National Audit Office

Report
by the Comptroller
and Auditor General

Department of Health & Social Care

The government's approach to test and trace in England – interim report

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The government's approach to test and trace in England – interim report

Report by the Comptroller and Auditor General

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This interim report provides an overview of test and trace services for addressing COVID-19 in England, including how the government's approach has developed, and how it managed performance and capacity in the period from May to October 2020.

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Contents

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Key facts

£22 billion	budget for the NHS Test and Trace Service (NHST&T) for 2020-21
£4 billion	expenditure by NHST&T to the end of October 2020
407	contracts, worth £7 billion, let to public and private organisations for supplies, services and infrastructure to support testing and tracing
154	additional contracts, worth £16.2 billion, to be let between November 2020 and March 2021 (not all expenditure falls in the current financial year)
23 million	number of tests done in hospital (Pillar 1) and community (Pillar 2) settings in England between 28 May and 4 November 2020
850,000	number of positive cases identified through testing between 28 May and 4 November 2020
630,000	number of people testing positive for COVID-19 who NHST&T reached and asked to provide information about their contacts between 28 May and 4 November 2020
1.4 million	number of close contacts of people testing positive for COVID-19 who NHST&T reached and advised to self-isolate between 28 May and 4 November 2020
41%	average proportion of those tested in person in the community from 28 May to 4 November 2020 (under Pillar 2 of the testing system) who received their results within the target timeframe of 24 hours
66%	the proportion of close contacts NHST&T reports having reached and advised to self-isolate, from 28 May to 4 November 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
68%	average laboratory capacity use from 1 May to 31 October 2020, peaking at 93% during September
1% – 56%	range of daily utilisation rates for national tracing service call handlers (Tier 3) between 1 August and 31 October 2020

Summary

Introduction

1 Test and trace programmes are a core public health response in epidemics that can be used with other measures such as social distancing, barriers (such as masks) and handwashing 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. Through early identification, potentially infectious contacts can be encouraged or obliged to reduce interactions with other people, thereby reducing the spread of disease.

2 At the start of the COVID-19 outbreak, Public Health England (PHE) carried out comprehensive test and trace activities for the relatively low numbers of infections. As infection levels grew, government introduced a national lockdown as the main way of reducing transmission of COVID-19, suspending comprehensive contact tracing in mid-March. From April onwards, the Department of Health & Social Care (the Department) significantly scaled up testing capacity in England. On 28 May 2020, government announced the launch of the new NHS Test and Trace Service (NHST&T), to lead on four areas of pandemic response, known as test, trace, contain and enable, and to bring these together into a single national programme.

3 NHST&T's overall aim is to "help break chains of COVID-19 transmission and enable people to return to a more normal way of life". In July it published a number of specific objectives, focussed on increasing the scale and speed of test and trace activities (see paragraphs 12 and 20). Advice from the World Health Organization and the UK's Scientific Advisory Group for Emergencies (SAGE) confirms that testing and tracing systems can contribute to reducing COVID-19 infection levels under certain conditions (see paragraphs 24 and 25).

4 Within government's overall response to COVID-19, the Department has responsibility for several policies intended to limit virus spread, including testing and tracing. Other public bodies with responsibility for developing and providing test and trace services are:

- NHST&T, part of the Department, which leads on the overall test and trace programme, working in conjunction with PHE and English local authorities.
- PHE, which is England's expert public health agency, with responsibilities for public health advice, analysis and support, and the response to public health emergencies. It carries out some laboratory testing, and contact tracing for higher risk cases in liaison with local authorities.
- Local authorities, which lead local outbreak planning and employ directors of public health, who have a statutory duty to control local disease outbreaks. Local authorities can set up their own contact tracing schemes and provide support for people who are self-isolating.

5 This is the first of two reports. This interim report provides an overview of test and trace services for addressing COVID-19 in England, including how the government's approach has developed, and how it managed performance and capacity in the period from May to October 2020. This report does not cover post-October planning for mass testing. It covers some aspects of public engagement efforts in relation to improving compliance with tracing. We intend to publish a further report in spring 2021 which will provide a fuller value-for-money assessment of test and trace. This will include an update on spend and performance, and matters not covered here, including examining the end-to-end process in more depth, the development and implementation of the contact tracing app, and a detailed look at elements of contract management.

Key findings

Government's approach to test and trace

6 In the past six months, the government has achieved significant increases in testing activity, and set up a national contact tracing service from scratch; as a result millions of people have discovered whether they have COVID-19 and whether they should self-isolate. On 28 May, the government launched NHST&T, bringing together a national programme for testing and tracing. Since then, both testing and tracing activity have increased significantly. For example, between the end of May and the end of October, the daily number of swab tests processed for community and hospital testing quadrupled, while the weekly number of contacts reached and advised to self-isolate had increased nearly four-fold. In total, between 28 May and 4 November, the system processed 23 million tests (from community and hospital settings) for England, found 850,000 positive cases. It also reached 630,000 people who tested positive to ask them for information about their contacts, along with more than 1.4 million of the contacts, through its tracing service. Much of the infrastructure and capacity to support these activities did not previously exist. During April and May, the government had to rapidly scale up tracing capacity to establish a national system of community contact tracing for COVID-19. In its first week of operation, this reached 50,000 contacts of people who had tested positive for COVID-19 (paragraphs 1.12, 1.36, 2.13, 3.11 and 3.14 and Figure 11).

7 The government did not document the basis for the delivery model it chose for the national test and trace programme in a business case until September 2020. NHST&T built on the central delivery model already being developed for testing. It also extended this to tracing, in conjunction with the existing PHE capacity. The government planned for a very rapid scaling up of tracing capacity. A range of stakeholders have queried why the government did not involve local authorities more in its initial approach to tracing, given their previous experience in this area. We have seen evidence that in April and May the Department considered, but ruled out as unfeasible, obtaining the call handler resources it needed from existing civil service staff and central government call centres, but not whether it could make use of local authority capacity for this. NHST&T told us that, in the time available, the only feasible approach was to focus first on building up tracing capacity centrally. A retrospective business case in September noted that the option of fully localised delivery (with no national capacity) would neither sufficiently reduce transmission levels nor provide value for money but it did not consider other forms of localised model. Local government stakeholders expressed concern that they had not been sufficiently engaged on the design and implementation of test and trace services. NHST&T has sought local engagement and feedback in a number of ways, including senior-level secondments from local authorities, advisory groups such as its local authority design group, and activities such as the pilots for mass testing and door-to-door testing (paragraphs 1.6 to 1.9 and 2.24).

8 **NHST&T has a budget for 2020-21 of £22 billion, with most funding assigned to testing.** This includes a £15 billion budget confirmed before the November Spending Review, of which around 85% (£12.8 billion) is for testing. Of this, £10 billion is to fund current testing activity with the remainder for a mass testing programme, which commenced in September. Planned spending on tracing is £1.3 billion. Up to the end of October, NHST&T had spent a total of £4 billion, about £2 billion less than forecast, due to underspending on laboratories, machines and mass testing. The November Spending Review introduced an additional £7 billion to increase testing and tracing as part of government's COVID-19 Winter Plan, taking the overall funding to £22 billion. This means there was a remaining budget of some £18 billion in the last five months of the financial year (paragraphs 1.28 to 1.31).

9 **NHST&T has signed 407 contracts worth £7 billion with 217 public and private organisations.** NHST&T relies on contractors for many of its supplies, services and infrastructure. It estimates it will sign a further 154 contracts worth £16.2 billion between November 2020 and March 2021 (with not all that spending occurring in this financial year). As with many other government procurements during the pandemic, 70% of early contracts by value were assigned as direct awards without competition under emergency measures. NHST&T told us that, given the need to scale up operations at speed, it had to use the private sector to respond quickly, for example in expanding the diagnostic industry and to employ a large number of central contact tracers. An internal government review of 15 other countries' test and trace approaches noted that some had used private sector outsourcing to increase testing capacity, but none had done so to increase tracing capacity, which was generally built up from existing tracing and public health expertise (paragraphs 1.10 and 1.33 to 1.34).

10 **NHST&T's services combine many new and pre-existing services operated by a range of bodies.** The test and trace service is a number of discrete services provided by different organisations. A principal challenge for NHST&T's management has been to connect them into an effective end-to-end process supported by appropriate systems, processes and information so that users experience a single user journey and all necessary experts and officials receive accurate and timely data. NHST&T's initial focus was on creating a "minimum viable process". It is now seeking to refine, integrate and stabilise that process so it operates reliably at scale (paragraphs 1.17 to 1.18).

11 **NHST&T has an unusual organisational relationship with the Department, with unclear accountability.** NHST&T is subject to the Department's financial, information and staffing controls, but its head, the executive chair, does not report to the Department's ministers or permanent secretary, but rather to the Prime Minister and the Cabinet Secretary. This direct reporting line to the Prime Minister and the Cabinet Secretary is a clear indication of NHST&T's importance to government as a whole. However, since the body is embedded within the Department, these dual reporting lines bring risks of unclear accountability. We have not undertaken a systematic review to determine whether these risks have materialised and to date have seen no evidence that they have (paragraphs 1.19 to 1.20).

Testing capacity, activity and performance

12 NHST&T has committed to provide rapid testing, at scale, that is reliable, accessible and able to focus on high-risk groups, locations and specific outbreaks. Since July, it has been pursuing a number of key objectives, including reaching 500,000 tests a day by the end of October, and providing results within 24 hours to people who take their tests in person (paragraphs 2.2 and 2.10).

13 Since spring, NHST&T has set up new testing sites and an expanded network of diagnostic laboratories to deliver testing nationwide, adding to existing NHS and PHE infrastructure and by contracting with the private sector. The Department gradually widened eligibility for testing from March to May, when testing was made available to the general public. Most testing is intended for people displaying symptoms of COVID-19. However, since July, there has been regular testing of asymptomatic staff and residents in care homes. This includes:

- NHS staff and patients, and some vulnerable groups, tested in hospitals or care homes with these tests processed in NHS or PHE laboratories (known as pillar 1 testing); and
- members of the public who self-refer, book and attend a test at a local, regional, mobile or satellite testing site or request a home test. These tests are processed in lighthouse or partnership laboratories (known as pillar 2 testing).

NHST&T is operating 593 testing sites and 15 laboratories and plans to add a further 15 lighthouse laboratories and two high-capacity 'mega-laboratories' in January 2021 (paragraphs 2.3 to 2.4 and 2.24).

14 Of the £15.1 billion made available to NHST&T before the November Spending Review, £12.8 billion (85%) is intended for testing. This includes £5.9 billion for laboratories and machines, £2.9 billion for mass testing and £1 billion for supplies and logistics. Much of this is paid to private companies and other public institutions under a variety of contractual arrangements. NHST&T sees this as an investment in a diagnostics industry that will bring long-term benefit but for this report we have not reviewed its strategy in this regard. The largest 10 suppliers of NHST&T are mainly for the testing programme, including for surveys to establish the prevalence of COVID-19 in the population, testing kits and equipment, logistics, and laboratory operators (paragraphs 1.28 to 1.30, 1.33 and 2.4).

15 Testing capacity increased five-fold between May and October, in line with plans to reach the public target of 500,000 available tests per day on 31 October, but the actual number of tests processed daily is below reported capacity. NHST&T set itself an ambitious target to expand its overall capacity to test people. Focusing on overall capacity has been useful to drive a major expansion of testing infrastructure, but the measure only indicates the system's theoretical maximum capacity on any given day and not what has actually been achieved. This capacity has seldom been used in full and at times tests have been rationed at levels below the maximum, meaning that some people who needed a test could not get one. NHST&T recommends that laboratories use 85% of theoretical maximum capacity in normal times. On average the number of tests carried out has been only 68% of the reported maximum since May, although this has fluctuated throughout the pandemic. We will revisit this matter in our next report to understand the reasons why capacity has not been used. NHST&T has ambitious plans to increase its maximum testing capacity to 800,000 tests a day by the end of January (paragraphs 2.11 to 2.14 and 2.24).

16 NHST&T has not met a target to provide results within 24 hours for tests carried out in person in the community. Performance on turnaround times for tests carried out in person in the community (pillar 2) peaked in June with 93% of test results provided in 24 hours, but this has since deteriorated to a low of 14% around mid-October. The performance then improved a little, with 38% of results reported within 24 hours by the beginning of November. Turnaround times for pillar 1 (hospitals and care homes) has consistently been around 90% although these are measured on a different basis (paragraphs 2.22 to 2.23).

17 NHST&T did not plan for a sharp rise in testing demand in early autumn when schools and universities reopened. The September spike in demand was much larger than NHST&T expected so it did not take adequate steps to prepare for it. Laboratories processing community swab tests were unable to keep pace with the volume of tests and experienced large backlogs, which meant that NHST&T had to limit the number of tests available, lengthen turnaround times, and commission extra assistance from NHS and 'surge' laboratories. Rationing of community tests in some geographical locations meant that average travel times to test sites lengthened in August and September with some potential users told to visit test sites hundreds of miles away. NHST&T could face similar spikes in future, perhaps owing to a surge in cases in the general population, or the end of the university and school terms in winter and if this happens it will need to consider again how best to balance processing volumes against speed of turnaround (paragraphs 2.17 to 2.20).

Contact tracing capacity, activity and performance

18 Government budgeted £1.3 billion in 2020-21 to establish and run a national tracing system from the end of May. The national service, consisting of text and email communications and a pool of central telephone tracers, was intended to deal with the majority of positive cases, while PHE regional teams had responsibility for tracing cases linked to potential outbreaks, for instance in workplaces or hospitality venues. In its first week of operation, NHST&T reached around 5,900 people who had tested positive for COVID-19 (cases) and more than 50,000 of those they had been in close contact with (contacts). The £1.3 billion budget for tracing included up to £720 million on contracts with Serco and Sitel for central call handlers. Actual expenditure on tracing up to the end of October was £478 million. In addition, the government has given £785 million in grants to local authorities to support their COVID-19 response, which could include tracing activities (paragraphs 1.29, 3.8, 3.11, 3.14 and 3.28).

19 Since July, local authorities have assumed a bigger tracing role, setting up their own schemes in conjunction with the national arrangements. The Department initially told local authorities to focus on working with PHE to "investigate and control outbreaks". By July, local authorities had started to set up their own locally run contact tracing schemes to cover the minority of cases that the national service cannot reach, working in conjunction with NHST&T. In August, NHST&T reduced the number of national-level contact tracers and designated a proportion of its specialist tracing staff to work exclusively to facilitate those local authorities that had their own scheme. By the end of October, 40% (60) of local authorities had a scheme in place, with a further 46% (69) planning to set one up. However, local government stakeholders told us that some authorities were being held back from developing their own arrangements by lack of funding or lack of clarity about whether funding would be available. At the end of October, NHST&T acknowledged that there needed to be better co-ordination of its tracing strategy and the growing range of national and local approaches (paragraphs 3.19 to 3.21, 3.23 and 3.24).

20 NHST&T published broad ambitions for the tracing service, and subsequently set some internal targets. NHST&T's July business plan set out objectives for the following three to six months. For tracing, these were mostly broad ambitions rather than specific or quantifiable targets. One ambition included increasing the number of contacts the service reached and advised to self-isolate, both by increasing the overall number of people being tested and by increasing the proportion of contacts reached who went on to self-isolate. A second ambition was to reduce the average time taken to reach contacts. NHST&T later developed some internal metrics and targets for its performance, including that 80% of people testing positive for COVID-19 would complete tracing, and that it would take 48–72 hours to advise close contacts to isolate following an initial person developing symptoms (paragraphs 1.25 to 1.26 and 3.5).

21 Tracing performance has fluctuated since May, with a substantial increase in activity during October. The proportion of cases reached and asked to give details of their contacts has fluctuated but as at the end of October was 85%, higher than the proportion at the end of May (73%). By contrast, the overall proportion of contacts reached and advised to self-isolate has dropped, from 91% in the last week of May to 60% in the last week of October. In part, this reflects a change in the types of cases, with a smaller proportion being linked to outbreaks, where it can be easier to reach a large number of contacts (for instance, all residents and staff in a care home). Numbers of cases covered by the service remained low over the summer, but more than quadrupled during October, with a similar pattern for close contacts. For both cases and contacts, the time taken to reach them generally increased from May to mid-October, before improving in the last two weeks of October. For example, the proportion of contacts reached by the national service within 48 hours stood at 87% at the end of May, before dropping to 64% in the middle of October, and rising to 81% by the end of that month. Taken together, these indicators suggest that progress against the ambitions NHST&T set in its business plan has been mixed (paragraphs 3.6, 3.11 to 3.13, and 3.15 to 3.16).

22 There has been no shortage of central tracers and, at times, parts of the national tracing service have been barely used. In May, the Department signed contracts for the provision of 3,000 specialist health professionals and 18,000 call handlers for an initial three-month period. It had very limited and uncertain information to determine what initial level of contact tracing capacity would be required. During the initial three months, the call handler contracts had no provision to vary the staffing levels that the Department had set, but the Department quickly became aware of the possibility of excess capacity. By 17 June, there were low utilisation rates for both specialist health professionals (4%) and call handlers (1%). Flexibility clauses, allowing the Department to change staffing levels, were introduced to the call handler contracts from 17 August, after which it immediately reduced its paid-for capacity from 18,000 to 12,000 staff. However, utilisation rates for call handlers remained well below the target of 50% throughout September and for much of October. Spend on the call handler contracts up to the end of January was projected to be 22% lower than had been budgeted (paragraphs 1.7, 3.28 and 3.33).

23 While NHST&T has got better at providing local authorities with timely access to relevant data since May, it continues to manage a number of risks relating to data quality and security. Local authorities need data on positive cases in their area for monitoring infections, managing outbreaks and to support contact tracing. NHST&T told us that to start with it had to resolve a number of data governance and security issues before it could share detailed data on cases. This meant that local authorities did not always have the information they needed, but local government stakeholders noted that these early problems have largely been resolved. NHST&T continues to manage a number of significant data risks, including the possibility of data breaches (as some tracing staff have wide access to contact details). Weaknesses in current systems will not be fully resolved until a planned upgrade of contact tracing software, scheduled for January 2021 (paragraphs 3.35 and 3.36).

Ensuring NHST&T contributes to reducing infection levels

24 The Scientific Advisory Group for Emergencies (SAGE) has provided advice on what a testing and tracing system needs to achieve in order to be effective; to date NHST&T has not achieved these standards. In May, SAGE advised that an effective test and trace system needed to reach at least 80% of close contacts of index cases.[1] Between 28 May and 4 November, NHST&T reported reaching 66% of close contacts and advising them to self-isolate (1.4 million of 2.1 million close contacts identified).[2] This proportion will not take into account the close contacts of those testing positive and whom NHST&T does not reach to identify their close contacts. Between 28 May and 4 November, NHST&T reached 82% of people with a positive test and asked them for information about their contacts. NHST&T's internal targets for the time taken to advise close contacts to isolate following an initial person developing symptoms is 48-72 hours, although SAGE emphasised the importance of isolating contacts within 48 hours of identifying an index case. Since May the service has taken longer than 48 hours to reach many contacts (paragraphs 1.13 to 1.15, 2.25, 3.11 and 3.16 to 3.17).

25 The high reported levels of non-compliance with self-isolation represent a key risk to NHST&T's success; national and local government have been trying to increase public engagement. SAGE noted that a high level of adherence to requests to self-isolate would be required for NHST&T to be effective, including that at least 80% of contacts of index cases would need to self-isolate. Different survey-based measures, using different questions and time periods, suggest that contacts' levels of compliance with requests to self-isolate might range from 10% to 59%. Government is using a combination of financial support and legal penalties to increase compliance, including fines for failing to self-isolate, and support payments for people on lower incomes. NHST&T acknowledges that non-compliance poses a key risk and has taken steps to monitor and increase levels of self-isolation, for example making follow-up calls to people during their isolation periods. The Association of Directors of Public Health has called for better understanding of users' barriers and likely behavioural responses throughout the process (paragraphs 1.13, 3.37 and 3.39 to 3.41).

1 Index case is the term used in the published SAGE minutes.
2 The Department requested that we note that its published data uses definitions supported by advice from the Office for National Statistics and the results of a rapid review which it commissioned from the UK Statistics Authority, and that it cannot agree any alternative presentations of these data.

Concluding remarks

26 This is an initial review of the aims, funding and performance of the government's approach since May. We found that overall NHST&T had achieved a rapid scale-up in activity in respect of both testing and tracing, and had built much new infrastructure and capacity from scratch. However, issues with implementation and potentially the initial choice of delivery model mean that it is not yet achieving all its objectives. As it plans and rolls out further changes in COVID-19 testing, including the introduction of rapid turnaround tests and mass testing, government needs to learn lessons from its experience so far. It is very important that testing and tracing is able to make a bigger contribution to suppressing the infection than it has to date.

27 We highlight here the most significant risks and issues that NHST&T needs to address in the immediate future. It should:

a **explore how to make fuller use of its theoretical maximum testing capacity each day,** so that existing infrastructure and resources are efficiently employed and more of those infected with COVID-19 can be identified and their contacts traced;

b **plan against a range of plausible outcomes to ensure it has flexibility to respond to predictable and unexpected spikes in testing demand**. Problems emerged when schools and universities reopened in September, despite a predictable spike in demand. NHST&T also needs to have contingency plans in place so it can respond to unexpected spikes in community testing, in order to provide an effective service, maintain public confidence, and ensure availability of testing for hospital patients;

c **set out a clear strategy for how national and local tracing teams will work together, informed by a good understanding of local authority capacity and performance.** The number of local authority-run schemes is set to increase, and NHST&T needs to be clear about how national and local services align, and who is best placed to carry out activities. It also needs to understand what local authority capacity and funding are required to deliver its objectives;

d **model and communicate as early as possible how changes in testing policy are likely to affect the workload of national and local tracing services.** Such changes could include increased testing of certain categories of key worker and the introduction of mass testing (formerly referred to as Operation Moonshot);

e **take steps to increase public engagement and compliance with self-isolation**. NHST&T is one of a number of bodies, alongside local authorities and the police, who can influence compliance. It must work closely with these bodies, drawing on the best public health and behavioural expertise to identify how its actions can best contribute. For as long as compliance is low, the cost-effectiveness of NHST&T's activities will inevitably be in doubt;

f **take account to the maximum extent possible of value for money and normal commercial good practice as it procures new infrastructure and services.** In particular, it needs to have sufficient flexibility in future contracts to allow government and contractors to respond effectively to changing requirements at reasonable cost; and

g **embed strong and sustainable management structures, controls and lines of accountability.** We have noticed arrangements where accountability does not clearly align with organisational and strategic objectives in other aspects of the government's COVID-19 response. With the creation of the National Institute for Health Protection, there is an opportunity to clarify arrangements.

