are the speed of the process, levels of access and reach, and public adherence and engagement

Key factors and characteristics determining the effectiveness of the test and trace approach	Indicative thresholds or targets
<p>Speed of the process</p> <p>It is important to minimise the time between someone developing symptoms and their contacts being reached and asked to self-isolate. This will include how long it takes for someone who might be infected with COVID-19 to request a test, self-isolate, get tested and then get the results; and for their contacts to be identified and traced.</p>	<p>In May 2020, SAGE advised that, for test and trace to be effective, it is desirable that no more than 48 hours should elapse between identification of an index case and their contacts self-isolating. A systematic review in July 2020 found that to stop the spread of COVID-19, no more than 2–3 days should elapse from a new case developing symptoms to the isolation of the case and quarantine of at least 80% of associated contacts. These are consistent with the optimum time noted by the World Health Organization.</p> <p>For in-person tests, the NHS Test and Trace Service (NHST&T) has a target of 80%, where the time taken from ordering a test to reaching contacts is within 48 hours (two days). Prior to March 2021, the target was 80% within 72 hours.</p>
<p>Levels of access and reach</p> <p>It is important to maximise the number/proportion of people with COVID-19 that the system reaches, along with their associated contacts. How access and reach vary for different groups in the population is also important, as they may have different levels of infections or risk of transmission. Linked to this will be the system having adequate capacity and capability to cope with demand.</p>	<p>SAGE has noted that “at least 80% of contacts of an index case would need to be contacted for a system to be effective”, which is broadly consistent with the systematic review we examined.</p> <p>NHST&T has targets to reach at least 90% of index cases, and 85% of contacts. It also aims to identify 60% of new infections through testing.</p>
<p>Public adherence and engagement</p> <p>This is particularly important in terms of people complying with requirements to self-isolate. However, other parts of the test and trace process also rely on high levels of public adherence, for example people having a test when required or agreeing to give details of contacts. This links to maintaining public awareness, understanding and acceptance of the system and what individuals need to do.</p>	<p>SAGE has noted that “at least 80% of contacts of an index case would need to isolate for an effective test and trace system”. The systematic review identified that for a highly effective system, quarantine and isolation would need to prevent 100% of further transmissions.</p> <p>NHST&T currently has no target in relation to compliance with self-isolation.</p>

Figure 23 *continued*

National Audit Office review of key determinants of the effectiveness of test and trace approaches for COVID-19

Other factors and characteristics determining the effectiveness of the test and trace approach	
Targeting of actions/ interventions	<p>An important role of the test and trace system is how quickly it can identify potential outbreaks, and escalate actions and capacity where needed.</p> <p>In relation to mass (asymptomatic) testing, SAGE has also noted that “some groups contribute more to the spread of the epidemic than others [so] targeting groups and institutions where prevalence is likely to be higher will have a greater impact on transmission”.</p>
Overall levels of infections	<p>In general, test and trace strategies for COVID-19 are not effective on their own, but must be used alongside other public health interventions, for example vaccinations, social distancing and good hygiene, to reduce infections. Test and trace strategies are most effective when overall infection levels are low, and exhaustive tracing of cases and contacts is possible. The systematic review we examined found that the effectiveness of contact tracing could stop the spread with five or fewer initial cases in the community, but with 40 or more cases, might not contribute meaningfully to stopping infections.</p>

Note

- 1 The following sources were included in our review: minutes from the UK Scientific Advisory Group for Emergencies (SAGE) between April 2020 and March 2021, including relevant papers from the Scientific Pandemic Influenza Group on Modelling (SPI-M); World Health Organization, *Contact tracing in the context of COVID-19, Interim Guidance*, 1 February 2021; The Association of Directors of Public Health, *Explainer: Test and Trace Service*, October 2020; Scottish Government, *COVID-19 – Test, Trace, Isolate, Support. A Public Health approach to maintaining low levels of community transmission of COVID-19 in Scotland*, May 2020; Juneau, C., Briand, A., Pueyo, T., Collazzo, P. and Potvin, L., *Effective Contact Tracing for COVID-19: A Systematic Review*, July 2020, available at: www.medrxiv.org/content/10.1101/2020.07.23.20160234v2.full.pdf.

Source: National Audit Office review of published information

3.15 Published information is now available for NHST&T, based on individual contacts, on the time elapsing between a case developing symptoms and that contact being reached.²² Before mid-November 2020, the median time for this was consistently above 100 hours, although it reduced to 80 hours following the change in rules for counting household contacts as reached (**Figure 24**).²³ It then rose to a peak of around 120 hours at the end of December, before reducing again; for each week starting 14 January to 29 April 2021, it has varied between 74 and 97 hours. This means that, for most contacts in this period, more than 72 hours elapsed before they were reached. NHST&T told us that longer turnaround times in April were partly due to an increase in the proportion of non-household contacts, who are harder to trace. In April, the proportion of non-household contacts made up around half or more of all contacts traced, compared with around one-quarter to one-third in March.

22 This is only available for contacts of cases who reported symptoms to NHST&T. It is based on individual, rather than all, identified contacts for a case. This means that the median time to reach all contacts of a case would be the same or greater than implied by this measure, as it would have to reflect the elapsed time for the last contact to be reached.

23 See paragraph 3.10 for details of the changes in counting of household contacts.

Figure 24

Median time taken between the onset of symptoms in an individual and the NHS Test and Trace Service reaching an identified contact, in England, weeks commencing 28 May 2020 to 29 April 2021

The time taken to reach contacts reduced between October 2020 and March 2021

Median time from symptom onset of case to contact being reached (hours)



- Changes in rules for reaching household contacts
- Median time taken in hours

Notes

- 1 The date for symptom onset is when the original case reports this to the NHS Test and Trace Service (NHST&T) after taking a positive test. This information is only available for contacts of cases who report to NHST&T that they have experienced one or more symptoms of COVID-19.
- 2 Medium time in hours is derived using time in days and taking 12:00 noon as the time of symptom onset.
- 3 NHST&T made changes to how it recorded the household contacts it reached between 18 November 2020 and 27 November 2020. Where household contacts were previously contacted individually by contact tracers, they were now deemed as reached if the original case provided basic information and agreed to tell them to self-isolate.

