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A photograph of a busy subway station with multiple escalators. People are seen moving up and down the stairs. The station has a high, vaulted ceiling with circular lights. The image is partially obscured by a large orange diagonal shape in the foreground.

COVID-19 Testing, Tracing and Isolating Strategies in the UK (England)

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THE LONDON SCHOOL
OF ECONOMICS AND
POLITICAL SCIENCE ■



PERISCOPE

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Summary

This report focuses on the development and implementation of test, trace and isolate strategies (TTIS) in England during the COVID-19 pandemic. The research comprised interviews with key stakeholders at central and local government levels. The interviews focused on the evolution of test, trace and isolate strategies and associated challenges, aspects that worked well and less well, measures to prepare for future pandemics and what was learned for public health.

As regards the development of testing strategies issues concerned the testing infrastructure, the development of testing technologies, the purpose of testing over time, and the testing process and research. Successes included the mass roll out of testing, and novel innovation regarding the use of testing for different purposes. Issues identified regarding the implementation of testing strategies concerned access to data; asymptomatic testing; test to release; digital exclusion and hard to reach groups; testing and care homes; LFTs and schools; and logistical and funding issues. Key challenges at the outset included setting up a national testing infrastructure, access to data and access to testing for those from low income and certain minority ethnic groups. Successes included the introduction of local testing sites, lateral flow tests and the introduction of daily contact testing.

Turning to contact tracing, issues raised concerned the role played by NHS Test and Trace (NHST&T); NHST&T and local contact tracing; the decentralisation of contact tracing; data and data sharing; outbreaks and contact tracing; contact tracing and vulnerable communities; schools and businesses and contact tracing; and the NHS COVID-19 App. Problems associated with national contact tracing were highlighted by interviewees at the local level including lack of local knowledge and understanding, and limited capacity during surges, with local contact tracing enabling contacts to be identified and reached more effectively.

The research revealed a number of issues regarding isolation strategies including data and information, financial support and accommodation. Initially there was no financial support for those in isolation who were unable to work from home; once central government support was provided the amount was not necessarily sufficient for many households, with some local councils providing additional financial support for self-isolation for particular groups of people. A further issue identified in the interviews which cross-cut test, trace and isolate strategies was that of communication from central government, and communication at a local level particularly in the context of diverse communities.

A range of measures to prepare for future pandemics were proposed including planning (for different levels of government), business continuity and dedicated funding for local authorities. Key themes to emerge regarding learning for public health concerned the importance of national and regional partnership, leadership and partnership at a local level (including with community groups), and the relationship between central and local government.

1 Introduction

This report focuses on the development and implementation of testing, tracing and isolation (TTIS) strategies in England in the context of the COVID-19 pandemic. It is supplemented by a documentary review of policies (see Annex C). The research involved carrying out interviews with key stakeholders involved with the strategies at central and local government levels in England. The interviews focused on the evolution of test, trace and isolate strategies in England and associated challenges, aspects that worked well and less well, measures to prepare for future pandemics and what has been learned for public health. The qualitative analysis that follows sought to address the following research questions in the English context:

- Which were the biggest challenges experienced in the context of TTIS strategies?
- Which problems were observed over the course of the pandemic?
- Which aspects of the TTIS strategies worked well and which less well?
- How could TTIS strategies have been improved?
- Which measures should be taken to prepare the TTI system for future pandemics?
- What was learned for public health from the pandemic?

The following sections describe the methods and sample, the analysis, and the main findings. The main findings address testing, tracing and isolation strategies in turn. A cross cutting section on communication follows before measures to prepare for future pandemic and what had been learned are addressed. The final section concludes.

2 Methods

The research study involved conducting expert interviews at a central and local level in England. Eight interviews, with nine experts, at central and local government levels were carried out. Interviews were conducted in a central government agency and in six local authorities in England. The local authorities were selected to represent geographical diversity in terms of rural and urban areas, cities and towns. They were located in different regions of England: London (LA B), the East (LAs E and F), North West (LAs A and C), Yorkshire and Humber (LA D).

Interviewees / participants¹ across central and local levels comprised four Directors of Public Health (DsPH), two Assistant DsPH, one former senior local government official (Chief Executive), one local authority consultant, and two local authority officers (see Annex A). The interviewees were approached individually with the overall aim of ensuring representation as noted above.

Ethical approval was obtained from the Institut für Höhere Studien (HIS) and the LSE. Interviewees / participants were provided with written information regarding the project and a consent form which was signed and returned. The interviews were recorded and transcribed. Field notes were also taken during the interviews by the researcher (AW). Neither interviewees nor organisations have been named in this report. The draft report was circulated to interviewees and the final version was revised in light of their comments.

The questions to interviewees were in line with agreed protocol (Annex B) and focused on testing, tracing and isolation strategies, challenges, problems encountered, and what participants felt worked well and less well. Interviewees were also asked questions regarding preparedness for future pandemics and what had been learned for public health.

¹ Comments from one DPH were incorporated when the draft was circulated to interviewees. The total sample thus involved ten participants.

3 Analysis

Each interview (which was carried out online) lasted between 53 and 70 minutes (mean 61 minutes). Each was digitally video- and audio-recorded and transcribed (with the interviewee's permission). Following multiple readings of each account inductively derived categories and themes were developed. Analytical work entailed working within each theme to examine the complexity and variation.

4 Findings

4.1 Testing strategies

This section focuses first on the development of the national development of infrastructure, technologies and testing, and second, on the implementation of testing.

Development of national infrastructure, technologies and testing

Four key themes were identified in the analysis: the testing infrastructure, the development of testing technologies, the purpose of testing over time, and the testing process and research.

Testing infrastructure for the pandemic

At the beginning of the pandemic the major issue was the lack of an appropriate testing infrastructure to respond to a pandemic (there was infrastructure for normal clinical practice). There was much debate within the central agency about how this should be developed. There were universities with labs that linked with the NHS and one key issue was should these have been developed or should the government build new 'lighthouse structures' (see Annex C). With the former, the interviewee noted that it would have been necessary to 'create systems on an individual basis in hundreds of different places'. This would have 'required NHS resources to link that in with that local setting' and there would have been a variety of challenges to ensure compatibility across the whole system.

Whilst one of the challenges as testing increased was laboratory space for testing samples, the real challenge was the logistics given the number of tests that were being dealt with 'we were doing millions of tests a day'. A further challenge was that whilst the larger labs had clear advantages when something went wrong 'it went wrong with a large number of samples, because we were doing such high numbers'. Thus, if there was an error with the results being uploaded, the numbers could be high although only a small fraction compared to the numbers going through. Importantly, there were also systems in place to monitor for errors and respond. Regardless of the challenges, it was stressed that 'the mass roll out of testing was an amazing success': 'getting to the mass number of PCR capacity from a standing start ... was a real achievement' [CA].

There was also the issue of how best to organise testing. 'Drive through sites were considered the easiest to set up quickly and likely to hit the highest numbers.' However, shortly after defining the clinical standard operating procedures for these, the central agency 'went onto defining the model for a walk-in model. A factor regarding how quickly these were set up was the logistical ability and the teams to set up sites': it was also why there was 'such a push on home testing' [CA] (see below).

Development of testing technologies

This in turn relates to the development of technologies. In England there was major investment in a variety of different technology types – the polymerase chain reaction (PCR) test, lateral flow antigen testing devices (LFD) and loop-mediated isothermal amplification (LAMP). The decision to invest was made at a time where increasing capacity was 'absolutely essential' and it was not clear at that stage which were likely to be the best or the most effective:

One of the strengths was that because we had a national system, we were able to leverage that national system to look at those different technologies and see where they may we'll work and that again led to really rapid development [CA].

'LFDs turned out to be very effective because of the self-use aspect' [CA]; this was particularly important as very early on it was recognised by the central agency for both symptomatic (PCR) and asymptomatic (LFD) testing that there was not the workforce available to carry out the swabbing for everybody in the country who needed it.

The central agency therefore did some work looking at how well people did self-swabs versus assisted swabs. This was the basis of the decision to move to self-swab taking: 'I think that was relatively different from the rest of Europe'. Similarly, when it came to the LFD there was a checking process to make sure that they were good enough, but they were all for professional use; this was seen as a limitation

so, we pushed forwards building the evidence base to show that people could effectively take the sample and do it themselves. Ultimately [we] showed that people were as good at doing it. I think that that led to a very different approach [with] people being able to do the testing [themselves] [CA].

It is important to stress that LFDs were not accredited for self-use at the outset. The central agency carried out 'some of the work used for the application for an EUA [exceptional use authorisation] to get kits approved for use in that way for the first LFDs that could be self-use. Even with that in place there were stock challenges' which required assisted LFDs to be used in some cases [CA].

Purpose of testing

The purpose of testing varied over time, with 'different testing at different times for different purposes'. Very early on in 2020, it was the 'key workers testing programme' which was mainly about ensuring that symptomatic key worker could go into work once they had tested negative. The purpose at this point was to 'minimise the impact of the self-isolation' [CA].

Later on, with the advent of lateral flow testing (LFT) (using lateral flow devices (LFDs)) the purpose became 'how do we stop community transmission and less about ensuring keyworker capability'. To drive down the spread of COVID-19 in the community, there 'was a point at which the modelling work suggested [testing] twice a week' was needed. However, 'most people ... moved to testing, as they felt that they were at risk'. The government then moved to that formally. The innovation was notable:

There was an awful lot of novel innovation on how you would use testing to achieve different purposes. I still feel that we're in a situation where we are learning how to use this new capability because five years ago, we couldn't do anything on this scale [CA].

Testing process and research

At a national level, consideration was given to the testing process. In particular, it was thought that saliva testing, perhaps through LAMP or PCR, could facilitate the testing process and improve individuals' quality of life. However, it was found that in care homes many people were unable to spit because of the medication they were on. Much work with the testing process was carried out to try and make it easier, better and more accessible, including for people who are blind and partially sighted. The central agency also compared swabbing – nose-only versus nose-and-throat – finding that there was a difference in PCR testing and with nose-and-throat swabbing being preferable. Building that evidence base was felt to be very important, although it was felt that the agency was

not always 'as good at explaining' the significance of some of the research findings as those involved were working under such pressure.

Other research had a significant impact on the isolation strategy, with the interviewee being particularly proud of one study on daily contact testing, the results of which allowed for contacts not to isolate if they tested negative using an LFD.

Implementation of testing

At a local level there were various challenges at different points in the pandemic. Early on, the lack of testing was an issue: the 'biggest challenge was the lack of scale testing availability' [LA B]. It was not possible to test people early on in the pandemic to find out if someone had COVID unless they were sick enough to go to hospital. It took a while to get a test developed that could be used widely enough and was accessible to the general public: 'So it probably meant that for a significant period of time transmission was occurring in people who [did not know] they were infected, or before they developed significant symptoms, which aided the spread of the initial cases'. The period of having no testing was very challenging [LA B].

Several themes were identified in the analysis: data, access and delays; asymptomatic testing; test to release; digital exclusion and hard to reach groups; testing and care homes; LFTs and schools; and logistical and funding issues.

Data, access and delays

During the early period there was a lack of data about the characteristics of those who had died of COVID. In one local authority the DPH heard about excess deaths from the local registrar, but there was no information on ethnicity. The DPH also started talking to local clinicians and subsequently the local authority put together data before there was mainstream collection of data on ethnicity. Eventually 'excellent data showed that you had a much higher risk of being very ill and dying if you were from certain ethnic groups for example and you are also much less likely to get vaccinated' [LA B].

Once testing was underway, there was a challenging period at the outset for local authorities as DsPH could not access data regarding cases 'which was just so unhelpful when we were trying to respond as local areas' [LA C]. Eventually, however, local authorities were able to access the data (see also Section 4.2).

The testing labs were felt to be good and in general were quick to respond. However, whilst the local labs in local hospitals were reported to be good, there were concerns regarding delayed responses from some of the national and commercial labs [LA F].

Regional and local testing sites

PCR testing in England initially focused on large, drive-in regional sites run by NHS Test and Trace (see section 4.2). These varied between areas and included test sites at hospitals, at airports, in the centre of towns.

The time scales to stand up testing were extremely challenging... [as was] the prescribed nature of the infrastructure required to deliver them. You had to have certain size rooms, entry, exit points. Some of that was very, very prescriptive and quite difficult to achieve. We had a really tight specification and because of that it was very difficult to find appropriate sites. Some of it was good infection control principles. Some of it was based on the hypothetical risk of transmission. Practically, to execute it in the way that we had to it was very difficult [LA B].

Access to testing was a recurring theme in the interviews. The regional test sites often required transport to access them. As a result, in some local authority areas where many people did not drive, accessibility was a challenge. However, over time these problems were resolved as local testing sites were developed:

We wanted to make sure the sites that we had were as accessible as possible, particularly ...because of low car ownership...and that sites were accessible to people from Black and minority ethnic groups and on low incomes...The key thing for us was to try and make sure our local test sites were within a 20 minute walk, because ... there wasn't always public transport [LA C].

In part of one local authority, there was a large, mainly Pakistani, Muslim community, so the council was 'very keen to get a site there'. Prior to this there had been a big regional testing centre, but the interviewee noted that 'we knew from previous experience, those kind of health initiatives didn't often reach people in in these communities' [LA D]. In another area: 'We stood up testing infrastructure in areas to make sure that we could capture those populations that did not drive... in the end we had three testing sites in the borough, and one outside the borough, in town halls, parks and places that the general public could access quite easily' [LA B].

This was felt to have worked reasonably well:²

There was quite a bit of back and forth about the value of walk in no appointment versus appointments online. We know we've got populations that are digitally excluded, that for whatever reason didn't want to, or struggled to register [their test results] so we had a period where you could walk into the testing centres. But at very busy times, some of that access was reduced...It was pretty hard to manage the ebb and flow of demand, because it went up and down at ... different stages of the pandemic [LA B].

Asymptomatic testing

When lateral flow testing first became available it was rolled out as an asymptomatic screening test for people with no symptoms. One DPH argued that as this was clinical diagnostic test, it could have been used for people with symptoms very effectively to confirm a diagnosis, acknowledging that it was 'probably a little bit less effective at excluding a diagnosis particularly early on' [LA B]. In one local authority the local university was 'a bit frustrated that they were advised against using [lateral flow testing] by public health as initially they did not think the science supported this use'. Subsequently, lateral flow testing 'was widely implemented and [the authority] ended up using the university testing site for the community too' [LA E].

LFTs were originally – in the pre-vaccination phase – targeted on specific groups who were still needing to leave home to work. This included, for example, people working where their business did not get access to tests from the government, informal careers and voluntary sector organisations where volunteers were visiting people who were isolating (see Section 4.3). Construction firms also asked their workers to get tested before going to work as they were finding that if 'one person had COVID...it knocked the whole team out' [LA B].

By the end of 2020, there was widespread, accessible, lateral flow testing for the general public, with a switch from a model whereby individuals had their tests supervised, to a system where people

² One interviewee noted that they got 'quite a bit of push-back from residents in some areas because they weren't that happy about having Covid testing on their doorstep and at that point people could only test if they had symptoms'.

came to collect tests and take them away. One interviewee argued that this should have been carried out at the beginning as 'clinical staff [were] allowed to [test] themselves but the general public weren't. The rationale at the time was that clinical staff would be better at it. But the reality was even where people were doing PCR tests, they were doing their own swabs...In this country all swabs, pretty much, were self-taken unless somebody was incapacitated and unable to test themselves' [LA B].