Part One

Government's approach to test and trace

1.1 This part examines the development of the government's approach to test and trace with its establishment of a national programme from May 2020. It also provides an overview of the current test and trace process, national and local responsibilities, and details on funding and spending.

Test and trace at the start of the COVID-19 outbreak

1.2 Test and trace programmes are a core public health response in epidemics that can be used with other measures such as social distancing and handwashing 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. Through early identification, potentially infectious contacts can be encouraged or obliged to reduce interactions with other people, thereby reducing disease spread, particularly from those carrying the disease without symptoms.

1.3 In recent times, countries have used this approach during outbreaks of Ebola and Severe Acute Respiratory Syndrome. In England, there are also well-established programmes for sexually transmitted infections and tuberculosis. Prior to COVID-19, local Public Health England (PHE) health protection teams were responsible for testing and tracing activities, in conjunction with local authorities' directors of public health and their teams.[3]

1.4 PHE carried out test and trace activities for COVID-19 from the start of the outbreak in England until 16 March 2020, when the comprehensive tracing of all community cases ceased in the face of rising infection levels. Since March the Department of Health & Social Care (the Department) has led efforts to scale-up testing capacity in England, with significant increases in capacity from April onwards. On 28 May government launched the NHS Test and Trace Service (NHST&T), working in conjunction with PHE. The establishment of NHST&T built on previous efforts to increase testing capacity and marked a return to the use of comprehensive community contact tracing as a strategy. This interim report focuses on the period from May, when test and trace was brought together under a national programme, to the end of October, when the government had a target to reach 500,000 available tests per day.

3 Local environmental health teams also undertake similar activities in relation to food poisoning outbreaks.

Developing the approach to test and trace for COVID-19

Government's choice of delivery model for national testing and tracing

1.5 The Department's priorities during the pandemic's first phase were to find a reliable test and scale up capacity to deliver it. From March onwards, it expanded eligibility for tests, initially for priority groups such as NHS and social care staff, and then, from 18 May, for anyone with symptoms. The scale-up built on existing PHE and NHS diagnostic laboratories, with additional laboratory capacity and logistical support from private companies and universities from April 2020 and through newly created lighthouse laboratories.

1.6 The launch of NHST&T on 28 May combined testing and tracing in a national programme, building on the central delivery model that was already being developed for testing. For tracing activities, the government established a national service comprising a central pool of contact tracers and online channels which would handle the majority of contact tracing. PHE regional teams, which were also expanded, had responsibility for tracing cases linked to communal settings (for example, care homes and workplaces), working in conjunction with local authorities.

1.7 A range of stakeholders have queried why local authorities were not more directly involved in the government's approach to tracing from the outset, given their existing experience of this activity. In April and May, the government had very limited and uncertain information on what level of contact tracing would be needed, with scenarios ranging from a few thousand tracing staff required to over 80,000. Models also indicated a sharp spike in demand when comprehensive community tracing started, as lockdown restrictions were easing. The government therefore planned a very rapid scaling up of tracing capacity, with spare capacity to cover any surges in demand. NHST&T told us that, given the time available, it was only feasible to focus on expanding centrally first, building on existing PHE technical systems (which supported workforce, record and data management). We have seen evidence from this period that the Department considered, but ruled out as unfeasible, obtaining the call handler resources it needed from existing central civil service staff and central government call centres, and decided the most feasible route would be to resource this via the private sector using an established framework. We have not seen evidence that they considered whether to make use of local authority capacity for call handling.

1.8 In April, PHE led on initial efforts to develop the national tracing model. Alongside its joint working with local authorities at a regional level, it also set up a design working group involving local government stakeholders and asked for secondees from local government. Following its launch, NHST&T also seconded representatives from local government to its Executive Committee and set up a number of channels to engage with local government (see paragraph 1.22). However, the Local Government Association (LGA) and the Association of Directors of Public Health (ADPH) told us that central bodies and their contractors had not engaged

sufficiently with local government and public health experts on key decisions about the design of test and trace services or the practicalities of implementing these services. Since April, both bodies have called for local government to play a bigger role in testing and tracing, although they recognise the value of having some national capacity for contact tracing (for example, for travellers arriving in the UK). The ADPH raised a specific concern about excessive focus on achieving high volumes of tests and tracing calls at the expense of poor clarity about the purpose of testing and the establishment of an effective infection control system.

1.9 In September, the Department finalised a retrospective business case for NHST&T and its associated expenditure in 2020-21, then estimated at £12 billion. Its preferred option was to establish NHST&T – confirming the actions it had already taken – with a focus on increasing testing capacity to 800,000 tests a day over the winter. Other shortlisted options were to cease running NHST&T and to run NHST&T with a capacity of 500,000 tests a day. Five further options were longlisted but the Department judged that they did not meet the criteria of: demonstrably reducing COVID-19 transmission; feasibility; value for money; and economic impact (that is, reducing the need for national restrictions on daily life). This included an option to deliver testing and tracing locally, coordinated by NHS trusts and local authorities. The business case noted that this option was not considered value for money because of a high risk of duplicated effort, in addition to lower economies of scale compared with the national scheme. It also considered that local variation in service quality would mean an insufficiently high impact on transmission.

1.10 In October, NHST&T's board discussed learning from a review of 15 other countries' testing and tracing systems (**Figure 1** on pages 20 and 21). The countries reviewed had a range of different public health systems before the pandemic, so were building their services from different starting points. The review showed how other countries had also experienced problems with capacity, test turnaround times, and public engagement and compliance. For testing, the review noted the importance, not just of overall capacity, but also of targeting tests and achieving rapid turnaround times for results. Countries had tried a number of approaches to increase testing capacity, including private sector partnerships. For tracing, most of the countries reviewed had built systems around existing tracing and public health expertise, with none making extensive use of outsourcing. Most countries conducted tracing at local or regional level. NHST&T told us that, given the need to scale up operations at speed, it had to use the private sector to respond quickly, for example in expanding the diagnostic industry and to employ a large number of central contact tracers.

The role of test and trace in the COVID-19 response

1.11 The stated primary goal of NHST&T is to help break chains of COVID-19 transmission and enable people to return to a more normal way of life.[4] This relies on identifying as many people as possible with the virus, as early as possible in their infection, and ensuring that both they and their recent contacts self-isolate. In its retrospective September business case, the Department stated that "NHST&T aims to avoid the need for a second national lockdown". It aimed to do this by reducing the R value (the average number of people infected by someone with the virus), though the business case explicitly recognised that NHST&T alone could not reduce R by enough, with some social restrictions needing to continue among the general population.[5] The business case justified the cost of NHST&T in part with reference to averting a future lockdown. It stated that there were "no financial benefits as such that will accrue to [the Department] as a result of undertaking NHST&T, with the main driver being the avoidance of a second national lockdown and the vast associated social and economic costs". A second national lockdown commenced in England on 5 November and ended on 2 December.

1.12 Testing and tracing systems typically suffer from attrition, meaning they are unable to identify everyone with a disease or all their close contacts. This is particularly a problem when people can have a disease asymptomatically, as with COVID-19. **Figure 2** on page 22 provides an overview of estimated attrition in English test and trace processes from 28 May to 4 November, based on published Office for National Statistics (ONS) and NHST&T data. For this period, our best estimate is that NHST&T reached about 32% of people infected with COVID-19 and asked them for details of their close contacts. This currently falls short of NHST&T's ambition to reach around 44% of infected people.[6] The greatest attrition occurs at the start of the process with people who have the infection but do not get a test. This includes individuals without symptoms. Such people are unlikely to be aware of the need to get tested but, in any event, are mostly ineligible for tests under current criteria. At the end of the process not everyone advised to self-isolate actually does so (see paragraph 3.37).[7]

4 Department of Health & Social Care, *Breaking chains of COVID-19 transmission to help people return to more normal lives: developing the NHS Test and Trace service,* published 30 July 2020, available at: www.gov.uk/government/publications/developing-nhs-test-and-trace-business-plan/breaking-chains-of-covid-19-transmission-to-help-people-return-to-more-normal-lives-developing-the-nhs-test-and-trace-service

5 Reducing the R value to below one is desirable as it means an epidemic is shrinking.

6 This is based on multiplying together two internal NHST&T targets: a target of 55% for the number of people testing positive as a proportion of the ONS survey estimate of new infections, and a target for 80% of people testing positive to complete tracing.

7 Louise E. Smith et al., *Adherence to the test, trace and isolate system: results from a time series of 21 nationally representative surveys in the UK (the COVID-19 Rapid Survey of Adherence to Interventions and Responses [CORSAIR] study),* doi: available at: https://doi.org/10.1101/2020.09.15.20191957

Figure 1

Lessons learnt from a review of test, trace and isolate systems used in 15 other countries, carried out by the Foreign, Commonwealth & Development Office and Joint Intelligence Organisation in October 2020

Other countries had a range of different public health systems before the pandemic and have used a range of approaches in setting up test, trace and isolate systems

Early warning and surveillance

Monitoring and surveillance plays a growing role in the most effective test and trace systems.

Ten countries have border testing regimes, which can be effective if there is sufficient testing capacity.

Only three countries (Hong Kong, Singapore and Australia) have tried mass testing. This can be a costly strategy and may fail unless done with strong community engagement and a clear intent.

Sewage-water testing is starting to complement wider surveillance efforts (although it is still at an early stage of use).

Test

The key to an effective testing system is not just sufficient capacity but testing the right people and testing them quickly.

Other countries use GPs to prescribe tests to help manage demand, although it is unclear what effect this is having.

Countries have increased testing capacity through a range of approaches including partnerships with the private sector and automation.

Most other countries test asymptomatic contacts of positive COVID-19 cases, except where testing capacity is overwhelmed.

Many countries are starting to implement 'rapid' tests to identify people with the virus, typically in time-critical environments and for mass testing of particular groups (eg airports or hospitals).

Note

1 The 15 countries were Australia, Belgium, Denmark, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Singapore, South Korea, Spain, Sweden and Taiwan.

Source: National Audit Office review of Foreign, Commonwealth & Development Office and Joint Intelligence Organisation documents

Trace

Most of the countries reviewed built their contact tracing capacity using public health and tracing expertise, as well as other public sector resource. None extensively use outsourcers.

In large countries, regional-based systems are typical.

Tracing infection source (backward tracing) is increasingly used by countries with the most successful test and trace strategies.

Most countries now use technology and apps to support contact tracing. These are complementary rather than central to contact tracing.

Eight of the countries reviewed had issues with low public engagement for tracing.

Some countries have specific strategies for ethnic minorities.

Isolate and support

Countries with the most effective test and trace systems use a mix of financial incentives and legal enforcement to improve compliance with isolation.

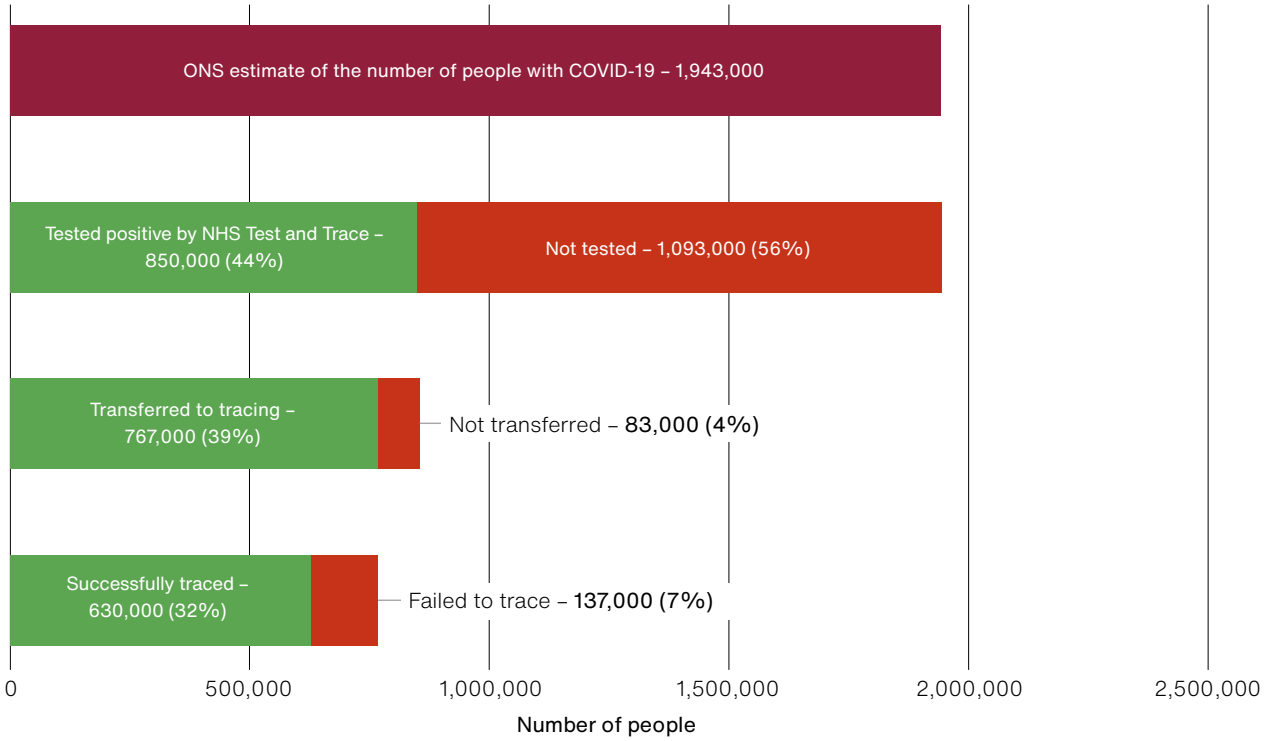
Types of support include food provisions, daily 'check-in' calls from local officials as well as financial support.

Some countries have reduced their quarantine periods in an attempt to improve compliance.

Figure 2

Estimated number of people in England infected with COVID-19, receiving positive tests, transferred to tracing service and reached by the NHS Test and Trace Service, 28 May to 4 November 2020

People transferred to the tracing service and successfully contacted represent about 32% of the estimate of new COVID-19 cases by the Office for National Statistics (ONS)



Notes

1 ONS estimated the number of new COVID-19 infections in the community in England based on its COVID-19 population surveys. Its survey does not cover people staying in institutions (for example, hospitals, university accommodation and care homes). To reflect the uncertainty in its estimates, ONS also included a confidence interval for its estimates. For simplicity, we have used the central estimate in our analysis.

2 In our analysis, the number of people testing positive refers to those reported through NHS Test and Trace (NHST&T), which includes people in institutional settings (for example, hospital or care homes). However, the ONS estimate of new infections excludes such groups. This will tend to over-state the proportion testing positive of new COVID-19 cases, as calculated here.

3 We included data from week commencing 28 May when NHST&T was formally set up. ONS estimates do not always align with the reporting week by NHST&T and we have done some smoothing to align the dates of the two datasets. Given the lag between infection, onset of symptoms, requesting tests and reporting results, the number of new cases reported by NHST&T each week may not correspond directly with the cases reported by ONS for the corresponding week.

4 'Transferred to tracing' refers to people who were tested positive and transferred to NHS Test and Trace for contact tracing. The weekly number of people transferred does not always align with the weekly number of people testing positive due to the lag between getting a test and the results, and being entered on to the contact tracing system. Also, some people may be transferred to the tracing system more than once if they have more than one positive test result. 'Successfully traced' refers to people who were tested positive, reached by NHST&T tracing teams and provided details of recent close contacts on request.

5 All numbers are rounded to the nearest thousand.

Source: National Audit Office analysis of Office for National Statistics COVID-19 Infection Survey estimates of new infections, NHS Test and Trace weekly performance statistics and the official COVID-19 Dashboard

1.13 In May, the government's 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. While acknowledging that much remained unclear about the nature of COVID-19, it stated that:[8]

- the objectives for a test and trace system should be to isolate as many contacts as possible as quickly as possible while minimising false positives (that is, isolating contacts unnecessarily because the index case does not have COVID-19);
- tracing of contacts should begin as soon as a new suspected case is identified, in parallel to testing;
- all individuals declaring symptoms should be tested as quickly as practicable;
- at least 80% of contacts of an index case would need to be contacted;
- an effective test and trace system required a high level of adherence to requests to self-isolate, and at least 80% of contacts of an index case would need to isolate for an effective system; and
- it was desirable for contacts to be reached and told to self-isolate within 48 hours, with any delay beyond 48–72 hours having a significant negative impact on the R number.

1.14 It should be noted that the service considered but decided not to ask people to disclose their contacts before they receive a positive test result. It continues to keep this decision under review.

1.15 NHST&T's performance in tracing contacts is discussed in detail in Part Three. Between 28 May and 4 November, NHST&T reported reaching 66% of close contacts and advising them to self-isolate. Not all people who test positive are reached by NHST&T, and not all provide information about their contacts or accurate contact details. This means that, in the population as a whole, for these reasons, a greater proportion of contacts are going untraced than NHST&T's statistics suggest. For operational reasons, NHST&T has to focus its efforts on tracing contacts it has identified and for whom it has accurate contact details. The Department requested that we note that its published data uses definitions supported by advice from the Office for National Statistics and the results of a rapid review which it commissioned from the UK Statistics Authority, and that it cannot agree any alternative presentations of these data.

8 Index case is the term used in the published SAGE minutes.

1.16 Measures of compliance with requests to self-isolate are still developing, but to date are lower than the levels implied by the SAGE advice (see paragraph 3.37). In September, SAGE said that the NHST&T system was having a "marginal impact on transmission" of COVID-19, due to the relatively low levels of engagement with the system (based on a comparison of ONS estimates with NHST&T numbers), testing delays, and likely poor rates of adherence with self-isolation. In early December, research conducted for NHST&T stated that, assuming people with COVID-19 symptoms self-isolated from the onset of their symptoms, this action combined with NHST&T's tracing of contacts may have contributed to a 20-30% reduction in the R rate during October.

Overview of the current test and trace process

1.17 **Figure 3** on pages 26 and 27 sets out the key stages of the test and trace process from a user perspective alongside the wider organisational activities and systems that support it. The end-to-end system is complex, requiring multiple parties to cooperate and share information, including members of the general public, NHST&T, testing sites, laboratories, logistics companies, local authorities and local public health teams.

1.18 Seamless exchanges of information are necessary both to meet public expectations of a single user journey and to ensure that all necessary experts and officials have accurate and timely data on which to take action and make decisions. NHS Digital, which was not involved in the initial set-up of the test and trace programme, was asked in early summer to review the service's end-to-end design and find opportunities for service integration and improvement. It found that NHST&T had been created rapidly to serve an immediate need by bringing together existing and new services. It is now working with NHST&T to move the service "from an assembly of minimum viable products to a coherent service that people can trust". This entails refining, integrating and stabilising that process so it operates reliably at scale. We will explore NHST&T's end-to-end process in more depth in our next report.

