

# Evaluation of the expanded Southampton pilot study (Phase 2) for use of saliva-based lamp testing in asymptomatic populations

## Final report, 16th November 2020

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## Executive summary

The Southampton COVID-19 Testing Programme Phase 2 Study has conducted saliva testing successfully in educational settings between September 14<sup>th</sup> and October 31<sup>st</sup> 2020. Staff, students/pupils and contractors at four schools (an infant, junior, primary and secondary) and at the University of Southampton were included. The contract was initiated on August 3<sup>rd</sup> 2020, though planning had started before that date.

Phase 2 drew heavily on the systems and procedures used in Phase 1, with most of the multi-disciplinary team involved in Phase 1 continuing into Phase 2, with extra expertise, particularly in relation to schools, being added. It has established the feasibility, acceptability and utility of saliva testing in schools and the University. Key factors in its success were:

- Continuity of expertise and the learnings from Phase 1
- Highly motivated, creative and engaged team members
- Early establishment of governance, programme management and workstreams
- Strong engagement from the leaders of the schools, the university and local government
- Well-developed laboratory, IT, enquiries and case contacting systems
- Good liaison between all partners
- Excellent communications and engagement materials
- Bespoke educational materials developed to meet the needs of teachers in the classroom
- Timely feedback from participants, leading to rapid and iterative modifications

A significant step in Phase 2 was the development of the legal framework to enable mass transfer of personal details from the schools to the NHS systems, so that registrations could be conducted for each school with the option for staff or parents to opt-out. Asking parents to register their children individually would have reduced participation and increased inequalities in access to testing. The legal frameworks adopted have been shared with the Department for Education, and are being developed as the basis of the legal framework for other school testing programmes. External contractors at the schools opted-in to the system by contacting the enquiries team at Southampton City Council Customer Services. Testing in two schools started on September 21<sup>st</sup> with the remaining two schools starting on September 28<sup>th</sup>. In total, 7,549 tests were conducted by staff and pupils in the four schools before the half term week.

Some 2,284 school staff, contractors and students were registered for the programme and of these 2,043 (89.5%) in the four schools submitted at least one sample during the testing period. Engagement of the schools, both pupils and staff, was high, and the schools warmly welcomed the testing programme. During the testing period, only three pupils tested positive and no staff or contractors. During the pilot, with regular testing and high participation rates, there was no evidence of any within school transmission of infection whatsoever. Inconclusive results, which were due to insufficient or occasionally a leaked sample occurred in 57/6,162 tests in pupils (0.9%).

Within the University, a different approach was used in that students were asked to register themselves, thus an opt-in approach rather than opt-out. University staff and contractors were not invited but were asked to register for testing if they fitted certain risk criteria, and this was a self-selection process; testing capacity was limited so eligibility focused on those most exposed to others. Testing of university students started on September 14<sup>th</sup>; though uptake was slow initially as most students had not arrived in Southampton by then. University staff started testing on October 5<sup>th</sup>. In total, 19,458 tests were conducted by University staff and students by October 31<sup>st</sup>.

In time for the last week of testing, 12,353 students had registered for the programme and so were eligible to have done at least one test within Phase 2. Of these, 77.9% provided at least one sample. There are currently 18,823 students registered at the University of Southampton, but not all of these

would have been in Southampton as they were studying online elsewhere, or were on placements. Some 1,593 staff and contractors registered and 18.5% provided at least one sample. Positive tests occurred for 56 students but none for staff. During the time period covered by the programme, test positivity rates increased exponentially in Southampton and in almost all other universities, but such a rise was not seen in the University of Southampton population in spite of continuation of some face-to-face teaching; the regular testing programme was felt likely to have contributed to this suppression of transmission. Inconclusive results, usually due to inadequate saliva sample were not common, occurring in 29 of 28,572 tests (0.1%).

The Animal and Plant Health Agency laboratory conducted all the testing, as in Phase 1. The methods for the Direct-LAMP testing were refined further and a full protocol has been produced and is provided in this report as an appendix to section 2e. The number of tests per day that could be conducted was limited to a maximum of 2,000 so modelling and monitoring the numbers was a necessary part of this Phase. The 2,000 limit was never breached. The percentage of results that were reported to participants within 24 hours of receipt in the laboratory was 97%, and 95% were reported within 12 hours.

Sophisticated IT systems were developed to manage the registrations, label printing, linking participants to their results, storing results and communicating them to participants. Results had to be made available to the GP-led Case Contacting Team (CCT) through the Oracle Application Express (APEX) system and to feed into the participants' GP records. The CCT reminded those testing positive to inform their school or the University. Positive results were sent to NHS Test and Trace. Southampton City Council's Customer Service Team, who were already established, were equipped to deal with enquiries also had to have access to certain information, though they did not see actual test results. These systems have been highly developed through Phases 1 and 2 and are being rolled out in other parts of the country where testing is being undertaken.

A steering group comprising senior representatives from each of the partners was formed – this included the University, Southampton City Council, the University Hospital Southampton and the Southampton City CCG. The steering group provided strategic guidance for the programme, while the operational activities were directed by a programme management group that met every weekday. The members of this multi-disciplinary team were highly committed and motivated to make the testing scheme work. Expertise required included: project management, business analysis, logistics, procurement, law, communications, engagement, education, finance, university and school organisation, public health, clinical, epidemiology, statistics, laboratory procedures, handling enquiries and evaluation. Work stream groups were established for key elements of the programme as in Phase 1. They met frequently, sometimes daily, to keep the work on schedule and to iron out difficulties rapidly when they arose.

Successful engagement of participants was key to the success of the programme. Schools were highly motivated and all four schools worked extremely hard to engage their staff and pupils. Highly successful education and engagement materials for both primary and secondary school students were designed and delivered in the schools by our LifeLab scientific literacy team and material was translated into seven languages to assist parents. This was accompanied by continuing professional development for the school staff. All these aspects were highly valued by students and staff, and undoubtedly contributed to the success of the programme. Based on our insights into science for health literacy to reduce COVID-19 transmission through engagement with testing and other measures, the University has received funding from Department of Health and Social Care (DHSC) to develop educational materials for national application focused on young people's decision-making and resilience to support themselves and their communities, and this work is underway.

Engagement with university staff and students was by email, text, social media and university websites. It was noted that it was hardest to engage the older secondary school pupils and the university students. Participant experiences were captured and revealed a variety of reasons why some people did not engage in the programme or only took part occasionally. These are described in detail in sections 2d and 3d of the report.

Building on the work of the Enquiries Team in Phase 1, Southampton City Council Customer Services took on the enquiries function for Phase 2. They were open seven days a week, but the hours of opening were tailored to demand through the programme. They had received 1,095 calls and 694 webchats by October 31<sup>st</sup>.

As in Phase 1, Southampton Primary Care Ltd (SPCL, the local GP federation) provided the GP-led Case Contacting Team. They contacted those who tested positive and those with inconclusive results. They assessed isolation, public health, clinical presentation and social support issues, and advised or signposted accordingly. A core Case Contacting Team (CCT) was also established comprising public health consultants, public health academics and public health specialty registrars. This team provided operational management of the SPCL Case Contacting Team, and provided public health oversight and input to all aspects of the programme.

The programme has been warmly embraced by Southampton City Council as a contribution to the efforts to contain the pandemic. Dr Debbie Chase, Director of Public Health has commented as follows:

*“As Director of Public Health for Southampton, I am very proud to support the Southampton saliva testing pilot programme. This ambitious and innovative testing programme is offering us a more frequent, easier to undertake tests to better protect our residents.*

*In the second Phase of this pilot, we are assessing provision of testing in some of our schools and at the University of Southampton. To date, experience of testing has been very positive and has provided reassurance to students, staff and their families. It has offered an opportunity for our educational settings to continue to provide a high quality educational experience for our children and young people whilst enabling extra vigilance in managing the risk of COVID-19 through the regular testing approach.*

*I look forward to reviewing the results of this second Phase and the potential for the third Phase of this programme.”*

Under Phase 3 of the programme, testing has continued in the four schools and the University, with 51,022 tests completed as of 14<sup>th</sup> November 2020. All positive tests have been confirmed by E gene PCR and no false positives have been recorded. E gene PCT C<sub>T</sub> values for the positive samples have ranged from 17.4 to 34.0, similar to the range of C<sub>T</sub> values seen in cell culture positive samples in published reports.