To assist with the testing process In the case of surge testing for new variants, the military was, on occasion, involved with testing. This happened under Operation Eagle³ in early 2021 following an outbreak. One interviewee noted that this needed to be very well managed: 'We said, we don't want any uniforms worn or it would do more harm than good' [LA C]. In another case the local authority called in the army noting that a neighbouring area had had an outbreak first: 'I think that the Department of Health and Social Care...persuaded the army to go in'. The interviewee noted that they were 'behind [the neighbouring LA] so I went ... to [the base] to talk to the army and the people there. I said, this is the initiative we need to follow. The request was signed off by [the Minister for Defence] within 12 hours and the army were in the local authority within 24 hours' [LA A].

Test to release

The test to release phase was viewed differently in different areas. This programme was designed to enable people to return to work who had been identified as contacts of people who had tested positive. One local authority was involved in one of the pilots involving the fire service in the area: 'We were all desperate for it. We needed to get people back into [work]' [LA E].

In another local area there were difficulties with test to release, as there 'seemed to be a real breakdown between the national team and delivery' [LA F]. In this case, a number of mostly food related businesses in the area believed that they were on the programme and were running the business as if they were. If an employee was identified as a contact, that person went into this regime where they would test, using an LFD [LA F]. In the case of some companies, the registering process had not worked: in short, the national test and trace service (NHST&T) rang the employee to say they were a contact of somebody who had tested positive, and that they needed to stay off work. In this case, the DPH checked the national database of the companies that were registered and the companies that believed they were part of the scheme did not appear; this caused confusion and additional work to confirm that they were in the scheme [LA F].

Digital exclusion and 'hard to reach' groups

A major challenge with the testing infrastructure, which relied on the use of the internet or a smart phone, was registering tests and results online for people who were digitally excluded.⁴ As one interviewee noted: 'If you weren't digitally competent to do things like scan a QR Code and add to your details multiple times that was quite difficult. We have people who didn't have an email address or a mobile phone, so they had no means of receiving a result. The whole infrastructure was set up for a result by mobile or email' [LA B]. As one interviewee noted:

If people don't have a smartphone or don't have Internet, [they] don't have access to these sorts of facilities. The central government is very good assuming everybody's got access to a smartphone. Amongst some communities in some deprived areas, people do not have

³ Operation Eagle, set up in early 2021, was the national framework for overseeing and responding to variants of concern (VOCs). Areas were asked to carry out surge testing (using PCR tests that were sent to specific laboratories for genomic sequencing) to identify other VOC cases and to carry out enhanced contact tracing.

⁴ It should be noted that the central agency set up a non-digital process whereby people could call for their results.

access to these facilities...Quite a few elderly people weren't confident [and] lots of people around here don't have the Internet or smartphones, so they were unable to register test results. The testing sites provided a capability to ... elderly people who wanted to ... test [LA A].

Testing within certain Black and minority ethnic groups was much lower. It was lower within certain occupational groups. It was lower within certain postcodes for us in the borough. And often they were the exact areas you wanted to reach [LA B].

In one area, as part of surge testing for new variants (Operation Eagle), the local authority:

set up trusted networks and established sounding boards. There were different sounding boards: Bangladeshi, Pakistani, Black African, disabled people. Trusted organisations came together with the public health team to test out ideas and to get feedback. These sounding boards really helped us build that trust and actually we got 5,000 people to come forward for testing. Testing centres were set up in mosques, the Hindu temple and other trusted places [LA C].

In another area there were also 'a lot of hard to reach communities who would not come to a testing site, so a mobile testing van went to community groups. When asymptomatic testing at home started the council gave out boxes of tests on the van and engaged with people'. Employing workers who could speak relevant languages also facilitated testing: 'We were lucky in that a lot of our team we got from an agency, and it just happened that we got people who could speak Arabic, Chinese, and Eastern European languages. It meant we could go into certain communities' [LA D].

In parts of one area, there were many people on zero-hours contracts, and people were 'reluctant to test because of that they couldn't afford to be out to work. They couldn't afford to get positive tests so they wouldn't test because they knew that if they were found to be positive, they would be told that they should isolate'. The local authority 'set up quite a large community championship network. We got volunteers working with us from the different communities. The Director of Public Health would brief them on a weekly or fortnightly basis, on what was happening' [LA A].

One issue arose when there was engagement with hard to reach communities: 'You're not going to give out as many tests or do as many tests as if you're just a general test site for the public'. This posed problems as far as the monitoring of the scheme was concerned: 'Monitoring the scheme by how many tests had been given out was an issue'. As the interviewee noted 'we're giving them out to groups that we have to spend time talking to. And...depending on what the community was ... there might be a lot of disinformation on WhatsApp' [LA D].

Testing and care homes

Early on in the pandemic one major issue was to do with the discharge of patients from hospitals. In one local authority, testing prior to discharge to care homes started in March 2020; the decision to undertake testing was a 'challenging decision' taken in advance of the national policy and facilitated by 'a really strong partnership with our acute hospital trust'. The interviewee noted that this was 'one positive thing ... we did ... we're really pleased we did [this]' [LA C].

By way of contrast, in another authority, it was noted that the 'regime of routine testing and care homes 'was a little bit chaotic to start with'. The interviewee noted:

There was a lot of onus put on care providers to...test, send-off packages and get their returns. But it didn't always work well. There was...a lack of understanding...of the pressure that care providers were under at the time with...caring for people and also the reduction in

staff because of isolation. Those involved with testing were not used to using computers or databases and the testing itself was time consuming. There was an expectation [nationally] that you could do your testing and package everything off, and that would be that. It could be a whole day's job to test followed by chasing up test results [LA F].

It was also noted that there were difficulties performing tests on care home residents with learning disabilities, and with dementia. 'On one occasion the team went out to test and they left without completing the test, because, in order to do so, the individual would have to have been restrained, which the nursing team felt to be unethical' [LA F].

LFTs and schools

LFTs played a very important role in enabling schools to reopen in January 2021, with the roll out happening over the Christmas holidays. Schools were required by government to carry out testing prior to schools opening in January 2021. 'That put immense pressure on the school system. Really practical stuff like who was going to do it, the space to do it, and therefore taking away from lessons. Schools were getting guidance but in [this LA] we did make the decision in December 2020 [that we would] provide testing on behalf of schools. That was against national policy [LA E].

In one area although secondary schools were fairly self-sufficient and getting test kits through the DfE, primary schools were the big issue:

Even though the teachers were testing, children under 11 were not, and because primary schools are smaller [and located in their] local community, the first indication we were getting outbreaks in the community was through the primary schools, usually through the headteacher... When we reached the threshold for an outbreak, we would send the team with the [mobile testing] van and lateral flow tests to the schools in the afternoon [and] hand out test kits to parents with the teacher and their WhatsApp groups...explaining [it] to the community [LA A].

In another local authority, LFTs were reported to have been broadly welcomed and opened up schools. 'The testing in schools went well, with testing days and showing people how to carry out the tests. It was the results of the tests coming back that they had real issues with...On Sunday night we knew we were going to be calls from headteachers who were getting ready for Monday morning and checking through the notes and [asking] how they had to proceed' [LA F].

Logistical and funding issues

Early on, there were logistical issues with procurement. For testing sites, the government brought in private contractors to supply tables, chairs, testing booths. In one local authority there were problems accessing test tube holders. 'The whole thing around procurement and being able to get hold of the right kind of equipment [was problematic]. We were told by the government 'You can either use our supplier or you have to prove that you've used best value for money'. You've got to prove that you've been out to tender, or that you've had a tender already in place''. The interviewee noted that this was not feasible so they had to 'go through the government suppliers. To go through normal tendering process 'would have been really time consuming' [LA D].

The same interviewee also noted that if there was a 'large outbreak we could get additional tests in mobile testing units. It was brilliant to have that resource and be able to draw that down when we needed it. But it wasn't always easy to request it – sometimes the process was more complicated than it needed to be', which was 'quite frustrating, not the people the system...various processes had to be gone through before [a request] would be approved'.

In one local area, there was an outbreak in a prison. The local authority made the decision to test from a public health point of view, but the authority had to fund the testing: 'We shouldn't have had to pay. We ended up paying. We commissioned an external provider to come and do the testing to prevent onward transmission within the prison. We made the right public health decision...but there was a no clarity on the funding stream, there was no formal policy' [LA C].

An outbreak at a university in autumn 2020 also posed challenges. In this case the Chief Executive took the decision to carry out mass testing of student halls of residence following a proposal from the public health team. 'Everyone rallied around to try and get us the resource for the mobile testing so that we could test. We found 800 positive cases' [LA C].

Whilst most testing in England was provided free of charge, some people went elsewhere and paid for tests, seeking 'to evade the necessity to have to register a test or a result. If it went through the NHS system that would be centrally recorded...and they would be contacted' [LA B]. Another difficulty was that once travel restrictions were lifted people had to pay to get tested to travel; this not only created confusion but 'created an issue for large families, particularly where they might have five people that needed testing' [LA B]. This had an impact as some people who returned from travel, who were meant to test but did not – because there was no follow up – and subsequently infected others.

Interviewees noted that much testing never got recorded because people did not register the test results: 'Finding a much more effective way to register results to people would have given us a better idea of what was happening...A huge number of positive results...weren't recorded and particularly lateral flow positive results.' [LA B]. Nevertheless, even though results were not always recorded, another interviewee noted: 'much as I hate to say it, I think it is probably more important that people do what we advised rather than register the results' [CA].

4.2 Contact tracing

The following sections focus on the early stages of the pandemic and the launch of NHS Test and Trace (NHST&T); NHST&T and local contact tracing; decentralising contact tracing; data and data sharing; outbreaks and contact tracing; vulnerable communities; schools and businesses and contact tracing; and the NHS COVID-19 App.

Early stages and the launch of NHST&T

NHST&T was launched on 28 May 2020. It worked with Public Health England (PHE) and various organisations, academic and commercial, to provide a range of services including tracing services. It was separate from the DHSC and PHE (House of Commons (HC) Committee of Public Accounts, 2021). National contact tracing, once fully established, was carried out at a central level.

At the very beginning of the outbreak, prior to the launch of NHST&T, one interviewee noted that they did 'know about one isolated case in the February [2020] before things kicked off. 'We knew they were isolating. Responsibility then shifted to the central level, which was 'particularly frustrating' as there had been an outbreak of measles in the area in autumn 2019 'in our community of adults with learning disabilities. We had been doing tracing... [although] it wasn't to the scale of COVID by any means' [LA E]. At the central level, contact tracing sat with Public Health England (PHE). One interviewee noted that the local authority got a 'report back on how many people being contact traced'. It was also clear 'quite early on that [PHE] wouldn't have the capacity to do all the contact racing...We did hold a particular view, [that] we could do some of this better locally, because we understood our populations better' [LA B].

Subsequently, the decision was made to procure a national contact tracing service. The national contact tracing system was centralised outside of PHE and ran as a separate system, part of NHS Test and Trace (NHST&T). NHST&T did not work with local authorities at the outset. For one interviewee this 'created a few challenges in terms of how we interacted with it and how much we knew and how much data we had' [LA B]. There was not a great deal of contact between the national service and the local authority. There were weekly meetings with PHE: 'they told us what's going on at a regional level and if there were particular outbreaks or situations. If there was a breakout in a care home, they would call up, and we would then work out how to manage that' [LA B].

It took 'many months of quite fierce lobbying to get any meaningful contact and especially resourcing to supplement the NHST&T effort' even though DPDs knew that they 'would be able to get better, quicker reach' [LA D]. However, it was not until the summer of 2020 that policy shifted (see Annex C).⁵ In June 2020, the government allocated £300 million to local authorities in England to develop local outbreak management plans to implement measures to identify and contain outbreaks. This funding was initially under the Test and Trace Support Service Grant, subsequently renamed the Contain Outbreak Management Fund (COMF) and was for 'test, trace and contain activity' (DHSC, 2022, p. 3).

NHS Test and Trace and local contact tracing

If NHS Test and Trace (NHST&T) were not able to reach people, information was passed to local authorities. In short, the local authority took on cases that the national tracing system could not contact. These were clearly the difficult cases already. Local contact tracing teams had the names of individuals who had been contacted by NHST&T and how many individuals were recognised as contacts of that person. Local authorities were able to cross reference to those contacts to see whether they had tested positive as well.

Local authorities used their own local telephone numbers for dialling out. As one interviewee noted:

People could ring us back which you couldn't do in national contact tracing. So, if you missed a national contact tracing call...you have to wait for a time it's convenient for them to ring you, not the other way around. We'd say, 'Ring us back on this number, we're your local team, we're here to help. Give us a call. And we also had mobile phone numbers. People could text message if they didn't want to speak to anyone. The mobile number actually came out from the disabled people 'sounding board' when they were saying for deaf people 'we want text'...but actually lots of young people prefer to text. [They] don't want to speak to a human being, they want to text and just get it over with. That's an option that we had [LA C].

The importance of 'local knowledge' and 'local understanding' was highlighted, as was being able to 'support people if they're poorly, like knowing about out-of-hours medical care. We tried [calling] at different times. We knew that if it was a parent with young children, don't ring them first thing in the morning [or] at teatime' [LA C].

In this local authority, the interviewee described the case of an 89-year-old man on his own, with COVID who the national system had not managed to reach for three days. For the local authority, this was 'top priority'. They managed to track him on an alternative number from his GP. They contacted him, and found he was on his own, with a 16-year-old granddaughter looking after him.

⁵ The Department of Health and Social Care 'acknowledged that it had not always got the balance between local and national delivery right' (HC Committee of Public Accounts, 2021, p.19).

The mother was ill in hospital with COVID. The family situation meant that the family did not have food, so the local authority sorted out food and his medication from the doctor; they contacted his daughter in hospital and said, 'your dad and your daughter are safe'. The interviewee noted: 'We were able to do a lot better than the national team' [LA C].

In another local authority, it was noted that the 'central tracing element, didn't really work. It's again down to sort of the communities around here. It needed that local contact tracing to be done...Part of that was because they [NHST&T] were using remote teams who didn't understand the community they were running, ringing from 0300 number that people [won't answer]'. Instead, a local number was used. Councils would call about contact tracing and also say 'Is there anything help we can help you with? We can organise food parcels'. The interviewee added: 'the tracing element...should have been put out to local authorities a lot earlier and the funding taken away from the central side and put it into the local authority' [LA A].

Decentralising contact tracing

In a number of areas, local authorities eventually took on all the contact tracing. In these cases, an individual who had been identified as a contact would get an initial message from NHST&T and be given a few hours in which to respond. If the individual did not respond the local authority would be notified, and all his or her information went directly to the authority; at that point, the local authority took over.

One interviewee noted that 'we knew a number of our residents were struggling to self-isolate (see Section 4.3), and we felt that if we had that open conversation, we could offer the support at the point of which we would notify them with their infection. They could get help to get their shopping or whatever support they needed'. The importance of recruiting staff who could communicate with the local population was stressed:

We recruited staff with languages from our local community. It was a really helpful early warning system, so we became aware of outbreaks really early on, because would get a call from a care home or a worker in a care home. And then we could immediately – rather than waiting for it to go up through the national team, [and] come back to us – get notified. It took sometimes two or three days out of that process. Because the contact tracers would just phone, they would be on it straight away. It made our response much, much quicker and hopefully prevented further cases [LA B].

Contact tracing 'definitely worked better at a local level. But it was resource intensive, and you get to a point with contact tracing where you've got so many cases its utility is limited in value. We got there pretty quickly' [LA B].

One local authority asked for all contact tracing to be carried out locally following Operation Eagle. The request was agreed by central government: 'I think we were one of the first areas that was allowed to do that, and it was 'really, really successful... we had such a high success rate of making contact with people'. The interviewee went on to say:

what we were able to do with our local contact tracing which the national service [NHS Test and Trace] couldn't do was talk to whole households in one go – not having separate phone calls for each individual person who tested positive. We could talk to them and say, 'Is there anyone else in your household? What support do you need [to isolate]? Do you need halal food?' [LA C].