Roles and responsibilities for test and trace services

1.19 Various national and local government bodies and commercial contractors have responsibility for aspects of test and trace services (**Figure 4** on pages 28 and 29):

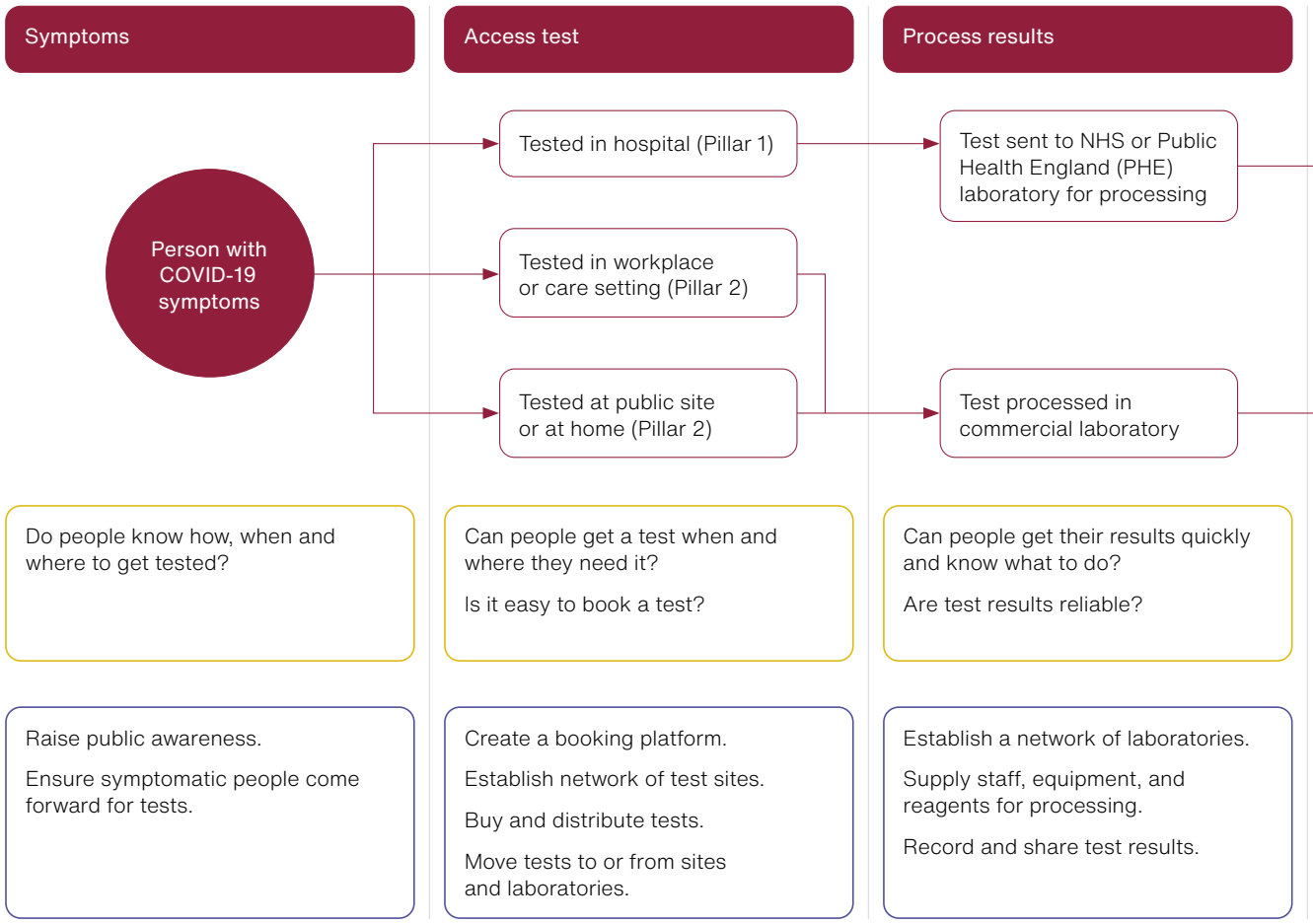
- The Department has overarching responsibility for actions to limit the spread of the virus and to maintain the resilience and capacity of the NHS and social care sector. The Secretary of State for Health and Social Care has ministerial accountability for the test and trace programme.
- NHST&T is responsible for leading the development and provision of the test and trace process and, working with local government, PHE and other bodies, for reducing COVID-19 transmission. It includes the Joint Biosecurity Centre which is a data and analytical hub.
- PHE is the expert agency on public health. It publishes guidance and provides scientific advice to government. Nationally, it contributes to laboratory capacity and test processing. Its regional health protection teams provide advice and operational support to local areas, which includes carrying out aspects of contact tracing (see paragraphs 3.8 and 3.12).
- Local authorities lead local outbreak planning.[9] They develop and oversee the local outbreak plan required for COVID-19. This might include planning and directing local testing capacity or setting-up their own contact tracing schemes. Local authorities also provide support to individuals and the community and help to ensure compliance with COVID-19 requirements, including for self-isolation.
- Many organisations outside government are involved in testing and tracing (see paragraphs 1.33 and Figure 9 for further details of commercial spend):
    - Testing: the NHS, universities and commercial companies provide laboratory capacity, while private companies also support logistics and the operational delivery of testing sites. Various commercial suppliers provide testing kits and equipment.
    - Tracing: The Department contracted with Serco and Sitel to provide a national pool of call handlers. It also outsourced aspects of the design and development of the digital contact tracing app.
    - General: A number of commercial companies supply underpinning technology and infrastructure, professional services support and key personnel.

9 In addition to local plans, the government can also intervene at a national level to put in place further measures, such as closing businesses and schools, or asking people to stay at home or restrict their movements.

Figure 3

Overview of the NHS Test and Trace service in England, as at November 2020

The test and trace user journey involves five key steps



- Stage in progress
- User perspective
- Wider enablers
- Process flow

Note

1 This is a summary overview of the test and trace process and does not show all possible routes through the stages.

2 Testing is currently organised under five 'pillars'. Pillar 1 comprises tests processed by NHS and PHE laboratories, primarily for NHS staff and patients with a medical need. Pillar 2 comprises tests processed by commercial and university laboratories which, in addition to NHS staff and patients with a medical need, can include key workers and members of the public. Since June, NHS Digital has taken on the responsibility for provision of public-facing IT services in the testing programme for Pillar 2.

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

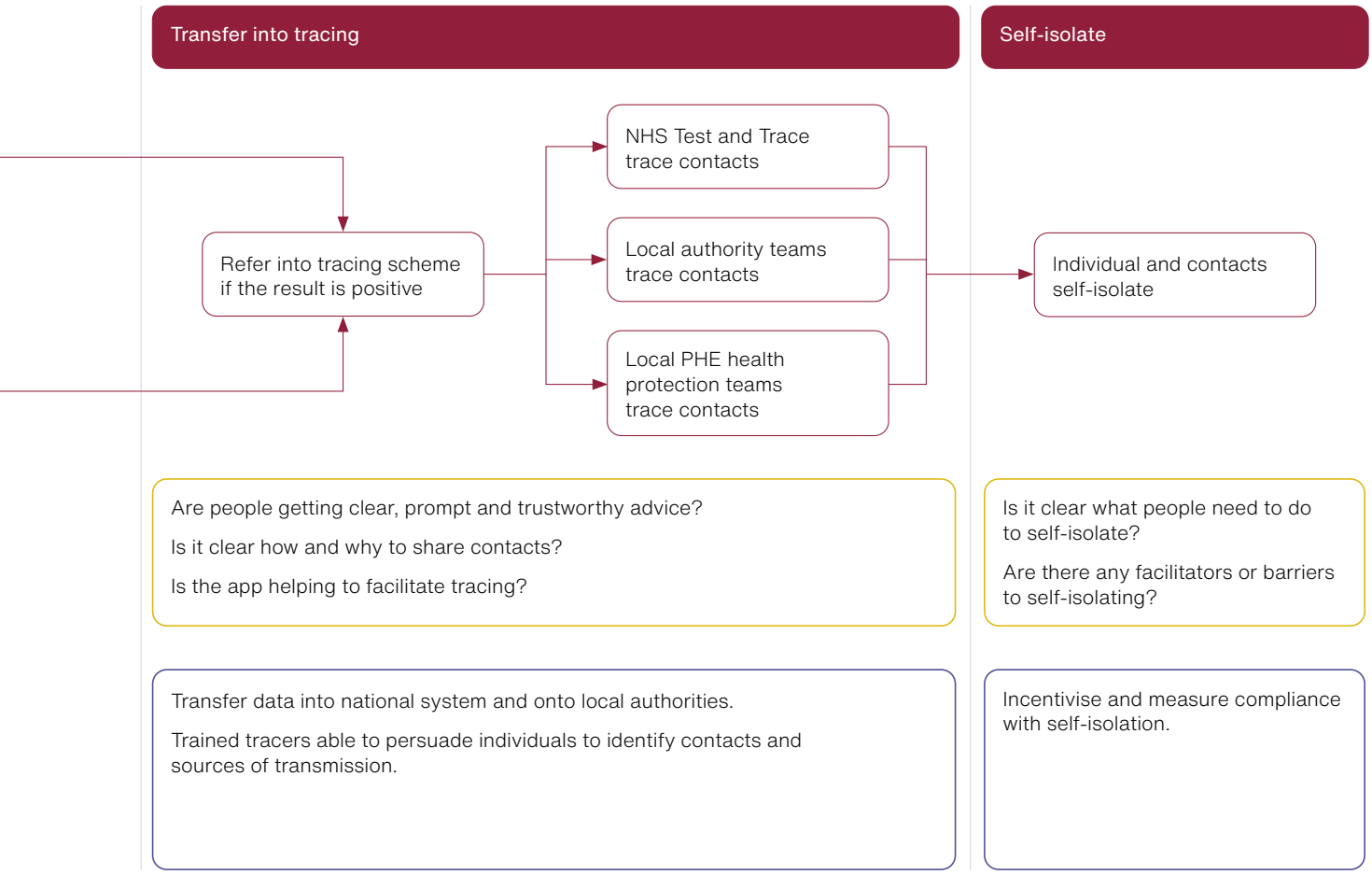
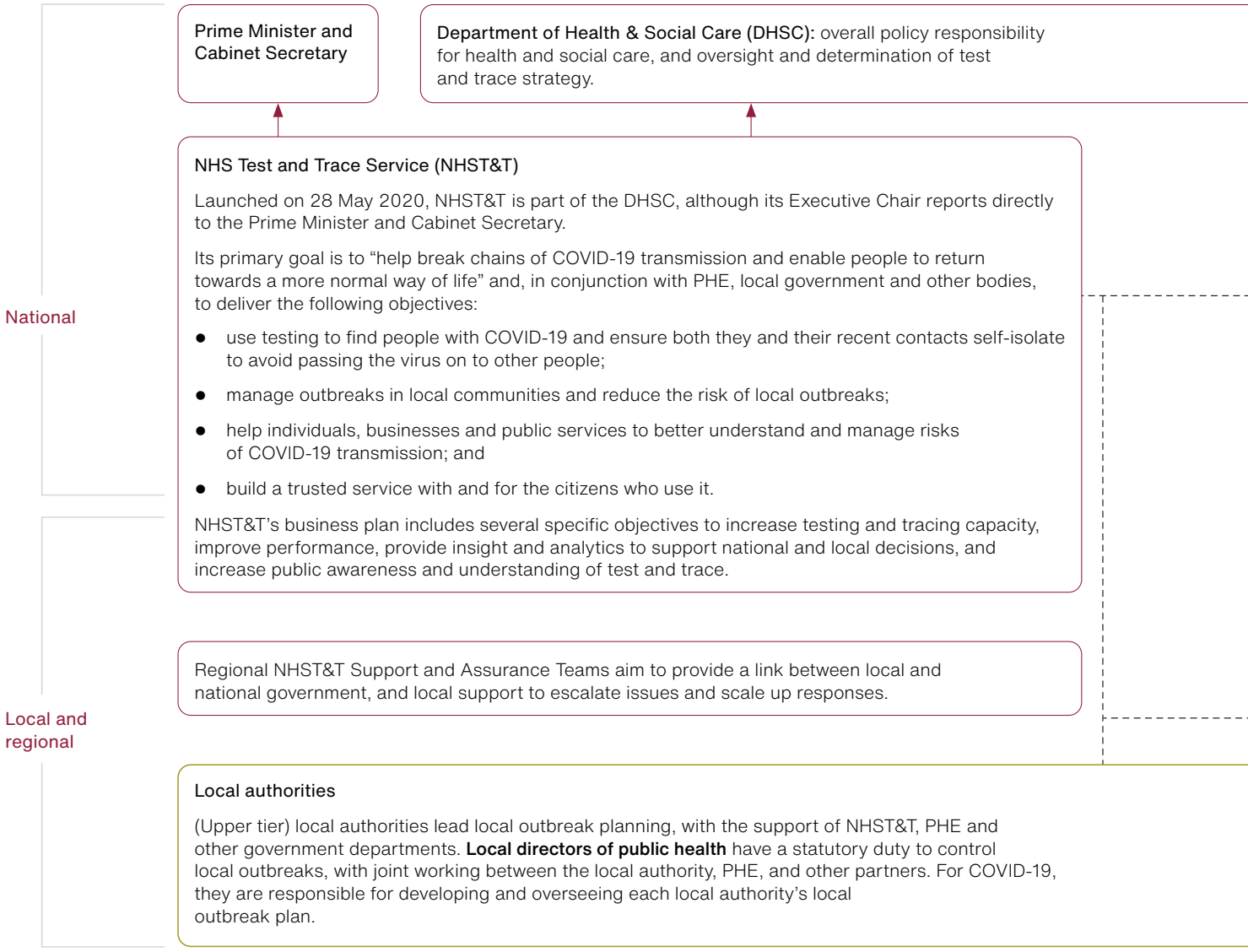

Transfer into tracing
Self-isolate
Refer into tracing scheme if the result is positive
NHS Test and Trace trace contacts
Local authority teams trace contacts
Local PHE health protection teams trace contacts
Individual and contacts self-isolate
Are people getting clear, prompt and trustworthy advice?
Is it clear how and why to share contacts?
Is the app helping to facilitate tracing?
Is it clear what people need to do to self-isolate?
Are there any facilitators or barriers to self-isolating?
Transfer data into national system and onto local authorities.
Trained tracers able to persuade individuals to identify contacts and sources of transmission.
Incentivise and measure compliance with self-isolation.

Figure 4

Roles and responsibilities for test and trace in England, as at December 2020

Responsibility for providing test and trace services lies with several national and local government bodies, and commercial and other contractors

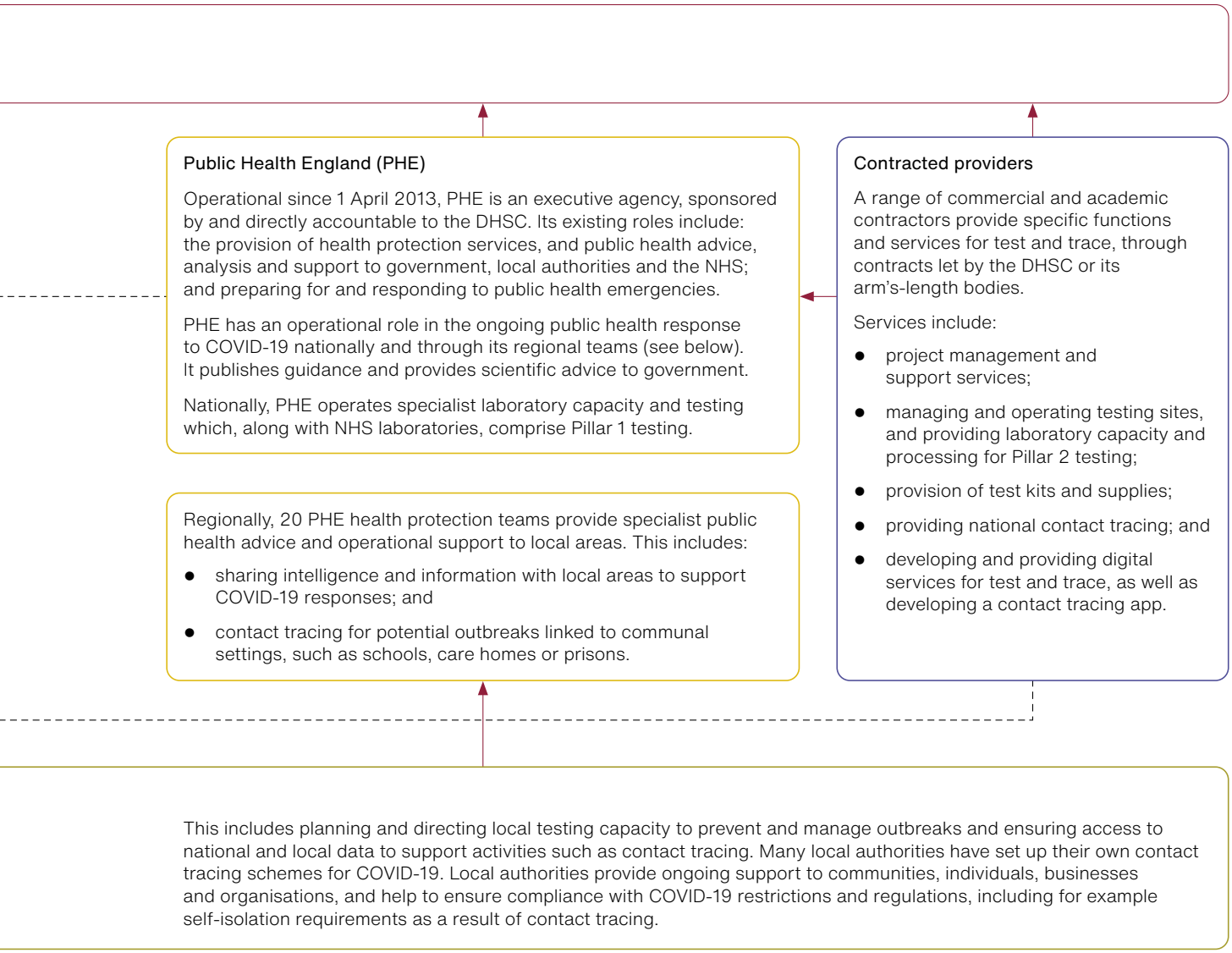


Notes

1 Testing is currently organised under five 'pillars'. Pillar 1 comprises tests processed by NHS and PHE laboratories, primarily for NHS staff and patients with a medical need. As such NHS England and NHS Improvement play a role as a provider of testing capacity and infrastructure but has not been explicitly recognised in this diagram. Pillar 2 comprises tests processed by commercial, university and lighthouse laboratories, which in addition to NHS staff and patients with a medical need, can include key workers and members of the public. Since June, NHS Digital has taken on responsibility for provision of public-facing IT services in the testing programme for Pillar 2.

2 The Joint Biosecurity Centre, established in May 2020 as an integral part of NHST&T, provides real-time analysis on infection outbreaks and advises on how the government should respond to the spread of infections.

Source: National Audit Office summary of Department of Health & Social Care, Public Health England and NHS Digital documentation and interviews


Public Health England (PHE)
Operational since 1 April 2013, PHE is an executive agency, sponsored by and directly accountable to the DHSC. Its existing roles include: the provision of health protection services, and public health advice, analysis and support to government, local authorities and the NHS; and preparing for and responding to public health emergencies.
PHE has an operational role in the ongoing public health response to COVID-19 nationally and through its regional teams (see below). It publishes guidance and provides scientific advice to government.
Nationally, PHE operates specialist laboratory capacity and testing which, along with NHS laboratories, comprise Pillar 1 testing.
Contracted providers
A range of commercial and academic contractors provide specific functions and services for test and trace, through contracts let by the DHSC or its arm's-length bodies.
Services include:
project management and support services;
managing and operating testing sites, and providing laboratory capacity and processing for Pillar 2 testing;
provision of test kits and supplies;
providing national contact tracing; and
developing and providing digital services for test and trace, as well as developing a contact tracing app.
Regionally, 20 PHE health protection teams provide specialist public health advice and operational support to local areas. This includes:
sharing intelligence and information with local areas to support COVID-19 responses; and
contact tracing for potential outbreaks linked to communal settings, such as schools, care homes or prisons.
This includes planning and directing local testing capacity to prevent and manage outbreaks and ensuring access to national and local data to support activities such as contact tracing. Many local authorities have set up their own contact tracing schemes for COVID-19. Local authorities provide ongoing support to communities, individuals, businesses and organisations, and help to ensure compliance with COVID-19 restrictions and regulations, including for example self-isolation requirements as a result of contact tracing.

NHST&T governance

1.20 NHST&T is part of the Department and, as such, is subject to its financial, information and staffing controls. It has a named senior sponsor within the Department but unusually, its executive chair also reports directly to the Prime Minister and the Cabinet Secretary rather than to the Department's permanent secretary or the Secretary of State. The direct reporting line to the Prime Minister and Cabinet Secretary is a clear indication of the importance the government places on NHST&T. However, since the body is embedded within the Department, these dual reporting lines bring risks of confused decision-making and, ultimately, could impair governance and accountability. While the situation may be temporary as further machinery of government changes are planned, it is the case that NHST&T has already taken many critical and costly decisions since its creation. We have not undertaken a systematic review to determine whether these risks have materialised and to date have seen no evidence that they have.

1.21 On 18 August, government announced that a new body, the National Institute for Health Protection, would subsume NHST&T, the health protection functions of PHE and the Joint Biosecurity Centre. The establishment of the new body, and consequent abolition of PHE, is due to take effect from April 2021.

Working between NHST&T and local government

1.22 The NHST&T business plan of 30 July stated that the organisation would be "local by default", signalling its commitment to work closely with local authorities and other community partners. The Department's *COVID-19 contain framework: a guide for local decision-makers* has sought to clarify national and local responsibilities for outbreak management , setting out principles for how national and local systems would be integrated.[10] In turn, upper-tier local authorities have produced local outbreak plans to describe their arrangements for preventing and containing outbreaks.

10 Department for Health & Social Care, *COVID-19 contain framework: a guide for local decision-makers*, July 2020.

1.23 NHST&T initially focussed on increasing central capacity for both testing and tracing but it has sought ongoing local engagement through setting up networks and advisory groups, newsletters and other ways.[11] For example, regional teams from the Joint Biosecurity Centre liaise with local authorities, largely in response to requests for information. In May, NHST&T established a good practice network of 11 local authorities to share learning and feedback on the roll-out of local outbreak plans. However, members of this network were unclear about how their views had informed policies and decisions. The chief executives of the 11 local authorities are also members of an advisory board established by NHST&T to ensure national testing and tracing arrangements build on local capability and learning. In July, NHST&T established nine COVID-19 Regional Partnership Teams to work with local authorities in their area and provide a link with NHST&T.[12] It told us feedback from this group had supported developments such as isolation support payments, locally supported contact tracing and the roll out of certain types of tests for locally-led testing.

1.24 Two specific concerns raised by local government representatives are:

- **NHST&T's high vacancy and turnover rate**. This seems to be confirmed by some of the documentation we reviewed. In October, NHST&T had a headcount of 3,800 , with a vacancy rate of 14%, or 550 vacancies. It has identified insufficient capacity as a key risk to its ability to respond to local outbreaks. In October, it noted that a lack of staff was constraining its ability to provide a stable service. Given the nature of its inception, many initial appointments to NHST&T were made on a temporary or secondment basis: for example, the majority of the current Executive Committee were not in post as at May, with seven out of 15 members taking up their roles after July. The ADPH has found it difficult to liaise effectively with NHST&T due to a lack of clarity about individual roles and the reliance on short-term secondments and consultants; and

11 Since May 2020, the 'contain' workstream of NHST&T has also been led by a seconded local authority chief executive.

12 We assume, but NHST&T did not confirm, that these are the same as the regional assurance and support teams referenced in the business plan and the Contain framework.