Source: National Audit Office analysis of data published by the Department of Health & Social Care

3.16 For in-person tests, NHST&T also monitors an internal target of 80% of cases, where the time taken from ordering a test to reaching contacts is within 72 hours.²⁴ Its internal management information shows that it reached this target consistently from the start of January 2021. At the beginning of March, NHST&T strengthened this target to 80% within 48 hours; it met it during that month although performance dipped below target in April. This metric does not include the elapsed time between someone developing symptoms and requesting a test, which NHST&T says it has limited influence over. It also only includes in-person tests, which made up 37% of PCR tests taken in the community between May 2020 and April 2021. The proportion has also decreased, standing at 16% for March and April 2021. Examples of tests not counted as ‘in-person’ include home test kits or tests supplied to care homes for regular testing of staff and residents. We were not able to access data on what proportion of positive cases are identified via in-person versus other PCR tests.

Effectiveness – levels of access and reach

3.17 In relation to levels of reach, SAGE has noted that “at least 80% of contacts of an index case would need to be contacted for a system to be effective”. NHST&T published targets to reach at least 90% of index cases, and 85% of their identified contacts by January 2021. NHST&T achieved the 90% target for cases for most weeks between mid-March 2021 and the end of April (paragraph 3.8). It has also exceeded the 85% target for identified contacts between the end of November 2020 and mid-April 2021, although performance dropped to 84% at the end of April (see paragraph 3.10).²⁵

3.18 As we noted in our interim report, testing and tracing systems typically suffer from attrition, meaning they are unable to identify everyone with a disease or all their close contacts. Our analysis suggested that, for COVID-19, the greatest attrition occurred at the start of the process, with people who have the infection but do not get a test. NHST&T has less direct influence over the very start of the process, before someone books a test. It has an internal target to identify 60% of new infections through testing. Up until November, it estimated this by combining its weekly data on positive cases with weekly estimates from the Office for National Statistics (ONS) of new infections. In our interim report, we used these data to calculate that around 44% of people with COVID-19 had a positive test by NHST&T, between 28 May and 4 November 2020.

3.19 Between December 2020 and March 2021, ONS suspended its weekly data on new infections when it revised its methodology for calculating these. This means that NHST&T could not reliably assess how well its testing covered new infections for a critical period covering the December rise in infections and the introduction of mass LFD testing.

24 SAGE has not specifically defined ‘identification of an index case’. For its target, NHST&T interpreted this as when someone ordered a test, the point at which it first becomes aware of a potential case.

25 As noted in paragraph 3.10, this period reflected the new rules in counting household contacts as reached once the original case was contacted.

3.20 From 26 March 2021, ONS resumed publishing weekly data on new infections with a revised methodology. However, NHST&T’s initial review indicated that the new estimates still did not provide a reliable or stable means of calculating its key performance indicator. For example, our calculations showed that for several weeks, the total number of positive cases identified by NHST&T exceeds the revised ONS estimate of total new infections. This means that NHST&T still lacks a reliable means of calculating this key performance indicator. NHST&T is reviewing different options to produce a robust measure for the percentage of new infections identified through testing, and aims to achieve this by mid-June.

Effectiveness – public adherence and engagement

3.21 An academic review of Department of Health & Social Care (the Department) – funded surveys on public adherence notes the reliance of test, trace and isolation systems on “how well people adhere to guidance on testing, provide details of contacts, and self-isolate”.²⁶ In particular, high levels of compliance with self-isolation are needed: SAGE has noted that “at least 80% of contacts of an index case would need to isolate for an effective test and trace system” (see Figure 23). NHST&T currently has no target in relation to compliance with self-isolation.

3.22 Scientific experts have noted the need to consider behavioural issues for the test and trace system, and that key levers available to NHST&T to encourage desirable behaviour include providing clear and consistent messaging through public health information that emphasises the social value of testing and frames compliance as the ‘right thing to do’. The Independent Scientific Pandemic Insights Group on Behaviours (SPI-B), which advises SAGE, has also noted the importance of addressing practical and psychological barriers to self-isolation, including through financial support. NHST&T confirmed to us that it has a responsibility to encourage people to both come forward for testing and to isolate if they test positive, but that it is also the responsibility of the individual to comply. Several stakeholders we spoke to highlighted that the extent of citizens’ compliance with NHST&T’s requirements was a significant risk it must actively manage.

²⁶ Smith, L. E., Potts, H. W. W., Amlôt, R., Fear, N. T., Michie, S., Rubin, G. J., *Adherence to the test, trace, and isolate system in the UK: results from 37 nationally representative surveys*, The BMJ, volume 372, March 2021, available at: <https://doi.org/10.1136/bmj.n608>

3.23 Several different survey-based measures are available on specific aspects of public adherence with the test and trace process (**Figure 25**). The surveys suggest:

- only a minority of people who develop symptoms request a test. The University College London study found that older people, men, and people in lower-income households were consistently less likely to request a test following symptoms;
- there is a wide range in estimated levels of compliance with self-isolation for people who develop COVID-19 symptoms in part explained by differences in the survey measures. In surveys by ONS, based on samples from NHST&T's contact tracing database, 82% to 86% of respondents said they fully adhered to the self-isolation requirements. Other surveys, based on the wider population, which include people whether or not they definitely have COVID-19, have taken a test or engaged with the test and trace system, suggest lower compliance levels, ranging from 43% to 62%.²⁷ The CORSAIR study identified a number of socio-demographic characteristics associated with lower levels of compliance, including: being male, younger, having a dependent child in the household, lower socioeconomic grade, greater financial hardship during the pandemic, and working in a key sector; and
- a high level of compliance with self-isolation after being notified as a contact of someone infected with COVID-19.