The interviewee added:

we had our own number for our local team, with nurses in the team. When people picked up the phone we said, 'we're public health nurses from [the city]' and that made all the difference: 'We need to support you. We know that you've tested positive for COVID. We're here to see what support we can offer'. And we always started the conversation with, 'How are you feeling'...which...was not even part of the [national] script [LA C].

Data and data sharing

The Contact Tracing and Advisory Service (CTAS) database, held by NHS Test and Trace, was created by NHST&T to record information about people who had been in contact with someone who had tested positive for COVID-19. Initially there were issues with CTAS as it was not possible to access the database until training had been provided. One interviewee commented that they did however, at this point, 'have regional Public Health England colleagues, who were also monitoring, and had access to wider data sets than we had at a very local level, and they could then pinpoint if there was an outbreak' [LA B].

Separately from CTAS, local authorities set up their own systems. 'CTAS wasn't helpful for linking families together...it was good for individuals, but not for people and places' [LA B]. Local data were used to increase the contact rate:

We'd be able to contact the [people] that they [NHST&T] were unable to contact because we'd use things like our council tax system to get phone numbers for people. We used the government's text messaging function. We sent text messages to everybody who tested positive and everybody who was a contact and told them they were going to receive a phone call, and that this was the support that they were entitled to [LA D].

Whilst local authorities were carrying out contact tracing, they populated the National CTAS system. One interviewee noted:

We did find that, using a bit of data matching, looking at our own records, we could usually increase the success rate in terms of our data and in terms of our contact tracing outcome. More importantly, we could link people to local support services which was probably the real benefit of [contact tracing at a] local level [LA B].

One thing that worked really well for us was collecting data locally. We wouldn't have got that same level of data if we'd just used the national system because...it didn't have the relevant data on it. When somebody tested positive, we would get that as quickly as we possibly could, put it into our own data capture template, carry out contact tracing, ask lots of information and interrogate our other internal systems such as council tax databases [LA D].

More generally, data sharing was facilitated in one local area by:

a cross-organisation group, which involved teaching hospitals, public health officials and data scientists from public health for the city. They held weekly meetings, shared updates, talked about difficulties. Data scientists would get all of the data that we were feeding into the system. We talked about the local picture in really granular detail [LA D].

Outbreaks and contact tracing

When there were massive surges the national NHST&T was not able to reach people and cases because there were too many: 'we had 2,000 cases come through one day. The big fault in the national system was when it couldn't cope, everything came to the local [level]. But there was no extra money, no extra resources' [LA C].

In these circumstances, the local authority had to use its 'knowledge and intelligence team locally'. It decided that with a list of 2,000 there was a need to prioritise, and so they looked at the areas of highest deprivation. They looked at people's age and prioritised from the list: 'We did that rather than the order coming in, which the national team would follow. That was using our local knowledge and intelligence to do the best we could in a really stressful situation'. As the numbers got bigger, the authority did not engage in the same way with individuals because 'too many who tested positive didn't actually respond...the priority then became the setting. If we had a school or a prison, then we would work with them'. The interviewee noted that with small numbers 'contact tracing can be highly effective and really work, and you can control an outbreak. By the time you're in thousands its utility is somewhat limited' [LA C].

Vulnerable communities

In order to engage with vulnerable communities, different approaches were used. In some cases, community teams included multilingual speakers from those communities where the local authority was 'struggling to making roads into...very often [people] working in insecure [jobs] in the food industries that we also had concerns about...being picked up by bus [50 miles away] to work in a production factory and driven home in the evening' [LA F]. The community teams who carried out the door knocking and contact tracing, comprised existing staff, and others were also recruited including Roma speaking people. The contact tracing team were 'not just asking people to remain at home and not go out, where have they been, and who have they been in contact with, but also asking how they were, did they need any support, have you got enough money, can you get your food?' [LA F]. Likewise, in another local authority it was noted that 'we could offer the financial incentive to isolate as part of the initial call [LA D].

Schools and businesses and contact tracing

Work with schools was seen as being successful. One interviewee noted that 'one of the things we're really proud of is the way that we worked really closely with our schools and our education team in the council.' The council worked with schools, early years settings and universities with managing outbreaks (see Section 4.1) but also 'supporting them on how they do contact tracing...who would be needing to isolate. We built up fantastic relationships' [LA C].

Turning to businesses, in a number of local areas, interviewees reported on the close working relationship between the authority's environmental health team, and compliance and enforcement. The local environmental health team would go and visit businesses, talk to management and explain 'all the extra things we can put in place and provide' [LA C]. One interviewee noted that 'we've got big factories and big workplaces where we did have outbreaks, and ... we had to approach them [to find] the reasons for the outbreaks, and where the source was. We could identify in some of them, and but not all of them'. In the case of one large factory with many people on zero-hours contracts, the factory 'actually had robots walking round saying, 'Keep your distance'' [LA F]. Companies were reported to be responsive when they were advised on what they needed to do.

The importance of partnership working was also stressed: 'Our environmental colleagues have built up relationships with the hospitality sector over the years; they knew almost instinctively [that they were] going to have a few challenges [in some businesses] before they went in, because of their previous history or issues' [LA C].

NHS COVID-19 App

Initially, many people downloaded the NHS COVID-19 App. As one interviewee noted: 'There was general feeling that the App was a useful thing'. However, when people started getting notified that they were contacts by the App

they all turned it off, deleted it, and stopped it. It stopped being a useful thing. My view is that it hadn't factored the human behaviour elements...this is a theory that one of the reasons that the Delta wave burnt out quite quickly was that so many people got pinged. People became very aware, very quickly that there was a big problem, and they changed their behaviour as a result. It might not have quite delivered the outcome in the way people expected, but it made the outcome right [LA B].

4.3 Isolation

Local authorities were sent information regarding individuals who, for health or other reasons, were isolating or shielding during the pandemic. There were some challenges with the lists coming from the government, knowing how they were shared, having to clean up the data, and concerns about the reliability of the information, with some being wrong or there being duplications. Volunteers and community groups provided support for those who were isolating. One interviewee commented that the council did 'quite well from a practical perspective' with food support, medication collection and dog walking [LA D]. In another area, it was reported that community organisations 'provided food for people, dropping things off at people's doors, and the council provided nappies and things for babies...we managed to support people to get medication because you can't order paracetamol' [LA C].

In areas where there were communities whose first language was not English the council's existing translation and interpretation services played an important role: '[central government] guidance was changing and the impact of the wrong communication about isolation requirements...seemed risky and so we didn't want to have conversations with people if we weren't speaking in their first language [LA D].

Initially, there was no financial support for those who were not able to work from home, although as one interviewee noted, this did come on board 'reasonably quickly'. 'We did get money from government to be able to give payments if people...had to isolate and therefore couldn't be at work and also people who were on zero-hours contracts and needed to supplement their income' [LA E].

However, the amount was not felt to be sufficient for many households, and some local councils put in additional support for self-isolation for particular groups of people who could not work from home. The groups varied. In one area the groups included 'care staff, people who worked in the gig economy and taxi drivers'. There was also additional support designed to help in those cases where COVID went through a family 'so you can end up with five or six weeks when no one can leave the house because of the way people were subsequently infected'. To manage some of that pressure the council 'put in wraparound support, which included some financial assistance, but also practical support' [LA B].

Self-isolation was noted to be easier during lockdowns:

Once we were out of lockdown it got really difficult, and the compliance dropped quite significantly. The reduction in the isolation time from 14 to 10 days was helpful and the government also started allowing people to carry out LFTs to release themselves from isolation. It got very messy around the point, not least because [the guidance] seemed to change every week [LA B].

Accommodation was another issue that was raised. In one local authority there were people with COVID in hostels, homeless people in hospitals and people in asylum seeker accommodation 'those sorts of settings where self-isolation means being in a room...three metres by three metres for two weeks. That's just frankly inhumane and we had families in that situation. You could have two

parents and three children, and they were not allowed to leave the room'. The ability to manage such situations and rehouse people to try and find more suitable accommodation was reported to be 'very challenging, because ...people don't really want to house people with COVID' [LA B].

4.4 Communication

A further theme identified in the interviews which cross-cut test, trace and isolate strategies was that of communication from central government and at a local level.

Communications from central government

The issue of communications with central government was raised by interviewees, as revealed by the following quotes:

The detail of that guidance was very helpful for people to understand what they had to do, and it made it quite clear....There were elements of guidance that were a little bit challenging [for example] when we had different areas in different tiers of lockdown where you had some boroughs being told that their children would be returning to school, and other boroughs being told that their children wouldn't be returning until somebody realised that was a terrible idea, and they moved on from it [LA B].

The testing guidance was relatively clear and straightforward. The bit ...where people were not clear was where they should resume testing when they tested positive, particularly using LFDs [LA B].

There was messaging coming from central government that was good, but a lot of it kept changing, confusing people...it was all reliant on people [having] smartphones or iPads or the Internet and [where] English is the first language [LA A].

The timeliness of announcements was an issue that interviewees identified as being problematic:

Often you would hear stuff on Twitter, or on the news before you'd got the press release from the government about it...I don't think it was colleagues in UKHSA, it was...the politicians. It felt like they were making stuff up...on the hoof [LA D].

Another noted that 'Boris Johnson [the Prime Minister] would stand a podium at 5 o'clock at night announcing something that we had to implement the next day... we didn't have enough time to be able to implement things as we'd want to... [it would have been good] if we'd have had a bit more of a heads up' [LA C].

A further cause for confusion arose with surge testing for variants of concern (VOCs) and the instructions given to those being tested. 'The kits had to be returned to the mobile test unit, not posted, but the labelling on the PCR kits said 'put it in the priority post boxes'. This was problematic, as for surge testing the tests should have gone to a separate lab for [genomic] testing [LA A].

Communication at a local level and diversity

Languages, community

Communication at a local level was not always straightforward: 'One of the problems was that all the guidance was in English. This meant that information could be shared in English quickly, but then it had to be translated. That made sense for those communities that needed it, but it caused delays' [LA D].

Another interviewee noted that local authorities had to set up a 'a whole great big comms [communications] in different languages and 'easy read', because the national comms were not fit for purpose for our local communities, and that goes throughout test, trace, isolate' [LA C].

In a similar vein, another interviewee noted: 'We've got a large Pakistani community, a large Indian community, quite a large Eastern European community, and then a British white community, so quite diverse, different cultures. The public health team went in with the Imams to local community centres. They addressed each community and there were different requirements in each [LA A].

There could also be a mismatch between what was happening at a local level and the mainstream media coverage. In one case the local authority 'had developed comms packages. They would send out 800 messages a day to people who had been in contact with somebody...and give them a direct link to all of the support that was available. But the mainstream media message was saying that transmission isn't happening. People on the ground [anecdotally] all said, 'The schools are absolutely full of it'. You end up thinking 'what's happening here with the messaging?'" [LA D].

Digital exclusion was also highlighted: 'The switch to digital, the assumption that everyone's got a mobile phone or an iPad. We haven't got that and even if people have got equipment, we've got households who haven't got wi-fi, they can't afford it. Digital poverty is a real thing for us in [this authority]' [LA C].

Behavioural insights

The importance of behavioural insights was mentioned by interviewees:

It's really having good behavioural insights into the impact of your messaging on families. The interpretation of 'household' culturally for many people was family, but family lived across more than one household. Because of the way they interpreted the message they thought it was fine to get five households together, because they were all the same family [LA B].

The need for community empowerment was felt to be important: 'We've got to give people the tools to do some stuff for themselves'. It was noted that the public and community had been ahead of where the public policy was at particular points when people limited socialising in advance of a lockdown being imposed [LA E].

4.5 Pandemic preparedness and planning

Interviewees were asked which measures should be taken by government to prepare the TTIS system for future pandemics. A strong theme to emerge was that of planning and business continuity, as exemplified by the comments below:

The original pandemic plan...imagines you to be a single isolated borough of pandemic. It fails to realise that everybody will be fighting for the same resource at the same time...The critical thing is that you do need a degree of centralisation, where you'll be competing for resource, but what you need to do is localise the response on the ground for your population [LA B].

There has to be ongoing planning, proper business continuity, contingency plans. Though the system is a bit more robust, so we wouldn't start from scratch, [I do feel it] would struggle again. I don't think we've got a fully resilient national system. I think we pulled back too much [in March 2022]. We are not as prepared as we should be, even if something happened again. There's no contingency plan published yet [LA C].

The importance of planning at different levels of government was mentioned: where responsibility should lie, at central, regional or local level, and how health services and local government should work together [LA B]. The importance of the regional level was also noted: 'You need some regional

infrastructure to work with the (central) powers' [LA E]. At the local level, the importance of understanding the community was raised:

Planning ... understanding the languages you need. All that...is part of your preparedness. Understanding who your vulnerable community is, for what, and for what risk [LA B].

Associated with this is the issue of communication:

Direction from central government comes at the national level, but then using local communications reinforces those messages, and [they can be] tweeted to the local community [LA A].

The need for data to be accessible was stressed:

Having a way of understanding how you access that data really quickly, what your flags are in your systems, and how you share [that information] with other agencies. So particular vulnerabilities can be identified, and particularly you need to know who will be digitally excluded [LA B].

The need for a dedicated funding stream was also stressed during the interviews (see above). The dependence on central government for funding during the pandemic meant that local authorities were limited in terms of what they were able to do [LA D].

In order to retain an institutional memory, one interviewee noted: '[The government] should probably have a ready to go toolkit...on a practical level...These are the processes that we created, and we've gone through...a lessons learned activity [LA D].

One interviewee raised a significant concern regarding the loss of expertise at the central level, where staff contracts had ended with the change of government strategy in March 2022 (see Annex C), noting that 'all that knowledge is disappearing, so come the next crisis...quite a bit of [the expertise] is going to be our local level' [LA A]. And at a local level there was a concern about the limited workforce and a 'workforce challenge if we have to mobilise' [LA C]. Finally, one interviewee noted that 'we have underestimated the impact of fatigue and...you also need to know how to move to steady state' [LA E].

4.6 Learning for public health

National, regional and local levels

At a central level, a number of issues were raised. One was that 'a lot of the decision making around the pandemic was made due to modelling' because of the counterfactual and the difficulty of running an RCT. Although the interviewee did not feel that it was wrong to make decisions on this basis, 'what we didn't necessarily do was say what the assumptions are behind that modelling and then evaluate if they were working in the way we expected in the real world. That was a challenge'.

It was also noted that quite often at a local level:

The focus was on the aim and not necessarily on the outcome. The [public health] teams weren't as focused on what the public health outcome was. They were more focused on what they've been told to do and delivering that infrastructure. There was probably a missed opportunity in being more joined up, [and using] the evidence better [CA].

At a local level, the key themes to emerge regarding learning for public health were first, national and regional partnership, second, leadership and partnership at a local level, and third, the relationship between central and local government and their respective responsibilities.

National and regional partnership

It is important to stress that during the pandemic the national public health agency, PHE was replaced with the UKHSA (see Annex C). This wisdom of dismantling PHE during a PH emergency was questioned by many (e.g., Murray, 2020). As noted by one participant 'to the credit of PHE now UKHSA they swivelled and kept on doing what they did despite [this decision]. But this led to massive disjoints in the public health system and the rest of the machine in government' [LA D].

Interviewees commented on the positive relations between central government and the key central agencies, PHE and UKHSA:

We've had brilliant relationships with our PHE and UKHSA colleagues throughout the pandemic and there's also been representatives from DHSC [LA C].

We had a very good working relationship between PHE and local government public health teams [for testing], but the contact tracing was all centralised outside of PHE [LA B].