- **Insufficient public health expertise** specifically expertise from current local public health teams and local authorities. The LGA felt that lack of consultation with local areas had led, for instance, to test centres being set up in places that many people had difficulty getting to. Currently, clinical public health expertise on the Executive Committee is through the chief medical advisor for NHST&T, who is a joint appointee with PHE. Of the Executive Committee in place at the end of October, six out of 15 members had an NHS or PHE background, three were from the central civil service, five from commercial companies and one from a local authority. NHST&T also noted that its local authority design group, which includes directors of public health, considers all aspects of its activity. It told us that engagement with local authorities has been improving through activities such as the pilots for mass testing and door-to-door testing.

Objectives for test and trace

1.25 Alongside its key objective to use testing to find people with COVID-19 and ensure both they and their recent contacts self-isolate, NHST&T has set itself three other key objectives:[13]

- managing outbreaks in local communities and reducing the risk of local outbreaks;
- helping individuals, businesses and public services to better understand and manage risks of COVID-19 transmission; and
- building a trusted service with and for the citizens who use it.

1.26 It made a series of public commitments underpinning its business objectives including a series of internal targets (**Figure 5** and **Figure 6** on page 34).

13 Specific objectives, which included extending the capacity and improving the performance of test and trace services are covered in more detail in Parts Two and Three.

Figure 5

The aims and objectives of the NHS Test and Trace business plan, July 2020

There are twenty objectives organised across four key aims

Finding and isolating people who have COVID-19 and their close contacts

Improve awareness of test and trace: from around 60% in May to more than 80% by October.

Double test capacity: from around 200,000 daily tests to 500,000 by end of October.

Expand asymptomatic testing and target greatest risk groups and areas: more than 150,000 asymptomatic tests per day.

Ensure testing accessible to all: more than 500 test sites by October and a greater range of local settings to access tests.

Improve testing turnaround times: more than 80% of results within 24 hours of booking for urgent in-person tests by the end of July.

Increase number of contacts reached and advised to self-isolate.

Increase speed of contact tracing: reduce the average time from ordering a test to advising contacts to self-isolate.

Local community action to prevent and manage outbreaks

Extend or enhance contact tracing from August to identify clusters and help stop wider community transmission.

Establish an effective and resilient integrated operating model to identify and respond to outbreaks, supported by the new *Contain* framework.

Support local councils to refine and improve their local outbreak plans and ensure they have capacity and capability to deliver.

Increase ability to deploy additional testing capacity to respond to outbreaks and clusters: within 24 hours of requests and within 12 hours wherever possible.

Establish processes to ensure **effective stakeholder engagement**.

Provide tools to support **effective community communications and engagement**.

Enabling individuals, businesses and public services to understand and manage risk

Introduce and promote widespread adoption of the app, enabling users to:

- book a test;
- understand their level of risk; and
- allow for digital contact tracing, if trials support it.

Research into antibodies and immunity:

- have 100,000 people participating in research studies into antibodies and immunity by September; and
- be at the forefront of research into immunity worldwide.

Offer antibody testing to all NHS staff by the end of July and to all social care staff by the end of September.

Building a trusted organisation with and for citizens

Improve **awareness and understanding** of NHS Test and Trace.

Rapidly **identify, incubate and accelerate innovation**.

Operate as an **effective, agile and trusted data organisation**.

Develop a **diverse and engaged workforce** that reflects the communities served by NHS Test and Trace.

Notes

1 The Contain framework sets out national and local responsibilities for preventing and managing outbreaks.

2 Upper-tier local authorities have produced local outbreak plans to describe their arrangements for preventing and containing outbreaks.

Source: National Audit Office review of NHS Test and Trace business plan update

Figure 6
Performance measures and targets against business objectives

NHS Test and Trace measures performance in three key areas

Objective: Find and isolate people who have had COVID-19 and their close contacts

Indicator	Performance ambitions
Reach	
• Proportion of new infections identified as a proportion of Office for National Statistics estimate.	55%
• Proportion of people testing positive who complete tracing.	80%
• Proportion of contacts identified who complete tracing.	Not set
Speed	
• Time from symptoms to test request.	12 hours
• Time taken from test taken to result (in-person swabs).	24 hours
• Time to isolate contacts (from symptoms of initial case).	48 to 72 hours
Compliance	
• Measure of isolation compliance.	80%

Source: National Audit Office analysis of NHS Test and Trace internal reporting from August 2020

1.27 NHST&T generates internal management reports to inform decision-making. We reviewed a sample of Executive Committee performance packs from August to October. The reports presented a wide range of national trend analyses for test volumes, laboratory utilisation, tracing and results timeliness. They later contained coverage of issues such as support for people self-isolating and public confidence. The focus has been on tracking delivery and quantifying outputs, with less information presented to the committee on quality, cost or the user perspective. The documentation did not contain regional or local breakdowns of data and there were also no papers relating to the experience of particular groups within the population, such as minority ethnic groups or those living in deprived areas. Members of the Executive Committee sit on other committees where these matters are discussed. We have also seen evidence that detailed regional and local data and data about the prevalence of COVID-19 among different ethnic groups are available to NHST&T's management through daily situational awareness reports.

Funding for test and trace

1.28 Government has allocated a total of £22 billion to the test, trace, contain and enable programme in 2020-21 with a further £15 billion for 2021-22: £10 billion for 2020-21 was assigned in July, and this was increased first in September (to £15 billion) and then November (to £22 billion). Much of the additional funding is expected to pay for an increase in testing capability from 500,000 to 800,000 tests a day and roll-out mass testing, previously known as Operation Moonshot.

1.29 Of the £15 billion made available to NHST&T before the November Spending Review, £12.8 billion, is intended for testing, including £5.9 billion for laboratories and machines, £2.9 billion for mass testing and £1.0 billion for supplies and logistics (**Figure 7** on page 36). Total planned spending for tracing is £1.3 billion. There is £785 million in grants for local authorities, including £300 million in June and an additional £485 million in the following months. The November Spending Review introduced an additional £7 billion for NHST&T to increase testing and improve contact tracing, as part of the government's COVID-19 Winter Plan, taking the overall budget for 2020-21 to £22 billion.

1.30 The £15 billion budget set before the November Spending Review is mainly to be spent in the second half of the year with about 76% of spending expected between October 2020 and March 2021. About 33% (£4.9 billion) of the funding is intended to pay for contracted services from third-party suppliers, while spending on staff employed directly by NHST&T (permanent, seconded, agency and contractor) accounts for 8% (£1.2 billion). NHST&T has also set aside £231 million to pay for professional advice and consultancy fees. We do not have further information on the £7 billion additional budget announced in the Spending Review.

Spending on test and trace

1.31 As of 31 October, NHST&T's actual expenditure to date was £4 billion (27% of the £15 billion budget approved before the November Spending Review), about £2 billion less than expected (**Figure 8** on page 37). The largest underspend relates to laboratories and machines (£754 million) which will require further investigation to ensure resources are not tied up if they are no longer required. Our second report will explore the reasons behind the underspend and how this links to its recent budget increase.

1.32 The emergency nature of the initial response meant that NHST&T did not have time to establish standard controls and processes in financial management before service delivery commenced. An internal document from June noted, "there are insufficient financial controls and understanding across NHST&T". NHST&T determined in October that this issue had been addressed by strengthening its financial governance and approvals process but we have not been able to review the improvements made in this interim report.

Figure 7

NHS Test and Trace service funding by main programme area, 2020-21

Of the £15 billion NHS Test & Trace Service budget made available by the end of October, £12.8 billion is intended for COVID-19 testing

Category		Sub-costs (£bn)	Cost (£bn)
Trace			1.3
Contain			0.4
Test	Labs and machines	5.9	
	Supply and logistics	1.0	
	Pillar 1 – NHS swab	0.4	
	Pillar 2 – community	1.5	
	Pillar 3 – antibody testing	0.2	
	Pillar 4 – prevalence surveys	0.8	
	Mass testing	2.9	
Test total			12.8
Other			0.5
Grand total			**15.1**

Notes

1 Testing is currently organised under five 'pillars'. Pillar 1 comprises tests processed by NHS and Public Health England (PHE) laboratories, primarily for NHS staff and patients with a medical need. Pillar 2 comprises tests processed by commercial, lighthouse and university laboratories which, in addition to NHS staff and patients with a medical need, can include key workers and members of the public. Pillar 3 is antibody testing. Pillar 4 is surveillance testing to ascertain prevalence in the population.

2 'Contain' refers to activities to identify local COVID-19 outbreaks and support local responses to the pandemic. This sum does not match the £785 million in paragraph 1.29 as some of that funding was given after our 31 October cut-off. 'Other' include budget for corporate services, digital services, Joint Biosecurity Centre and other enabling work during the programme.

3 This analysis does not include the additional £7 billion announced in the 2020 Spending Review.

4 Totals in the table may not add up due to rounding.

Source: National Audit Office analysis of NHS Test and Trace budget data

Figure 8

Spending by NHS Test and Trace to the end of October 2020, by programme area

Total spending to the end of October on test and trace is £4 billion, about one third less than planned

Programme area	Budget (£m, YTD)	Spend (£m, YTD)
Joint Biosecurity Centre	24	28
Corporate services	59	53
Contain[2]	347	464
Digital and data	181	136
Innovation and Partnerships	5	5
Testing	4,734	2,774
Pillar 1 – NHS swab	155	201
Pillar 2 – community, delivery channels, supply chain and logistics	485	300
Pillar 3 – antibody testing	128	59
Pillar 4 – prevalence surveys	432	252
Laboratories and machines	2,049	1,295
Mass testing	1,309	558
Supply and logistics	177	109
Other	0	16
Tracing	713	478
COVID-19 app	26	43
Total	**6,090**	**3,997**

Notes

1 Based on internal financial reporting which has not been audited.

2 'Contain' refers to activities to identify local COVID-19 outbreaks and support local responses to the pandemic.

3 Testing is currently organised under five 'pillars'. Pillar 1 comprises tests processed by NHS and Public Health England (PHE) laboratories, primarily for NHS staff and patients with a medical need. Pillar 2 comprises tests processed by commercial, lighthouse and university laboratories which, in addition to NHS staff and patients with a medical need, can include key workers and members of the public. Pillar 3 is antibody testing. Pillar 4 is surveillance testing to ascertain prevalence in the population.

4 Figures may not sum due to rounding.

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

Spending on contractors

1.33 By the end of October, the Department had signed 407 contracts with 217 suppliers across the private and public sector for activity related to NHST&T (**Figure 9**). The total value of the contracts was £7 billion (£8 billion including contract extensions).[14] Testing accounted for 198 (49%) of the contracts (with a value of £6.2 billion) while tracing accounted for 155 (with a value of £0.7 billion). Just ten of the largest suppliers account for more than half (£3.9 billion) of the total value (**Figure 10**).[15] Between November 2020 and March 2021, NHST&T estimates it will award a further 154 contracts (£16.2 billion) but not all of the spending will occur in this financial year. In total, NHST&T reported in November that it had 325 contracts in the pipeline with a total value of £21.4 billion.

Figure 9

Number and value of signed NHS Test and Trace contracts by service category, as of the end of October 2020

Most of the contracts by value are for COVID-19 testing including supply of test equipment, consumables, laboratories and logistics

Category	Percentage of total number of contracts – 407 (%)	Percentage of total value of contracts – £7 billion (%)
Test	48.6	89.1
Trace	19.2	9.0
COVID-19 app	18.9	0.9
Corporate services	10.1	0.9
Joint Biosecurity Center	2.5	0.1
Contain	0.7	0.0

Notes

1 These contracts include 13 contracts with zero values and one contract with values to be based on rate cards. Twenty-nine of these contracts have been extended with an additional value of £1 billion which is not included in this analysis. In addition, there are eight more contracts which have been extended but their additional values are yet to be decided.

2 Some of the contracts have maximum values and the actual service provided may be less than the contract value included in our analysis.

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

14 A small number of contracts with a total value of £1 billion have an end date beyond 2020-21 (with some up to March 2022).

15 These contracts include 13 contracts with zero values and one contract with values to be based on rate cards. Twenty-nine of these contracts have been extended with an additional value of £1billion which are not included in this analysis. In addition, there are eight more contracts which have been extended but their additional values are yet to be decided. The largest 10 supplier contracts were worth £3.9 billion in initial value but with contract extensions, the total value has increased to £4.6 billion.

Figure 10

The 10 suppliers with the total highest contract values signed by the end of October 2020

The total value of contracts for the 10 suppliers with the total highest contract values is £3.9 billion

Supplier name	Programme area	Contract value (£m)
Office for National Statistics	Testing – infection prevalence surveys	616
Innova Medical Group Inc	Testing – test kits	604
Life Technologies	Testing – laboratory equipment and consumables	522
Randox	Testing – laboratory infrastructure	461
Abbott	Testing – testing technology, testing kits and reagents	355
Optigene	Testing – supply of machines and tests	323
Serco	Testing and tracing – contact tracing and test sites	277
Perkin Elmer	Testing – laboratory infrastructure and testing consumables	273
Kuehne + Nagel (as prime)	Testing – logistics	261
Primer Design	Testing – new testing technology	236
Total		3,928

Notes

1 Contract durations and payment terms vary. We have not reviewed the individual contracts listed.

2 The contract value is based on the best estimate available to the National Audit Office at the time of the report. Some of the contract values have not been finalised and the final contract values and the actual spending on these contracts may be greater or smaller than what is reported here.

3 We are aware that contracts have been extended for six of the 10 suppliers with a total additional value of £633 million.

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

1.34 Due to the need to move quickly, the Department's procurement strategy in relation to NHST&T has been to award most contracts to suppliers directly, using existing government frameworks. It opted for short-term contracts with break clauses, recognising the risk this might pose for value for money in the medium and long term. Of the 407 contracts (£7 billion), 216 (£1.4 billion) were awarded under existing frameworks, 121 (£5 billion) were awarded directly under emergency regulations.[16]

16 For the remaining 70 contracts, 6 (£10 million) were grants or other regulatory contracts with universities, seven (£620 million) were given under memorandum of understanding to public bodies including the Office for National statistics, NHS bodies and other government departments, 36 (£29 million) were sub-threshold procurement. We do not have information for the remaining 21 contracts (£18 million).

1.35 Over the summer, NHST&T examined its commercial arrangements, recognising that there was insufficient commercial control and understanding across NHST&T and it needed to improve. It noted that it also lacked a commercial strategy, and had limited visibility of its commercial pipeline and contract risk exposure. This had manifested in specific risks such as:

- lack of central oversight over what it was commissioning;
- conflicts of interest not being comprehensively managed;
- examples of work starting before a contract had been awarded; and
- limited initial flexibility in contracts which had been based on early planning assumptions (see paragraphs 3.28 to 3.33 for details of how this affected the Serco and Sitel contracts).

NHST&T told us it is taking steps to strengthen its commercial arrangements and in September, established a standard approvals governance model for spending decisions.

Scaling up capacity

1.36 Since it was established on 28 May, NHST&T has led efforts to scale up testing activity and to establish a national system of community contact tracing for COVID-19 (**Figure 11**). Between the end of May and end of October, the daily number of tests processed in the UK has more than tripled, with a total of 31.5 million tests conducted. Much of the infrastructure and capacity to support these activities did not previously exist. For example, the government put in place 18,000 call handlers for the national tracing service when it started operation in May, and reached more than 50,000 contacts of people who had tested positive for COVID-19 in the first week. By the end of October, the weekly number of contacts reached and advised to self-isolate had increased nearly four-fold to 190,000. The rest of this report focuses on activity and performance of the testing (Part 2) and tracing system (Part 3) .

Figure 11

Testing and tracing capacity and activity at the end of May and end of October 2020

Between May and October 2020, testing and tracing activity and capacity increased substantially

	End of May	End of October
Testing (Pillars 1 and 2)		
Number of tests processed per day	78,000	263,000
Number of testing sites	230	593
Number of operational lighthouse and partner laboratories	5	15
Cumulative number of tests processed (UK-wide)	3.5 million	31.5 million
Tracing		
Number of people transferred onto tracing service and reached since 28 May 2020	n/a	630,000
Number of close contacts reached and asked to self-isolate since 28 May 2020	n/a	1,410,000
Weekly number of close contacts reached and asked to self-isolate	50,000	190,000

Notes

1 The cumulative tests processed covers the whole of the UK, as data for England only are not available from before the end of May. Elsewhere in this report we refer to a total of 23 million tests processed between 28 May and 4 November, which covers England only. This includes testing in the community (Pillar 2) and hospital (Pillar 1) settings only.

2 For testing capacity and the number of tests carried out, only Pillars 1 and 2 are included in this analysis. The number of tests carried out per day are rolling seven-day averages (three days before and three days after). The data cover the period from 28 May to 31 October.

3 Tracing data are published weekly, so 'end of May' refers to the week beginning 28 May and 'end of October' refers to week beginning 29 October

Source: National Audit Office analysis of NHS Test and Trace data

Part Two

Testing capacity, activity and performance

2.1 This part examines what the government set out to achieve with the testing programme and what it has achieved in terms of increasing testing capacity, managing demand for tests, and identifying people with COVID-19. It also sets out the plans to expand testing further.

What did NHST&T set out to achieve?

2.2 In its business plan, the NHS Test and Trace Service (NHST&T) committed to "rapid testing, at scale, that is reliable, accessible, able to focus on high-risk groups, locations and specific outbreaks."

Initial approach

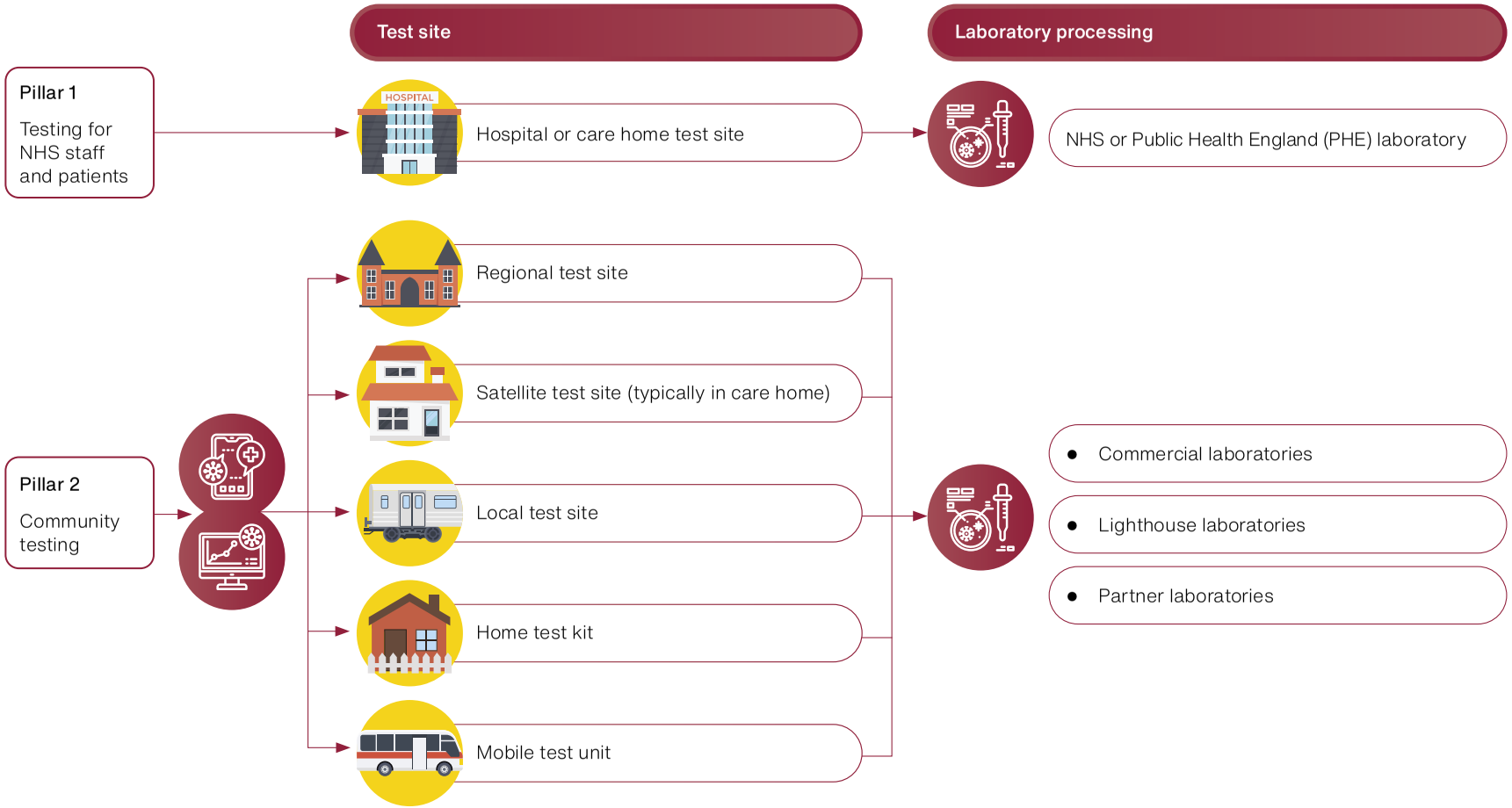
2.3 Government first set out a testing strategy in April, with five testing 'pillars' (**Figure 12**), principally:

- swab testing for people with a medical need and health and care workers ('Pillar 1'), where tests are typically conducted in hospitals or care homes and processed by existing NHS and Public Health England (PHE) laboratories;
- swab testing for all key workers and, from mid-May, for those in the wider population with symptoms ('Pillar 2'). There are several routes for testing including mobile testing sites, drive-in centres and home test kits. Tests are dispatched mainly to commercial laboratories for processing; and
- other pillars focused on antibody testing to establish immunity ('Pillar 3'), surveillance testing to learn more about disease prevalence ('Pillar 4') and the build-up of mass-testing capability ('Pillar 5').