Estimating the overall impact of test and trace

3.24 It is inherently difficult to establish the impact that NHST&T activities by themselves have on reducing transmission, as they were implemented nationally in a short space of time in conjunction with a range of other measures intended to reduce infections, such as social distancing, wearing masks and vaccinations. NHST&T has published, and worked with external experts to produce, modelled estimates of the impact of its activities. As with any model, the estimates will depend on the structure of the model, the counterfactual being used (broadly, what would have happened in the absence of test and trace activities), and assumptions about the value of key parameters (for example, compliance levels with self-isolation or the proportion of cases that present symptoms). We reviewed a number of published and internal analyses, which set out findings, technical descriptions and assumptions for these models. Below we set out findings for these models, including observations from our own review.

²⁷ These ask whether respondents left home at all during the self-isolation period (which is permissible under certain circumstances).

Figure 25
Survey-based measures of public adherence and compliance with different stages of the test, trace and isolate process

These measures suggest compliance with the test and trace process varies across its different stages

Stage	Source	Based on	Measure	Level	Date
Requesting a test after developing symptoms	CORSAIR	Adults aged 16+ in the UK, who reported experiencing COVID-19 symptoms in the past seven days	Requested a test	18%	May 2020 to January 2021
				22%	January 2021 (most recent measure)
Compliance with self-isolation – people developing symptoms	UCL	Adults in the UK, who reported developing COVID-19 symptoms since the pandemic started	Requested a test	33% every time, 10% on some occasions but not others	March 2020 to January 2021
			Not leaving home for any reason in the first 10 days after symptoms developed	43%	October 2020 to January 2021
Compliance with self-isolation – people potentially in contact with COVID-19	CORSAIR	Adults aged 16+ in the UK who reported experiencing COVID-19 symptoms in the past seven days	How many days isolating	52%	January 2021 (most recent measure)
				62% for 10 days or more	March 2020 to January 2021
Compliance with self-isolation – people potentially in contact with COVID-19	ONS (experimental statistics)	Individuals aged 18+ on NHST&T's contact tracing database, who had tested positive for COVID-19	Fully adhering to the self-isolation requirements throughout their self-isolation period	82% – 86%	February 2021, March 2021, April 2021
			How many days isolating	80% for 10 days or more	March 2020 to January 2021
Compliance with self-isolation – people potentially in contact with COVID-19	ONS (experimental statistics)	Individuals aged 18+ on NHST&T's contact tracing database, who were notified by NHST&T they had been in contact with someone testing positive for COVID-19	Fully adhering to the self-isolation requirements throughout their 10-day self-isolation period	90%	March 2021, April 2021
			How many days isolating		

Notes

- 1 CORSAIR study: Smith, L. E., Potts, H. W. W., Amiot, R., Fear, N. T., Michie, S., Rubin, G. J., *Adherence to the test, trace, and isolate system in the UK: results from 37 nationally representative surveys*, The BMJ, volume 372, March 2021. Based on series of cross-sectional surveys, using quota samples. Sample sizes for: (a) requesting a test: 3068 (all waves), 117 (January 2021); (b) compliance with self-isolation requirements: 1213 (all waves); 83 (January 2021).
- 2 UCL: University College London, *COVID-19 Social Study*, Results Release 28, January 2021. For compliance measures, respondents provided the shortest time they had isolated if they had been required to self-isolate more than once as a case or contact. Based on volunteer sample. More than 70,000 respondents in total, but sample sizes for these analyses not published.
- 3 ONS (experimental statistics): Office for National Statistics, *Statistical Bulletins on Coronavirus and self-isolation after testing positive in England*, February–April 2021, and *Statistical Bulletins on Coronavirus and self-isolation after being in contact with a positive case in England*, March–April 2021. ONS notes that as the statistics are experimental, care needs to be taken in interpreting them. Based on random samples of cases and contacts. Based on random samples from NHS Test and Trace Service (NHST&T) contact tracing database. Range of sample sizes per wave: (a) for people testing positive: 1,122 to 1,168 (response rates of 16% – 17%); (b) for notified contacts = 1,100 to 1,212 (response rates of 17% – 19%).

Source: National Audit Office review of published survey measures

3.25 In February 2021, NHST&T published the findings of an initial model analysis, which assessed the impact of test, trace and isolate on COVID-19 transmission (the R number).²⁸ This estimated that, in October 2020, the combination of testing, tracing and self-isolation resulted in a reduction in the R number of 18% – 33%. Self-isolation upon onset of symptoms by individuals accounted for most of this reduction, 16% – 28%, with the impact of contact tracing activities alone estimated at 2% – 5%. NHST&T is planning to publish an updated model by the end of June 2021, to cover the period May 2020 to May 2021, including the introduction of LFD tests.

3.26 Based on our review of the published information, we note a number of elements that, overall, could overstate the estimated contribution of NHST&T’s activities to reductions in transmission:

- The analysis notes that “the majority of [estimated] transmission reduction is due to isolation on symptoms”, which occurs before people engage with the test and trace system, and that the most infectious period is likely to have passed before someone receives a test result. It is therefore arguable the extent to which this component of the reduction can be attributed to NHST&T’s activities. NHST&T highlighted that the analysis showed a correlation between engagement with test and trace, and compliance with self-isolation. However, how much people’s compliance is actually influenced by test and trace activity is still very difficult to gauge;
- In estimating the impact of NHST&T’s activities, it compares this to a scenario with only social distancing and no self-isolation, that is, it assumes no one would self-isolate of their own accord if they were to develop symptoms. Any departure from this assumption would reduce the estimated impact. NHST&T noted that it was difficult to make alternative comparisons, given a lack of information on levels of compliance with isolation when people do not have a test; and
- Like any model, the estimates are highly dependent on a number of assumptions, which are set out in additional technical information published by NHST&T. The model was also subject to external review, which “regarded the core assumptions and structure as appropriate given the constraints”. Our review noted that while many of the assumptions are based on the best available data, some may be over-optimistic, for example the assumption that there is no overlap between people’s contacts.