The development of a regional structure was welcomed. Initially there was no regional infrastructure with liaison being through the Department of Health and Social Care. However, a regional infrastructure was subsequently set up following input from senior local government officers assisting the DHSC [LA E]. In short, in June 2020, regional teams were set up by the government to help with the management of outbreaks at a local, cross-boundary and national level. The aim was for them to 'act as a link between local and national government to escalate critical issues, feedback, share learning and provide local outbreak readiness assurance' (LGA, 2020, np).⁶ As part of this development each region had a 'regional convenor' who was an experienced senior leader from within local government' (LGA, 2020). The value of partnerships regionally was welcomed. 'The two-way flow of information was so useful, so you know what decisions are being made which enables us to support them at a local level and equally enables us to say actually that's not what's happening at a local level ... It's not just command and control' [LA B]. The role of the regional convenor was also welcomed: 'this was a critical role and for us worked pretty well' [LA D].

Another interviewee commented on the regional 'weekly conferences with the local councils where we could feedback to each other' [LA A]. The fact that this communication was ongoing was valued: 'The ability to continue to talk to each other frequently is something that we didn't do pre-COVID. we talk to each other every week-and-a-half now, and that communication has kept flowing' [LA B]. Other learning arose from the development of local systems for recording information: 'We had our own local system for recording, and we've kept that. We're using it for wider health protection issues as well, so that's something that's been learned' [LA C].

Leadership and partnership at a local level

Key themes to emerge regarding learning at the local level included leadership and partnership. As regards leadership, one interviewee commented: 'The most important thing is the role of the leadership team being able to make decisions really quickly, but actually not expecting any one single person to have all the answers' [LA B].

Partnership was another important theme. One interviewee noted that there was 'brilliant partnership work' on establishing all local testing sites: 'we worked with our estates team, city council colleagues, a range of venues like our sporting leisure centres throughout the city'. The role

⁶ They were to 'work in partnership with local authorities and Public Health England (PHE) and be staffed from a range of areas including the Joint Biosecurity Centre...and the contain team within the Department of Health and Social Care' (LGA, 2020, np).

played by environmental health officers and retired environmental health officers who were redeployed to work as contact tracers was noted [LA C].

Partnership working was also mentioned in other local areas, particularly with community groups:

One of the best things that came out of the pandemic was that it taught us how to work better with vulnerable communities than we had done in the past. We could see the disparity so the impact was quite apparent...We got to engaging with the communities [by] community leads in the first instance, and that has been helpful going forwards. It's improved the relationship undoubtedly because we developed networks we didn't have before right across the board, testing included [LA D].

We developed networks with community and faith groups to allow us to respond and ...they've lasted. We've now got to lots of voluntary organisations, such as food banks and citizens advice and there's a better way for us to communicate with those organizations. And we meet with them regularly, and they give us feedback on how we're delivering, and that allows us to improve [LA D].

One of the biggest lessons is that we often talk about the partnership working, and we think of joint work between the local authority and UKHSA and the NHS, but actually seeing our communities and our community leaders as key partners [is important given] the valuable contribution they make to the health protection response [LA C].

Role of central and local government

A number of themes emerged in relation to learning and the role of central and local government. One key issue was that of the role of PHE / UKHSA and local public health teams. During the pandemic, PHE became overwhelmed quickly and so there was a transfer of responsibility to public health teams to provide additional capacity: 'In the end when resourcing was available [from the Contain Outbreak Management Fund] what got shaped was the "boots on the ground response". For 'local authorities to have an active role they need to be resourced, without adequate resourcing they play the game of risk / muddling through' [LA D].

Concerns regarding the cuts to public health funding by central government and consequences were also stressed:

[There have been] reductions [to public health] because of austerity and quite serious reductions in 2015-16. We had to rebuild our health protection team while we were responding to the pandemic...The positive is that public health is definitely in the right place in local government and also the resilience of having that expertise [LA C].

A further issue was that of trust, with the need for central government to trust local government to make decisions given the expertise at a local level. As one interviewee noted: 'the word "trust" is a key one throughout everything' [LA C].

Relatedly, another interviewee noted:

A big lesson for government is it is better to be managed by the local Director of Public Health and the health team who understand their community. Communication needs to be done centrally as a lot of people still do get the information from the BBC news or the ITV news, but it also needs local government to reinforce that message [LA A].

Finally, the importance of central government working with local authorities was raised in the context of systems and IT, with the need for the government to ‘involve local authorities from day one and [not] try and manage it from central government’ [LA A].

5 Conclusion

This research study set out to examine, by means of interviews with expert stakeholders at central and local government levels, the evolution of test, trace and isolate strategies (TTIS) during the COVID-19 pandemic; associated challenges; those aspects of responses that were felt to have been more and less successful; measures to prepare for future pandemics; and what had been learned for public health. The findings revealed a range of challenges at central and local levels, regarding testing, tracing and isolation strategies, and successful and less successful aspects of responses.

As regards testing, successful aspects to address the challenges posed by the pandemic included the development of a national testing infrastructure, of technologies and of the testing process. In terms of implementation, the lack of testing in the early stages was a challenge as was access to data on cases which were held centrally. PCR testing was run by the NHS and initially focused on large, drive-in regional sites, which posed access issues especially for those without cars and those from disadvantaged groups, including those from some minority ethnic backgrounds and those on low incomes. Over time these problems were resolved as local testing sites were developed which enabled these groups to access testing, and links with the communities concerned were strengthened at the local level. By the end of 2020, there was widespread, accessible, lateral flow testing for the general public. LFTs played an important role in enabling the economy to reopen and enabling schools to reopen in January 2021. A major challenge with the testing infrastructure, which relied on the use of the internet or smart phone, was registering tests and results online for people who were digitally excluded.

Regarding contact tracing, NHS Test and Trace (NHST&T) was set up in May 2020, and contact tracing carried out at a central level. NHST&T did not work with local authorities at the outset. If NHS Test and Trace (NHST&T) were not able to reach people, information was passed to local authorities, where there was ‘local knowledge’ and ‘local understanding’. In some cases, local authorities eventually took on all the contact tracing. When there were massive surges the national NHST&T was not able to reach people and cases because there were too many and local authorities provided additional capacity and local knowledge absent at the national level.

Turning to isolation, initially, there was no financial support for those who were not able to work from home; moreover, when central support became available, the amount was not felt to be sufficient for many households. Some local councils put in additional support for self-isolation for particular groups of people. A key cross cutting theme was that of communication. Messaging coming from central government was reported to be good but changed frequently. At a local level, communication was not always straightforward in some cases as the guidance was in English and had to be translated, causing delays.

In terms of measures that should be taken by government to prepare the TTIS system for future pandemics, a strong theme to emerge was that of planning and business continuity. The importance of planning at different levels of government was raised – where responsibility should lie, at central, regional or local level – and how health services and local government should work together. The importance of the regional level in the process was stressed. The need for a dedicated funding stream was also stressed: the dependence on central government for funding during the pandemic meant that local authorities were limited in terms of what they were able to do.

As regards learning for public health, a number of issues were raised. At a central level, much decision making around the pandemic was made on the basis of modelling, and although the assumptions were made clear, it was a challenge to evaluate if they were working in the expected way in the real world. At a local level, interviewees commented on the positive relations between central government and the key central agencies, PHE and UKHSA, and the development of a regional structure was welcomed. In relation to learning and the role of central and local government, one key issue was that of the role of PHE / UKHSA and local public health teams. During the pandemic PHE became overwhelmed quickly and so there was a transfer of responsibility to public health teams to provide additional capacity, but the need for local authorities to be resourced to play an active role was stressed. Concerns regarding the cuts to public health funding by central government since 2010 was also stressed as was the need for central government to trust local government to make decisions given the expertise at a local level.

References

DHSC (2022) Contain Outbreak Management Fund: guidance – financial year 2020 to 2021.

<https://www.gov.uk/government/publications/contain-outbreak-management-fund-2020-to-2021/contain-outbreak-management-fund-guidance-financial-year-2020-to-2021>

House of Commons Committee of Public Accounts (2021) Test and Trace update, HC 182

<https://committees.parliament.uk/publications/7651/documents/79945/default/fer>

LGA (2020) Coronavirus latest: update from the LGA's Chief Executive, 30th June.

<https://content.govdelivery.com/accounts/UKLGA/bulletins/2935a19>

Murray, R. (2020) 'Found guilty without a trial': The King's Fund response to the shake up of public health 18th August. <https://www.kingsfund.org.uk/press/press-releases/found-guilty-without-trial-response-shake-up-public-health>

Annex A: Expert Interviewees / participants

National / local level	Position / role
Central agency [CA]	Director of Public Health (Consultant in Public Health)
Local authority A [LA A]	Consultant for testing, tracing and isolation strategies
Local authority B [LA B]	Director of Public Health
Local authority C [LA C]	Director of Public Health and Assistant Director of Public Health (Consultant in Public Health)
Local authority D [LA D]	Council lead officer for TTI, Council officer for testing/logistics, Director of Public Health
Local authority E [LA E]	Former Chief Executive
Local authority F [LA F]	Assistant Director of Public Health (Consultant in Public Health)

Annex B: Interview schedule

Note that the interview schedule was adapted depending on the role of the interviewee with questions relating to the role of the interviewee in question.

Name/affiliation/position of interviewee(s)

Role in the context of TTIS during the pandemic

Section 1: General information

- Brief introduction to the PERISCOPE project and the interviewer
- Information on goal of the interview

Section 2: Testing strategies

- Which were the biggest challenges you experienced in the context of testing strategies?
- Which problems did you observe in this regard over the course of the pandemic?
- In your view, which aspects in the context of testing strategies worked well and which worked less well?
- In your view, how could testing strategies have been improved?

Section 3: Contact tracing strategies

- Which were the biggest challenges you experienced in the context of contact tracing strategies?
- Which problems did you observe in this regard over the course of the pandemic?
In your view, which aspects in the context of contact tracing strategies worked well and which worked less well?
- In your view, how could contact tracing strategies have been improved?

Section 4: Isolation strategies / contact person management

- Which were the biggest challenges you experienced in the context of isolation strategies and contact person management?
- Which problems did you observe in this regard over the course of the pandemic?
- In your view, which aspects in the context of isolation strategies and contact person management worked well and which worked less well?
- In your view, how could isolation strategies have been improved?

Section 5: Pandemic preparedness for the public health system

- In your view, which measures should be taken to prepare the test-trace-isolate-support system for future pandemics/crises?
- Which measures should be taken by the executive bodies themselves?
- Which measures should be taken on the system level?

- Which measures should be taken on the legal level?

Section 6: Learning

- All in all, what are the most important things you have learned from the pandemic
- for your own authority/organisation and
- for the public health sector as a whole?

Annex C: Documentary analysis of TTIS in England

Introduction

This Annex addresses Testing, Tracing and Isolating (TTI) strategies with regard to COVID-19 in the UK (England) between January 2020 and April 2022. It draws on legislative provision, guidance, reports published by government/public agencies, and high quality media reports. The paper provides a chronology of events from the start of the COVID-19 pandemic until April 2022. The paper comprises the following sections: Section 1: National context, Section 2: Testing strategies, Section 3: Tracing strategies and Section 4: Isolation and support provided. In each section, the role played by central and local government is addressed. A brief postscript concludes.

1. National context

The UK is a quasi-federal state, being neither a unitary nor a federal state (Bogdanor, 2005). In short it is a union of countries: Scotland, Wales, and Northern Ireland, with autonomous executives and legislatures, and England, which is governed by the UK government from Westminster. The Scottish Parliament, Welsh Parliament, and Northern Irish Assembly have devolved powers, with legislative competence in areas except for those ‘reserved’ for the UK government in Westminster (Leeke et al., 2003). The provision of health services is a devolved responsibility, but social security is a national UK-wide responsibility.

1.1 Covid-19 and legislative provision

The first novel Coronavirus case was identified in England on 31 January 2020. And by 10 February there were eight known cases (DHSC, 2020a). New legislative arrangements relating to COVID-19 were introduced across the UK (for earlier legislation, see Griffith, 2020). In England, on 5 March 2020, a statutory instrument was made into law;⁷ this added COVID-19 to the list of notifiable diseases and SARS-CoV-2 to the list of notifiable causative agents. The subsequent legislative provision underpinning the government’s response to the COVID-19 pandemic was the Coronavirus Act – applicable across the whole of the UK – which received royal assent on 25 March 2020. This was ‘to enable the Government to respond to an emergency situation and manage the effects of the COVID-19 pandemic’ (Coronavirus Act, 2020, p. 7).

The first lockdown was announced on 23 March. This was a “four-nation approach” and entailed high levels of cooperation between the governments of the UK. The Coronavirus Act granted UK ministers extensive legislative powers to respond to the pandemic. In addition, pre-existing powers, such as those in delegated legislation were also used. The additional powers were, in the main, through secondary legislative provision (statutory instruments) (Anderson, 2021).

In the UK, local government is a devolved matter and the ways in which local government functions varies across countries (Leeke et al., 2003). In England, Scotland, and Wales, local councils were responsible for a number of areas affected by the coronavirus, including some elements of education provision and social care. Working with local authorities is thus the responsibility of each devolved government, and in the case of England, the UK government. Across the UK, governments

⁷ Medical practitioners had a statutory duty to notify suspected and confirmed cases of notifiable diseases to PHE under the Health Protection (Notification) Regulations 2010 and the Health Protection (Notification) Regulations 2020.

issued guidance to local authorities: local government thus played a crucial role in the implementation of measures introduced by the government concerned.

1.2 Government and its agencies

In England, the Department of Health and Social Care (DHSC) has responsibility for pandemic preparedness (DHSC, 2020b). However, the control of infectious diseases has historically been located at a local level by public health practitioners. In 2003, the Labour Government set up the central Health Protection Agency, which took over the work on infectious diseases previously conducted by health authorities. However, the government also retained a Public Health Observatory and infectious disease control teams. Public health was fragmented, but it was still linked up to communicable disease control and the NHS (Lewis, 2021). Following the Health and Social Care Act 2012, Public Health England (PHE) was established on 1 April 2013; this brought together public health specialists from more than 70 organisations into a single public health service (PHE, 2021). The operation of public health was also returned to local authorities from health authorities and local Directors of Public Health were created (Lewis, 2021).

Public Health England was set up as an Executive Agency of the Department of Health⁸ and was the ‘expert national public health agency, which fulfils the Secretary of State for Health’s statutory duty to protect health and address health inequalities and executes the Secretary of State’s power to promote the health and wellbeing of the nation’ (Ellison, 2014, p.1). The first function of PHE was ‘to protect the public’s health from infectious diseases and other public health hazards, working with the NHS, local government and other key partners in England, but also working with the Devolved Administrations and internationally where appropriate’. Other functions included securing ‘improvements to the public’s health’ and playing ‘a key role in improving the population health through sustainable health and care services’ (Ellison, 2014, p. 2).⁹

As an Executive Agency PHE staff were civil servants, and its chief executive, was accountable to ministers in the DHSC. The government’s objective was to streamline agencies providing public health services and, it has been argued, create a strong voice like the US’s Centers for Disease Control (Institute for Government, 2020). It operated out of eight local centres, plus an integrated region and centre for London, and 4 regions (north of England, south of England, Midlands and east of England, and London) (PHE, 2021). There were three main scientific campuses, two of which are of particular significance for pandemics: PHE Porton, which includes departments for rare and imported pathogens, research, culture collections and emergency response and PHE Colindale, which includes infectious disease surveillance and control, reference microbiology, other specialist services such as sequencing and high containment microbiology.

Public Health England was replaced by UK Health Security Agency and Office for Health Improvement and Disparities in April 2021.

1.3 COVID-19 pandemic

In January 2020, at the start of the outbreak, the UK’s testing and contact tracing policy was designed to “contain” the virus and disrupt its transmission by testing suspected individuals (cases) and following up close contacts of those who tested positive. As the number of cases increased the

⁸ The Department of Health became the Department of Health and Social Care in January 2018.