Figure 12

Overview of COVID-19 testing journey for individuals in England, as at November 2020

Pillar 1 and Pillar 2 have different routes for carrying out and processing tests



Notes

1 Testing is currently organised under five 'pillars'. Pillar 1 comprises tests processed by NHS and PHE laboratories, primarily for NHS staff and patients with a medical need. Pillar 2 comprises tests processed by commercial and university laboratories which, in addition to NHS staff and patients with a medical need, can include key workers and members of the public.

2 NHS and PHE laboratories may also process some Pillar 2 tests requested through telephone or online.

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

2.4 To support testing at scale, government:

- **purchased testing kits.** In April, the Department of Health & Social Care (the Department) made a public call to British organisations that could manufacture and supply consumables and equipment for testing.[17] A review group was created to prioritise new kits for validation. They led on procuring these supplies.
- **set up additional testing sites,** including permanent drive-through centres and mobile testing units. It is currently operating 593 testing sites.
- **launched an online booking portal,** and a call centre to enable the public to book a test.
- **increased the number of diagnostic laboratories,** to create more capacity to process tests. It opted to do this through two workstreams, using existing NHS and PHE laboratories infrastructure (based mainly in hospitals) and a new network of commercially operated facilities.
    - The NHS has made capacity available in 96 laboratories.
    - The number of commercially operated laboratories, which tend to be larger than NHS facilities, has increased over time. Initially, the government established three "lighthouse".[18] Currently, there are 15 in total: six lighthouse laboratories, three partner laboratories and six surge laboratories for spikes in demand.[19] Four of the laboratories are based outside the UK.[20] NHST&T sees lighthouse laboratories as an investment in a diagnostics industry that will bring long-term benefit but for this report we have not reviewed its strategy in this regard.
- **contracted for logistical support,** from firms such as Amazon and DHL, to assist with transferring supplies and tests to and from test sites, members of the public and laboratories.

17 Department of Health & Social Care, *Help the government increase coronavirus (COVID-19) testing capacity,* Guidance, 8 April, available at: www.gov.uk/guidance/help-the-government-increase-coronavirus-covid-19-testing-capacity
18 The network of lighthouse laboratories across the UK was developed through a partnership with the Department, the Medicines Discovery Catapult, UK Biocentre and the University of Glasgow, GSK, AstraZeneca, the University of Cambridge and PerkinElmer. Deloitte is responsible for the coordination of the laboratories.
19 Contracted to provide services for less than eight weeks.
20 The laboratories are: Eurofins (Germany and France), Immensa (Italy) and Accora (Europe).

2.5 We will examine how these organisations and processes work together to form an end-to-end process in our next report. As we noted in Figure 1, other countries have taken different approaches. In particular, many have chosen to use existing primary care facilities such as GPs, pharmacies or private clinics as the principal access points for testing, augmented by more limited mobile and drive-through sites.

2.6 In May, the Department considered the equalities implications of expanding eligibility for testing. This is important because data clearly demonstrate that COVID-19 is disproportionately dangerous to some groups, in particular the elderly, black and other minority ethnic groups, men, and those with a number of pre-existing conditions. The Department recognised that certain groups might be less well placed to access testing, even when eligibility criteria were widened. Notably, driverless households might struggle to access test sites, while digitally excluded groups would not be able to book a test online. Some categories of vulnerable people are overrepresented among the driverless and the digitally excluded. In response, the Department established walk-in testing centres and a telephone line, as well as starting to offer home test kits.

2.7 The Department's assessment of equality issues also noted the potential for some users with mental or physical disabilities or language barriers to face difficulties. NHS Digital did further research in June and found that people with cognitive, hearing, mobility and visual impairments had indeed experienced issues when trying to use assistive software to book tests online or process information at test sites, or read test instructions. Some had difficulty handling the contents of test kits. In June, NHS Digital also noted, based on interview research, that familiarity with the process for booking a test was especially low among people from black, Asian and minority ethnic communities, with a majority unaware of the 119 coronavirus test booking service. Any new service will need some time to identify and address equalities issues but speed of response is particularly important for NHST&T, given the uneven impact of COVID-19. We will consider equalities issues in our second report.

2.8 In the early stages of developing its testing strategy the Department's overriding focus was on massively increasing the number of tests that could be processed each day . It was clear, even without detailed modelling, that existing testing capacity in March and early April was too low.

2.9 Since then, we have seen some evidence that the Department, and latterly NHST&T, have made use of detailed models and forecasts to set capacity expansion targets and manage eligibility criteria. For example, most testing has been focused on people displaying symptoms of COVID-19. But since July, there has been regular testing of asymptomatic staff and residents in care homes. We have seen examples from May and October, on attempts to predict daily demand for tests from a range of population groups and NHST&T told us these models were updated weekly. In broad terms, the forecasts took account of:

- overall likely demand for swab tests to estimate the total number of tests needed; and
- anticipated theoretical laboratory capacity based on the deployment of existing and new laboratories.

The May forecast anticipated a peak in demand in January 2021, mainly due to seasonal flu, but did not predict the scale of increased demand in September, when schools and universities returned. We expect to review these models and any successors in our next report to understand what they contain and how they have influenced key planning decisions.

What has been achieved?

2.10 Most of England's current testing infrastructure has been built from scratch in a very short space of time. The number of tests that laboratories are able to process has steadily risen since the spring, as more laboratories have opened, new technology has been introduced to increase processing speeds, and processes have improved. In its July business plan, NHST&T set (public target) objectives that were designed to enhance the effectiveness and reach of its testing programme. These included objectives to:

- reach 500,000 tests a day by the end of October;
- provide test results within 24 hours;
- increase the number of testing sites to 500 by October; and
- test an average of 150,000 at-risk but asymptomatic people daily by September.

In the remainder of this Part, we look at how the NHST&T testing programme has been performing, against the first two of these objectives. NHST&T told us it had achieved its target on testing sites (with 575 in place by October) but not on asymptomatic testing due to greater than anticipated demand for symptomatic testing.

Growing testing capacity

2.11 NHST&T uses capacity, meaning how many tests it can carry out daily, as its main public measure and a key internal driver of activity. It is a projection, based on reports from laboratories about how many laboratory-based tests they can process with their available staff, machines and other resources. The published measure represents 90% of the totals that laboratories report, with the reduction made in order to ensure that they can handle their workload smoothly in all circumstances. This has been a useful management metric for NHST&T. Capacity across NHS and PHE laboratories and the commercial lighthouse laboratories has increased five-fold in the six months since May (**Figure 13** overleaf). NHST&T invested significant effort and money in reaching a capacity of 500,000 tests per day by the end of October, expanding the size of certain existing laboratories, quickly opening a new partner laboratory, and deploying rapid testing in hospitals.

2.12 However, capacity is not the same as the actual volume of tests processed each day. It is an estimate of the testing system's theoretical maximum capacity, if all parts of the system are functioning as expected and if sufficient demand materialises.

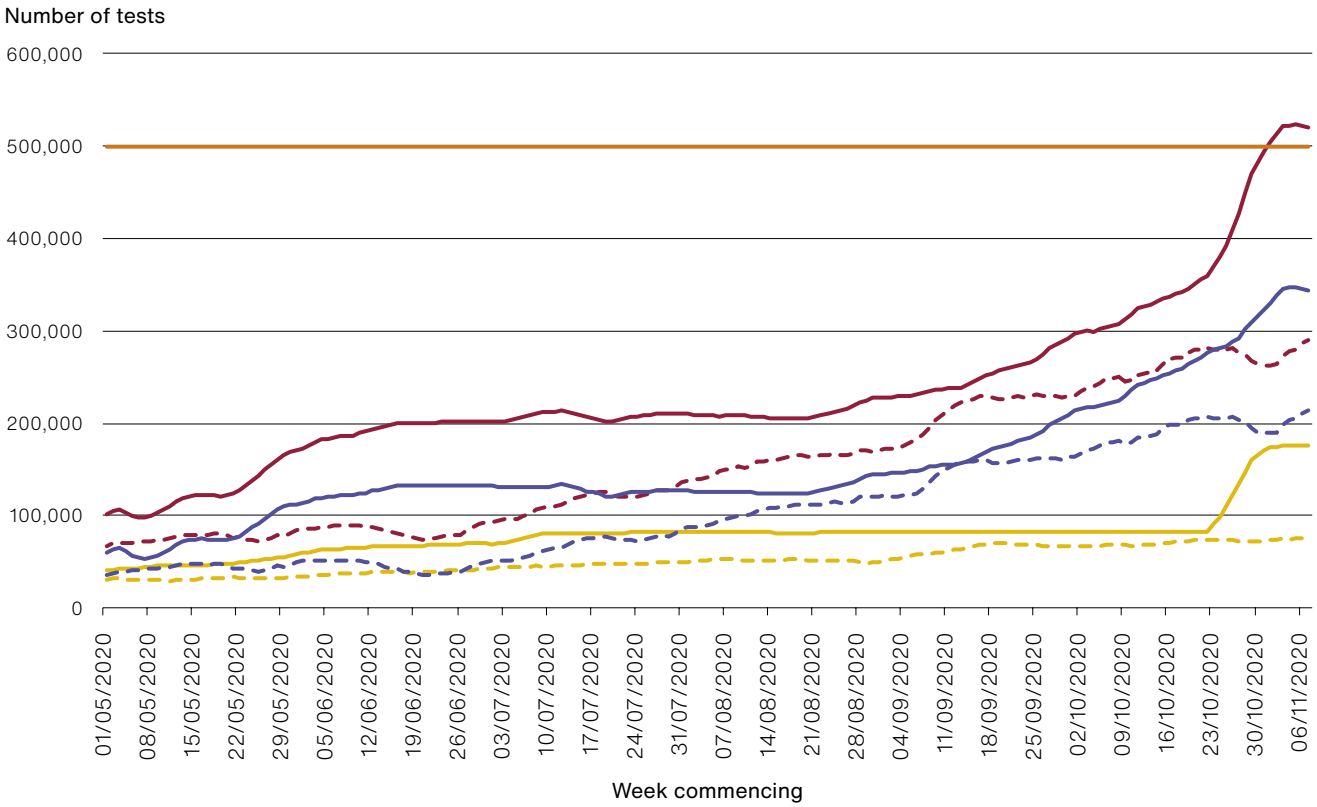
2.13 A total of 23 million tests (Pillar 1 and Pillar 2) were carried out in England between 28 May and 4 November.[21] The actual number of tests carried out daily has been below existing capacity. While capacity increased from 100,000 to 500,000 per day across the UK between 1 May and 31 October, the number of tests being processed per day rose from 67,000 to 263,000 (390%) (Figure 13). It would not be desirable to run the system at maximum capacity every day, as was the case during September when demand for testing exceeded capacity and the utilisation rate repeatedly went above 90%. We note that NHST&T recommends a utilisation rate of 85% of published capacity to ensure a safe and sustainable service. The utilisation rate has fluctuated, falling during June to around 40% when the level of infection was low and more capacity became available, and peaking at 93% in September when infections and demand rose. The total number of tests carried out across Pillars 1 and 2 has been 68% of reported capacity for Pillars 1 and 2 between 1 May and 31 October, but the utilisation rate has fluctuated more for Pillar 2 than Pillar 1.

21 Twenty-three million tests included 7.5 million Pillar 1 tests reported in the COVID-19 daily dashboard and 15.6 million Pillar 2 tests reported in the weekly test and trace statistics for the period between 28 May and 4 November.

Figure 13

Trends in COVID-19 test capacity and the number of tests processed per day, 1 May to 6 November 2020

COVID-19 test capacity increased from 100,000 per day at the beginning of May to more than 500,000 per day by the end of October, but the actual number of tests processed towards the end of October is only around half of the available capacity



Notes

1 Testing is currently organised under five '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 commercial and university laboratories which, in addition to NHS staff and patients with a medical need, can include key workers and members of the public.

2 Daily testing capacity is based on data across the UK for Pillars 1 and 2 only. It represents the number of tests that can be performed for Pillars 1 and 2 based on staff availability and other resources.

3 The number of tests carried out include confirmed positive, negative or void laboratory-based test results, by Pillar. This counts tests carried out and may include multiple tests for an individual person.

4 Antibody serology testing for the presence of COVID-19 antibodies include Pillar 3 tests and antibody serology tests undertaken under Pillar 4. We have excluded Pillars 3 and 4 from our analysis.

5 All data on the number of tests are based on seven-day rolling averages (three days before and three days after).

Source: National Audit Office analysis of COVID-19 dashboard data published by the Department of Health & Social Care

2.14 There are several possible reasons for low utilisation. It could result from fluctuating public demand (for instance by region or day of the week), inefficiency or operational capacity constraints. Spare capacity can be helpful in the event of sudden spikes in demand. But if spare laboratory capacity routinely goes unused, it may mean that NHST&T has shortages elsewhere in its testing system – for instance, at testing sites or in its logistics operations – that make some of its theoretical maximum capacity permanently or temporarily unusable. Alternatively, it could indicate that existing eligibility criteria, for instance the exclusion of many asymptomatic people who suspect they have been exposed to the virus, are too restrictive.

Managing operational demand

2.15 NHST&T needs good operational data to run its services. Testing sites and laboratories are spread across the country and not all laboratories can process every type of test. NHST&T needs to understand both national and local patterns of COVID-19 incidence and likely demand so it can adapt its testing service to daily needs.

2.16 In July, NHST&T established a prioritisation board to maintain oversight of testing capacity allocations across the system, monitor demand, supply and activity, with a view to ensuring that current and planned operations remain aligned to agreed policy priorities. This board uses a variety of data to inform its decision-making including website visits, the number of people calling 119 and applying insight from the Joint Biosecurity Centre to determine testing priorities and approaches.

2.17 Starting in late August and continuing until mid-September, NHST&T was unable to satisfy the national demand for tests. Our analysis shows that during this period the total number of tests processed each day came close to theoretical maximum capacity with laboratories operating at more than 90% for more than a week. Some laboratories were at their maximum capacity and no more tests could be processed, meaning that many people who wanted a test could not get one. Some people were unable to book a test at all while others reported opting not to book because the site they were told to attend was hundreds of miles away. It is NHST&T's view that up to a quarter of the people who came forward for testing at this time did not have symptoms or were not instructed to seek a test. People are now travelling on average shorter distances to access tests. With the exception of August and September when travel times lengthened, median travel time has halved from 5.9 miles in May to 2.9 miles at the end of October as more local and mobile test sites became available.

2.18 During the August and September spike, NHST&T publicly stated that it was unable to meet demand due to insufficient laboratory capacity. This resulted from:

- delays in getting new laboratories up and running;
- delays in delivering testing equipment, including supply chain problems with swabs, screening kits and testing reagents; and
- difficulties in staffing new laboratories.

2.19 It created a surge capacity working group to accelerate the creation of new capacity in the system and took a range of actions both to increase capacity and reduce demand. These included:

- **requesting additional support from NHS laboratories:** In late August, NHS laboratories were urgently asked to support Pillar 2 testing by taking on 500 or more tests a day each;
- **amending existing laboratory contracts:** Enabling laboratories to offer longer guarantees of employment to improve staff retention;
- **temporarily bringing in additional laboratory capacity:** In October, it brought in 'surge laboratories' to boost processing capacity and bridge the gap between potential temporary shortfalls and planned further increases. It intends to use these arrangements for six weeks at a cost of £52 million;
- **prioritising access and changing eligibility:** It first prioritised access to testing for those who were most vulnerable and key workers. This later expanded to include those in outbreak and high-prevalence areas. This was predominantly achieved by deploying mobile testing units to these areas and increasing the number of home test kits available there. Areas with low prevalence of COVID-19 at the time had reduced access to testing;
- **increased test turnaround times:** In September, it opted to run lighthouse and partner laboratories at above the recommended 85% capacity to fulfil as much demand as possible. This meant there has been a lengthening of turnaround times; and
- **changing public communications:** Advertising of the testing service was scaled back and the text on the booking website and in call-centre scripts was amended to discourage asymptomatic people from seeking tests. Politicians and senior officials also made clear public statements at the time saying that it was inadvisable for asymptomatic people to seek tests, a clarification of the earlier public message that people should seek a test if in doubt.

2.20 Many public health experts have stated that this spike in demand was foreseeable because of the return of schools and universities after their summer break. But NHST&T was unprepared for the scale of demand. We note that, in November, the executive chair of NHST&T acknowledged to parliament that the surge had been higher than expected and the "balance between supply and the demand forecast was not right". NHST&T might consider taking similar actions again if demand were to spike to unexpected levels over the winter.

Identifying infected people

2.21 NHST&T has an internal target to identify 55% of people infected with COVID-19 through a positive test. It measures this with reference to the Office for National Statistics' weekly survey of infection levels. Given the limits in data collected, it is not possible to know precisely how NHST&T has performed against this target, but our analysis indicates that, its performance was mostly below target (**Figure 14** overleaf) between May and October, ranging between a high of 92% early on to a low of 23% in July. It has met the target in only six weeks. As the pandemic re-intensified during the autumn and access to tests was sometimes rationed, an increasing number of new infections were not identified.

Turnaround times for results

2.22 The rapid reporting of test results is critical in helping to control COVID-19 transmission. Speaking in Parliament in early June, the Prime Minister undertook 'to get all tests turned around in 24 hours by the end of June, except for difficulties with postal tests or insuperable problems'.[22]

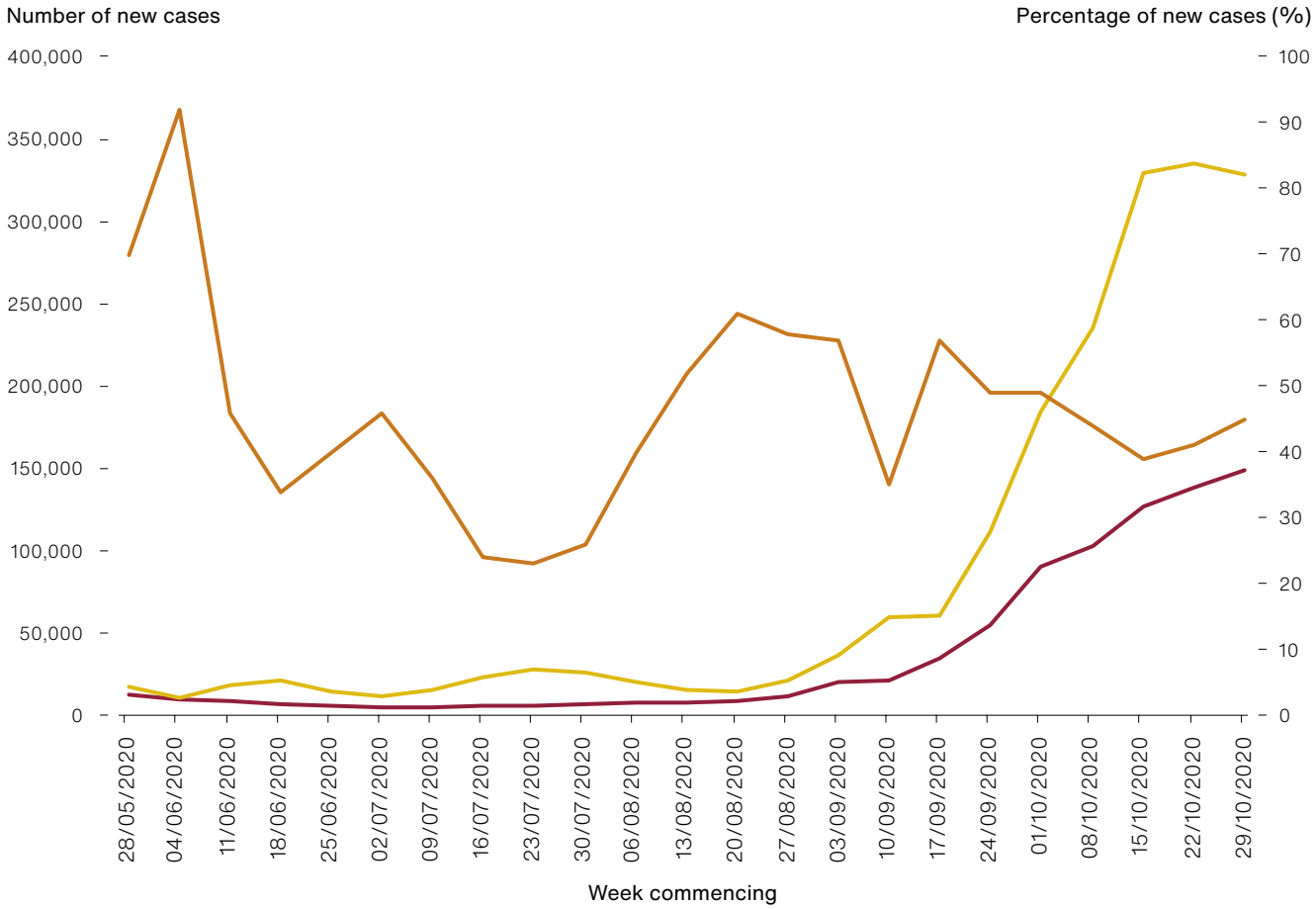
2.23 NHST&T aims to meet this target wherever possible for in-person testing (which excludes home testing and satellite sites). However, the time taken to issue results has worsened since the end of June, with only 41% of people receiving their result within 24 hours of taking their test in person (outside a hospital setting) between 28 May and 4 November (**Figure 15** on page 53).[23] There were some signs of improvement in October. Within Pillar 2, turnaround times vary substantially by testing route, with a median time from taking the test to receiving the result of 60 hours for home test kits, and 25 hours for mobile test units or regional test sites.[24] The majority of tests (90%) within hospitals (Pillar 1) do achieve a 24-hour target but performance is measured differently so is not directly comparable.[25]

22 *Hansard HC*, 3 June 2020, Vol. 676, col 839, available at: https://hansard.parliament.uk/commons/2020-06-03/debates/BD52C1B9-0DB7-42FB-9169-ED5E912E4156/Engagements
23 For home tests and those carried out by satellite test sites, the target of 24 hours does not apply. However, the majority of the Pillar 2 tests (56%) are carried out in these settings.
24 Note that there are different approaches to measuring turnaround times: the home test kits include the time taken for an individual to post the test kit after taking a swab.
25 For pillar 1, turnaround time is measured from sample arrival in the laboratory to result. For pillar 2, it is measured from swab kit registration to result and includes moving the sample from test site to laboratory.