## Purpose of the report

This report serves to describe the Southampton Phase 2 saliva testing programme. Separate to formal reporting requirements of the DHSC-funded service evaluation, the aim is for this report to provide a form of manual as guidance for any group that wishes to undertake similar testing.

The report below begins with a general overview of the programme, but then more detailed sections follow relating to: the overall programme; the work in schools; and the work in the University.

Further details are given in the annexes, as follows:

1. Process maps of the entire testing system
2. Instruction leaflet for providing a saliva sample
3. "Google jam boards" containing the reflections of the teams on their work
4. Communication team overview of the University students and staff experience
5. Newsletters sent to schools each week
6. Post-it notes from pupils at the secondary school giving their views on saliva testing

## **Programme overview and summary of recommendations**

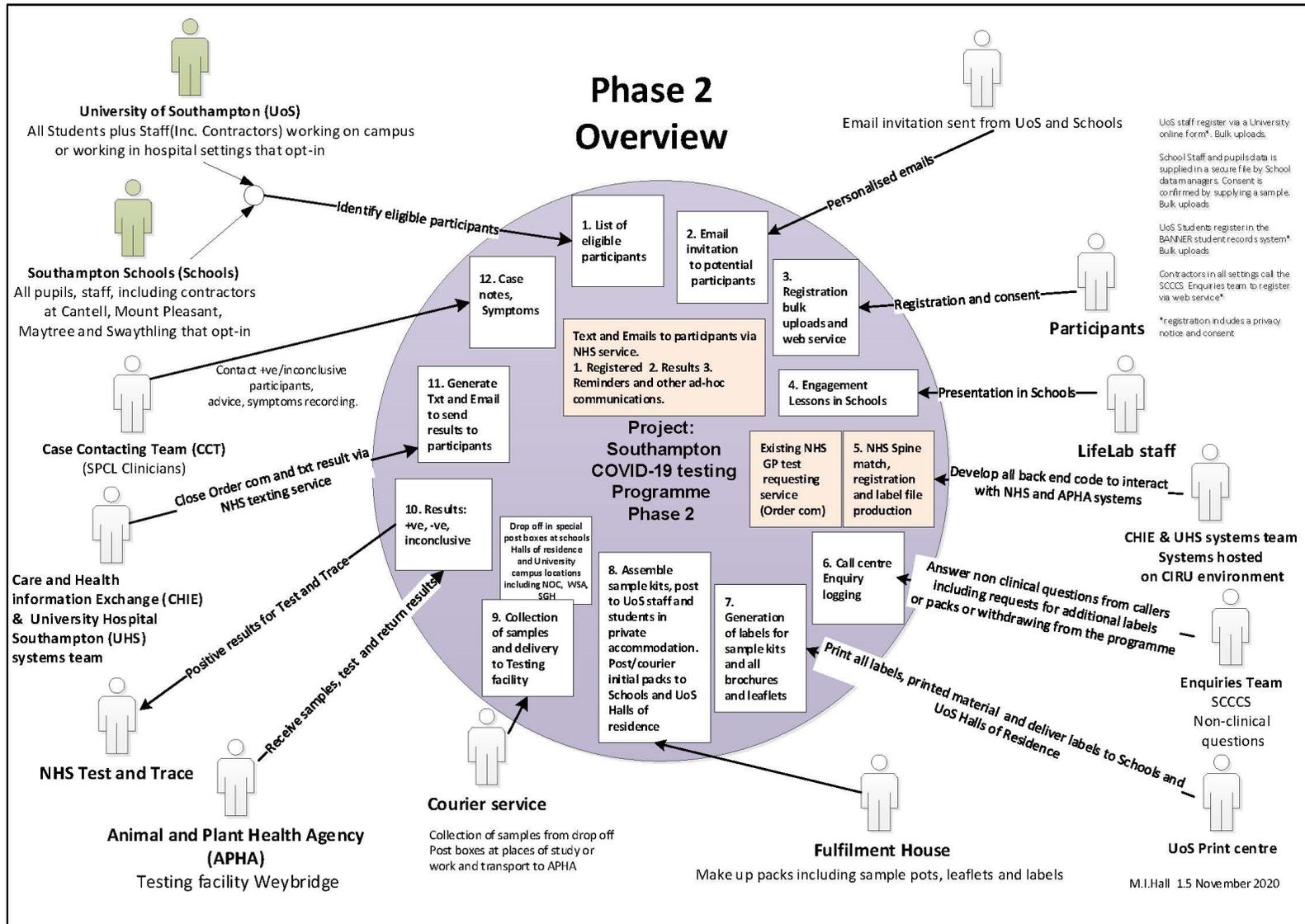
This overview provides a summary of the various aspects of work conducted within the programme, as well as an insight into the results. Specific recommendations in relation to some aspects of the work are also provided, to assist those who wish to set up similar programmes. The topics covered here are addressed in much more detail in the body of the report in three separate chapters:

1. Context
2. Overall programme issues
3. School-specific issues and test results
4. University-specific issues and test results

The summaries here mirror the format of the main chapters and their sub-sections. For most aspects, specific recommendations are made, but further, more detailed, recommendations are provided in the main part of the report.

The figure below outlines the processes required for conducting Phase 2 of the programme. This shows the various stages required in order to conduct the testing. Within the sections below, and in more detail in the body of the report, all these steps are described and explained.

Figure: Overview of programme systems



Specific areas described in the body of the report are summarised below and greater detail is provided on each area in later sections of the report:

## **1. Context**

Phase 2 of the testing programme was implemented in Southampton over a seven-week period from 14th September to 31st October 2020. Southampton is a major port on the south coast of England. It has significant pockets of deprivation and life expectancy is lower than the national level for men and women. This Phase of the testing programme concentrated on educational settings – four schools (one infant, one primary, one junior and one secondary school) and the University of Southampton. At the start of Phase 2, less than 1% of NHS Pillar 2 tests for symptomatic disease were positive, with a positivity rate in the population of around 6.7 per 100,000 population per week. By the end of October, when this Phase was completed, the proportion of Pillar 2 tests that were positive had risen to 8.8% and the positivity rate was more than 150 per 100,000 population per week.

## **2. Overall programme**

### **2a. Governance and programme management**

Overarching governance was provided by a Steering Group comprising leading figures in the key partners in the programme. The day-to-day operations were managed by a Programme Management Group that was formed from the leaders of the various work streams and others playing key roles; this group met each weekday. Workstreams were established early on and worked at pace. Trust, commitment, responsibility, and imagination were vital at all levels and everyone worked together for the good of the programme.

#### **Recommendations:**

- Governance and structures need to be established early on
- Partnership working throughout with strong communication channels is required
- Use best practice project management processes and documentation
- Skilled project managers and business analysts required for early planning and to continue throughout
- Strong leadership with an open and inclusive team culture
- A team committed to common values and behaviours to deliver the programme

### **2b. Communications**

A communications team was established. The communications lead participated at programme board level, giving strategic advice on communications issues and liaison with the DHSC and the Cabinet Office. The communications team included representation from key partners (Southampton City Council, University of Southampton) and experts in engagement and behavioural science. Daily meetings of the team allowed coordination, horizon-scanning and resolution of emergent and reactive issues. The tight oversight/sign-off mechanisms, combined with challenges in gaining engagement or timely responses on queries, media requests and sign-offs communications, presented challenges for the programme. Active and responsive engagement with democratic representatives was well received and generated goodwill and informed engagement with the programme by these representatives and their constituents. Communication during the course of the programme was a challenge and there was insufficient resource to develop an independent identity for the programme, with a dedicated website.

#### **Recommendations**

- It is important to have a programme-level communications lead encompassing programme board counsel, strategic direction and senior communication stakeholder engagement responsibility

- Ensure that funders appreciate the need for early and wide publicity about the programme locally to facilitate wider engagement in the programme by participants. This should include ongoing updates about programme uptake and testing results
- Include key partners and experts in a communications and engagement group
- Dedicate resource to communication throughout the programme
- Allow enough resource to develop an independent identity for the programme, with a dedicated website, to build trust and confidence among participants

### 2c. Logistics

The logistics team managed all the procurement of supplies, using readily available components, contracting the courier services, the finance, organising the distribution of test packs including resupply when necessary, preparation and distribution of labels, arranging sample drop-off points and collection boxes. Business analysts and project managers were part of the team and provided strong oversight. Liaison with other teams was required such as: the laboratory in relation to samples that could not be linked properly; providing answers for FAQs for the enquiries team; providing input parameters for the modelling of test numbers per day; negotiating with the schools about logistics; and liaison with the university, in particular the leads for managing halls of residences.