⁹ Notwithstanding the formal remit and functions of PHE, in its strategy document 2020-25 (PHE, 2019) priority number six out of 10 was to ‘enhance our ability to respond to major incidents (including pandemic influenza) by strengthening our health protection system’

UK moved to a “delay” phase on 12 March 2020 (Rough, 2020), with the first national lockdown beginning on 23 March.

There were two waves of COVID-19 between March 2020 and May 2021 in England. There is no strict definition for when a wave starts and ends (Office for National Statistics (ONS), 2021) but according to the ONS the first wave was from March to September 2020. The second wave was from September 2020 to June 2021, with one peak in mid-November after which infection levels decreased before rising again in December 2020 following the emergence of the Alpha variant, which became dominant from January 2021 and peaked early that month. The third wave began in June 2021 when Delta became dominant (ONS, 2022a). Omicron became dominant in January 2022. Prevalence was high from April to July 2022 (with Omicron sub-lineages BA.4 and BA.5).

There were lockdowns and restrictions at various points in this period (see Annex C1).

2. Testing strategies

2.1 Evolution of PCR testing

In early 2020, there was extremely limited testing capacity and infrastructure within the NHS, Public Health England (PHE) and the private sector. Testing capacity – using a real-time reverse transcription-polymerase chain reaction (RT-PCR) test¹⁰ to identify cases of Covid-19 – for NHS services was strictly limited and focused on patient testing (NHS Providers, 2020).

On 12 March, as cases of COVID-19 soared, the government announced that it would stop all community testing; this was driven by a lack of testing capacity. Instead, it would focus on testing people in hospitals and protecting health workers (Iacobucci, 2020a). On 20 March, the then Chief Executive of Public Health England, Duncan Selbie, stated that the PHE and NHS laboratory-based testing capacity would be increasing from 5,000 to 25,000 per day. PHE’s National Infection Service was to lead this with scientists at NHS England. The plan at this point was to ‘maximise as much as possible the existing technology already on hospital campuses, and to supplement this with commercial support’ (Selbie, 2020a).

The DHSC led efforts to increase testing capacity in England. In April, a “[five-pillar plan](#)” (DHSC, 2020c) was published; this was an effort to increase capacity as hospital trusts had reported shortages of testing equipment: ‘These shortages were exacerbated by the fact that there were a number of different testing equipment manufacturers, with consumable swabs, reagents and plastic kits often tied to a [particular testing platform](#)’ (NHS Providers, 2020). The five pillars comprised:

- Pillar 1: tests by PHE and NHS laboratories for patients and frontline workers in the NHS.
- Pillar 2: the creation of new testing capacity delivered by commercial partners for the community.
- Pillar 3: antibody tests to detect if people had had the virus and were now immune.
- Pillar 4: surveillance, which involved conducting surveys to find out what proportion of the population had already had the virus (this used a high accuracy antibody test operated by Public Health England at the Porton Down science campus).
- Pillar 5: this was to build rapidly ‘the large diagnostics industry that this country currently lacks. This new national effort for testing will ensure we can get tests for everyone who needs them’ (DHSC, 2020c, p. 4)

¹⁰ This relies on collecting genetic material (RNA) from the suspected case via a nose and/or throat swab to detect nucleic acid from the virus SARS-CoV-2.6 (Rough, 2020).

In order to process Pillar 2 tests – those undertaken in the community as opposed to in hospital – a network of seven “lighthouse laboratories” was set up across the UK through a partnership with the DHSC, the Medicines Discovery Catapult, UK Biocentre and the University of Glasgow, GSK, AstraZeneca, the University of Cambridge and PerkinElmer. Deloitte was responsible for the coordination of the laboratories (Rough 2020). The expansion of testing thus built on extant diagnostic laboratories (PHE and NHS) with additional laboratory capacity and logistical support provided by private companies, universities and the new “lighthouse laboratories” from April 2020 (Comptroller and Auditor General, 2020).

On 18 May 2020, the government announced that anyone with symptoms of coronavirus was eligible to book a test: anyone experiencing a new, continuous cough; high temperature; and now ate a loss of or change in the individual’s normal sense of smell or taste can book a test by visiting the NHS website’. The expansion in eligibility for testing followed confirmation by the four UK Chief Medical Officers that anosmia (change in sense of smell which can also affect taste) had been added as a symptom of COVID-19 (DHSC, 2020d).

On 28 May 2020, the government announced that the new NHS Test and Trace Service was to be launched, to lead on four areas of response to the pandemic: test, trace, contain and enable, and to bring these together in a single national programme, working with PHE and English local authorities (Comptroller and Auditor General, 2020). Guidance on how the process worked at the outset is given in Annex C2 (DHSC, 2020e); this was modified over time.

From 23 September 2020, individuals who developed symptoms of COVID-19, were able to order a test through the NHS website or by telephone and choose to either visit a test site or receive a home test kit (Pillar 2 testing). Employees, residents, and patients in high-risk settings, such as care homes and hospitals, could be tested through NHS and Public Health England laboratory facilities (Pillar 1 testing) (Briggs et al., 2020).

Testing capacity across the UK increased over time. The National Audit Office reported that 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 [2020]’. However, the actual number of tests processed daily was found to be ‘below reported capacity’ (Comptroller and Auditor General, 2020, p.10; HM Government, 2020).

In February 2021, NHS Test and Trace, working with PHE, local authorities, businesses, schools, universities and others, had capacity for approximately 800,000 PCR tests per day, across the UK. By this time over 80 million PCR tests had been conducted. According to the UK government, more than 85% of in-person test results were returned the next day. The median distance travelled to one of over 850 test sites was approximately 2 to 3 miles (Cabinet Office, 2021a).

In November 2021, the government reported that the opening of the Rosalind Franklin Megalab brought total capacity to over 700,000 PCR tests daily across the four nations (HM Government, 2021). Testing capacity fluctuated over time peaking at over 1,000,000 a day in January 2022 during the first wave of Omicron (GOV.UK, 2022).

1.2 Evolution of asymptomatic (lateral flow) testing

In its COVID-19 Winter Plan for 2020, the UK government announced that testing was to be broadened from symptomatic testing to identifying those with no symptoms (HM Government,

2020).¹¹ The so-called “Operation Moonshot” mass testing programme, built on testing pilots in Liverpool, in which over 100,000 people were tested at asymptomatic test sites, and in Merthyr Tydfil in Wales.

On 9 November, the DHSC and the Secretary of State for Health and Social Care issued a press release stating:

Over half a million rapid-turnaround lateral flow tests will be sent out by NHS Test and Trace ... this week... Test kits will be issued to over 50 directors of public health across England this week, to enable local teams to direct and deliver community testing based on their local knowledge. Each will receive a batch of 10,000 antigen lateral flow devices as part of a new pilot to enable them to start testing priority groups. Directors of public health will determine how to prioritise the allocation of these new tests, based on the specific needs of their communities, and will determine how people in the local area are tested. They will be supported by NHS Test and Trace to expand testing programmes in their area through access to training and clinical and operational guidance. This initial 600,000 batch will then be followed up with a weekly allocation of lateral flow antigen tests (DHSC and Hancock, M., 2020).

Directors of Public Health were prioritised based on the prevalence in their areas of COVID-19 and expressions of interest to the DHSC. By 17 November, 67 areas in England had been given access to lateral flow tests (Iacobucci, 2020b).

The Community Testing Programme was launched in December 2020; this rapid testing programme was a partnership between national and local government. It was expanded in January 2021 for all local authorities in England to use. The Programme enabled asymptomatic testing for local public services, small businesses, self-employed people and communities that had been disproportionately affected by the virus (Cabinet Office and DHSC, 2021). The following month, a new Community Collect model was launched; this enabled families, small businesses and the self-employed to take away rapid tests from some government and local authority sites.

From 9 April 2021, everyone in England was able to access free lateral flow tests to be sent to their home, providing ready access to those who required access to regular testing (DHSC et al., 2021)¹² (see Annex C3 for different testing regimes). Community testing continued, which enabled local authorities to focus on high-risk groups and those disproportionately affected by COVID-19 (HM Government, 2021). The use of lateral flow tests in education settings played a crucial role in identifying positive cases at the beginning of 2021, when schools re-opened (Cabinet Office, 2021b). Lateral flow devices (LFD) were found to identify around a quarter of all cases reported daily (NHS Test and Trace, 2021). Individuals who received a positive test result were advised to take a confirmatory PCR test.

In January 2022, the recommendation for a confirmatory PCR test following a positive LFD was changed to an LFD regime (HM Government, 2022).

¹¹ Additional funding of £7 billion for NHS Test and Trace was allocated to increase testing and continue to improve contact tracing, taking the overall funding provided for Test and Trace this financial year to £22 billion

¹² The expanded regular testing offer for people without symptoms was delivered through a home ordering service; workplace testing programmes; community testing by local authorities; collection at a local PCR test site; testing on-site at schools and colleges. A new ‘Pharmacy Collect’ service was also launched: asymptomatic adults were able to collect a box of 7 rapid tests to use twice a week at home). If testing at home, individuals were required to register their results online or by calling 119.

Types of lateral flow devices

The DHSC referred over 160 lateral flow devices to the UKHSA Porton Down and University of Oxford SARS-CoV-2 lateral flow antigen test validation cell to be evaluated (DHSC, 2022a). Further testing by UKHSA Porton Down assessed whether the lateral flow devices displayed desirable characteristics in terms of specificity and sensitivity for mass population, community-based testing. Those that fulfilled the criteria were published by the UKHSA (2022a). LFDs used for NHS home testing included Orient Gene Coronavirus Ag Rapid Test Cassette (Swab), ACON Flowflex™ SARS-CoV-2 Antigen Rapid Test and Innova SARS-CoV-2 Antigen Rapid Qualitative Test. Some tests required both throat and nasal swabs and some the latter.

2.4 Issues with testing

Prior to early April 2020, ‘efforts to bring together a coherent national strategy for testing were also hampered by a confusing split in responsibility between government departments and their national arms-length bodies. Simply put, responsibility and accountability for testing was diffuse and unclear’ (NHS Providers, 2020). Rough (2020) in a House of Commons briefing paper summarised a range of concerns regarding testing: capacity problems at the “lighthouse laboratories”; concerns that these operated separately from NHS laboratories; concerns that setting up a new national diagnostic laboratory network had bypassed the extant NHS and the public health network; and concerns that NHS laboratories were left ‘under used’ with centres such as the Francis Crick Institute and Oxford University being ignored when they offered expertise and resources. Significant concerns were raised regarding the use of the private sector, including Deloitte to manage the organisation of national drive-in testing centres and Serco to run the contact tracing programme (see below) (Blackburn 2020).

The Financial Times reported on 14 September 2020 that leaked Government documents “indicated that there was a significant problem with tests being “voided” mostly due to “leaked samples” (Gross and Neville, 2020). Rough (2020) reported that capacity problems had been exacerbated by staff shortages as students and academics who had been working in the laboratories returned to their “day jobs”. And between September and October 2021, the BBC reported that Immensa Labs had sent out over an estimated 40,000 “false negative” results to people who had tested positive on LFDs across the south west of England, but negative on follow-up PCR tests the laboratories had carried out (Gregory-Kumar, 2022).

This relates to a further issue, namely the procurement of tests. By the end of March 2021, the DHSC had signed over 900 contracts with over 400 suppliers for goods and services that related to NHS Test and Trace. Testing accounted for 90% of the total contract value (£12.7 billion). Ten of the largest suppliers accounted for more than half (£7.3 billion) of the total contract value, with Randox being the fifth largest supplier in terms of value of contracts at that time (Comptroller and Auditor General June 2021). In 2022, an investigation by the NAO into the government’s contracts with Randox Laboratories Limited was carried out.¹³

¹³ Between January 2020 and December 2021, the DHSC and PHE awarded 22 contracts to Randox or its strategic partner Qnostics, with a maximum value of £776.9 million. Almost all were for the provision of COVID-19 testing services. 85% of the total value of contracts were awarded without any competition (Comptroller and Auditor General, 2022).

2.5 Other testing

Nationwide testing

The COVID-19 Infection Survey is a UK-wide regular household survey, which is designed to estimate the number of people testing positive for infection and for antibodies. The survey is conducted by the Office for National Statistics on behalf of the government. The statistics provided refer to the number of COVID-19 infections at a particular point in time within the population living in private residential households. The survey does not include those in hospitals, care homes and/or other communal establishments (where rates of COVID-19 infection are likely to be different) (ONS, 2022b).

To test for the presence of the virus, the nose and throat swabs collected are sent to the “lighthouse laboratory” in Glasgow and tested for SARS-CoV-2 using PCR tests. Where there is sufficient virus, the genetic material from every positive swab in the survey is sent to Northumbria University for whole genome sequencing (ONS, 2022b).

Antibody testing

Antibody serology tests which test for COVID-19 antibodies have not had a high profile in England (for data see GOV.UK, 2022). People booking a PCR test for COVID-19 were, for a period, given the option to take part in antibody testing if their test was positive; this ended in March 2022 (UKHSA, 2022b). To ascertain antibody positivity, the Coronavirus Infection Survey (CIS), UK Health Security Agency data from NHS Blood and Transplant (NHS-BT) blood donors, and Real-time Assessment of Community Transmission-2 (REACT-2) data are used (see for example, ONS, 2022c). There was also a pooled testing pilot for university students (UKHSA, 2020a). Surveillance and Immunity studies, managed by the UK Health Security Agency (UKHSA) are aimed at understanding COVID-19.

Since February 2022, the government has continued to monitor the virus through scaled back surveillance studies and other data sources including genomic sequencing (UKHSA, 2022c)

Testing for variants

Regular updates on variants of concern are published by the UKHSA (2022d). The key body involved with genomic sequencing is the Sanger Institute; this has a history and capacity for genomic surveillance in other diseases and began sequencing SARS-CoV-2 genomes in March 2020, as part of the COVID-19 Genomics UK consortium (COG-UK). The sequencing is conducted to identify and to track new variants of the virus; the viral genome data are also made immediately available to scientists worldwide. According to the Institute: staff have ‘sequenced over 2.5 million SARS-CoV-2 genomes to date. This currently represents about 20 per cent of the global total of sequences publicly available’ (Wellcome Sanger Institute, 2022a).

In early 2021, the Institute began working with the UKHSA to carry out viral genome sequencing. The Institute notifies the UKHSA of the sequencing results, showing which variants are present, in order to assist with decision making. These data are important for tracking and analysing SARS-CoV-2 in the UK in real-time (Wellcome Sanger Institute 2022a). The majority of SARS-CoV-2 samples the Institute sequence come from the UK “lighthouse laboratories” which process PCR tests from the community (Wellcome Sanger Institute, 2022b).

3. Tracing strategies

At the start of the outbreak, PHE carried out test and trace activities for COVID-19 (Comptroller and Auditor General, 2020). In February 2020 there had been a small number of novel coronavirus

cases. PHE undertook contact tracing with the aim of preventing the infection spreading further. If a person tested positive for the novel coronavirus, a clinician would speak to them to gather details of places they visited and the people they had been in contact with since they became unwell or, in the case of international travellers, since they arrived in the UK. PHE used this information to 'build up a detailed picture of the people we need to get in touch with, such as family members, colleagues or fellow travellers'. A "close contact" involved either face to face contact or spending more than 15 minutes within 2 metres of an infected person (Phin, 2020).

Early on, cases were rapidly identified through the PHE's contact tracing approach, tested and provided with appropriate support. At this point PHE stated: 'If we believe a contact is at higher risk of infection they may be asked to self-isolate, remaining in their home and staying away from work, school or public places and we contact them daily until they can be given the all-clear. If the person being monitored does develop symptoms, we would test them and provide them with specialist care if they have the novel coronavirus' (Phin, 2020).