Figure 14

Trends in the number of new COVID-19 cases and the number of people identified by NHS Test and Trace, week commencing 28 May to 29 October 2020

A large proportion of new COVID-19 infections have not been identified by NHS Test and Trace



Notes

1 The Office for National Statistics (ONS) estimated the number of new COVID-19 infections in the community in England based on its COVID-19 population surveys. Its survey does not cover people staying in institutions (for example, hospitals, university accommodation and care homes).

2 The number of people tested positive by NHS Test and Trace (NHST&T) include all people tested positive, including those diagnosed in hospitals and care homes. Therefore, the percentage reported in the chart could be higher than the actual performance.

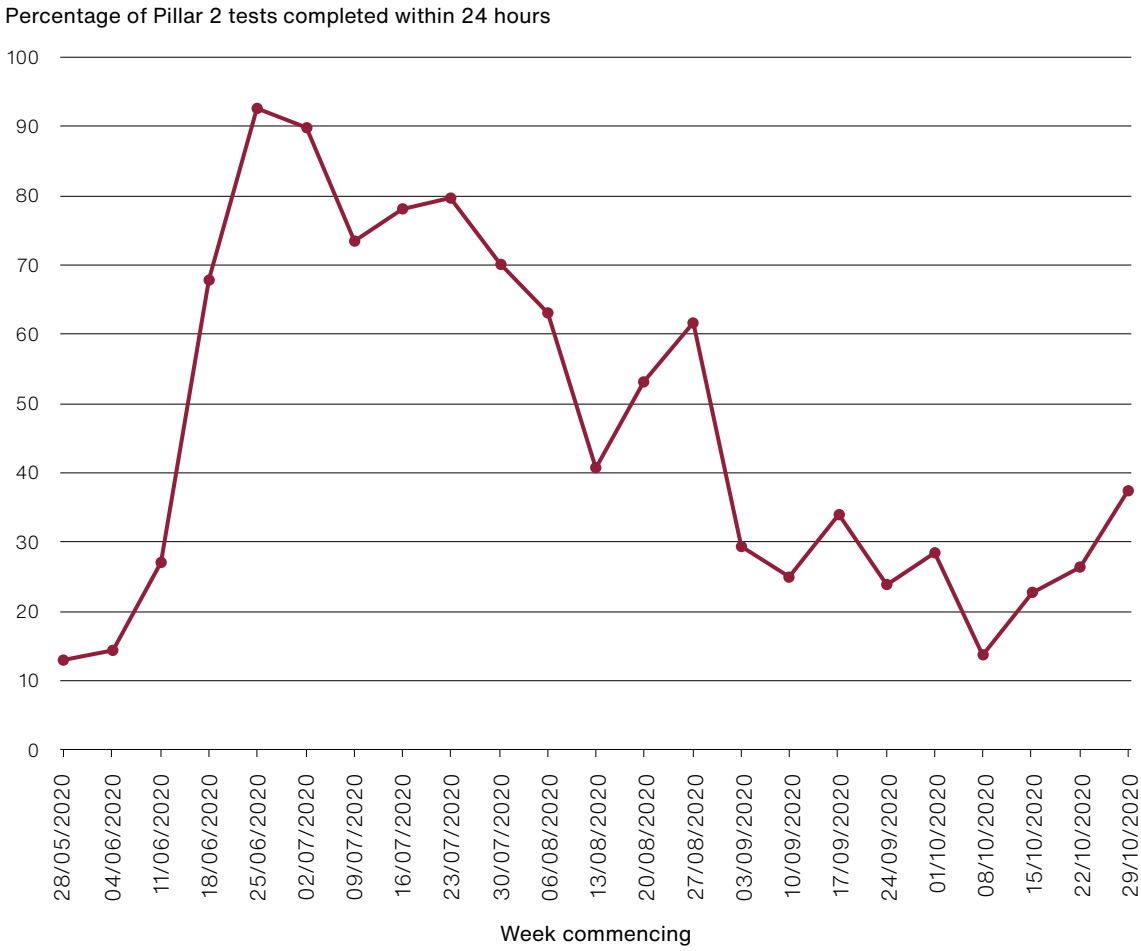
3 We included data from week commencing 28 May when NHST&T was formally set up. ONS estimates do not always align with the reporting week by NHST&T and we have done some smoothing to align the dates of the two datasets. Given the lag between infection, onset of symptoms, requesting tests and reporting results, the number of new cases reported by NHST&T each week may not correspond directly with the cases reported by ONS for the corresponding week.

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

Figure 15

Percentage of Pillar 2 COVID-19 tests completed within 24 hours in England, week commencing 28 May to 29 October 2020

The timeliness of results from Pillar 2 tests has worsened since June but is now showing signs of improvement



Notes

1 Pillar 2 comprises tests processed by lighthouse, commercial and university laboratories, which can include key workers and members of the public.

2 For Pillar 2 tests, only those carried out in person at regional, local and mobile test sites (44% of all Pillar 2 tests) were included in the analysis for this figure. We excluded home tests and those carried out at satellite sites from the analysis for this figure as the target of 24 hours does not apply for these settings. The majority (56%) of all Pillar 2 tests are carried out in these settings.

Source: National Audit Office analysis of weekly statistics for NHS Test and Trace (England) and coronavirus testing (UK)

Future plans

2.24 The testing system continues to evolve quickly.

- Government is now working to reach daily testing capacity of 800,000 tests by the end of January. In order to meet this target, it intends to open a further 15 lighthouse laboratories on top of the six that are already operational.
- The above expansion will not be enough to deliver mass population testing (formerly referred to as Operation Moonshot), so NHST&T also aims to build two new 'mega-laboratories' which will be large-scale, high-capacity facilities.
- In September, NHST&T also started to pilot sample pooling,[26] a way to increase significantly the number of people tested while using fewer testing resources by allowing samples from several people to be analysed in one test. Follow-up tests on individuals are only needed if the pooled sample tests positive. Other countries are already using this approach particularly at times when COVID-19 prevalence is low.
- Finally, England is looking to make more use of a range of rapid tests, and is currently trialling the use of LAMP and lateral flow tests which do not require laboratory processing and give faster results.

26 Samples from several people are analysed in one test. If the pooled sample is negative then the laboratory assumes all samples are negative but if the pool tests positive, then individual samples within the pool are tested.

Part Three

Contact tracing capacity, activity and performance

3.1 This part looks at the establishment of the current contact tracing service, the objectives set for it, and how the balance between national and local activity has evolved. It also looks at public engagement and compliance with self-isolation.

Initial establishment and objectives

3.2 At the start of the COVID-19 outbreak, when the overall number of infections was low, Public Health England (PHE) undertook contact tracing for all cases. However, as infection levels grew, government introduced a national lockdown as the main way of reducing transmission of COVID-19, suspending comprehensive contact tracing on 16 March 2020 . PHE teams stopped community tracing and focused on potential outbreaks linked to communal settings such as care homes or prisons.

3.3 The launch of the NHS Test and Trace service (NHST&T) on 28 May marked the resumption of widespread contact tracing to reduce COVID-19 infection levels. Government announced that the new programme would initially trace the contacts of up to 10,000 people a day.

3.4 The new national service was to operate via text, web, email and telephone, focused on a central pool of telephone staff, comprising 3,000 health professionals and 18,000 call handlers. PHE teams continued to undertake contact tracing for higher risk cases. NHST&T also anticipated that the contact tracing app would shortly be available to support national tracing.

3.5 NHST&T's July business plan set out objectives for the following three to six months. For tracing, these were mostly broad ambitions rather than specific or quantifiable targets, namely to:[27]

- increase the number of contacts reached and advised to self-isolate, both through increasing the overall number of people having a COVID-19 test and increasing the proportion of contacts reached who successfully self-isolate;
- reduce the average time from a person ordering a test to the point – if they test positive – of advising their contacts to self-isolate; and
- enhance contact tracing in relation to cases and groups of cases that might indicate a local outbreak. This included expanding local authority and PHE tracing capacity, establishing arrangements to meet peaks in demand and adapting the national service's contact tracing approach.

3.6 Between the end of May and end of October, progress against these broad areas has been mixed:

- the weekly number of contacts identified by NHST&T increased, but the proportion of contacts which it reached decreased (reflecting in part an increasing number of contacts not being identified with outbreaks in communal settings, such as care homes, and therefore being generally harder to reach, paragraphs 3.14 and 3.15);
- the time taken to reach people with positive tests and their contacts remained similar, having fluctuated more generally and dipped in early October (paragraphs 3.13 and 3.16); and
- PHE capacity has increased while a growing number of local authorities have set up their own tracing schemes (paragraphs 3.19 to 3.21 and 3.26). The proportion of cases which are referred to local PHE teams as higher risk has declined (paragraph 3.12).

3.7 We requested but did not receive information on how NHST&T had taken account of the needs of users from diverse groups for tracing. In June, no equality assessment had been carried out on the tracing aspects of the programme and there were a number of risks to accessibility for different groups. Nonetheless, some actions have been taken, for example, liaising with the Ministry of Housing, Communities & Local Government to ensure individuals on local authorities' lists of vulnerable people can be contacted and traced. NHST&T also told us that its call centres offer a language interpreter service and can be accessed by people with hearing or speech difficulties by calling a specific number. The national contact tracing software does not currently meet accessibility guidelines, which could exclude some people with impairments and disabilities from using the system. This is due to be corrected in a move to a new system scheduled for 2021.

27 This report does not cover the COVID-19 app in detail, but the business plan also included an objective to introduce and promote adoption of an app which, pending trials, would allow for digital contact tracing. The COVID-19 app, which included contact tracing functionality, was launched on 24 September.

The tracing process

3.8 A combination of national and local bodies undertake contact tracing for those testing positive for COVID-19 (**Figure 16** on pages 58 and 59). There are three 'tiers' of contact tracing:

- Tier 1 services comprise regional PHE teams working in conjunction with local authorities. They handle and investigate cases that might be linked to a local outbreak. This will include cases where an individual is linked to a communal setting or tracing may involve vulnerable groups, such as schools, care homes or prisons.
- National Tier 2 specialists make initial calls to people who have tested positive for COVID-19, to assess whether cases may be linked to an outbreak, make referrals to PHE teams, and identify contacts where necessary.[28]
- National Tier 3 call handlers deal with contacts for any cases not managed by PHE teams, providing standard information on self-isolation and support.
- Increasingly local authorities have set up their own tracing schemes, which receive cases from the national service if they have not been reached after 24 hours (paragraphs 3.19 to 3.22).

3.9 Alongside contact tracing services, since 24 September individuals can download the NHS COVID-19 app. Following a positive test, the app can anonymously alert other app users who have been in close contact and advise them to self-isolate. However, national and local test and trace services do not receive any information about the contacts that the app identifies in line with the data sharing protocols developed for the app.

Contact tracing activity and performance

3.10 To reduce COVID-19 transmission levels, two critical factors for the tracing service are to reach as many people as possible who either have COVID-19 or have been exposed to it; and to do so as quickly as possible (see paragraph 1.13). In this section, we look at NHST&T's performance in relation to these for tracing:

- people who test positive for COVID-19 and are transferred to the service, who we refer to as **cases**; and
- people who are identified as close contacts of these individuals, who we refer to as **contacts**.[29]

28 People may also choose to get in contact and provide details on-line, removing the need for Tier 2 and 3 staff to phone them.

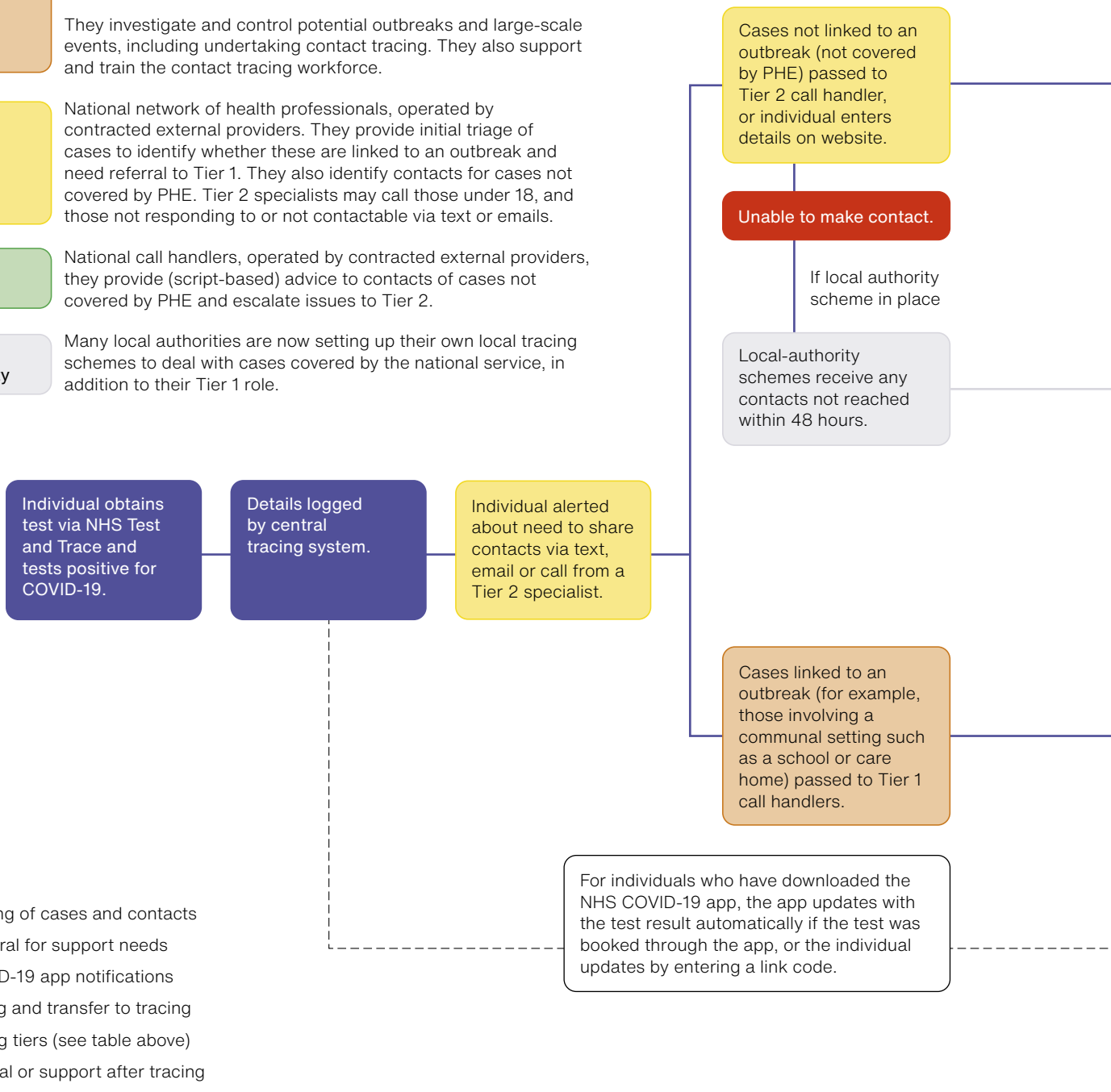
29 Contacts include other household members, and non-household members who the individual has been in 'close contact' with in the 48 hours before the onset of symptoms. 'Close contact' means: having face-to-face contact with someone less than 1 metre away; spending more than 15 minutes within 2 metres of someone; or travelling in a car or other small vehicle with someone or close to them on a plane.

Figure 16

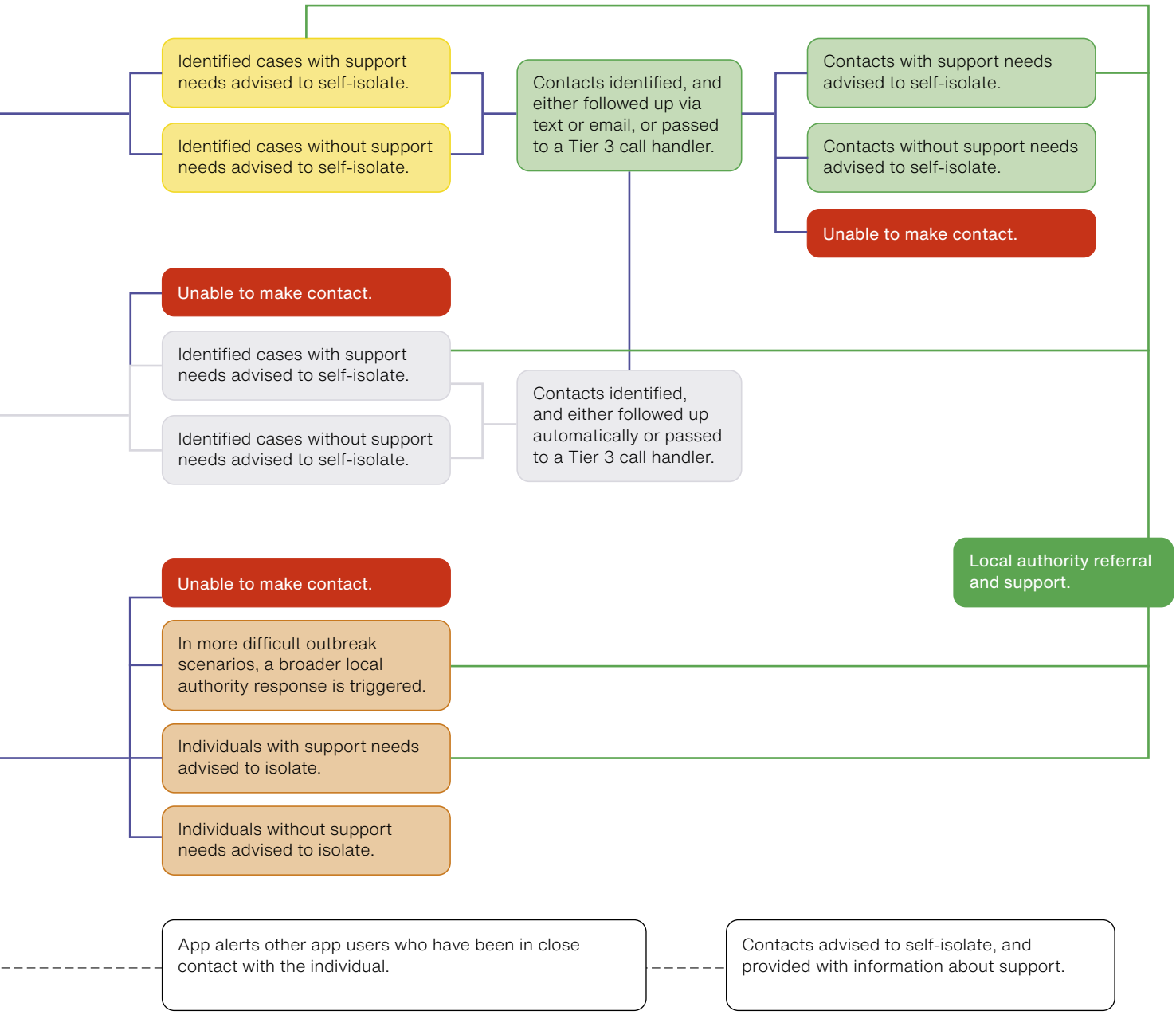
The COVID-19 contact tracing process in England, as at December 2020

Different national and local bodies carry out contact tracing for those testing positive for COVID-19, depending on whether a case is linked to a potential outbreak

Tier 1	Regional network of local Public Health England (PHE) health protection teams, working in conjunction with local authorities and local resilience forums. They investigate and control potential outbreaks and large-scale events, including undertaking contact tracing. They also support and train the contact tracing workforce.
Tier 2	National network of health professionals, operated by contracted external providers. They provide initial triage of cases to identify whether these are linked to an outbreak and need referral to Tier 1. They also identify contacts for cases not covered by PHE. Tier 2 specialists may call those under 18, and those not responding to or not contactable via text or emails.
Tier 3	National call handlers, operated by contracted external providers, they provide (script-based) advice to contacts of cases not covered by PHE and escalate issues to Tier 2.
Local authority	Many local authorities are now setting up their own local tracing schemes to deal with cases covered by the national service, in addition to their Tier 1 role.



Source: National Audit Office analysis of published Department of Health & Social Care documents, gov.uk information about NHS Test and Trace, and local outbreak plans


Identified cases with support needs advised to self-isolate.
Identified cases without support needs advised to self-isolate.
Contacts identified, and either followed up via text or email, or passed to a Tier 3 call handler.
Contacts with support needs advised to self-isolate.
Contacts without support needs advised to self-isolate.
Unable to make contact.
Unable to make contact.
Identified cases with support needs advised to self-isolate.
Identified cases without support needs advised to self-isolate.
Contacts identified, and either followed up automatically or passed to a Tier 3 call handler.
Local authority referral and support.
Unable to make contact.
In more difficult outbreak scenarios, a broader local authority response is triggered.
Individuals with support needs advised to isolate.
Individuals without support needs advised to isolate.
App alerts other app users who have been in close contact with the individual.
Contacts advised to self-isolate, and provided with information about support.

Tracing cases

3.11 NHST&T has transferred over 767,000 people to its tracing service since it began and reached around 630,000 up to 4 November (i.e. through phone calls or online channels). In its first week of operation, over 8,000 people were transferred, with NHST&T reaching around 5,900. The weekly number of transfers fell over the summer but more than quadrupled during October (**Figure 17**). The proportion of cases reached and asked for information about their contacts has broadly increased since May, from 73% in the last week of May to 85% for the last week of October. From early July the proportion reached has generally been higher than the internal NHST&T target of 80%, with dips below target during August and September. It stood at 82% for the whole period 28 May to 4 November.