²⁸ The R number is the average number of people infected by someone with the virus.

3.27 The Department also funded a study which evaluated the impact of the NHS COVID-19 app on reducing transmissions using two different models.²⁹ The app helps reduce transmission through automated notifications to app users who have come into close contact with another app user who has tested positive. The study estimated that, between October and December 2020, approximately 100,000 to 900,000 cases could have been prevented by the app. During the period modelled for the app, there were 1.89 million reported COVID-19 cases. As noted in the peer-reviewed published papers, there are some inherent uncertainties and limitations with the data used and therefore the estimates from the models, as reflected in the large range in the estimates of cases prevented.

3.28 NHST&T also highlighted research that had been carried out into the impact of asymptomatic testing on the infection rate within schools during March 2021. We reviewed a preliminary report of this research, although this did not include details of the methods or main assumptions. The report noted a steady increase in the number of secondary school aged pupils testing positive by LFD tests during the first three weeks that schools were open. It produced “preliminary and qualitative” model estimates that LFD testing may have reduced infection by up to 30% in secondary school pupils, compared with a scenario based on isolation of close contacts alone. The paper noted that the link between secondary school, and wider community transmission, was unclear.

Accessibility and diversity

3.29 In our interim report, we noted that the Department had identified that certain disadvantaged groups could have difficulties in accessing test and trace services and it had taken some steps to address these. NHST&T’s December 2020 business plan set out aims to increase reach among disadvantaged and less visible groups, translate more guidance nationally, and to make user experiences simpler, easier and more convenient. It has also developed an internal Equity and Inclusion Strategy.

3.30 NHST&T noted measures it had taken since October 2020 include undertaking research to improve understanding of groups disproportionately impacted by self-isolation; partnering with the Royal National Institute of Blind People to improve the experience of blind and partially sighted people; providing more translation and interpretation services; and running targeted campaigns to raise awareness of lateral flow testing amongst higher risk groups. NHST&T’s internal management reporting also includes some limited metrics and performance indicators to track diversity and inclusion. However, gaps remain for certain groups, and it has identified evidence of systemic bias in some data collection methods. NHST&T told us it was exploring additional data collection, which would allow it to measure service performance and outcomes for areas and population groups of interest.

²⁹ Wymant, C., Ferretti, L., Tsallis, D. et al. The epidemiological impact of the NHS COVID-19 app. *Nature* 594, 408–412 (2021). Available at: <https://doi.org/10.1038/s41586-021-03606-z>. The analysis included both epidemiological and statistical modelling.

3.31 Analyses by ONS and Public Health England indicate that some groups may have a higher number of COVID-19 infections and COVID-19-related deaths, with variations observed, for example, by ethnic group and levels of deprivation.³⁰ Many factors such as previous underlying health conditions could contribute to unequal outcomes. NHST&T already collects some data that can be used to understand whether differences in access to test and trace services for vulnerable groups exist, and if so, how they could be contributing to the poorer outcomes for these groups. We have seen a range of in-depth analysis by NHST&T on levels of infections or number of outbreaks by age groups, geographic locations or for particular settings, for example workplaces and care homes. It has also undertaken limited analysis of the number of lateral flow tests registered by men and ethnic minority groups. However, we are not aware of any systematic analysis on differences in access to symptomatic testing and tracing services by vulnerable groups and whether this has affected their outcomes. Several stakeholders we spoke to expressed concern about lower levels of testing among minority ethnic groups or for those living in deprived areas and the particular challenges they faced in adhering to self-isolation.

3.32 There have been wide and unexplained variations in the number of tests and proportion of people testing positive for COVID-19 by local authority. Between May 2020 and April 2021, the number of tests carried out ranged from 0.8 to 2.5 tests per person, while the proportion of people testing positive ranged from 1% – 13%. It is not clear how variations in access to testing and the performance of test and trace have impacted on variations in the level of infections. Our exploratory analysis suggested that local authorities with lower levels of testing tended to have higher proportions of people testing positive for COVID-19. We did not find a clear relationship between numbers of tests carried out and levels of deprivation. However, we note that a small number of areas – Oldham, Blackburn, Bradford, Bolton, which all have a high level of deprivation – persistently have a higher level of infection than most other parts of the country.

30 Office for National Statistics, articles on *Updating ethnics contrasts in deaths involving the coronavirus (COVID-19), England*, available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/articles/updatingethniccontrastsindeathsinvolvingthecoronaviruscovid19englandandwales/previousReleases>

Office for National Statistics, *Coronavirus (COVID-19) Infection Survey: characteristics of people testing positive for COVID-19 in England and antibody data for the UK: December 2020*, 14 December 2020, available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19infectionsinthecommunityinengland/december2020>

Public Health England, *Beyond the data: Understanding the impact of COVID-19 on BAME groups*, June 2020; *Disparities in the risk and outcomes of COVID-19*, August 2020. It also regularly updates variations in infection levels for different ethnic groups in its *National flu and COVID-19 surveillance reports*, available at: <https://www.gov.uk/government/statistics/national-flu-and-covid-19-surveillance-reports>

Part Four

Future plans for the NHS Test and Trace Service

4.1 There are many uncertainties about both the medium and longer-term future, including the impact of the vaccine on COVID-19 prevalence and transmission, as well as the impact of new variants of COVID-19. NHS Test and Trace (NHST&T) therefore faces significant challenges in planning for the future, including managing various competing demands. It needs to:

- plan for a range of scenarios which could involve an overall reduction in infection levels, while at the same time managing the risk of localised outbreaks or an overall resurgence of COVID-19;
- plan and deliver structural changes as it prepares to merge with other bodies and transition to the new UK Health Security Agency (UKHSA) by October 2021, while at the same time continuing its efforts to contain the spread of the virus; and
- establish how it will deliver its commitment to secure long-term benefits from its investment in testing infrastructure, including preparedness for future infectious diseases and early diagnostics for other diseases.