However, on 16 March 2020, the comprehensive tracing of all cases in the community came to a halt in light of the rising infection levels (Comptroller and Auditor General, 2020). The decision to stop contact tracing for COVID-19 in early March was in part driven by a lack of testing capacity, according to England's deputy chief medical officer (Iacobucci, 2020a).

A former regional director of public health criticised the government's decision to stop contact tracing, saying that he believed that cuts to public health had contributed to a lack of testing capacity. He said:

They started doing the right thing with quarantining the Wuhan returnees...but then they only did that for a couple of weeks. It was quite bizarre that they threw their hands up and gave in. Reading between the lines, there seems to be a capacity issue for doing contact tracing, which is not surprising given that they've presided over such a significant reduction in the size of local and regional public health teams, with big cuts in budgets, big cuts in staff. If we had had the capacity for testing, there's no reason why we shouldn't have carried on doing what we were doing (Iacobucci, 2020b)

3.1 Developing the national tracing model

PHE led on initial efforts to develop the national tracing model (Comptroller and Auditor General, 2020). In April 2020, a letter was sent to Directors of Public Health, informing local authorities that the DHSC and NHS were working at a national level on a national web-based and telephone approach to contact tracing as well as the traditional methods of contact tracing: 'This nationwide model of contact tracing includes inputs from local authorities and other local partners, especially the NHS and care home sector. The model has a co-ordinating function to undertake the science, data and quality assurance of the service which will be led by PHE and we would like [Directors of Public Health] and others to work with PHE on this element' (Gleave, 2020).

According to the National Audit Office, the government planned a very rapid scaling up of tracing capacity, with the DHSC deciding that the most feasible way to proceed would be to resource this via the private sector. The National Audit Office noted that they had not seen 'evidence that they considered whether to make use of local authority capacity for call handling (Comptroller and Auditor General, 2020, p. 18). 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. The NHS Test and Trace Service was launched on 28 May 2020, and the COVID-19 app in September 2020 (see below): both signified a return to a strategy of comprehensive community contact tracing (Comptroller and Auditor General, 2020).

Contact tracing for non-complex cases was provided by call handlers recruited by the private company Serco. However, in the first two months of NHS Test and Trace, the Health Foundation (Briggs et al., 2020) reported that call handlers were having difficulties reaching a significant proportion of cases and their contacts. As a result, around 20% of cases passed to NHS Test and Trace were uncontactable. Only about 60% of the non-complex cases contacted by call handlers, were reached and advised to isolate. For these non-complex cases, each contact needed to be identified and reached by a contact tracer. By contrast, complex cases and outbreaks, largely managed by specific organisations, such as the care home manager or hospital infection control team reached nearly 100% of contacts. In addition, the time taken to advise close contacts of non-complex cases to self-isolate, from when a case is identified, was significant, with just over half of the contacts being advised within 24 hours, and nearly 8% taking over 3 days (Briggs et al., 2020)

In a similar vein, the National Audit Office (Comptroller and Auditor General, 2020) found that there was no shortage of central tracers, and, at various points, the national tracing service had been 'barely used' (p. 12). It was reported that utilisation rates for call handlers was lower than anticipated in September and most of October 2020. Tracing performance improved over time. There was fluctuation in terms of the proportion of cases reached and asked to give details of their contacts but at the end of October it was over 80% higher than it had been at the end of May (just over 70%). On the other hand, the overall proportion of contacts reached and advised to self-isolate dropped from between May and October 2020; 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. The proportion of contacts reached by the national service within 48 hours stood at nearly 90% at the end of May, before dropping to under two-thirds in mid-October and rising to just over 80% by the end of the month. Significantly, the Local Government Association found that ten schemes run by local authorities reached between 47% and 91% of cases that the national system could not (Comptroller and Auditor General, 2020).

3.2 NHS COVID-19 App

An App was developed, branded as NHS Test and Trace and managed by UKHSA, the manufacturer of the App. It was designed to make digital contact tracing possible while protecting the individual's privacy and identity. The app included a notification feature which alerted an individual if she or he has been near another app user who tested positive for COVID-19, if the local area had a changed risk status or, if a variant of COVID-19 had been identified as being of concern for the individual's local area (so-called "variants of concern"). If an individual tested positive, the app asked the individual concerned to allow those she or he had been in contact with, to be alerted. It used technology developed by Apple and Google called "exposure notification" and "exposure logging" to do this (see UKHSA, 2022e).

In September 2020, the roll-out of the NHS COVID-19 app took place; this was later than in many other countries. Research found that initial app uptake was 41%, with a 12% drop-out rate by March 2021. Initial uptake was found to be associated with for example social norms, privacy concerns and misinformation about third-party data access (Horvath et al., 2022).

According to Public Technology, the government has signed a £2.5m deal for a specialist supplier – the Danish firm Netcompany – to provide support and ongoing development work for the NHS Covid-19 contact-tracing app from February until December 2022 (Trendall, 2022).

3.3 Role of local authorities

Following its launch, NHS Test and Trace seconded representatives from local government to its Executive Committee and set up a number of channels to engage with local government. However, the Local Government Association (LGA) and the Association of Directors of Public Health (ADPH) told the National Audit Office 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’ (pp. 17-18). The NAO reported that both bodies had called for ‘local government to play a bigger role in testing and tracing’ (Comptroller and Auditor General 2020, p. 18).

In June 2020, local authorities in England developed COVID-19 outbreak control plans to help manage COVID-19.¹⁴ Initially, local authority Directors of Public Health were not able to implement their plans effectively as they were not able to access the necessary individual level data from commercial laboratories because of concerns regarding data governance (Briggs et al., 2020). In July, the government sought to clarify the responsibilities of local government to control local outbreaks in partnership with local Public Health England health protection teams. The government also introduced test and trace support and assurance teams: these provided a link between national and local government, supporting the development of local responses to rising numbers of cases (Briggs et al., 2020).

From July 2020, local authorities thus took on a bigger role in tracing, establishing their own schemes in conjunction with the national arrangements. Following the increase in local responsibility and in response to rising case numbers, some local authorities, developed local contact tracing processes for non-complex cases; in one authority they reached up to 90% of individuals that the national system was unable to contact (Briggs et al., 2020).

Until 18 July 2020 local authorities did not have full information about positive COVID-19 tests in their local area (Helm and Tapper, 2020). On 6 August, councils in England were offered near real-time data on COVID-19 cases in their local area (Halliday et al., 2020).

In light of local contact tracing successes and the national difficulties that NHS Test and Trace has had with reaching some cases, the government said on 10 August that NHS Test and Trace would reallocate 6,000 of its contact tracers to provide greater support to local authorities developing their own contact tracing systems for hard-to-reach non-complex cases. In August 2020, NHS Test and Trace reduced the number of national-level contact tracers and designated specialist tracing staff to work with those local authorities with their own scheme. By the end of October, 40% (60) of local authorities had a scheme in place, with a further 46% (69) were planning to set one up. However, some local authorities were held back from developing their own arrangements by lack of funding or lack of clarity regarding the availability of funding (Comptroller and Auditor General, 2020).

By 2021, local authorities were significantly more involved with testing and tracing. However, although NHS Test and Trace’s engagement with local authorities and data sharing had improved,

¹⁴ Central government made £300m available to support local authorities.

they could not access all the data they needed, making it difficult for them to manage outbreaks at a local level (Comptroller and Auditor General, 2021).

3.4 Privacy and T&T

A key problem in the initial stages of the pandemic was that of privacy. Local authorities needed data on positive cases in their area for monitoring infections, managing outbreaks and to support contact tracing. According to the National Audit Office, at the outset NHS Test and Trace had to resolve a number of data governance and security issues prior to sharing detailed data on cases. This meant that local authorities did not always have the information they needed. However, stakeholders noted that these early problems had subsequently largely been resolved (Comptroller and Auditor General, 2020).

3.5 Contact tracing and close contacts

Contact tracing – once it restarted – began when a person tested positive for COVID-19. NHS Test and Trace contacted the individual concerned by text message, email or telephone to ask for information about their household and close contacts in the 48 hours before they became unwell. NHS Test and Trace also requested details regarding visits to other places where people may have been exposed, such as a workplace, school or GP practice (Briggs et al., 2020).

The guidance regarding what was meant by a contact changed between May 2020 (see Annex C4) and February 2022. In February 2022, the UKHSA noted that a contact was a person who had been close to someone who has tested positive for COVID-19. An individual could be a contact any time from 2 days before the person who tested positive developed their symptoms (or, if the individual did not have any symptoms, from 2 days before the date he or she tested positive) and up to 10 days after. The UKHSA guidance noted that a risk assessment could be undertaken to determine this, but a contact could be:

- anyone who lives in the same household as another person who has COVID-19 symptoms or has tested positive for COVID-19;
- anyone who has had any of the following types of contact with someone who has tested positive for COVID-19: face-to-face contact including being coughed on or having a face-to-face conversation within one metre;
- been within one metre for one minute or longer without face-to-face contact;
- been within 2 metres of someone for more than 15 minutes (either as a one-off contact, or added up together over one day);
- A person may also be a close contact if they have travelled in the same vehicle or plane as a person who has tested positive for COVID-19 (UKHSA, 2022f).

Details of how contact tracing worked in practice including referrals to other agencies/bodies are given in Annex C4.

From 24 February 2022, routine contact tracing ended. Contacts were no longer required to self-isolate or advised to take daily tests, with non-regulatory guidance being published and local health teams continuing to use contact tracing where they assess this to be necessary as part of their role in managing infectious diseases (HM Government, 2022).

3.6 Contact tracing and different sectors

On 18 September 2020 new legal requirements came into effect for designated venues – hospitality, tourism and leisure, places of worship and local authority facilities such as libraries – to collect

contact details and display official NHS QR code posters. Legislative provision changed over time with the vaccination roll out which began in December 2020. By July 2021 it was no longer a legal requirement for venues to display an NHS QR code or request that customers, visitors and staff ‘check in’, although this was encouraged (Department for Business, Energy & Industrial Strategy, DHSC, Hancock and Sharma, 2021).

4. Isolation strategies

4.1 Evolution of strategies

The legislative underpinnings of isolation were initially via the Health Protection (Coronavirus) Regulations 2020, which came into force on 10 February 2020, and provided for ‘the detention, isolation and screening of, and other appropriate restrictions to be imposed upon, persons who have or may have coronavirus, or who have arrived in England from an area in which the virus is prevalent’. The subsequent 2020 Coronavirus Act included similar provisions for the screening and isolation of certain persons, including powers to impose other restrictions and requirements, and revoked the Regulations. The legislation provided public health officers, constables and (in some circumstances) immigration officers with the means to enforce restrictions.

From 28 September 2020, a new legal requirement was introduced,¹⁵ and individuals could be fined if they did not stay at home and self-isolate following a positive test result for COVID-19, or if they were contacted by NHS Test and Trace and instructed to self-isolate because they were a contact of someone who had had a positive test result. To knowingly provide false information about close contacts to NHS Test and Trace was also an offence. Fines of up to £10,000 could result if individuals failed to comply with these requirements (PHE, 2020b).

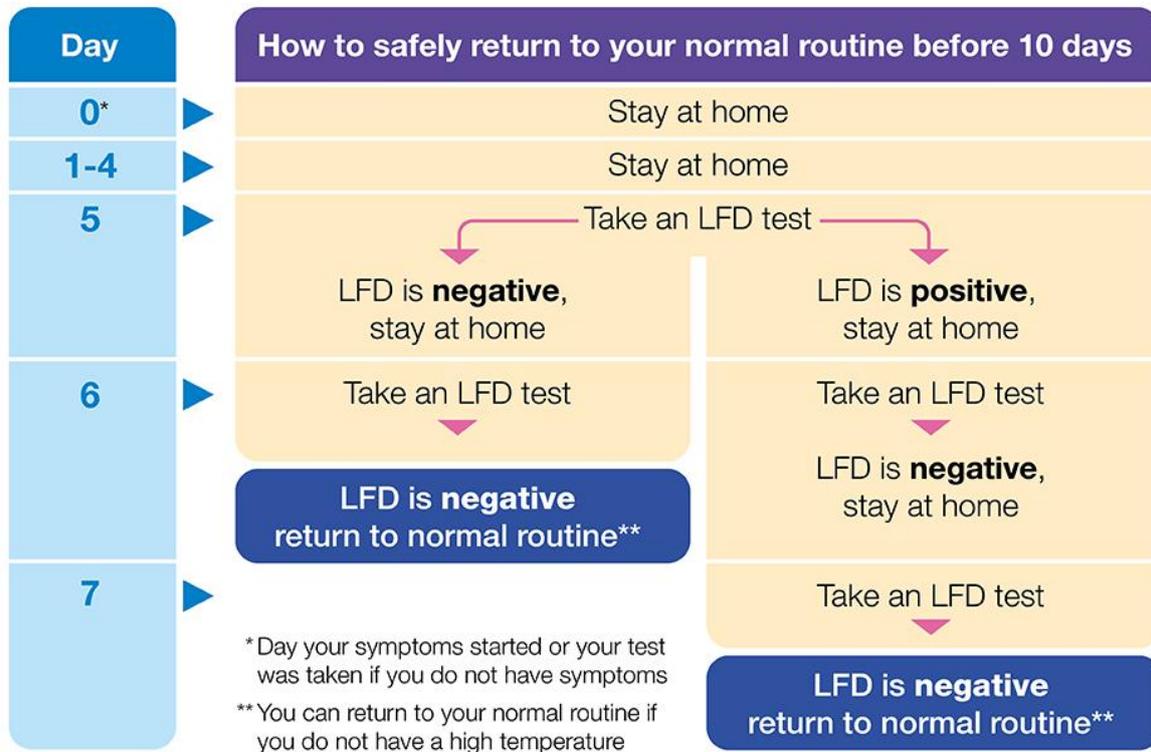
The isolation period for those with symptoms evolved over time:

- 13 March 2020: Duncan Selbie, the Chief Executive of Public Health England, stated: ‘We are advising anyone with a new continuous cough or a high temperature to stay at home and not leave for 7 days from the onset of these symptoms.’ (Selbie, 2020b).
- May 2020: Anosmia (loss of smell) was added a symptom with consequences for self-isolation (DHSC 2020d).
- 31 July 2020: Self-isolation period extended to 10 days from 7 days for those with symptoms (DHSC, 2020f; UKHSA, 2021).
- 22 December 2021: The 10-day self-isolation period for people who tested positive for coronavirus (COVID-19) was reduced to 7 days (in most cases) (UKHSA, 2021b).
- January 2022: Self-isolation could end after [5 full days if the individual concerned had two negative LFD tests taken on consecutive days](#). The self-isolation period remained 10 full days for those without negative results from 2 LFD tests taken a day apart (UKHSA, 2022g).
- From February 2022: If an individual developed any of the main symptoms of COVID-19, she or he was to stay at home and self-isolate immediately. If the individual had a positive LFD or PCR test result but did not have any of the main [symptoms of COVID-19](#), she or he was to stay at home and self-isolate as soon as she or he received the results. This was the case even if the individual had received one or more doses of COVID-19 vaccine (UKHSA, 2022g). If an individual’s day 5 LFD test result was positive, she or he could continue taking LFD tests until she or he received 2 consecutive negative test results (UKHSA, 2022g).

¹⁵ The Health Protection (Coronavirus, Restrictions) (Self-Isolation) (England) Regulations 2020 came into force on 28 September 2020 and imposed a legal duty on individuals who test positive and certain close contacts to self-isolate.

- From 24 February, the government removed the legal requirement to self-isolate following a positive test (HM Government, 2022).