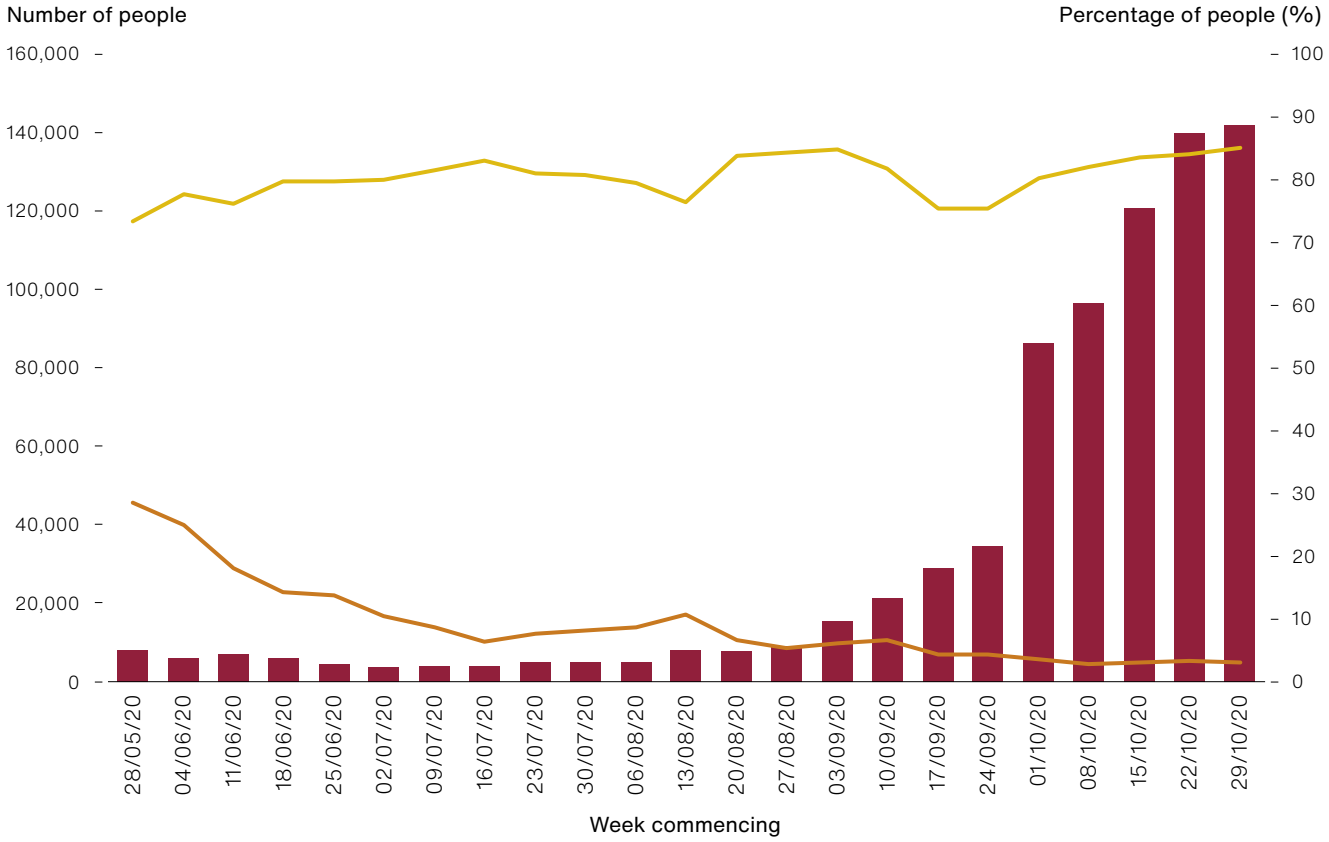
3.12 Regional PHE teams manage those cases which might be linked to an outbreak: these make up a minority and a declining proportion of all cases. The proportion of cases referred to PHE decreased from 28% in the last week of May to 3% in the last week of October. In October, the criteria for referral to PHE was narrowed which reduced escalation to these teams (particularly for education settings), so it is likely that the proportion of cases covered by PHE will continue to be low.

3.13 Information is available on the time taken to reach those cases managed by the national service (i.e. not PHE). This includes cases covered by the national tracers and online channels, as well as, from July 2020, hard-to-reach cases passed by the national service to local authority-run schemes, where they exist. The time taken to reach these cases fluctuates from week to week. It generally increased from the end of May to the middle of October, before improving in the last two weeks of October. For example, the proportion of these reached within 24 hours of being passed to the tracing service stood at 77% in the last week of May, reached a low point of 44% in the middle of October, then increased to 73% in the last week of October (**Figure 18** on page 62).

Figure 17

People transferred to the COVID-19 contact tracing system, percentage of people reached, and percentage reached who were managed by regional Public Health England teams, 28 May to 29 October 2020

The number of people transferred onto the contact tracing systems quadrupled during October



Notes

1 Individuals are transferred to the COVID-19 contact tracing system if they receive a positive test result.

2 A small proportion of those not reached did not have contact details provided.

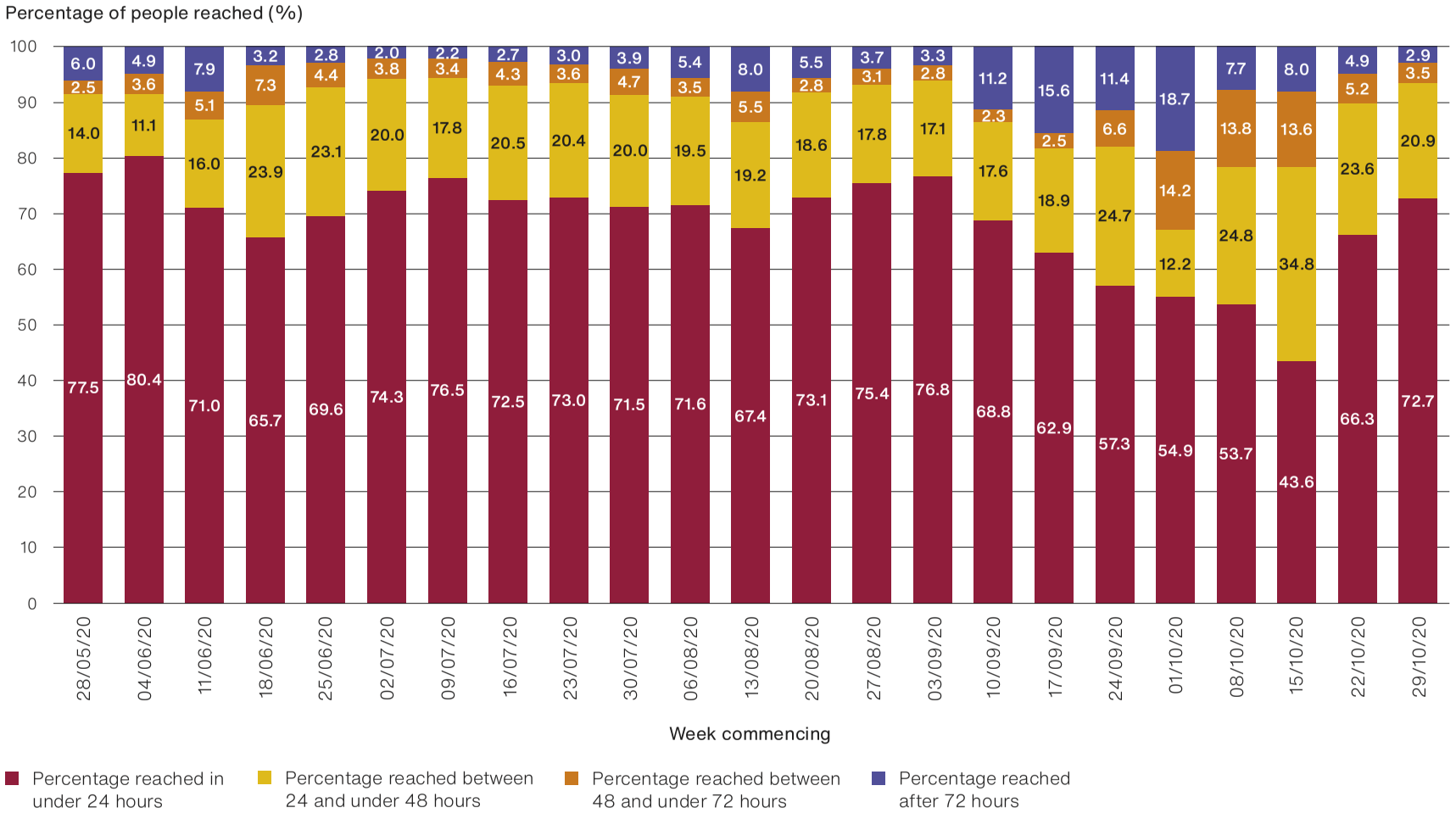
3 Regional Public Health England teams manage cases that might indicate an outbreak such as those linked to care homes, prisons, homeless hostels, or schools.

Source: National Audit Office analysis of NHS Test and Trace statistics (England)

Figure 18

Time taken to reach people testing positive for COVID-19, for cases managed by the national service, 28 May to 29 October 2020

The time taken for the national service to reach people generally increased from the end of May to the middle of October, before improving in the last two weeks of October



Notes

1 Figure excludes cases who were not reached. Time taken refers to the time between the case being transferred to the contact tracing system and being reached by the national service.

2 Cases managed by the national service include those covered by national tracers, online channels, and from July 2020, harder-to-reach cases passed by the national service to local authority-run schemes, where one was in operation.

3 Values in some columns may not add to 100 due to rounding.

Source: National Audit Office analysis of NHS Test and Trace statistics (England)

Tracing contacts

3.14 In its first week of operation, the test and trace process identified around 55,000 contacts and reached 50,000 (91%) of them (**Figure 19** overleaf). Between 28 May and 4 November, the service has identified over 2.1 million contacts, reaching over 1.4 million of them to advise them to self-isolate. Changes in the weekly number of contacts identified largely mirror trends in the numbers of cases.[30] The numbers of contacts identified each week fell between May and July, and then increased substantially during September and the start of October, particularly for contacts of cases managed by the national service.

3.15 The overall proportion of contacts reached has steadily declined since the service began, from 91% in the last week of May to 60% in the last week of October (Figure 19). In part, this reflects an increasing number of contacts being managed by the national service, which carries out its work in a different way to regional PHE teams. NHST&T noted that it counts contacts traced by the national service are counted as reached when they are individually identified, advised to self-isolate and return a tracing survey between the end of May and October, the proportion of contacts it reached broadly increased from 53% to 59%. By contrast, contacts managed by PHE teams, which involve higher risk cases linked to institutional settings (for example, care homes or prisons) are counted as reached when the team issues advice to the institution. Over nine in ten contacts are reached on this basis.

3.16 As for cases, the time taken for the national service to reach contacts generally increased up to the middle of October, before reductions in the last half of that month.[31] The proportion of these contacts reached within 48 hours of being identified by the tracing service stood at 87% at the end of May, before dropping to 66% by the middle of October, and rising to 81% by the end of that month (**Figure 20** on page 65).

3.17 At the end of October, the median total time between an original case presenting symptoms and their contacts being traced and advised to self-isolate was 119 hours. This was an improvement on the 123 hours reported at the end of September, but still some way short of NHST&T's internal target of 48–72 hours, which is in line with SAGE advice on what an effective test and trace system needs to achieve.

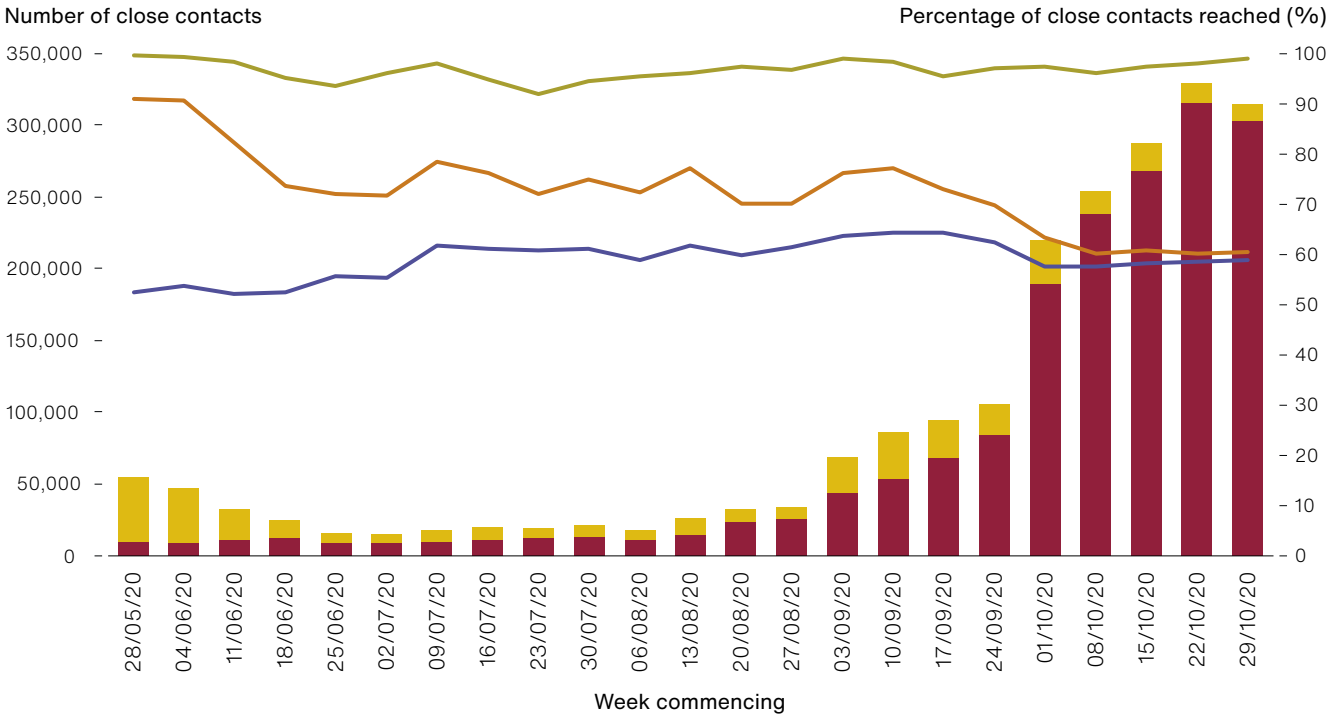
3.18 For the national tracers, NHST&T collects regular monitoring data on the reasons why tracing calls are unsuccessful. At the end of October, around a third of calls that were unsuccessful were because people refused to cooperate: this level was similar for calls to cases by health professionals (Tier 2) and calls to contacts by call handlers (Tier 3). A much higher proportion of unsuccessful Tier 2 calls were because the maximum number of call attempts had been made, while a higher proportion of unsuccessful Tier 3 calls had invalid contact details.

30 Although they will also reflect changes in the average number of contacts identified per person testing positive.
31 Information on the time taken to reach contacts is not available for contacts of cases covered by PHE teams.

Figure 19

Total number of close contacts identified, and the percentage of close contacts reached by regional Public Health England teams and the national service, 28 May to 29 October 2020

The percentage of close contacts reached has steadily declined since May, with a large and persistent difference between Public Health England (PHE) teams and the national service in the percentage reached



Notes

1 Regional PHE teams manage the close contacts of cases that might indicate an outbreak such as those linked to care homes, prisons, homeless hostels, or schools.

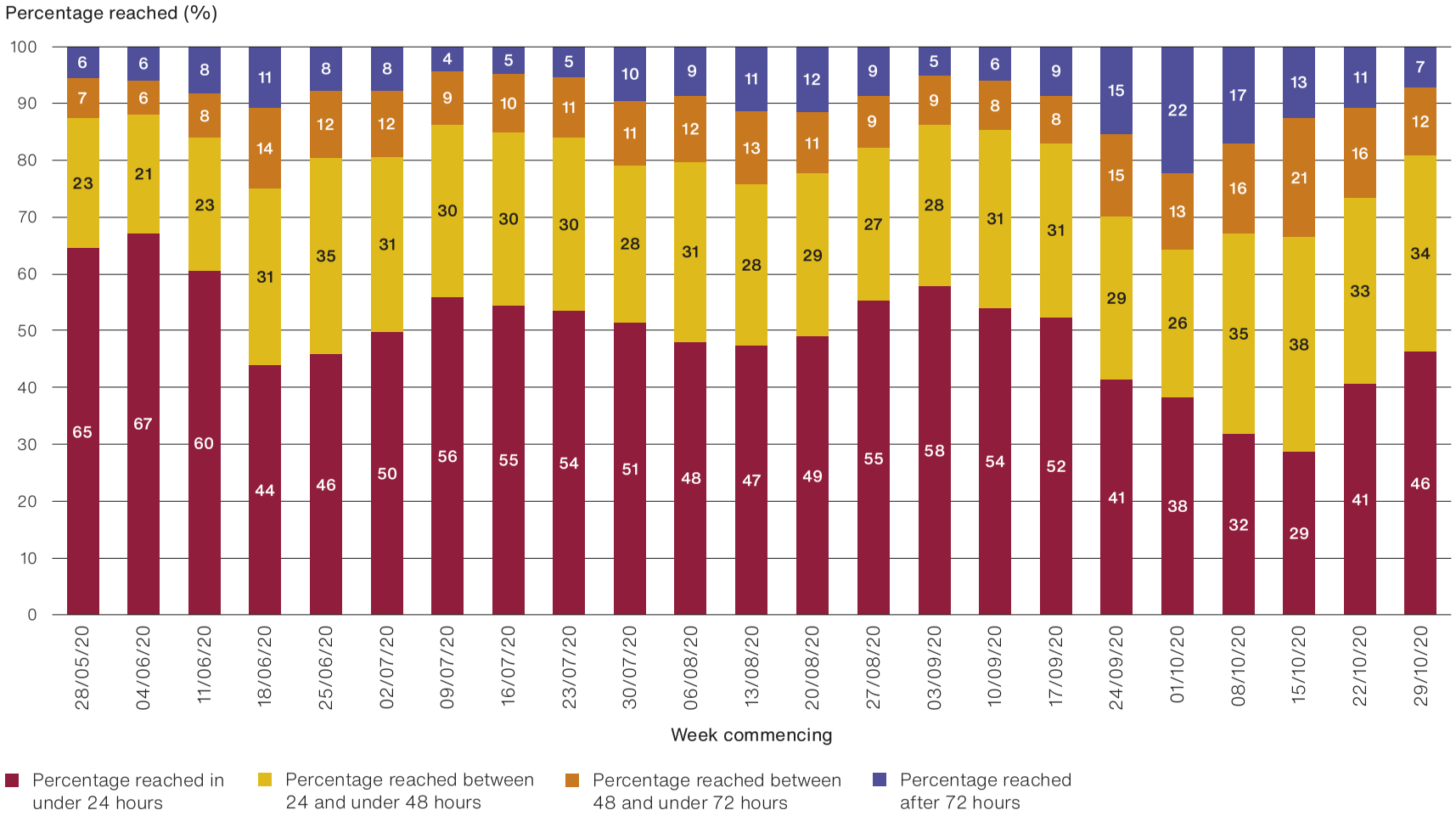
2 The national service manages the close contacts of cases not referred to regional PHE teams.

Source: National Audit Office analysis of NHS Test and Trace statistics (England)

Figure 20

Time taken by the national service to reach close contacts of cases, 28 May to 29 October 2020

The time taken for the national service to reach close contacts generally increased up to the middle of October, before reductions in the last half of that month



Notes

1 The national service manages the close contacts of cases not referred to regional PHE teams.

2 Timing information is not available for a small number of contacts who may be associated with cases referred to PHE teams. This means the number of contacts reached by national tracers may be lower than that reported elsewhere in other datasets.

3 Values in some columns may not add to 100 due to rounding.

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

The balance of national and local tracing

3.19 The involvement of local authorities in undertaking contact tracing has gradually increased since NHST&T's launch. The Department initially told local authorities to focus on working with PHE to "investigate and control outbreaks", which could involve tracing, and there were also early communications about their role in leading local COVID-19 responses and providing local support. During fieldwork, NHST&T told us that it had always planned to build out from the initial system to create an integrated national and local tracing service. However, we have not seen any formal documentation, or public communications with local authorities, from the period between April and June that demonstrates this was the intended strategy. By July, in addition to their work with PHE, some local authorities had set up their own schemes to trace the minority of cases that the national service was unable to reach, working in conjunction with NHST&T. At the end of that month NHST&T set out a 'local by default' model in its business plan.

3.20 There is emerging evidence that locally run schemes, working in conjunction with the national service, can increase the overall number of people who are traced. Based on 10 case studies published by the Local Government Association (LGA), locally run schemes reported reaching between 47% and 91% of cases that the national service were unable to reach. In November, the Executive Chair of NHST&T acknowledged that local teams were consistently reaching a higher proportion of people than the national service.

3.21 Since August, NHST&T has reduced substantially the number of national call handlers and designated a portion of the national specialist tracers to work exclusively with local authorities who had established their own tracing schemes.[32] Information from the LGA indicates that, by the end of October, local schemes had started in 60 out of 151 (40%) upper-tier local authorities, and there were active plans to set up schemes in a further 69 (46%) NHST&T's analysis of the new 'locally supported' arrangements in October suggested that they had the potential to improve overall contact tracing performance significantly, in part by providing faster links to local authority support for individuals. Based on the 25 areas covered by the new arrangements at the time, it found that case completions rose in 21 areas (by 10% or more in ten areas) and fell in only four areas.