#### Recommendations

- Use of standard supplies for ease of procurement and setting up regular orders
- Dedicated procurement and finance staff
- Rapid communication channels, for example using the MS Teams chat function
- Identify better post boxes, which have fewer touch points and allow for a master key for all those in use
- School and university staff need to be able to contact key people quickly and *vice versa*, so establish the links early on
- For schools, provide packs containing sufficient supplies for a full half term

### 2d. IT systems

The IT system was central to the efficient functioning of the programme. It brought together all the registration data from the various sources in schools and the University, linked them to the participants' NHS and GP records, enabled labels to be printed, linked with the laboratory for test results, enabled text messages to be sent to participants to ask them to take their next test and to provide test results, and provided real time summaries of results. Parts of the system were accessible to Southampton City Council Customer Services Enquiries Team, and to the Case Contacting Team to enable their work to function smoothly. Much of the development from Phase 1 fed into this system but was considerably enhanced through Phase 2. Frequent meetings between the systems team, members of the Enquiries Team and members of the Case Contacting Team were essential for a smooth operation of the system.

#### Recommendations

- Highly skilled team members are needed, who are freed up from other roles
- An out-of-hours support service
- Efficient processes needed for managing access to the system, with all documents held centrally in one place only
- Rigorous validation of incoming data
- One label only on pots and none on the bag to avoid confusion
- Develop reporting systems early on and automate them as much as possible

### 2e. Laboratory processes

The sample preparation conditions and testing workflow for saliva Direct RT-LAMP testing methodology were developed in Phase 1 in Southampton. These were developed further in Phase 2,

with further rigorous validation, and the transportation chain requirements from sample collection to analysis have been defined. A full protocol for use of the OptiGene Ltd. COVID-19 Direct Plus RT-LAMP Kit for the detection of SARS-CoV-2 directly from saliva or swab samples has been produced (Appendix 1e.1 at the end of section 1e). The Phase 2 team contributed to and were part of the National Steering Group for the allied NHS-England/Improvement “Mission 2” pilot of daily saliva testing in NHS staff in Southampton, Basingstoke, Birmingham and Manchester; within this study paired positive and negative saliva and swabs were subjected to RT-qPCR (Viasure), Direct RT-LAMP, RNA RT-LAMP and a subset were run on LamPORE. The detailed results of this service evaluation and validation study are outside the scope of this report, but showed high acceptability of saliva testing, with good sensitivity and specificity of RT-LAMP testing across the range of viral loads that have been associated with transmission of infection.

#### *Recommendations*

The following steps have been optimised following this development Phase and are recommended for future use:

- Analysis is not required in duplicate
- A synthetic positive control should be included in the process for every LIMS reporting time point
- The mucolyse and Chelex steps have been replaced by dilution (50µl:50 µl) in Optigene Lysis Buffer B and subsequent 98°C heat treatment for 2 minutes

#### *2f. Modelling to predict numbers*

As there was a limit on processing capacity at the laboratory, it was necessary to ensure that the maximum number of 2,000 samples per day was not breached. Modelling was used to manage this challenge, though defining the inputs was difficult in the presence of much uncertainty, particularly in relation to when University students would arrive in Southampton. The model worked better after the initial period when more of a steady state had been reached. The model needed to be refined throughout, and comparison between predictions and the actual numbers was an important part of the process. Twice a week, the model was used to provide estimates of tests for the laboratory.

#### *Recommendations*

- Models are helpful for prediction of numbers, but at the outset, in the presence of too many poorly known input variables, they function less well than in a steady state
- The model needs to be reviewed regularly to see how the results compare with the actual number of tests done, and then modifications made accordingly.

#### *2g. Enquiries Team*

For Phase 2, Southampton City Council Customer Services (SCCCS) provided the Enquiries Team function. Training was provided remotely via MS Teams. Participants in the programme could contact the Team by phone or using webchat, the latter being an addition in Phase 2, that was welcomed and used extensively, particularly by University students. Process development built on that in Phase 1 and was carefully documented and expanded as necessary. Use of the system was monitored, which enabled the hours of operation to be reduced as few enquiries were made at the beginning or end of the day. During Phase 2, 1,095 calls and 694 webchats were made to the Enquiries Team. The FAQs from Phase 1 were expanded as new issues arose, and excellent liaison with members of the programme team who could answer new questions meant that enquiries could be dealt with speedily. The Enquiries Team needed good access to information sent to participants and to details of individuals; they did not have access to test results and this was never needed. They could refer participants to the Case Contacting Team if necessary.

#### *Recommendations*

- Chat system online for Enquiries Team members to communicate with each other
- Good liaison with participant groups and an understanding of the needs of each

- Single viewpoint of a participant's record should be available to Enquiries Team, including test schedule, all texts/emails sent, all interactions with the Enquiries Team, but no access to test results
- End-to-end testing of the whole system from registration to receiving results, including an overview of communications, to ensure the best customer experience for participants
- Webchat or similar method of electronic communications as well as a freephone number
- Host more FAQs/information online for those who find this a useful way of accessing information
- Direct link from the Enquiries Team to the Case Contacting Team to ensure support for participants can be provided in a timely way

## **2h. Case Contacting Team**

The Case Contacting Team was composed of two teams: a core team of public health consultants and registrars and a contracted team provided by Southampton Primary Care Limited (SPCL). The core team led contact tracing at an operational level, including liaison with the testing programme team, and also provided the main link to schools and universities during testing for the delivery of the programme. The contracted SPCL team dealt with calls to participants about positive and inconclusive tests and dealt with other issues such as problems with samples. Using the established SPCL clinical triage team was seen as an advantage, particularly as extra staff could be brought in if needed.

### **Recommendations**

- Text messages about positive tests need to be sent to the Case Contacting Team quickly to allow prompt contact with people who have tested positive
- Senior managers from participating settings (in this case – schools and a university) should be involved from the outset as a point of contact for out of hours test notification
- Testing instructions should be clear in order to avoid confusion, especially for inconclusive tests
- Clinical and social support for positive cases is needed with particular attention to mental health issues resulting from self-isolation
- Call handlers need appropriate skills – advanced nurse practitioners and paramedics were used successfully in the programme
- A single IT system is necessary for efficient management of results and calls – the programme used the APEX system

## **2i. Liaison with external organisations**

During Phase 2, we continued to collaborate with partners and stakeholders across Southampton and further afield. In particular, we worked closely with Southampton City Council and the local Director of Public Health, the Health Protection Board, NHS Test and Trace (NTAT), Public Health England and the local Health Protection Team (HPT). Such liaison is vital for a testing programme to succeed, and to be properly integrated with other systems, and we built on long-standing links as well as those developed and strengthened in Phase 1. We also gave support to other groups by providing resources for schools to engage children and young people in the concept of surveillance/mass testing to increase acceptability and participation.

### **Recommendation**

- Ensure good links with local authorities, NHS bodies and public health organisations to ensure integration of the testing programme with other activities to curb the pandemic

## **3. Schools**

### **3a. Legal**

Each school is required to identify a clear purpose for sharing data and then an appropriate lawful basis for doing so. The programme needed to be as inclusive as possible and it was realised early on

that operating on a lawful basis of 'consent' would jeopardise that and would delay participation. After extensive consultation, it was agreed that the appropriate lawful basis for the work in schools was public task (although consideration was also given to legitimate interests). To rely on public task the schools had to satisfy themselves that their overall purpose was either performing a public task or exercising official authority with a sufficiently clear basis in law. All schools complied with their accountability obligations by: (i) taking legal advice; (ii) carrying out a Data Processing Impact Assessment (even when one was not legally required); (iii) entering into a Data Sharing Agreement; and (iv) documenting the decision and reasoning for relying on the lawful basis of public task. This allowed the data transfer from schools to the NHS for registration of staff and pupils into the programme and for testing to begin. Staff and parents could ask to opt-out and their registration data would then be removed. The schools' privacy notices were reviewed and amended as necessary and a joint privacy notice was issued for the programme. The work has resulted in suitable templates for use in other schools for individual privacy notices, joint privacy notices, data sharing agreements and DPIA. This information has been shared with the Department for Education and forms the basis for national templates that are being developed.