Figure 1: How to safely return to your normal routine before 10 days



Source: UKHSA, 2022g

4.2 Isolation of contacts

The government guidance regarding the isolation of contacts changed over time. Between May 2020 to 24 February 2022 there were over 30 updates. Notable changes were:

- May 2020: If someone was informed that they were a contact of a person who had had a positive test result for COVID-19, he or she was required to self-isolate at home for 14 days from the date of their last contact with the person (PHE, 2020a) (see Annex C5).
- December 2020: The self-isolation period for contacts was reduced from 14 to 10 days (DHSC, 2020g)
- 16 August 2021: Contacts who were fully vaccinated, under the age of 18, participants in clinical trials and those who could not be vaccinated for clinical reasons, no longer had to self-isolate (UKHSA, 2021b).
- 27 September 2021: Regulations¹⁶ clarified that a household contact would only be exempt from self-isolation as a result of being fully vaccinated if fully vaccinated at the date the household contact first developed symptoms (where the contact is asymptomatic, the date the contact took the test leading to the positive result).

¹⁶ Health Protection (Coronavirus, Restrictions) (Self-Isolation) (England) (Amendment) (No. 3) Regulations 2021 (SI 2021/1073).

- 22 February 2022: If an individual was informed by NHS Test and Trace that she or he was a contact of someone who had had a positive LFD or PCR test result for COVID-19, and was aged 18 or over, she or he was legally required to stay at home and self-isolate unless fully vaccinated (with some exceptions). If the individual was not fully vaccinated, she or he was legally required to self-isolate. If an individual was legally required to self-isolate because she or he was not fully vaccinated and was a contact of someone with COVID-19 who the individual did not live with, the household did not also need to self-isolate (UKHSA, 2022f).
- 24 February 2022: All legal requirements to self-isolate were removed.

4.3 Support for those isolating

The UK government, which is responsible for employment rights and most benefits and social security, also implemented various measures during the pandemic, statutory sick pay was made available to people unable to work due to contracting Covid-19 or engagement in self-isolation or shielding (Anderson, 2021).

At the end of September 2020, employed and self-employed people unable to work from home, in receipt of benefits and required to isolate, could be considered for a payment of £500. The £500 Test and Trace Support Payment was for people on low incomes who had to self-isolate because they had tested positive for COVID-19 following a PCR or LFD test; or had been notified as a close contact of someone who had tested positive for COVID-19 (and was not exempt from self-isolation). In March 2021, the parent or guardian of a child or young person who was self-isolating could also be eligible for the Test and Trace Support Payment (DHSC, 2021).

If an individual was notified by the NHS COVID-19 app to self-isolate and applied for the Test and Trace Support Payment, they were also legally required to self-isolate. Further, if an individual tested positive on a self-reported (home) LFD test, she or he would not be eligible for the Test and Trace Support Payment unless they took a follow-up PCR test, and the result was positive (UKHSA, 2022h).

From March 2021, there was discretionary funding made available by central government to help local authorities to ensure people self-isolating had access to practical support, such as food deliveries or help with their caring responsibilities, and support for wellbeing. The government also funded a free medicines delivery service for those self-isolating without help to access medicines (DHSC, 2021).

5. Postscript

The government's publication "Living with Covid" was published in early 2022 (HM Government, 2022). From 1 April, the government ended the provision of free universal symptomatic and asymptomatic testing for the general public in England:

The Government will help enable COVID-19 tests to be made available for those who wish to purchase them through the private market. Private markets are established in many European countries - including France, Germany, Italy and Spain - and the United States of

America. The Government is working with retailers and pharmacies to help establish the private market in testing.¹⁷

Since 1 April 2022, there has been some limited ongoing free testing; there is limited symptomatic testing available for certain at-risk groups; and free symptomatic testing available to social care staff (HM Government, 2022; see also Iacobucci, 2022c). The government also published guidance on the steps that people with respiratory symptoms (including COVID-19) should take to minimise contact with other people given the changes to testing (NHS, 2022).

As noted above, from 24 February 2022, the government removed the legal requirement to self-isolate following a positive test, and the legal requirement for close contacts who were not fully vaccinated to self-isolate. In addition, self-isolation support payments, national funding for practical support and the medicine delivery service ended. From 24 March the government removed the COVID-19 provisions within the Statutory Sick Pay and Employment and Support Allowance regulations (part of the benefits system).

As regards COVID-19 outbreaks, local authorities are now required to manage outbreaks through local planning, and pre-existing public health powers, as they would with other infectious diseases (HM Government, 2022).

References

Anderson, P. (2021) The Covid-19 Pandemic in the United Kingdom: A tale of convergence and divergence, in Steytler, N. (2021) Comparative Federalism and Covid-19: Combating the Pandemic, London: Routledge. ISBN9781003166771 <https://www.taylorfrancis.com/chapters/oa-edit/10.4324/9781003166771-10/covid-19-pandemic-united-kingdom-paul-anderson>

Blackburn, P. (2020) Outsourced and undermined: the COVID-19 windfall for private providers, 8 September. London: BMA. <https://www.bma.org.uk/news-and-opinion/outsourced-and-undermined-the-covid-19-windfall-for-private-providers?query=nhs%20labs%20underused>

Bogdanor, V. (2005) Constitutional reform in Britain: The quiet revolution, Annual Review of Political Science 2005 8:1, 73-98.

Briggs, A., Jenkins, D. and Fraser, C. (2020) NHS Test and Trace: the journey so far <https://www.health.org.uk/sites/default/files/2020-09/NHS%20Test%20and%20Trace.pdf>

Cabinet Office (2021a) COVID-19 Response - Spring 2021. Published 22 February 2021 <https://www.gov.uk/government/publications/covid-19-response-spring-2021/covid-19-response-spring-2021#fn:2>

Cabinet Office (2021b) COVID-19 Response: Autumn and Winter Plan 2021 Updated 9 November 2021 <https://www.gov.uk/government/publications/covid-19-response-autumn-and-winter-plan-2021/covid-19-response-autumn-and-winter-plan-2021#fn:20>

¹⁷ Minutes from the UK's Scientific Advisory Group for Emergencies (SAGE) indicate a concern amongst experts that removing access to free testing 'would make it harder for people to take this and other precautionary actions' (SAGE, 2022).

Cabinet Office and DHSC (2021) Community testing: a guide for local delivery Updated 24 February 2021 <https://www.gov.uk/government/publications/community-testing-explainer/community-testing-a-guide-for-local-delivery>

Comptroller and Auditor General (2020) The government's approach to test and trace in England – interim report, 9 December London National Audit Office. <https://www.nao.org.uk/wp-content/uploads/2020/12/The-governments-approach-to-test-and-trace-in-England-interim-report.pdf>

Comptroller and Auditor General (2021) Test and trace in England – progress update, 25 June. HC 295 <https://www.nao.org.uk/wp-content/uploads/2021/06/Test-and-trace-in-England-progress-update.pdf>

Comptroller and Auditor General (2022) Investigation into the government's contracts with Randox Laboratories Ltd. 24 March. HC 1018. <https://www.nao.org.uk/report/investigation-into-the-governments-contracts-with-randox-laboratories-ltd/x>

Coronavirus Act (2020) Explanatory Notes.
http://www.legislation.gov.uk/ukpga/2020/7/pdfs/ukpgaen_20200007_en.pdf

Department for Business, Energy & Industrial Strategy, DHSC, Hancock, M. and Sharma, A., (2021). Venues required to enforce rule of 6, NHS QR code posters and contact logs.
<https://www.gov.uk/government/news/venues-required-to-enforce-rule-of-6-nhs-qr-code-posters-and-contact-logs>

DHSC (2020a) Chief Medical Officer for England announces 4 further coronavirus cases.
<https://www.gov.uk/government/news/chief-medical-officer-for-england-announces-four-further-coronavirus-cases>

DHSC (2020b) Coronavirus action plan: a guide to what you can expect across the UK.
<https://www.gov.uk/government/publications/coronavirus-action-plan/coronavirus-action-plan-a-guide-to-what-you-can-expect-across-the-uk>

DHSC (2020c) Coronavirus (COVID-19) Scaling up our testing programmes 4 April 2020.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/878121/coronavirus-covid-19-testing-strategy.pdf

DHSC (2020d) Everyone in the United Kingdom with symptoms now eligible for coronavirus tests.
<https://www.gov.uk/government/news/everyone-in-the-united-kingdom-with-symptoms-now-eligible-for-coronavirus-tests#full-publication-update-history>

DHSC (2020e) NHS Test and Trace: How it works 27 May 2020.
https://allcatsgrey.org.uk/wp/download/governance/clinical_governance/guidelines/NHS-test-and-trace-how-it-works-GOV.UK.pdf

DHSC (2020f) Statement from the UK Chief Medical Officers on extension of self-isolation period: 30 July 2020 <https://www.gov.uk/government/news/statement-from-the-uk-chief-medical-officers-on-extension-of-self-isolation-period-30-july-2020>

DHSC (2020g) UK Chief Medical Officers' statement on the self-isolation period: 11 December 2020.
<https://www.gov.uk/government/news/uk-chief-medical-officers-statement-on-the-self-isolation-period-11-december-2020>

DHSC (2021) Government increases support for those self-isolating.

<https://www.gov.uk/government/news/government-increases-support-for-those-self-isolating>

DHSC and Hancock, M. (2020) More rapid COVID-19 tests to be rolled out across England, 9 November. <https://www.gov.uk/government/news/more-rapid-covid-19-tests-to-be-rolled-out-across-england>

DHSC, Johnson, B. and Hancock, M. (2021) Twice weekly rapid testing to be available to everyone in England. 5 April 2021. <https://www.gov.uk/government/news/twice-weekly-rapid-testing-to-be-available-to-everyone-in-england>

Ellison, J. (2014) Letter to Duncan Selbie and David Heymann from Jane Ellison, Minister for Public Health. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/319708/PHE_remit_letter_pdf.pdf

Gleave, R. (2020) 24 April Letter to Directors of Public Health, London: Public Health England <https://www.gov.uk/government/publications/contact-tracing-letter-to-directors-of-public-health>

GOV.UK (2022) Coronavirus (COVID-19). <https://coronavirus.data.gov.uk/details/testing>

Gregory-Kumar, D. (2022) Immensa: Why were Covid test errors at Wolverhampton lab not stopped sooner? 1 April <https://www.bbc.co.uk/news/uk-england-birmingham-60940877>

Griffith. R. (2020) Using public health law to contain the spread of COVID-19, British Journal of Nursing, 29, 5, 326-7.

Gross, A. and Neville, S. (2020) UK faces backlog of nearly 200,000 Covid-19 tests in government labs. 14 September. <https://www.ft.com/content/45a559bd-ec00-426b-9f05-ac962ba49375>

HM Government (2020) COVID-19 Winter Plan. November 2020 CP 324 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/937529/COVID-19_Winter_Plan.pdf

HM Government (2021) COVID-19 Response – Spring 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/963491/COVID-19_Response_-_Spring_2021.pdf

HM Government (2022) COVID-19 Response: Living with COVID. February. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1056229/COVID-19_Response_-_Living_with_COVID-19.pdf

Horvath L., Banducci S., Blamire, J. et al (2022) Adoption and continued use of mobile contact tracing technology: multilevel explanations from a three-wave panel survey and linked data, BMJ Open, 12:e053327. doi: 10.1136/bmjopen-2021-053327

House of Commons Library (2021) Coronavirus: A history of English lockdown laws <https://commonslibrary.parliament.uk/research-briefings/cbp-9068/>

Iacobucci, G. (2020a) Covid-19: Lack of capacity led to halting of community testing in March, admits deputy chief medical officer, BMJ 2020; 369 doi: <https://doi.org/10.1136/bmj.m1845> 6 May.

Iacobucci G. (2020b) Covid-19: Government ramps up “Moonshot” mass testing BMJ 2020; 371:m4460 doi:10.1136/bmj.m4460 17 November.

Iacobucci G. (2022c) Covid-19: Who will be eligible for free testing from 1 April? BMJ, 376:o807 doi:10.1136/bmj.o807 25 March.

Institute for Government (2020) Public Health England, 7 April 2020.
<https://www.instituteforgovernment.org.uk/printpdf/9622>

Leeke, M., Sear, C. and Gay. O. (2003) An introduction to devolution in the UK Research Paper 3/84 London: House of Commons Library. <https://researchbriefings.files.parliament.uk/documents/RP03-84/RP03-84.pdf>

Lewis, J. (2021) The Challenge of Controlling COVID-19: Public Health and Social Care Policy in England During the First Wave, Bristol Policy Press.

NHS (2022) What to do if you have coronavirus (COVID-19) or symptoms of COVID-19 26 May.
<https://www.nhs.uk/conditions/coronavirus-covid-19/self-isolation-and-treatment/when-to-self-isolate-and-what-to-do/>

NHS Providers (2020) Learning lessons for the next phase of the national COVID-19 testing strategy. August 2020. <https://nhsproviders.org/standing-up-to-the-test/introduction>

NHS Test and Trace (2021) Weekly statistics for rapid asymptomatic testing (England): 26 August to 1 September 2021.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1016257/Rapid_testing_210909v2.pdf

Office for National Statistics (ONS) (2021) Coronavirus (COVID-19) Infection Survey technical article: waves and lags of COVID-19 in England, June 2021.
<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19infectionsurveytechnicalarticle/wavesandlagsofcovid19inenglandjune2021>

ONS (2022a) Updated estimates of coronavirus (COVID-19) related deaths by disability status, England: 24 January 2020 to 9 March 2022.
<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/articles/coronaviruscovid19relateddeathsbydisabilitystatusenglandandwales/24january2020to9march2022>

ONS (2022b) Accuracy of COVID-19 tests and how to identify different variants FOI Ref: FOI/2022/3802, 23 February.
<https://www.ons.gov.uk/aboutus/transparencyandgovernance/freedomofinformationfoi/accuracyofcovid19testsandhowtoidentifydifferentvariants>

ONS (2022c) Coronavirus (COVID-19) latest insights: Comparisons 29 June.
<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19latestinsights/overview>

Phin, N. (2020) Coronavirus (COVID-19) Expert interview: What is contact tracing? UKHSA.
<https://ukhsa.blog.gov.uk/2020/02/13/expert-interview-what-is-contact-tracing/>

PHE (2019) PHE Strategy 2020-25: Executive Summary.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/830105/PHE_Strategy_2020-25_Executive_Summary.pdf

PHE (2020a) Guidance for contacts of people with confirmed coronavirus (COVID-19) infection who do not live with the person 28 May 2020.

https://allcatsrgrey.org.uk/wp/download/governance/clinical_governance/guidelines/Guidance-for-contacts-of-people-with-possible-or-confirmed-coronavirus-COVID-19-infection-who-do-not-live-with-the-person-GOV.UK_.pdf

PHE (2020b) Guidance for contacts of people with confirmed coronavirus (COVID-19) infection who do not live with the person 28 September 2020.

https://allcatsrgrey.org.uk/wp/download/governance/clinical_governance/guidelines/Guidance-for-contacts-of-people-with-possible-or-confirmed-coronavirus-COVID-19-infection-who-do-not-live-with-the-person-GOV.UK_.pdf

PHE (2021) PHE: About us. <https://www.gov.uk/government/organisations/public-health-england/about>

Rough, E. (2020) Coronavirus: Testing for Covid-19 Number CBP 8897, 14 October 2020, London: House of Commons Library. <https://researchbriefings.files.parliament.uk/documents/CBP-8897/CBP-8897.pdf>

Scientific Advisory Group for Emergencies (SAGE) SAGE 105 minutes Coronavirus (COVID-19) response, 10 February 2022. <https://www.gov.uk/government/collections/sage-meetings-february-2022>

Selbie, D. (2020a) Duncan Selbie's Friday Message - 20 March 2020.

<https://ukhsa.blog.gov.uk/2020/03/20/duncan-selbies-friday-message-20-march-2020/>

Selbie, D. (2020b) Duncan Selbie's Friday Message 13 March 2020.