4.2 This section covers NHST&T's future plans, including:

- its approach to testing and tracing, including its operating model and testing and tracing capacity;
- arrangements for transitioning to the new UKHSA and key risks that we, NHST&T and stakeholders have identified; and
- plans for securing benefits from the laboratory infrastructure it has established.

NHST&T's plans for its approach to testing and tracing

The operating model

4.3 NHST&T has acknowledged that it needs to determine what its operating model will look like if COVID-19 prevalence reduces and outbreaks become more localised. Local stakeholders told us there is uncertainty about the roles that national, regional and local bodies will play, what the structure will look like as NHST&T transitions into UKHSA, and the future resourcing model given the need to respond flexibly to local outbreaks.

4.4 Stakeholders we spoke to highlighted the need for a clearer whole-system plan for test, trace and isolate and a more consistent approach. One stakeholder told us there is no recovery plan, although these would normally be put in place during a public health incident. We also heard that NHST&T policies on test, trace and isolate often operate in isolation from each other. Some local initiatives are providing more joined-up and citizen-focused ways of working, such as by providing information on self-isolation support at testing centres.

4.5 In February 2021, NHST&T's Executive Committee noted that national and local areas needed to provide a more integrated service that aligned data, people and assets. Local stakeholders told us that joint working between national and local bodies has improved. However, they also noted that despite a willingness for national and local integration at senior levels within NHST&T, there is sometimes a reluctance on the ground to give responsibilities to local partners. We also heard that local authorities sometimes find it difficult to respond quickly and effectively to incidents due to having insufficient powers under legislation.

Understanding the need for testing and tracing

4.6 NHST&T is working in a very uncertain environment and it is difficult to make predictions about the future prevalence of COVID-19 (see paragraph 4.1). However, we have seen evidence that NHST&T has sought to improve its understanding of the need for testing and tracing:

- NHST&T told us that to forecast the need for testing and tracing, it now undertakes modelling using historical data and information on prevalence. It considers that this has enabled it to forecast need with more precision, although we have not reviewed its model.
- In December 2020, it used models to assess the likely impact of the vaccine on the need for test and trace activities using four scenarios. These looked at different scenarios for vaccine impact, including its effect on new infections, transmission and symptoms, as well as the uptake and length of time for which it provides immunity.

4.7 NHST&T’s analysis, which was based on data produced by the Scientific Pandemic Influenza Group on Modelling (SPI-M), indicates that the need for test and trace activities would be different in each of the four scenarios it considered (**Figure 26** overleaf). It told us that the data indicated that there would be another surge in COVID-19 cases with varying timings and it is working on the assumption that the surge will occur in autumn 2021.

Plans for future testing and tracing capacity

4.8 Where there is uncertainty about a service need, it is important to build flexibility into plans to be able to respond to sudden surges in demand. Our previous report found that the Department of Health & Social Care’s (the Department’s) contracts to provide call handlers for tracing had no provision to vary the staffing levels in the first three months. However, the Department quickly became aware that it had purchased excess capacity.³¹ This section looks at NHST&T’s capacity plans for symptomatic testing, tracing and asymptomatic testing, including building flexibility into these plans.

Plans for symptomatic testing capacity

4.9 NHST&T plans to retain its laboratory capacity in 2021-22, whilst building in flexibility to respond to surges in need. It is planning to:

- increase the maximum theoretical capacity in privately-owned Pillar 2 laboratories to 760,000 tests a day in 2021-22, from 477,000 tests a day on 31 March 2021. It expects laboratories to operate at up to 80% of this theoretical capacity (equivalent to 608,000 tests a day);
- retain capacity in Pillar 1 laboratories, comprising 12,500 tests a day in Public Health England (PHE)-owned laboratories, 67,000 tests a day in NHS owned laboratories in England as well as capacity provided by the devolved administrations. In addition, the NHS has also committed to process 33,000 rapid point of care tests each day for the financial year 2021-22 under Pillar 1. It is easier to use these laboratories for other purposes if the capacity is not needed, and NHST&T is reviewing how they could be used without incurring high extra costs; and
- create capacity in the new Leamington Spa laboratory, which is due to start processing samples in June 2021 and is expected to have an operating capacity of 200,000 tests a day when fully operational in autumn 2021.

³¹ Comptroller and Auditor General, *The government’s approach to test and trace in England – interim report*, Session 2019–2021, HC 1070, National Audit Office, December 2020.

Figure 26

NHS Test and Trace Service analysis from December 2020 of the impact of the COVID-19 vaccine on the need for test and trace activities, using four possible scenarios

NHS Test and Trace Service analysis of the impact of the COVID-19 vaccine shows that the need for test and trace activities would be different in each of the four scenarios it considered

Implications for NHS Test and Trace Service					
Scenario description	Symptomatic testing	Non-symptomatic testing	Laboratory capacity	National and local contact tracing	Surveillance
Vaccine effectively reduces the transmission and symptoms of COVID-19. There is a high vaccine uptake and permanent immunity	Demand reduces	Could be scaled back, reprioritised or removed	Can be significantly reduced or repurposed	Option to relocate resources meant for national contact tracing and reduce resourcing for local contact tracing	Helpful for managing flare-ups, including anti-body testing
Vaccine effectively reduces the transmission of COVID-19 but not the symptoms. There is a moderate vaccine uptake and immunity window	Demand reduces	Could be scaled back, although option to retain in non-vaccinated groups	Can be reduced or repurposed	Cases and unvaccinated contacts fall	Could be needed to protect non-vaccinated groups
Vaccine effectively reduces COVID-19 symptoms, but transmission remains high. There is a moderate vaccine uptake and immunity window	Demand reduces	There could be an increased need, for example, in non-vaccinated groups	Can be reduced or repurposed. Laboratory operating model could change, for example, to prioritise volume over speed	Increased asymptomatic case finding	Would be critical for protecting non-vaccinated groups, including antibody testing
Vaccine has minimal impact on transmission and symptoms. Low vaccine uptake and short immunity window	Demand unchanged	There could be an increased need, for example, in non-vaccinated groups	Cannot be reduced	Cases and contacts remain high	Need for surveillance limited by enduring high case rate