3.22 Under new arrangements, wherever there is a locally-run scheme, the national service pass cases to the local authority if it cannot reach them within 24 hours (48 hours up to August).[33] Local authorities then pass back the details of contacts they identify so that the national service's Tier 3 call handlers can try to reach them.

32 These local schemes were in addition to existing PHE contact tracing for cases linked to outbreaks. The schemes were intended to help trace cases in local authorities that had been initially assigned to the national service.

33 Cases are given 8 hours to complete their details online, before being contacted by a phone tracer. Up until 13 October, the online option was not available for areas with a locally run scheme but was reinstated from that date for all areas.

3.23 In September, as national caseloads for contact tracing began increasing (see paragraphs 3.11 and 3.14), NHST&T's Executive Committee noted that training and staffing were limiting factors in the rollout of its support to local schemes. The Association of Directors of Public Health (ADPH) told us that some authorities had been held back from developing their own tracing schemes by lack of funding. It cited a lack of a transparent process for assessing local requirements and allocating funding, with too much focus on one-off payments for areas after they had already reached high levels of infection. It also expressed concerns that the national service was passing large volumes of cases to some local authority teams that did not have enough staff to process them. To date, in 2020-21, the government has provided grants of £785 million to local authorities to support their COVID-19 responses, which can include tracing activities (see paragraph 1.29). From June, it allocated specific funding to local authorities requiring higher levels of intervention, which from October was linked to an area's designated alert level.[34] Following the end of the second national lockdown on 2 December 2020, councils received £4 per head of population for every 28 days at a tier 3 alert level, and £2 per head at tier 2.

3.24 At the end of October, NHST&T's Executive Committee acknowledged that there needed to be better co-ordination of tracing strategy and the growing range of national and local approaches, as well as more engagement with local Directors of Public Health. NHST&T is currently considering the future operating model of the tracing service. One option under consideration is that local authorities could vary in their involvement in contact tracing (for example, with some tracing all cases and their contacts), drawing on the national service where necessary, and governed by national standards.

Tracing capacity

3.25 Tracing capacity comprises a combination of staff in PHE and local authorities, and Tier 2 and 3 contract staff working for NHST&T (see paragraph 3.8).

34 On 12 October, the government announced the introduction of a three-tiered system of local COVID-19 alert levels, which would apply to each local authority. The three levels were set as: tier 1/medium; tier 2/high and tier 3/very high. During the second national lockdown in November to December 2020, all local authorities received £8 per head of population.

Levels of capacity

3.26 Figure 21 shows how tracing capacity has changed between May and October. NHST&T told us that the number of PHE staff in regional health protection teams more than tripled in this period, from 362 to 1,220. These staff do not work exclusively on tracing as they have other public health responsibilities. There was also an increase in the number of Tier 2 specialists, from 3,000 in May to 5,000 by October (on a full-time equivalent basis).[35] By contrast, the number of Tier 3 call handlers was reduced from 18,000 in May to 12,000 in August and 10,000 in September.

3.27 There are little available data on local authority staff involved in contact tracing. Of ten local schemes highlighted by the LGA, team sizes ranged from six to thirty, often drawing on staff from elsewhere in the council. In August, NHST&T surveyed 110 Directors of Public Health, covering 72% of upper-tier local authorities. This found that local authorities were adding around 2,800 staff to their test and trace functions, with around 341 focused on local contact tracing.

Figure 21

Tracing capacity in Public Health England, and Tier 2 and Tier 3 national services, England

The number of Tier 3 call handlers has reduced by 44% since May

Area of service	Capacity and date
Public Health England (PHE) health protection teams	362 as at May
	1,220 as of October
Tier 2 specialists (health professionals)	3,000 recruited in May
	5,000 by October
Tier 3 call handlers	18,000 recruited in May
	12,000 revised headcount in August
	10,000 revised headcount in September

Notes

1 PHE staff in its field epidemiology service may also undertake contact tracing; as of May there were 137 staff in the service.

2 Tier 2 is a national network of health professionals operated by external contractors that provide initial triage of cases to identify those needing onward referral to regional PHE teams.

3 Tier 3 are national call handlers operated by external contractors that advise the contacts of cases not covered by PHE teams and may escalate issues to Tier 2.

Source: National Audit Office analysis of gov.uk announcements, and Department of Health & Social Care, NHS Test and Trace, and Public Health England documentation and data

35 NHST&T did not provide us with information on the exact timing of the increase in Tier 2 capacity, or the source of the additional staff.

Planning and utilisation of Tier 2 and 3 capacity

3.28 In mid-May, the Department signed contracts for the provision of around 3,000 Tier 2 specialists (mostly via NHS Professionals) and 18,000 Tier 3 call handlers (from Serco and Sitel) for an initial three months. The contracts for Serco and Sitel were worth up to £720 million in 2020-21. The Department set the amount of tracing capacity it wanted contractors to supply.

3.29 On 18 May, after the contracts had been finalised, the Department undertook further modelling, which suggested that between 21 May and 26 July:[36]

- the number of Tier 2 call handlers that it was likely to need would range from a peak of around 4,500 in May to just over 1,000 in July, thus implying some shortfall in capacity; and
- the number of Tier 3 call handlers that it was likely to need would range from a peak of around 13,000 in May to around 3,000 in July, thus implying considerable unnecessary capacity.

3.30 On 17 June, following the launch of NHST&T, the utilisation rate of contracted staff was just 4% in Tier 2 and 1% in Tier 3. The Department's analysis indicated that part of the reason for the under-use was lower than expected numbers of cases and contacts being handled by the tracing service. It also recognised that its initial planning assumptions had been incorrect. For example, the Department had assumed that each case transferred to the tracing system would provide 10 to 30 contacts (the actual number was 2.4) and that 10% of cases would return details via the online route (the actual proportion was 20%).

3.31 The Tier 3 contracts that the Department had signed had no provision to change staffing levels. It negotiated new flexibility clauses which came into force on 17 August. These allowed NHST&T to decrease full-time equivalent staff levels by up to 20%, or increase them by 4,000, every two weeks. Newly hired staff also had a minimum of four weeks before their hours could be decreased. NHST&T noted that these conditions "balance the risk of need to ramp up with political, media and social considerations".

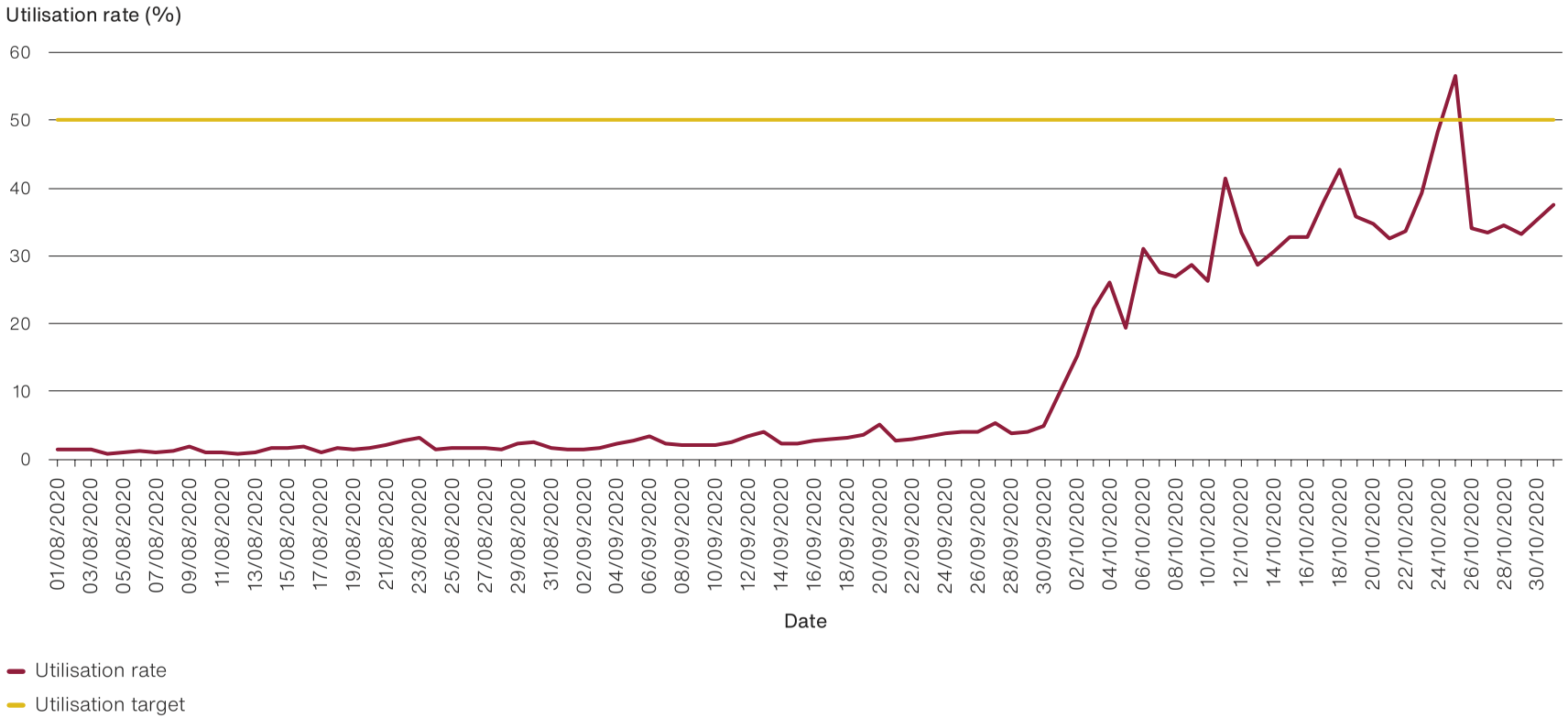
3.32 In order to manage unexpected or rapid spikes in demand, from August Tier 3 staffing levels include a 'buffer' of around 20% planned spare capacity, and a target utilisation rate of 50%.[37] NHST&T data show daily fluctuation in the utilisation rates (**Figure 22** overleaf). The utilisation rate fell to under 1% in August when cases were low and there was little flexibility to reduce staffing levels. From August NHST&T had more flexibility over contracted staffing levels and used this to reduce the number of tracers. The utilisation rate then rose, ranging from 1% to 5% in September, and between 10% and 56% in October, generally well below the 50% target and exceeding it on only one day in that period. The levels of under-utilisation mean that substantial public resources have been spent on people who were barely used in actual tracing activity.

36 The model did not cover PHE or local authority capacity.
37 The utilisation rate is the amount of utilised time (in hours) divided by the amount of paid hours.

Figure 22

Daily utilisation rates for national call handlers, 1 August to 31 October 2020

Utilisation of Tier 3 call handlers ranged from 1% to 56% between 1 August and 31 October, against a target of 50%



Notes

1 Tier 3 are national call handlers operated by external contractors that advise the contacts of cases not covered by Public Health England.

2 The utilisation target is set by NHS Test and Trace.

3 The utilisation rate is the amount of utilised time (in hours) divided by the amount of paid hours.

Source: National Audit Office review of NHS Test and Trace information

3.33 Reducing the original 18,000 Tier 3 staff by 33% in August and by a further 11% in September has led to lower Tier 3 contract costs. NHST&T has projected that expenditure would be 22% lower than budgeted by the end of January 2021.

3.34 For Tier 2, NHS Professionals was contracted to provide 3,360 full-time equivalent health professionals (around 6,000 staff in total), either through their existing bank of staff or via agencies. Tier 2 staff work on an hourly rota basis organised by NHS Professionals, which means their levels of activity may also vary. Unlike the Tier 3 contracts, the Department was able to vary the required staffing levels from the outset (with four weeks' notice during the first three months, and two weeks' notice subsequently). Utilisation rates vary from day to day and between provider. Based on performance reports at the end of October and beginning of November, the utilisation rate ranged between 13% and 63%. The average number of cases completed per paid hour also varied from 0.2 to 1.21.

Data handling and contact tracing

3.35 Local authorities and health protection teams need data on positive cases in their area to monitor infections, inform decision-making, prevent, investigate and manage clusters of outbreaks, and support contact tracing. At the start of the outbreak, NHST&T told us that it had to resolve and manage data governance and security issues, in order to share detailed data on cases with local authorities. This meant local authorities did not always have the information they needed. Directors of Public Health started to receive postcode-level data on infections in their area from 24 June, and now have access to individual-level data. NHST&T told us that all local authorities have now signed data sharing agreements with PHE, with details of how data must be shared securely. The ADPH described how, while it took some months to resolve the early problems, data flows from national to local systems have now improved since the start of the pandemic. However, it noted that there continued to be issues with delays, and the provision of inaccurate or incomplete data (for example, case records omitting people's occupation).

3.36 NHST&T has identified a number of issues affecting contact tracing data and data governance reflecting the rapid introduction of the Synergy case record management system used by the national service and its linkage to the existing PHE contact tracing system (CTAS). Risks include the possibility of data breaches and the fact that all Tier 2 tracing staff have wide access to contact details. NHST&T has to continue to manage these risks until the planned replacement of CTAS, which is now scheduled for January 2021.

Public engagement and compliance

3.37 In May, SAGE advised that a high level of public adherence to requests to self-isolate was required for a test and trace system to be effective. It also noted that individuals repeatedly asked to isolate, or who would be impacted financially by doing so, might be less compliant. Reliable data on rates of compliance with instructions to self-isolate are still emerging. Surveys conducted for the Department between March and August indicated that around one in five respondents who had symptoms of COVID-19 fully self-isolated, and that one in 10 respondents who had been notified they were a close contact of somebody testing positive had isolated for 14 days.[38] A survey conducted by NHST&T in August and September showed around 59% of close contacts reached and advised to isolate by NHST&T complied fully with requirements. This survey also explored how much contact respondents had with others during each non-essential visit outside the home: 12% of respondents reported contact on this basis.[39] Other estimates also suggest that significant numbers of people are not fully complying.

3.38 NHST&T's business plan states that it wants users to be able to engage quickly and confidently with its service, and to increase awareness of the service from around 60% in May to over 80% by October. NHST&T's internal performance reporting, based on commissioned surveys, shows that awareness of the service was close to or above this target for most of October.

3.39 When NHST&T began, there was no legal duty to comply with self-isolation requests as government had taken advice that a mandatory approach might deter individuals from reporting symptoms, ordering tests or sharing contact information. This changed from 28 September when, under English law, anyone notified of a positive test must self-isolate for at least 10 days after the onset of symptoms. Close contacts must self-isolate for up to 14 days (the particular requirements for self-isolation will differ for each individual). Anyone breaking these rules can be fined £1,000 or up to £10,000 for repeat or severe breaches. Alongside these measures, government has begun providing support payments of £500 to those on lower incomes who cannot work from home and lose income due to self-isolation. In the week commencing 28 October, NHST&T recorded 6,466 applications for support, involving payments of £1.9 million, around 3,000 of which were declined.

38 Smith, L., Potts, H., Amlot, R., Fear, N., Michie, S., and Rubin, J., *Adherence to the test, trace and isolate system: results from a time series of 21 nationally representative surveys in the UK (the COVID-19 Rapid Survey of Adherence to Interventions and Responses [CORSAIR] study),* Medrxiv: www.medrxiv.org/content/10.1101/2020.09.15.20191957v1, September 2020. The authors advised caution in using the results related to quarantine of contacts due to small sample sizes. The authors advised caution in using the results related to quarantine of contacts due to small sample sizes. They also identified an issue with the underlying dataset, suggesting that respondents who had been contacted by NHST&T and asked to quarantine were over-represented (around 3% of respondents compared to less than 1% from official NHST&T data). The paper was not yet peer-reviewed, and findings, particularly the interpretation of the quarantine data, may change in the final peer-reviewed paper.

39 The authors noted limitations that mean the findings must be interpreted with caution. This included a 16% response rate, which means that there may be differences between those who responded to the survey and those who did not, and that the survey relied on a self-reported measure of compliance.

3.40 NHST&T, local authorities and the police all have roles in encouraging or enforcing compliance with self-isolation:

- NHST&T call handlers make follow-up calls to advise and support those self-isolating, and can escalate suspected non-compliance to local authorities or the police.
- Local authorities do not enforce self-isolation but encourage compliance, for example through education campaigns. They may also provide practical support for vulnerable individuals, such as food or medicine deliveries, and administer the government's £500 support scheme. Authorities may escalate suspected non-compliance to the police.
- Where there is clear evidence of non-compliance, the police decide what action to take which may include issuing a penalty fine.

3.41 Front-line contact tracers have reported difficulty convincing some individuals to self-isolate. The ADPH has called for better understanding of users' barriers and likely behavioural responses throughout the process. NHST&T acknowledges that contacts not obeying instructions to self-isolate pose a key risk. It has taken measures to increase public engagement and compliance, such as carrying out trials to understand whether compliance can be improved by communicating with people during their self-isolation. NHST&T monitors compliance by collecting information on the outcome of follow-up calls, applications and payments for isolation support, and polling data on cooperation with isolation instructions.[40]

40 However, the performance reports we reviewed for the end of October did not include this polling information as NHST&T had suspended data collection pending a review of the metrics.

Appendix One

Our audit approach

1 This audit is an interim report which examines aspects of the development and implementation of test and trace services in England, including the establishment of the NHS Test and Trace Service (NHST&T). It reviewed:

- the set-up, governance and spending of NHST&T;
- actions to develop and deliver testing activity;
- actions to develop and deliver tracing activity; and
- the interface between national and local bodies.

This report does not cover post-October planning for mass testing. It covers some aspects of public engagement efforts in relation to improving compliance with tracing.

2 We intend to publish a further report in spring 2021 which will provide a fuller value-for-money assessment of test and trace. This will include an update on spend and performance, and matters not covered here, including examining the end-to-end process in more depth, the development and implementation of the contact tracing app, and a detailed look at elements of contract management.

3 Our audit approach is summarised in **Figure 23** and our evidence base is described in Appendix Two.

Figure 23
Our audit approach

The objective of government

Test and trace programmes are a core public health measure in epidemics, alongside other actions like social distancing and handwashing, to reduce infections. Through early identification, potentially infectious contacts of infected individuals can be traced and encouraged to reduce their interactions with others, thereby reducing disease spread. In May 2020, the government launched the NHS Test and Trace Service (NHST&T) in England, with an overall aim to "help break chains of COVID-19 transmission and enable people to return to a more normal way of life".

How this was achieved

The launch of NHST&T combined testing and tracing into a centralised national programme and built on the central delivery model already being developed for testing. NHST&T is responsible for leading development of the test and trace provision, which entails working with other national and local bodies, including the Department of Health & Social Care, Public Health England and local authorities. Many organisations outside government are also contracted to help deliver different aspects of test and trace services.

Our key areas of focus

Set-up, governance, and spend, including initial planning and decision-making; objectives and targets; governance and funding arrangements; national and local interface; spend; and what commercial arrangements were in place.

Testing capacity, activity, and performance, including planning and forecasting; performance to date against key commitments, and constraints to performance and activity.

Tracing capacity, activity, and performance, including planning and forecasting; performance to date against key commitments; national and local interface; and constraints to performance and activity.

Our evidence
(see Appendix Two for details)

As part of our fieldwork for this review, we:

- reviewed a wide range of publicly available and internal documents to understand the background and development of NHST&T. This included ministerial submissions, business plans and cases, Executive Committee reports, financial and management reports, internal and external communications, contract information, and guidance documents;
- analysed data from several sources to understand the operational and financial performance of NHST&T to date. This included publicly available data from the Office for National Statistics and NHST&T, internal budgeting information, and regular reporting of key performance indicators and metrics;
- carried out a small number of stakeholder interviews to understand external views of the service, including with the Local Government Association, the Association of Directors of Public Health, the Health Foundation and The Nuffield Trust. We also reviewed documents and reports on test and trace published by these and other sources;
- reviewed publicly available information on the main characteristics of different international approaches to test and trace systems; and
- reviewed the number, value and composition of contracts let by NHST&T to understand the commercial landscape, the procurement approach, and the contract management arrangements in place.

Appendix Two

Our evidence base

1 Our review of the NHS Test and Trace (NHST&T) service was based on evidence collected between October and November 2020. Our approach is outlined in Appendix One.

Document review

2 We reviewed a wide range of documents to understand the background and development of NHST&T. This included published material, in addition to internal material accessed under our statutory audit rights. This included ministerial submissions, business plans and cases, Executive Committee reports, financial and management reports, internal and external communications, contract information, and guidance documents.

Data analysis

3 We analysed data from several sources to understand the operational and financial performance of NHST&T to date. This included publicly available data from the Office for National Statistics, internal financial information, and regular reporting of key performance indicators and metrics.

Stakeholder interviews and documentation

4 We carried out a small number of stakeholder interviews to understand external views of the service, including with the Local Government Association (LGA), the Association of Directors of Public Health, the Health Foundation and The Nuffield Trust. We reviewed documents and reports on test and trace that were published online by these and other sources. In particular, the Health Foundation's Senior Policy Fellow, Dr Adam Briggs, made himself available to us to discuss aspects of its September 2020 report, NHS Test and Trace: The Journey So Far, which he co-authored. The LGA also provided information on local authority-run contact tracing schemes.

International comparators

5 We reviewed publicly available information on the main characteristics of different international approaches to test and trace systems.

Contract data review

6 We reviewed departmental commercial data to understand the number, value and composition of contracts let by NHST&T and the procurement approach.

Limitations of the evidence

7 This was a rapid review of evidence drawing predominantly on published information, supplemented by an information request to public bodies under our statutory audit powers. We have not audited the underlying information systems and source data used in this report for completeness or quality, however relevant bodies have reviewed and confirmed the accuracy of information relating to them. We have undertaken an initial analysis of costs and contracts, based on internal management information. Many costs and budgets are not yet final as the UK government's response continues. The analysis in this report reflects our best understanding, but there are particular limitations and uncertainty in the completeness and quality of the financial and contractual information available.

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