<https://ukhsa.blog.gov.uk/2020/03/13/duncan-selbies-friday-message-13-march-2020/>

Trendall, S. (2022) NHS Test and Trace signs £2.5m deal to support Covid-19 app until end of 2022. 10 March 2022. <https://www.publictechnology.net/articles/news/nhs-test-and-trace-signs-%C2%A325m-deal-support-covid-19-app-until-end-2022>

UKHSA (2020a) Pooled testing for coronavirus (COVID-19) pilot: guidance for university students.

<https://www.gov.uk/government/publications/cohort-pool-testing-for-coronavirus-covid-19/pooled-testing-for-coronavirus-covid-19-pilot-guidance-for-university-students>

UKHSA (2020b) Privacy notice for maintaining records of staff, customers and visitors to support NHS

Test and Trace. <https://www.gov.uk/government/publications/privacy-notice-for-maintaining-records-of-staff-customers-and-visitors-to-support-nhs-test-and-trace/privacy-notice-for-maintaining-records-of-staff-customers-and-visitors-to-support-nhs-test-and-trace>

UKHSA (2021) Self-isolation for COVID-19 cases reduced from 10 to 7 days following negative LFD

tests. 22 December 2021. <https://www.gov.uk/government/news/self-isolation-for-covid-19-cases-reduced-from-10-to-7-days-following-negative-lfd-tests>

UKHSA (2022a) Outcome of the evaluation of rapid diagnostic assays for specific SARS-CoV-2

antigens (lateral flow devices). <https://www.gov.uk/government/publications/assessment-and->

[procurement-of-coronavirus-covid-19-tests/outcome-of-the-evaluation-of-rapid-diagnostic-assays-for-specific-sars-cov-2-antigens-lateral-flow-devices](#)

UKHSA (2022b) Guidance Coronavirus (COVID-19): antibody testing. Updated 23 March 2022 <https://www.gov.uk/government/publications/coronavirus-covid-19-antibody-tests/coronavirus-covid-19-antibody-tests>

UKHSA (2022c) COVID-19 surveillance and immunity studies. 28 June. <https://www.gov.uk/government/publications/covid-19-surveillance/covid-19-surveillance>

UKHSA (2022d) SARS-CoV-2 variants of concern and variants under investigation in England Technical briefing 34. 14 January 2022. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1050236/technical-briefing-34-14-january-2022.pdf

UKHSA (2022e) NHS COVID-19 app: privacy notice. Updated 16 May 2022. <https://www.gov.uk/government/publications/nhs-covid-19-app-privacy-information/nhs-covid-19-app-privacy-notice#digital-contact-tracing>

UKHSA (2022f) Guidance for contacts of people with confirmed coronavirus (COVID-19) infection who do not live with the person. Updated 15 February 2022. <https://www.gov.uk/government/publications/guidance-for-contacts-of-people-with-possible-or-confirmed-coronavirus-covid-19-infection-who-do-not-live-with-the-person>

UKHSA (2022g) Stay at home: guidance for households with possible or confirmed coronavirus (COVID-19) infection Updated 15 February 2022. <https://www.gov.uk/government/publications/covid-19-stay-at-home-guidance/stay-at-home-guidance-for-households-with-possible-coronavirus-covid-19-infection>

UKHSA (2022h) Claiming financial support under the Test and Trace Support Payment scheme <https://www.gov.uk/government/publications/test-and-trace-support-payment-scheme-claiming-financial-support/claiming-financial-support-under-the-test-and-trace-support-payment-scheme>

UKHSA (2022i) NHS Test and Trace: what to do if you are contacted 17 January 2022. <https://www.gov.uk/guidance/nhs-test-and-trace-how-it-works>

Wellcome Sanger Institute (2022a) COVID-19: update on SARS-CoV-2 genome sequencing at the Sanger Institute <https://sangerinstitute.blog/2022/05/31/covid-19-update-on-sars-cov-2-genome-sequencing-at-the-sanger-institute/>

Wellcome Sanger Institute (2022b) Sequencing COVID variants: latest stats <https://sangerinstitute.blog/2022/03/01/sequencing-covid-variants-latest-stats/>

Annex C1: Lockdowns in England

Figure C1: Lockdowns and restrictions in England

First national lockdown (March to June 2020)

England was in national lockdown between late March and June 2020. Initially, all “non-essential” high street businesses were closed and people were ordered to stay at home, permitted to leave for essential purposes only, such as buying food or for medical reasons. Starting in May 2020, the laws were slowly relaxed. People were permitted to leave home for outdoor recreation (beyond exercise) from 13 May. On 1 June, the restriction on leaving home was replaced with a requirement to be home overnight, and people were permitted to meet outside in groups of up to six people.

Minimal lockdown restrictions (July to September 2020)

Most lockdown restrictions were lifted on 4 July 2020. Most hospitality businesses were permitted to reopen. New health and safety guidance on operating businesses “Covid securely” was published. Gatherings up to thirty people were legally permitted, although the Government was still recommending people avoid gatherings larger than six.

Reimposing restrictions (September to October 2020)

On 14 September, restrictions for gathering in England were tightened and people were once again legally prohibited from meeting more than six people socially. The new “rule of six” applied both indoors and outdoors. Eleven days later, pubs, bars and restaurants were told they had to shut between 10pm and 6am.

During this period, a range of local restrictions were imposed across England. On the 14 October, the Government rationalised local restrictions by introducing a “three tier system”. At first, most of the country was placed in the least restrictive tier one, which had similar restrictions to the previous national rules. As time went on, more of the country was placed in the higher two tiers.

Second national lockdown (November 2020)

On 5 November, national restrictions were reintroduced in England. During the second national lockdown, non-essential high street businesses were closed, and people were prohibited from meeting those not in their “support bubble” inside. People could leave home to meet one person from outside their support bubble outdoors.

Reintroducing a tiered system (December 2020)

On 2 December, the tiered system was reintroduced with modifications.

Restrictions on hospitality businesses were stricter and most locations were initially placed in tiers two and three. On 19 December, the Prime Minister announced that a fourth tier would be introduced, following concerns about a rising number of coronavirus cases due to a new variant (what was to become known as the Alpha variant, first identified in Kent).

The tier four rules were like those imposed during the second national lockdown. On 30 December, after the first review of tiers under the new system, around 75% of the country was placed under tier four restrictions.

Third national lockdown (January to March 2021)

Following concerns that the four-tier system was not containing the spread of the Alpha variant, national restrictions were reintroduced for a third time on 6 January.

The rules during the third lockdown were more like those in the first lockdown. People were once again told to stay at home. However, people could still form support bubbles (if eligible) and some gatherings were exempted from the gatherings ban (for example, religious services and some small weddings were permitted).

Leaving lockdown (March to July 2021)

On 8 March 2021, England began a phased exit from lockdown. A four-step plan, known as the roadmap out of lockdown, intended to “cautiously but irreversibly” ease lockdown restrictions. Instead of a return to the tiered system, the Government said it planned to lift restrictions in all areas at the same time, as the level of infection was broadly similar across England.

England moved through the roadmap as planned but step four was delayed by four weeks to allow more people to receive their first dose of a coronavirus vaccine.’

Source: House of Commons Library, 2021

Annex C2: NHS Test and Trace

Figure C2: How NHS test and trace service works (May 2020)

'Part 1: for someone with symptoms of coronavirus

1. isolate: as soon as you experience coronavirus symptoms, medical advice is clear: you must self-isolate for at least 7 days. Anyone else in your household must self-isolate for 14 days from when you started having symptoms

2. test: order a test immediately at www.nhs.uk/coronavirus (<https://www.nhs.uk/conditions/coronavirus-covid-19/>) or call 119 if you have no internet access

3. results: if your test is positive, you must complete the remainder of your 7-day self-isolation. Anyone in your household must also complete self-isolation for 14 days from when you started having symptoms. If your test is negative, you and other household members no longer need to self-isolate

4. share contacts: if you test positive for coronavirus, the NHS test and trace service will send you a text or email alert or call you with instructions of how to share details of people with whom you have had close, recent contact and places you have visited. It is important that you respond as soon as possible so that we can give appropriate advice to those who need it. You will be told to do this online via a secure website or you will be called by one of our contract tracers.'

DHSC, 2020e, 27 May 2020

Annex C3: Asymptomatic testing

Figure C3: Testing in different settings and for different occupations (February 2021)

Workplace testing: twice-weekly testing for all those unable to work from home.

Community Testing: local authority-led testing available at asymptomatic test sites on an ongoing basis.

NHS frontline staff: twice-weekly home testing.

Care homes: three tests a week for staff, monthly PCR testing for residents.

Domiciliary carers: weekly testing.

Schools and colleges: twice-weekly testing of teachers and secondary school and college pupils. Live for teachers - full rollout for pupils from 8 March.

Universities: twice-weekly testing for all students and staff currently on-site.

Hauliers: testing to enable cross-border travel.

Other settings (including prisons and hospices): mix of PCR and rapid testing

Source: Cabinet Office, 2021a

Annex C4: Contacts and contact tracing

Figure C4 (a): What is a contact? (May 2020)

A 'contact' is a person who has been close to someone who has tested positive for coronavirus (COVID-19) anytime from 2 days before the person was symptomatic up to 7 days from onset of symptoms (this is when they are infectious to others). For example, a contact can be:

- people who spend significant time in the same household as a person who has tested positive for coronavirus (COVID-19)
- sexual partners
- a person who has had face-to-face contact (within one metre), with someone who has tested positive for coronavirus (COVID-19), including: being coughed on, having a face-to-face conversation, within one metre, or having skin-to-skin physical contact, or any contact within one metre for one minute or longer without face-to-face contact
- a person who has been within 2 metres of someone who has tested positive for coronavirus (COVID-19) for more than 15 minutes
- a person who has travelled in a small vehicle with someone who has tested positive for coronavirus (COVID-19) or in a large vehicle or plane near someone who has tested positive for coronavirus (COVID-19)

Medical advice is clear: contacts of a person who has tested positive for coronavirus (COVID-19) must self isolate at home because they are at risk of developing symptoms themselves in the next 14 days and could spread the virus to others before the symptoms begin.

If you are a contact of someone who has tested positive for coronavirus (COVID-19), then you will be notified by the NHS Test and Trace service via text message, email or phone. If you are notified, please follow the guidance in this document closely.

Source: Public Health England, 2020b, 28 May 2020

Figure C4 (b): NHS Test and Trace: Tracing contacts (updated 17 January 2022)

'If you get a positive PCR test result or report a positive LFD test result, NHS Test and Trace will contact you and ask you to share information about any close contacts you had just before or after you developed symptoms or, if you did not have symptoms, just before or after the date of your test. This is vital to stop the spread of the virus.

NHS Test and Trace will contact you by text message, email or phone. If you are under 18 years old, we will speak to your parent or guardian.

You will be sent a link to the NHS Test and Trace website and asked to create a confidential account where you can record details about your recent close contacts. If you do not have internet access or if you don't complete the online process, one of our contact tracers will phone you to gather this information from you.

The information you give will be handled in strict confidence and will only be kept and used in line with data protection laws. It will help us to contact people who are at risk of having been exposed to COVID-19, explain what they should do to help prevent the further spread of the virus and provide advice.

Some local authorities have their own contact tracing teams who are employed by the local council. NHS Test and Trace may pass your details to these local teams. These teams work with local public health experts and will usually contact you by phone and text. They may visit you at your home to ask you to make further contact with them or to ask about your contacts.

When we contact people to advise them to get a test or self-isolate (or both), we do not tell them your identity. But if you have alerted them when you first develop symptoms or when you get your test result, they will be better prepared for the advice we give them.

When we contact you

If NHS Test and Trace contacts you, the service will use text messages, email or phone.

All texts or emails will ask you to sign into one of these 2 NHS portals:

- NHS Test and Trace
- NHS Test and Trace contact tracing

NHS Test and Trace will only ever call you from the phone number 0300 013 5000.

All information you provide to NHS Test and Trace is held in strict confidence and will be kept and used in line with the Data Protection Act 2018.

Contact tracers will:

- call you from 0300 013 5000 – local contact tracers will contact you from a local council number but if you're unsure if this is genuine, contact your local council for advice
- send you text messages from 'NHStracing'
- ask you to sign into either NHS Test and Trace or NHS Test and Trace contact tracing
- ask for your full name to confirm your identity, and postcode to offer support if you are required to self-isolate
- ask about the COVID-19 symptoms you have been experiencing
- ask you to provide the name, telephone number and/or email address of anyone you have had close contact with in the 2 days prior to your symptoms starting
- ask if anyone you have been in contact with is under 18 or lives outside of England

...

What we will ask you

We will ask you:

- if you have family members or other household members living with you. Unless they are exempt, they must continue to self-isolate for the rest of the 10-day period from when your symptoms began or, if you did not have symptoms, from the date of your test
- if you have had any close contact with anyone other than members of your household. We are interested in the 2 days before you developed symptoms and the time since you developed symptoms. Close contact means:
 - having face-to-face contact with someone less than 1 metre away (this will include times where you have worn a face covering or a face mask)
 - having been within 2 metres of someone for more than 15 minutes (either as a one-off contact, or added up together over one day) travelling in a car or other small vehicle with someone (even on a short journey) or close to them on a plane
- if you work in, or have recently visited, a setting with other people (for example, a GP surgery, a school or a workplace) – the use of face masks and other forms of PPE does not exclude somebody from being considered a close contact, unless they are providing direct care with patients or residents in a health and care setting

We will ask you to provide, where possible, the names and contact details (for example, email address, telephone number) of the people you have had close contact with. As with your own details these will be held in strict confidence and will be kept and used only in line with data protection laws.

If NHS Test and Trace identify you as a contact, you are not exempt from self-isolation, and you work in a critical service where the instruction for you to self-isolate would have impact on providing that critical service, your employer will need to escalate this to the local health protection team (HPT) for a risk-assessment.

How this information is used

Based on the information you provide, we will assess whether we need to alert your contacts and provide them with advice on steps they should take to protect their family, friends and local community.

We may refer the case to local public health experts if you work in or have recently visited:

- a health or care setting, such as a hospital or care home
- a prison or other secure setting
- a school for people with special needs
- critical national infrastructure or areas vital for national security
- when NHS Test and Trace has been unable to contact you after an agreed amount of time and your local authority has set up a system to take over your case

Local public health experts are UK Health Security Agency (UKHSA) staff and teams employed by your local authority, who work together with all parts of the local community to prevent or respond to local outbreaks.

Annex C5: Isolation

Figure C5: Guidance on isolation (May 2020)

Self-isolation advice

Stay at home for 14 days after your last contact with the person who has tested positive for coronavirus (COVID19).

Do not go to work, school, or public areas, and do not use public transport or taxis.

You must not go outside even to buy food or other essentials, and any exercise must be taken within your home.

Self-isolating at home for the 14-day period will help protect your family, friends and the NHS.

Self-isolating at home in this way can also protect the most vulnerable in society, by reducing the chance of a second wave of coronavirus (COVID-19) in the wider community.

If you are living with children, keep following this guidance to the best of your ability, however, we are aware that not all these measures will be possible.

We are aware that not all these measures will be possible if you, or those you are living with, have significant conditions such as learning disabilities, autism or serious mental illness. Please keep following this guidance to the best of your ability, while keeping yourself and those close to you safe and well, ideally in line with any existing care plans.

Where possible, arrange for anyone who is clinically vulnerable...and clinically extremely vulnerable... to move out of your home, to stay with friends or family for the duration of your home isolation period.

If you cannot arrange for vulnerable people to move out of your home, stay away from them as much as possible, following the guidance. For the clinically extremely vulnerable please follow the shielding guidance...

Source: PHE 2020a, 28 May 2020