Notes

- 1 NHS Test and Trace Service's (NHST&T's) scenario analysis is based on data published by the Scientific Pandemic Influenza Group on Modelling (SPI-M).
- 2 Symptomatic testing refers to the testing of people with symptoms of COVID-19. It is carried out using polymerase chain reaction (PCR) tests, which are processed in laboratories and test for the presence of the COVID-19 virus using a swab.
- 3 Asymptomatic testing refers to the testing of people without symptoms of COVID-19. Regular asymptomatic testing in social care is carried out using PCR tests but other asymptomatic testing is predominantly carried out using lateral flow device (LFD) tests. LFD tests give results in 30 minutes or less without the need for laboratory processing.
- 4 The surveillance technologies considered by NHS Test and Trace Service were wastewater analysis and antibody testing.

Source: National Audit Office analysis of NHS Test and Trace Service documents

4.10 Laboratory capacity cannot be turned on or off at short notice, and there is a trade-off between having the flexibility to change capacity at short notice and cost. NHST&T told us that it has introduced more flexibility into 2021-22 contracts to be able to flex volumes. It told us that there are several options for building capacity, including increasing staff and equipment in Lighthouse labs to make use of dormant capacity (6-12 weeks lead-in times), or procuring surge capacity from the private sector (fast to secure but expensive).

Plans for tracing capacity

4.11 NHST&T has not planned what central call handler capacity it will use in 2021-22 due to uncertainty about future prevalence. As at 8 March 2021, its current capacity levels were 15,300 people in total, including 4,600 Tier 2 specialists, and 10,700 Tier 3 call handlers.

4.12 Local stakeholders told us that there was a need to secure flexible resource capacity for local contact tracing, in case infection levels increase in the future. They noted that local capacity was being stretched and that much of the local COVID-19 response workforce were on temporary contracts, meaning it might be hard to retain and recruit people if the economy picks up.

Plans for asymptomatic tracing capacity

4.13 NHST&T has not yet set out its medium to longer-term plans for asymptomatic testing, including if it will be needed in the future and by which sectors. It has noted that as prevalence reduces, asymptomatic testing could be limited to NHS and adult social care workers. However, it is not clear what factors or levels of prevalence would trigger a reduction in the need for testing. NHST&T's budget for 2021-22 includes provision for 21 million lateral flow device (LFD) tests a week. NHST&T has provided businesses with free workplace testing until at least 19 July, after which responsibility may transfer to businesses. It is considering if daily testing of the contacts of positive cases could be used as an alternative to self-isolation if the contacts test negative.

Transition to the UKHSA

4.14 On 18 August 2020, government announced that a new body, the National Institute for Health Protection, would subsume NHST&T, including the Joint Biosecurity Centre (JBC), and the health protection functions of PHE. As announced on 24 March 2020, the new body, now renamed the UK Health Security Agency, was formally established in April 2021 to protect people from infectious diseases and external health threats. A new Office for Health Promotion, within the Department, is to be established in autumn 2021 to lead on promoting good health.

4.15 The Department expects UKHSA to be fully operational from 1 October 2021, at which point all staff that are due to move from NHST&T, PHE and the Department will transfer to UKHSA. The Department expects that by October, IT systems, data, contracts, estates and all other accompanying functions will also transfer from the Department and PHE to UKHSA, allowing PHE to move into a close-down phase. Final details on the design, structure and expected outcomes of UKHSA are due in autumn 2021. A chief executive and separate chair was appointed to UKHSA in April 2021 and the post of executive chair of NHST&T ended in April 2021.

4.16 The transition of NHST&T to UKHSA brings several risks and challenges:

- The need to plan and implement the restructuring alongside the COVID-19 response and other business-as-usual activities. One local stakeholder told us that local capacity is being stretched due to the need to consider the implications of public health reform alongside the COVID-19 response and the recovery of other business activities. Our reports on reorganising bodies in government have highlighted the importance of effectively managing both transition risks and business-as-usual risks simultaneously, ensuring that management focus on one does not divert resource or result in ineffective control of the other.³²
- Ensuring clear accountability and governance during and after the transition. Our interim report on NHST&T found it had an unusual organisational relationship with the Department, with unclear accountability. NHST&T is subject to the Department’s financial, information and staffing controls. Until December 2020, its then executive chair reported to the Prime Minister and Cabinet Secretary before this changed to the Secretary of State for Health. The creation of UKHSA creates an opportunity to clarify these arrangements. However, our reports on organisational restructuring in government have highlighted the challenges to maintaining clear lines of accountability and governance over the budgets of organisations being transferred.³³ The Department mitigated this risk by making its second permanent secretary accountable for NHST&T’s spending until accountability transfers to the chief executive of UKHSA on 1 October. However, three different accounting officers will have been responsible for UKHSA’s spending within the space of five months, bringing risks of confused decision-making and accountability.
- The need to determine and establish the base level of capacity that UKHSA needs. One of the government’s objectives for establishing UKHSA was to “ensure the nation can respond quickly and at greater scale to deal with pandemics and future threats”. UKHSA will therefore need a plan for how it could scale capacity up and down, including determining the baseline capacity it needs to hold for testing, tracing and data systems.

³² National Audit Office, *Short Guide to Reorganising Arm’s Length Bodies*, 1 December 2010. Available at: www.nao.org.uk/report/short-guide-reorganising-arms-length-bodies-2-2/

³³ See footnote 32.

- The loss of corporate knowledge, capacity and skills is also a key risk as NHST&T recognises that staff may choose not to transition to UKHSA. It is heavily reliant on a temporary workforce, with some 99% of its staff having fixed end dates.