#### **Recommendations**

- The procedures and documents developed here can be used by other schools engaging in similar testing programmes
- Incorporate amendments to the data sharing agreements and privacy notices to allow for senior leaders in each school to receive information directly about positive tests, so that procedures for minimising onward transmission of the virus can be enacted as speedily as possible. Letters would need to be sent to parents and staff to inform them about this.

#### **3b. Communications**

Letters were sent to parents to introduce the programme to them as an extension of the previous pilot phase. Weekly newsletters were sent to staff, parents and pupils. These encouraged engagement by showcasing programme activities, giving reminders about testing procedures and answering frequently asked questions, and included links to appropriate video clips. The newsletters are available in Annex 5 in the separate Annex document.

#### **Recommendation**

- Provide appropriate communication throughout the programme to enhance engagement by providing updates, reminders and answering questions

#### **3c. Results**

Uptake of the programme was high with almost 100% of staff and pupils registering with the programme. Registration rates were slightly lower among external contractors at the schools (e.g. cleaners, peripatetic teachers) at 85%. Engagement with the programme was high with almost 90% of those registered providing at least one sample. Provision of samples varied according to year group amongst pupils with somewhat lower rates in year R (children aged 4 to 5 years) than for other years. Engagement was highest among pupils in years 3 and 4 at primary school level and years 7 and 8 at secondary level. There were only three positive tests during the seven-week period covered by the programme. These were among secondary school pupils and were not related to contact at school. There were 57 inconclusive tests (a rate of below 1%), all occurring among pupils. Inconclusive tests were more common among younger pupils.

#### **3d. Engagement and participant experiences**

LifeLab is a novel educational intervention designed to empower secondary school students through science enquiry to understand the consequences of lifestyle choices on their own health. This team were brought in to develop primary and secondary schools' lessons to communicate with school students from Year R - Year 11. They also provided teacher professional development, to give teachers skills, confidence and knowledge to deliver these sessions and provide opportunities for

school students to ask questions. This team were invaluable to ensure that school students and teachers had correct scientific information and understood the need for testing. They were brought in during Phase 2 due to their expertise with this cohort. A range of approaches was used to promote pupil engagement with the programme. These included interactive classroom activities, delivered by teachers who had received professional support, at primary school level, and group assemblies at secondary school level, delivered by the University's LifeLab team using Zoom. Engagement was evaluated using semi-structured interviews and focus groups with students, parents, staff and school leaders. These demonstrated the importance of good communication throughout all stages of the programme to facilitate engagement. Other factors that were important for engagement included a feeling of community spirit and the perceived benefit amongst participants in terms of their ability to interact with family and friends without putting them at risk of infection. Responses from participants suggested several steps that could optimise engagement further. These included extra support for participants who test positive, and their families, and increasing accessibility and inclusivity for those for whom English is not their first language and for those whose religious beliefs make them less likely to take part. Teachers and parents felt that non-participation might be due to concerns about data privacy, about the accuracy of the tests and because some people were not taking the virus seriously.

### *Recommendations*

- Use interactive activities to engage pupils
- Ensure communication is clear and continues throughout the programme, and look for ways to harness community spirit
- Build trust in the testing programme
- Provide updates about the results of the programme as it goes along
- Provide extra support for participants, and their households, after positive tests
- Consider the need to increase inclusivity – providing more translations of study information and considering the needs of religious groups

## **4. University**

### **4a. Legal**

In contrast to the processes for the schools, University staff and students were asked to opt-in to the programme and provided their consent through registering on University systems that were adapted for the purpose, with different procedures for students and staff. Accordingly, the University has used consent and legitimate interests as the lawful basis for sharing data in phase 1 and 2, however, it has formed the view that for scaling up, the lawful basis which should be relied on is public task as there is justification for the overall purpose as being performing a public task or exercising official authority, both of which have a sufficiently clear basis in law. However, the systems in place for Phase 1 and Phase 2 were such that consent or legitimate interests were applied in the early phases. Data Protection Impact Assessments (DPIAs) were completed by all relevant parties. Data sharing agreements were put in place between the University, Southampton City Council and University Hospital Southampton NHS Foundation Trust and these informed the subsequent data sharing agreements and the privacy notices. It was recognised through the programme that there was a need for the University to be informed rapidly about positive test results, rather than waiting for the participant to inform them, to avoid delay in managing the risk of virus transmission; this is being addressed, again on the basis of public task and amendments to the data sharing agreements and joint privacy notice, and needs to be built into future documentation for scaling up.

### *Recommendations*

- Use public task as the lawful basis for saliva testing programmes, rather than relying on consent or legitimate interests. This must be supported by the necessary assessment through the DPIA process, data sharing agreements and privacy notices. Transparency in communications is

essential and all documentation should be drafted to develop trust and confidence in participants.

- Incorporate amendments to the data sharing agreements and privacy notices to allow appropriate senior University leaders to confidentially receive information directly about positive tests, so that procedures for minimising onward transmission of the virus can be enacted as rapidly as possible. Staff and students also need to be informed of this.

#### **4b. Communications**

The communications team worked closely with the equivalent team in the University to develop communication targeted at students and eligible staff. Approaches to communication with students included emails, targeted flyers in halls of residence, intranet posts and use of social media. Engagement activities, described below, gave insights into student attitudes at the start of the programme but resource constraint limited ability to monitor student attitudes over time. Invitations to participate were sent to staff using emails from University leaders. Reminders and updates were sent via the University Intranet and staff newsletters.

#### **Recommendations**

- Work with university partners to plan appropriate approaches to communication at the start of the programme and to encourage ongoing engagement
- Allocate resource to allow ongoing monitoring of attitudes during the programme

#### **4c. Results**

All University of Southampton students (n=18,823) were invited to take part, but only staff doing face-to-face or other higher-risk work were asked to register. As many students had not returned to the University, it was hard to define the denominator and so registration rates cannot be reported accurately. Students in halls of residence were asked to provide samples weekly, but due to laboratory capacity issues, those in private accommodation were asked fortnightly. In the first few weeks of the programme, there were few positive test but this increased in the last few weeks as more students arrived at the University and local rates increased. Up to the end of the programme on 31<sup>st</sup> October, there were 56 positive saliva tests – all among students. In the same period, there were 103 positive NHS Pillar 2 tests for symptomatic disease. Positive test rates were highest in Week 4 of the programme at 0.4%, which is equivalent to 400 per 100,000 per week. There were 25 inconclusive samples – a rate of 0.1%. Among students, 80% of those living in halls of residence returned at least one sample, slightly higher than for those in private accommodation (77%). There were no positive tests among staff and contractors and four inconclusive results. Some staff were tested weekly and others fortnightly. More than 85% of staff and contractors who registered provided at least one sample.

#### **4d. Engagement and participant experiences**

The University LifeLab Team delivered activities to promote engagement with the testing programme among students. These included socially distanced Gazebo Chats in halls of residence to find out students' attitudes to testing, and COVID-secure Escape Rooms. University Safe-campus Ambassadors were also involved in talking with students about the programme and encouraging participation. Engagement with and participant experiences of the programme were assessed using semi-structured interviews (n=25) and focus groups (n=11). Overall, 108 people were involved in interviews or focus groups and this included four students who declined to participate in the testing programme. Participants valued many aspects of the programme including the engagement activities, the ease of registration and availability of drop-off points, the general clarity of instructions and phone calls from the Case Contacting Team about positive tests. Students valued the reassurance that the programme provided which made them feel they could visit friends and relatives knowing that they had tested negative. Those with inconclusive test results appreciated the communication and advice they received. Among those who declined to participate, reasons for

non-participation included the potential inconvenience of dropping off samples and having to use public transport to do so, a desire to avoid the disruption to their lives that might come from a need to self-isolate, not wanting their DNA to be harvested, loss of data privacy and not taking the virus seriously. University leaders were very positive about the programme, believing it had allowed the University to function effectively, and had improved public and student perception of the University.

*Recommendations*

- Use interactive activities to engage students and consider involving peers
- Ensure communication is clear and continues throughout the programme
- Provide extra support for participants, and their contacts, after positive tests and consider the effects of self-isolation on mental health

## Report chapters

### 1. Context – place, timeframe, phase of the pandemic

Phase 2 of the saliva testing programme was conducted in Southampton, with the contract running from August 3<sup>rd</sup> to October 31<sup>st</sup>.