Securing benefits from laboratory infrastructure

4.17 A November 2020 business case for the £10 billion expansion of testing in 2020-21 committed to leaving a lasting ‘legacy’ from NHST&T’s work. It stated that the £150 million investment in laboratory infrastructure would provide sustainable modern diagnostic capability post-COVID-19, with two major aims:

- Diagnostic preparedness for future infectious disease emergencies.
- Transformation to provide early diagnostics for cancer, cardiovascular and metabolic diseases, thus facilitating early preventative interventions.
- The plan also committed to creating new industrial capacity in the UK life sciences industry, resulting in significant job creation and economic growth.

4.18 NHS England and NHS Improvement told us that it was not informed of the business plan commitment to use the Test and Trace laboratories for this purpose at the time the commitment was made. It has now started to have conversations with NHST&T about potential legacy opportunities. NHST&T has identified various potential benefits from investment in early diagnostics, including scope to treat patients sooner as a result of pre-symptomatic testing. It also told us that there are opportunities to develop regional hubs and co-located life sciences clusters, which would create jobs and economic growth. However, it does not yet have detailed plans for how these benefits can be achieved, despite committing to developing a benefits realisation strategy by the end of December 2020 in its November 2020 business case. As such, it is unclear what the benefits are, who is delivering them and whether there are risks that will need to be managed. The Department will own the Leamington Spa laboratory for the next 18 months and Lighthouse labs are owned by private and NHS partners. NHST&T told us that detailed planning will be taken forward by UKHSA.

Appendix One

Our audit approach

1 This is the report of an audit updating on the test and trace services in England, including the ongoing operation of the NHS Test and Trace Service (NHST&T). It focuses on the period from November 2020 to April 2021 and follows an interim report published in December 2020 that focused on the period from the end of May to the end of October 2020.

2 This update report reviews:

- major changes to the test and trace programme and its operating context since October 2020;
- performance since the end of October 2020, including a focus on the overall effectiveness and impact of the test and trace system;
- budgets and spend, including areas of significant Parliamentary interest (contracts, consultants, utilisation rates); and
- future strategy and plans for NHST&T, including the transition to the UK Health Security Agency and plans to secure longer benefits from investment in testing infrastructure.

3 This report is mainly factual in nature. We originally intended to publish a fuller value-for-money assessment following the interim report but, following the second wave of infections in December 2020, we have decided instead to publish a more rapid update report. This report was specifically requested by the Committee of Public Accounts and has been undertaken primarily to fulfil the Committee's evidence requirements rather than providing a full assessment of value for money. A full assessment of the programme at this time would be also challenging due to the ongoing nature of the response, and changes in the test and trace programme.

4 Our audit approach is summarised in **Figure 27** on pages 73 and 74 and our evidence base is described in Appendix Two.