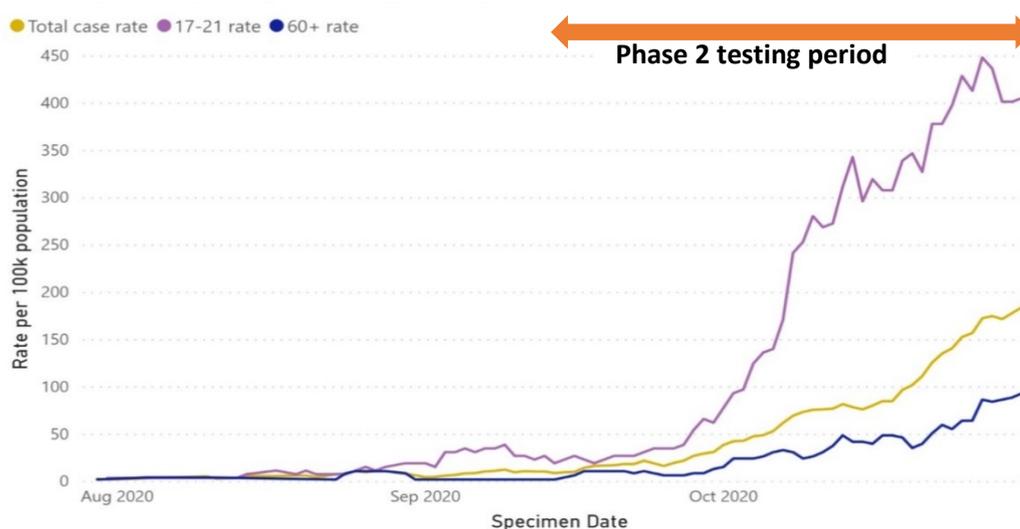
Southampton is a city with a population of a quarter of a million and is a major port on the south coast of England. It had an estimated population of 256,459 in 2018. It has a young population; the proportion aged 15-24 years was 19% higher than the national average of 12% reflecting the large student body at its two universities (Southampton and Solent). Only 13% of the population were over 65 years, lower than the national average of 18.2%. Life expectancy for both males and females is lower than at national level reflecting persistent health inequalities. There is a large gap in life expectancy between the 20% most deprived areas of the city and those living in the 20% least deprived areas, at 6.6 years for men and 3.1 for women. In the 2011 Census, 22.3% self-classified as non-White British, including a large Polish community. In school pupils in 2018, the non-White British figure was 37.2% and over a quarter of pupils did not have English as their first language.

Phase 2 focused on testing in educational settings with the following sectors involved: infant, junior, primary and secondary schools and the University of Southampton. The four schools chosen had catchment areas that included more deprived parts of the city, and the pupils came from a range of ethnicities. In one school, 95% of pupils had English as an Additional Language. More than a quarter of students at the University of Southampton come from outside the UK and the University attracts students from across the UK as well. Testing capacity in the laboratory meant that we were unable to include a sixth form college in the Phase 2 programme.

The saliva testing programme was warmly welcomed by the four schools and the University. Planning started during school holidays/University vacation. The planning work coincided with major uncertainty for the University, due to the changes in grading of A levels and the effect of COVID-19, leading to difficulties in predicting numbers of students arriving in September/October.

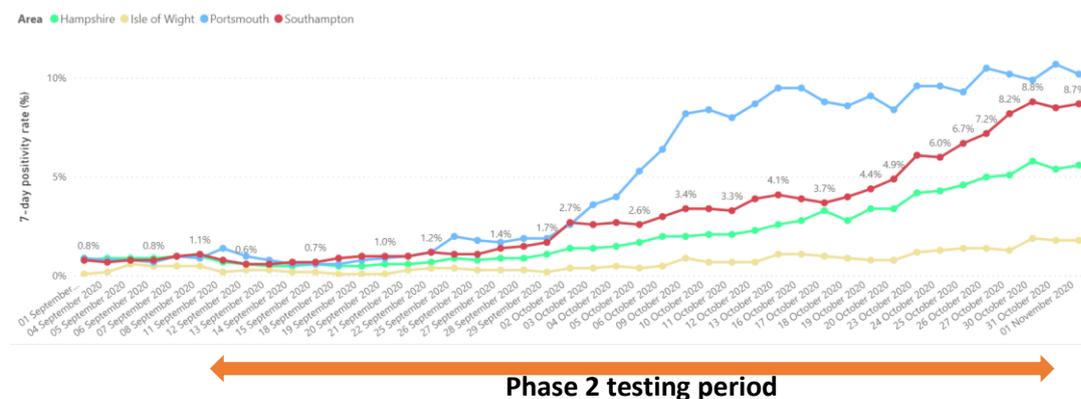
During Phase 1, the background infection level (post Lockdown 1) was very low, and the asymptomatic health and social care staff saliva testing identified no positive cases. The testing period of Phase 2 ran from 14<sup>th</sup> September to 31<sup>st</sup> October, against a background of rising SARS-CoV-2 transmission. Phase 2 started when COVID-19 rates were relatively low in Southampton. The week before the testing programme started, rates of cases identified through NHS symptomatic Pillar 2 testing was around 6.7 per 100,000 population (see Figure 1.1). By the end of October, when this Phase was completed, they had risen to more than 150 per 100,000. However, throughout the period, rates in Southampton were lower than those for England as a whole (see Figure 1.1)

**Figure 1.1 Southampton 7-day average case rate per 100,000 population**



During the period of Phase 2, access to Pillar 2 tests improved across the city, with walk-through testing sites opening up alongside the move of the Regional Testing Centre to Southampton Airport and the postal/home delivery testing option. At the start of Phase 2, less than 1% Pillar 2 tests were positive, but the positivity rate increased steadily throughout October to greater than 8% (see Figure 1.2).

**Figure 1.2. 7-day positivity rate by date and area**



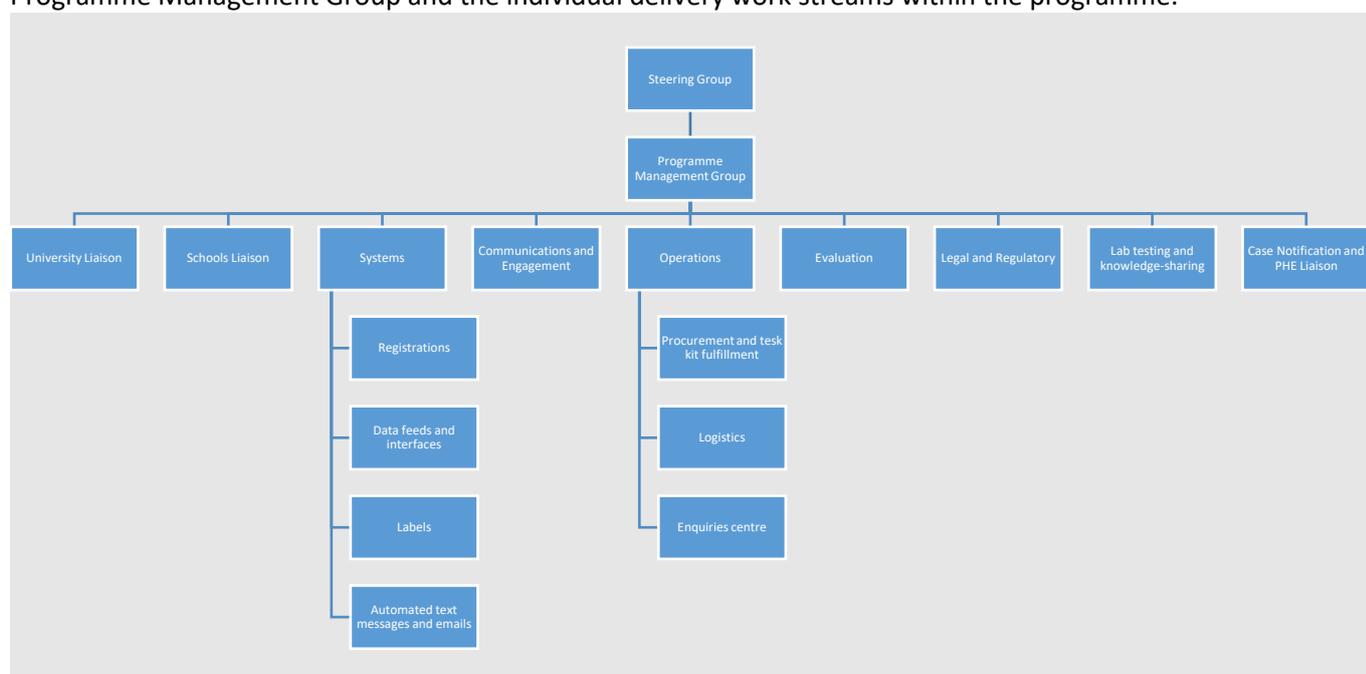
In Phase 2, testing was conducted over a period of seven weeks from September 14<sup>th</sup> to October 31<sup>st</sup>. Few tests were conducted in the first week, as the systems were only in place for testing University students, most of whom had not arrived on campus. School testing started in two schools (infant and junior) in the week beginning September 21<sup>st</sup> (week 2 of the programme). The staff of the secondary school were tested at the end of that week, following a positive case identified through NHS testing in a staff member, and the students started testing the following week (week 3). The primary school started testing in the week beginning 28<sup>th</sup> September (week 3). The bulk of the University staff testing started in the week beginning 5<sup>th</sup> October. External contractors in schools and the University were also included, as and when they joined the programme.

## 2. Overall programme

### a. Governance and programme management

#### Governance Structure

Phase 2 of the programme carried forward and adapted the programme governance established in the early stages of Phase 1. The structure below shows the relationship between the Steering Group, Programme Management Group and the individual delivery work streams within the programme.



The Steering Group clearly reflected the partnership-working nature of the programme. Chaired by the Vice-Chancellor of the University of Southampton, members included the local Directors of Public Health for Southampton and Hampshire, the leader of Southampton City Council (SCC), the Deputy Chief Executive of SCC, the Chief Medical Officer of University Hospital Southampton NHS Trust and representatives from the Clinical Commissioning Group (CCG), together with the Programme Chief Operating Officer, Programme Lead and Programme Manager. The direction provided by the Steering Group was key in enabling effective delivery with resources working together from all partnership organisations towards a shared vision and clear set of outcomes.

The Programme Management Group met on every weekday and was chaired by the Programme Chief Operating Officer. Members included the leads from each work stream, together with key representatives from the organisations responsible for specific aspects of the programme. Leads of the larger work streams chaired daily meetings to drive activity aligned to the delivery plan. Risks, issues and decisions needed were then escalated to the Programme Management Group for consideration and resolution. The daily flow of information between the Programme Management Group and the work streams enabled agile working and fast adaptation to changing needs, which was necessary for a fast-paced programme with challenging deadlines.

Regular meetings also took place with the Testing Team at DHSC, initially on a daily basis reducing to weekly as the programme progressed. These were used for the programme team to update on progress and escalate issues for mutual consideration. Discussion was open and constructive and a partnership approach quickly developed which was invaluable in resolving problems and clearing blockers.

### Programme Management

Best practice programme and project management documentation and procedures were used through the programme to deliver to the funded objectives agreed with DHSC, most particularly:

- detailed planning of activities and timelines with mapped inter-dependencies
- governance set up with clear roles and responsibilities and ownership of each work stream and/or work package
- early identification and on-boarding of project management and business analysis resource to support the work streams
- identification and management of stakeholders
- managed actions, decisions and issues logs with clear escalation process and daily 2-way information flow between management team and work stream teams
- regular team meetings with agenda; notes distributed immediately afterwards
- strong financial control
- regular progress reporting to key stakeholders

Business analysis resource was brought into the programme at an early stage to produce detailed process and data flow maps. This work teased out key decisions needed and issues to be addressed, and became the foundation of a common understanding of the delivery (see Annex 1). It also enabled requirements' definition for the systems development and, together with the programme plan, informed both communications' needs and the service definition for logistics partners.

### Team Style

The governance structure and programme management systems were underpinned by values and behaviours which enabled the delivery of ambitious aims, milestones and outputs within challenging time frames, as well as the resolution of many, at times seemingly insurmountable problems. In effect, the team style was a key enabler for the results delivered.

Whilst the style of teamwork was never articulated formally, the key values and behaviours were:

Values – public benefit at the heart of everyone's commitment; can do attitude; joined up work; and active learning.

The behaviours which reflect the team's values are: understands the purpose of the programme and reflects this in day to day work; takes personal responsibility for delivering their goals and is proactive in working out how to improve things; is curious about problems that arise and is open and honest when things don't go to plan; seeks and listens to solutions offered by others and works to help resolve issues faced by others; works across functional or service boundaries to develop innovative solutions; thinks creatively when faced with new problems and applies this to help achieve team goals; is open to learning from others and puts learning into practice; and celebrates achievements made by other members of the team.

All members of the team were committed to these values and behaviours and demonstrated these in their work every day. This approach was nurtured actively by the programme leaders.

### Recommendations

**Early establishment of programme governance and structure** with partners and key stakeholders involved from outset to enable clear directional steer and decision-making. Agreed Terms of Reference for governance groups, clearly defined roles and responsibilities, regular meetings. Programme structure must enable work stream leads to work collaboratively to develop solutions.

**Ongoing partnership working** – strong commitment to open and honest relationships demonstrated by leaders and managers in all partner organisations; informal lines of communication kept open at all times e.g. for joint problem solving and issue resolution; and allocation of resources to partners to reflect their contributions to the programme.

**Use of best practice project management processes and documentation** such as use of RAID (Risks, Assumptions, Issues and Dependencies) logs, project plans, roadmaps, progress reporting, structured meetings, shared documents.

**Resource identification, allocation and review** – the importance of skilled project management and business analysis was recognised to support the delivery, together with project office function. High quality project planners are vital as is commitment from work stream leads to spend time on early planning. Staff need to be full-time dedicated to the programme, responsive, flexible and involved throughout to ensure knowledge and experience is built and shared. Resource from across partnership organisations is needed to ensure joined up working and commitment. Systems and data protection leads need to be involved as early as possible. Ongoing management of data needs dedicated resource.

**Strong leadership with an open and inclusive team culture** – visible and accessible leader/s are needed who facilitate strong information flow throughout the structure and provide quick and clear direction even when decisions cannot be finalised. Use of Teams chat channel and sites for quick and easy information access/exchange is very useful. Regular team meetings with mutual support, trust and respect are vital.

**Team style** – commitment is required by all members of the team, whatever their role, to values and behaviours which enable a high performing team and, in doing so, the delivery of ambitious goals for the benefit of the public.

## **b. Communications**

### **Structure and governance**

In keeping with Phase 1, a programme communications and engagement lead represented the workstream at Programme board (daily meeting). They provided counsel and direction for programme board on communications, liaised with DHSC and Cabinet Office (CO) on communication issues and led a pan-partnership communications and engagement group (daily meeting) in the discussion, resolution of issues and operationalisation of solutions, activities, outputs.

That group operated with a strong emphasis on consensus and joint problem-solving, drawing on a range of skill sets and perspectives. Representation included SCC head of communications, UoS head of media and/or media officer, the freelance communications manager for programme communications and seconded UoS communications officer for programme, behavioural science expert, LifeLab schools' engagement leads, policy and political engagement expert, UoS Public Policy, and local authority public health expert.

Line of sight to corporate communication leads/accountable officers was via these representatives +/- direct engagement by programme communications lead. Additional senior communications representative engagement, e.g. around announcements or reactive issues, came direct from programme communications and engagement lead as necessary.

Under Phase 2, DHSC communications held sign-off on all communications around the programme, outside those needed for participants' information/operationalisation of the programme. Within the programme, sign-off and representation in media pieces was via the accountable individuals at the lead partners (e.g. Testing Programme scientific lead, SCC Director of Public Health, and Deputy CEO for SCC).

### **Resource**

Operational communications resource dedicated to University and programme communications totalled approximately 1.75 FTE, which was less than Phase 1 of this pilot programme. (Additional resource was drawn from schools, and the City Council and the University led on communications and engagement within the participating schools and the University.)

A significant proportion of this core resource was dedicated to service design and logistics planning for the first four weeks of this 12-week programme. Whilst vital and key for future work, there is a clear need to allocate more resource or time to enable greater focus on planning communications and engaging participants during start-up Phases.