Figure 27
Our audit approach

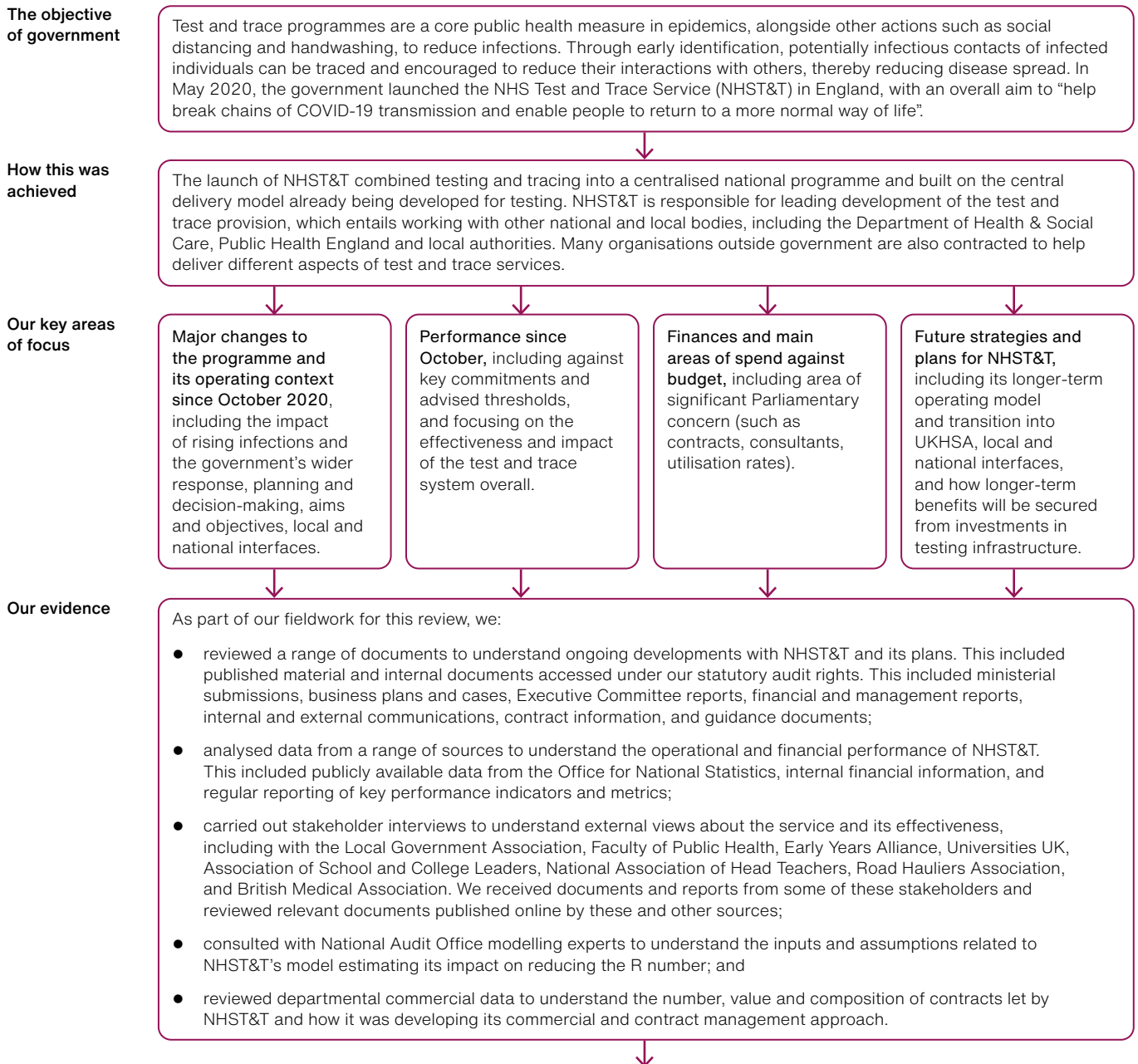


Figure 27 *continued*

Our audit approach

Our conclusions

The primary goal of NHST&T is to help break chains of COVID-19 transmission and enable people to return towards a more normal way of life. Since it was established in May 2020 there have been two national lockdowns and more than four million confirmed cases. In order to break chains of transmission, SAGE advises that no more than 48 hours should elapse between identification of an index case and their contacts self-isolating, and that 80% of these contacts would need to be reached. NHST&T now reaches around 90% of all contacts, and has reduced the elapsed time to trace contacts for in-person PCR tests. However, in-person PCR tests make up a declining minority of tests, and it is less clear whether the wider system is operating as quickly as it needs to. Since November, it has rolled out a national asymptomatic testing programme to seek to identify those people who do not know they have COVID-19. Only a small minority of the tests it has bought have been registered as used, and NHST&T are now undertaking research to understand the reasons for this with a work programme underway to bring about improvements. The success of the test and trace programme relies on the public coming forward for tests when they have symptoms, carrying out asymptomatic tests when they do not, and complying with instructions to self-isolate where necessary. NHST&T is responsible for driving up public compliance, but research suggests that only a minority of people who have COVID-19 symptoms come forward for testing. It has no target for increasing this, the uptake of LFD testing or compliance with self-isolation.

NHST&T was set up at speed with a workforce heavily reliant on consultants. It had planned to reduce its dependency on consultants but has not yet done so. NHST&T operates in an environment of high uncertainty, where demand for testing and tracing can be affected at short notice by new variants, case numbers and policy decisions (for example, national lockdowns). It is therefore challenging to forecast costs with precision. However, there is a very wide margin between the underspend of around 10% that NHST&T discussed with the Committee of Public Accounts in January 2021, and the 39% underspend of its 2020-21 budget that it reported two months later. It has taken steps to increase the flexibility of its contracts for contact tracing and future laboratory use and has generally improved its provision of data to and engagement with local authorities. However, local authorities still struggle to get timely access to the data they need to deal with localised outbreaks of COVID-19, and they are unclear on the planned operating model after July 2021. To achieve value for money NHST&T must be able to demonstrate both that the interventions it delivers are effective in achieving its objective, and that the mix of interventions is the most cost-effective use of public resources.

Appendix Two

Our evidence base

1 This update report on test and trace services in England was based on evidence collected between February and April 2021. Our approach is outlined in Appendix One.

Document review

2 We reviewed a range of documents to understand ongoing developments with the NHS Test and Trace Service (NHST&T) and its plans. This included published material and internal documents accessed under our statutory audit rights, such as ministerial submissions, business plans and cases, Executive Committee papers, financial and management reports, internal and external communications, contract information, and guidance documents.

Data analysis

3 We analysed data from a range of sources to understand the operational and financial performance of NHST&T. This included publicly available data from the Department of Health & Social Care, NHST&T and Office for National Statistics, internal financial information, and internal reporting of key performance indicators and metrics.

Audit body interviews

4 To clarify our understanding of internal documentation and data, we carried out a small number of interviews with NHST&T staff. To understand cross-government working with NHST&T, we also spoke to staff at the Office for National Statistics, NHS England and NHS Improvement, NHS Digital, the Department for Education, HM Treasury, the Cabinet Office and Department for Business, Energy & Industrial Strategy.

Stakeholder interviews and documentation

5 We carried out stakeholder interviews to understand external views about the service and its effectiveness, including with the Local Government Association, Association of Directors of Public Health, Faculty of Public Health, Early Years Alliance, Universities UK, Association of School and College Leaders, National Association of Health Teachers, Road Hauliers' Association, United Kingdom Homecare Association, British Medical Association, Independent SAGE and the Health Foundation. We received documents and reports from some of these stakeholders and reviewed relevant documents published online by these and other sources.

Model review

6 We consulted with NAO modelling experts to understand the inputs and assumptions related to NHST&T's model estimating its impact on reducing the R number.

Contract data review

7 We reviewed departmental commercial data to understand the number, value and composition of contracts let by NHST&T and how it was developing its commercial and contract management approach.

Limitations of the evidence

8 Like the interim report, this final report was based on a rapid review of evidence drawing predominantly on published information, supplemented by information requests to public bodies under our statutory audit powers. We have not audited the underlying information systems and source data for completeness or quality. However, relevant bodies have reviewed and confirmed the accuracy of information relating to them. We reviewed costs and contracts based on internal and unaudited management information, but these figures may be subject to change as the UK government's COVID-19 response continues. The analysis and findings in this report reflects our best understanding, but there are limitations and uncertainty in the completeness and quality of the financial and contractual information available.

CORRECTION SLIP

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SESSION 2021-22

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Correction One:

In Part Two of the report there is a page numbering issue which needs to be corrected. Part Two starts on page 32 and continues sequentially to page 35 but after this page the page numbers start again. The page numbering should be as follows;

Part Two should start on page 32 and end on page 47; Part Three should start on page 48 and end on page 68; Part Four should start on page 69 and end on page 75; Appendix One should start on page 76 and end on page 78; and Appendix Two should start on page 79 and end on page 80.

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