Communications to university students were achieved in collaboration with/via UoS communications teams. Whilst they were always helpful and proactive, these teams were limited in how much time and bandwidth they could allocate to the programme at an incredibly busy time of the academic year, especially so under pandemic conditions.

In particular, it became clear that the programme's capability in reaching students through social media was limited, and that a lack of resource and continuous activity via social channels was a challenge in supporting or addressing gaps in conventional channel reach (e.g. email etc.). Additional resource could be deployed via the programme itself and/or in bolstering institution-side resources (for example, within the Student Communications and Students' Union communications teams) to ensure that messages about saliva testing were embedded throughout wider communications.

The nature of this in-kind/collaborative resourcing and support was also challenging within the programme, with various contributors including the programme communications lead, splitting their attention with responsibilities within their substantive roles.

### ***Programme identity and positioning***

Beyond the name, the programme did not have its own visual identity, and more time could be invested in thinking about how to use this to build trust and confidence. In the absence of an identity, we used the council's coronavirus design assets to create synergy with other COVID-19 materials in use across the city.

The lack of an independent identity and platform presented significant challenges to establishing separate/ancillary engagement routes into older school students and university students. This, combined with insufficient core resource, made, for example, it impossible to have effective, strategic engagement of social media influencers that may reach these audiences.

Within the University of Southampton, messaging about an 'innovative pilot' progressed towards service provision – integrating testing under the programme into the UoS offer to protect all and preserve campus life. There are pros and cons to positioning as a 'pilot' programme – some may be put off taking part in something that is untested, while others will like the idea of contributing to something positive for the greater good. On balance and on reflection, a stronger emphasis on its role as a means of enabling more normal university experience from the outset would have been beneficial.

### ***Website***

In the absence of a distinct identity, the decision to host information about the programme on Southampton City Council's website was made early on in Phase 2 planning. The benefits and rationale underlying this included: the Council's website being a trusted source of factual information about coronavirus; the role of the Council in managing the local public health service; and the prominence of the Council website in search engine listings. In addition, it signalled to students that they were part of a broader programme that extended beyond their university.

The information appeared clear and easy to navigate. Southampton City Council's web team were proactive, effective and highly responsive in site setup and ongoing amends.

Future work should consider closely which local organisations are considered authoritative and trusted sources of information when deciding where to host, or replicate content online. In addition, the rapid iteration and development of content should be key to this, with frequent, often emergent/reactive tweaks required as learning and queries came through programme delivery.

A standalone site is likely to be an important feature of any larger scale implementation of this programme, especially in the instance of a distinct identity. However, an established website with high trust and good search engine optimisation may serve similar purposes, especially for similar-scale initiatives.

### ***Participant text messages and emails***

After participants were registered and segmented by cohort, we were able to contact them directly by text message and email via the NHS systems team. This system was outside the direct control of the programme communications team and the process was time consuming.

There would be considerable benefit in giving programme communications resources direct access and editorial control over such an important tool, as it would allow more responsive and effective communication to cohorts and even individuals.

Any errors in this process had a detrimental impact on user experience, and a review/Q&A process as part of communications editorial oversight would be beneficial.

### ***Test pack instructions and labels***

A standard set of instructions for taking the saliva test were printed and included in every test pack. The instructions included a visual 12-step guide with minimal text on a single A-4 folded sheet. The instructions were also listed on the programme website so that they could be translated online into different languages. The schools team helped to produce videos outlining the process for children, in multiple languages, which were also added to the website.

Unlike Phase 1 of the programme, we did not include any cohort-tailored introductory/overview and further information in the test packs, as they were packed and sealed early by the fulfilment house. Whilst there is relatively little evidence that this contributed to poor compliance or confusion, it does represent a doorstep, persistent/retained opportunity to personalise the testing experience, connect with participants and clarify their specific process. Developing the systems and means of including such information targeted at individual cohorts would be beneficial in future work.

Whilst participants' personalised labels were developed to be slightly more user friendly in Phase 2, with the use of colour and a clearer layout, there were still instances of participant error. Having an existing blank label on the test pots was potentially confusing for some. As with other areas, engagement of communications' resources in process design/operational areas will be critical to addressing fundamental user experience challenges.

### ***Media***

The University's press team worked successfully with colleagues at the City Council and participating schools to announce the second Phase of the programme and coordinate subsequent media activities.

That collaboration ensured a strong mix of senior partnership spokespeople and locations on announcement day that appealed to TV and radio broadcasters. This resulted in positive TV news pieces on Channel 4, BBC South and ITV Meridian and radio interviews on LBC, Wave and BBC Solent.

Importantly a pooled footage approach was not favoured by broadcasters. This adds to learning in previous Phases, with BBC News citing better coverage off a solo piece (Phase 1), and Sky News questioning why their clip with a participating family was being pooled (Phase 2; Sky were the only outlet to use it).

This, combined with the partners having capacity to manage individual set pieces with different broadcasters, indicates an outlet-by-outlet approach handled locally based on more effective announcement media planning and discussions with DHSC communications.

The oversight arrangements between DHSC and the programme communications team on handling ad-hoc media enquiries from the media worked sufficiently well, although we note it is important that the programme team retain the remit to answer general questions on the programme and the test, and defer questions on funding and wider testing policies to DHSC.

### **Other local stakeholders**

Phase 2 saw the continuation and strengthening of direct engagement with democratically elected representatives, as the regular briefing channels of the Local Resilience Forum (LRF) ceased as the LRF moved out of response mode.

It was recognised by core team and the communications and engagement subgroup that ongoing communication with local representatives was important for three reasons: 1) to ensure that elected representatives could respond to enquiries by their constituents in a timely and accurate manner; 2) to ensure they could respond to media enquiries in a timely and accurate manner; and 3) to maintain the good relations developed during Phase 1 through programme leads answering questions on the programme and, in some cases, on the wider body of COVID-19 related research.

Careful consideration was given to what granularity of information was passed to elected representatives (safeguarding data provided by parents of pupils at the education settings and students and staff of University). For example, percentages of positive cases based on all settings rather than numbers of cases per setting were provided.

The frequency of this information relayed to these stakeholders was calibrated to make updates available at a point following DHSC approval for wider dissemination but before public sharing. With each update an open invitation to be verbally briefed by the programme lead was offered, allowing for free-flowing question and answer sessions. The irregularity of this activity-based mode of communication presented some challenges to acting as a 'single point of truth' in comparison with the weekly LRF channels. In particular, there were multiple instances of having to make reactive responses to elected representatives' queries arising from their own extensive networks.

Relationships with local MPs and Councillors have been strengthened during Phase 2 with more frequent requests for information to support constituent requests, which has served to demonstrate the importance of engaging regularly. There is also an element of civic pride that has carried across from Phase 1 and been built upon with Phase 2 supporting the local effort to keep schools open in a safe manner, through the expertise at the University in partnership with the local and national authorities of which elected representatives play a key intermediary role.

### **Summary of key learning points**

- Programme-level communications lead role encompassing programme board counsel, strategic direction and senior communication stakeholder engagement responsibilities was vital
- High frequency pan-partnership operational communications and engagement group was vital to coordination, horizon-scanning and resolution of emergent and reactive issues
- Insufficient core communications resource – especially in social, digital, engagement – was problematic to effective delivery of communication and engagement objectives, with a lot of bandwidth taken up with process and operational linkages
- A lack of significant insight and pre-engagement resource hampered understanding of audience needs/contexts and the effective direction and tailoring of communications and engagement activities/outputs
- Opportunities for communications resources to exploit/be directly involved in the use of functional channels (e.g. text messages to participants etc.) were not fully realised/integrated
- Lack of a distinct programme identity presented challenges in direction to a single source of truth and in providing a base off which to engage, particularly with older school pupils and university students and their influencers
- The tight oversight/sign-off mechanisms with DHSC, combined with challenges in gaining engagement or timely responses on queries, media requests and sign-offs from DHSC communications presented operational and reputational/goodwill challenges for the programme.

- Active, frequent and responsive engagement with democratic representatives was well received and appears to have generated goodwill and informed engagement with the programme by these representatives and their constituents

### **Learning themes for communication personnel**

The programme core communications team met to discuss lessons learned at the end of Phase 2 and distilled their observations into 10 themes for sharing with future teams:

1. **Secure ample resource** – Communication is integral to all aspects of a programme, all hours of the day. It's not an 'add on'. Teams should be fully resourced and fully integrated from Day 1.
2. **Allow plenty of time for planning** – Allowing time for planning, even when there's significant pressure to act, will ultimately make a programme more effective, and save time in the long run.
3. **Map and revisit participant journeys** – Mapping a participant's experience, and all their opportunities to deviate from the intended journey, is vital in planning what communications are required. These journeys will change as the academic year progresses and external restrictions change, so they need to be revisited regularly.
4. **Gather insights early and often** – Supplying a communications team with regular insights into participant experiences and attitudes will help the programme produce effective communications.
5. **Manage expectations** – While stakeholders may be keen to talk up the programme and its achievements, it's often better to under-promise and over-deliver.
6. **Trust your experts** – In the thick of a busy programme there is often pressure to 'do more communications' but it's important to engage and trust the experts whose job it is to talk to participants and stakeholders.
7. **See things from other people's perspectives** – Participants' experiences of the programme need to be seen through the lens of everything else they are seeing and hearing about the pandemic and what else is going on in their lives. Equally, it's important to remember that the staff facilitating the programme in their organisations are also likely to be swamped with other COVID-related activities.
8. **Be transparent** – Being transparent about programme data will empower communications teams to make better decisions faster. Being transparent with participants can clarify their responsibilities and increase their engagement.
9. **Keep it simple** – While there may be pressure to 'say more' and 'do more', people will often respond better to shorter, simpler, well-planned messages, and contacting them too often is more likely to reduce their engagement rather than increase it.
10. **Pause** – Even when things are moving quickly and there's a need to respond to events outside of your control, it's ok to pause and reflect on the participants' experience before communicating.

The communication team have provided an overview of the University students and staff experience in Annex 4.

## c. Logistics

### Report of work and procedures developed

#### Team

The operations team comprised around 12 full time equivalent (FTEs) at the start of the project and this dropped to around nine FTE after the first month. The team met each morning to talk through any issues from the previous day and discuss the business of the day, highlighting anything that needed to be shared, resolved or escalated. It was essential that specialists from procurement, finance and communications attended to work alongside the project managers. The different teams have provided an overview of their experiences and recommendations in Annex 3.

#### Operational procedures

Several operational processes were needed to ensure smooth running of the programme within schools and the University. The base components of each were the same with a few modifications for the different settings. Some of the logistics developed in Phase 1 were carried into Phase 2, though a few of them were altered following lessons learnt from Phase 1.

**Test Packs:** Each pack contained an information/instruction leaflet (see Annex 2), five universal sample tubes, a pack of five absorbent pads and 10 plain plastic bags. The contents were standard readily available supplies, procured by the University procurement team, and remained the same from Phase 1. The packs were compiled externally by a procured fulfilment house service and either delivered in bulk to a specific location i.e., to a school or University hall of residence or were posted to individuals' addresses via Royal Mail where addresses were more spread out. This process was used in Phase 1 and remained in place for Phase 2. A strong relationship and good communications with the fulfilment house team ensured that this service was reliable and flexible as required. During Phase 1, the packs were made for each cohort, containing specific communications, but this made the fulfilment house process more complex and thus slower. It was therefore decided that all cohorts would receive the same generic pack and any messaging to those cohorts would be done via email and text messages. This worked extremely well, and the fulfilment house was able to pack over 1,000 packs per day.

**Sample Identifier Labels:** These were designed in conjunction with the print service and the data team to ensure they contained all the required data to identify each unique sample. In Phase 1, the type of label used created issues at the print centre as some labels peeled off the sheet inside the printer. A different supplier was tested and used in Phase 2, but this created an initial delay while the new label sheets were cut and produced. Data cleaning was tricky but communications between the data team and the print centre enabled these to be overcome. A "return-to address" was added to all address labels. Labels for schools and University students in halls of residence were delivered to the sites to be handed out with the test packs; the remainder were sent daily to the fulfilment house, which included them in the packs using the relevant address label on the outside of the pack for posting. The fulfilment centre hand-folded each label sheet; a recommendation would be for this job to be automated by the print centre.

Royal Mail were informed daily how many packs were going through the post, both in the area near the fulfilment house and around the area where most University staff and contractors lived. Their business continuity plan was examined and provided assurance. This communication did not occur in Phase 1 and it proved to be problematic. By communicating with Royal Mail in Phase 2, they were able to provide the service paid for by the programme.

In schools, once the Data Protection Agreement had been signed by each school, a transfer of data from the School Information Management System (SIMS) to the database team at UHS was completed. The output of this was to generate a label run for each school. To make it easier for the four schools, the data were transferred alphabetically at class level so that the labels could easily be distributed within each location.

**Sample provision process:** Participants were asked to produce a saliva sample into a tube, label the tube with a unique test code and place it inside a plastic bag. This sealed bag was then placed inside another plastic bag, sealed and a matching unique test code label stuck on the outer bag. This was in line with current transport guidance for infectious materials and met the health and safety requirements. The bags and tubes used in Phase 1 were also used in Phase 2 but the labels were altered. In Phase 1, the labels were black and white print, and it was not always obvious to those providing the samples which two labels matched. In Phase 2, colour was used on the labels to make this easier, with further instructions printed on the labels. This improved the situation, but it would be easier if the outer bag did not have to use a second label, with individuals just using one label per test.

In schools, each year group received a lesson around the testing programme and, as part of the lesson, pupils were asked to open their packs and review the contents. At the end of the lesson, each pupil stuck their own envelope label on the outside of their pack, put their sample label sheet in the envelope and sealed the envelope before taking it home. Each year group and staff group were asked to test on a specific day to spread the tests being taken across the week.

**Sample drop-off and collection locations:** In Phase 1, sample drop-off and courier collection points were either inside workplace locations such as a GP surgery or a care home, or outside at various staffed points across the city. In Phase 2, the aim was to find inside locations, away from a radiator, which did not need to be manned. The locations needed to be in areas near to where staff were working to provide some oversight, but also accessible by a wide variety of people who may not necessarily access that building on a regular basis. Locations on the University campuses were identified, including at halls of residence that are only accessible with a swipe card. In schools, plastic boxes were located at entrances so that the staff and pupils could drop off their samples as they arrived each morning. Posters were produced to highlight the drop off locations and at the University, and floor signs were produced to guide students and staff to the post boxes. The courier company was provided with a list of locations and the information about how to access buildings. This at times did prove to be problematic, especially at the start of term when not all buildings were open, and clear communication of opening times or availability of security guards were required to ensure the samples could be dropped off and collected by the courier company.

**Collection boxes:** In Phase 1, large plastic boxes were used at all the drop-off locations, so individuals could drop their samples off in a safe manner with no touch points. The drivers then closed the lid and transported them to a central location before collating and taking them up to the laboratory. In Phase 2, schools were provided with similar plastic boxes. Initially, these boxes were lined with a plastic collection bag that the courier company could pick up each morning and replace with a new bag for the next day. Large, stand-alone, lockable post boxes were set up at the locations around the University campuses and halls of residences. These locked boxes were lined with plastic bags, appropriately marked for road transport, which enabled the courier company to simply open the box, remove, and replace the bags. During the period, the laboratory and the courier company noted that these large plastic bags were getting dangerously full and could split on route. They therefore moved to transporting the samples in the same plastic boxes used in Phase 1. This stopped the risk of sample bags spilling out on route and so maintained health and safety requirements for transport of potentially infectious samples.

**Couriers:** In Phase 1, University staff acted as couriers, picking up the plastic boxes from the drop-off locations and then collating them into one vehicle to drive up to the laboratory. In Phase 2, a courier company was procured to collect from each post box twice a day seven days a week, and from each school once a day in the morning, five days a week. They were required to submit a morning and afternoon report estimating the volume of samples in each box (on a scale of 0-5 where 0 is no samples, and 5 is overflowing box), and the date/time stamp for each collection. Initially, they were transporting samples in appropriately marked plastic bags. The couriers required access to buildings and a set of keys to open the post boxes situated at the University. Since the post boxes did not have a master key, the couriers needed to be supplied with a key for all boxes, so all the boxes were numbered and the keys labelled appropriately.

**Testing laboratory:** The laboratory was contracted to perform up to 2,000 tests per day. The laboratory was used in Phase 1 and partnered with us in Phase 2 to continue to develop new assays. The testing laboratory would get in touch with the operations team if a sample could not be located against the master testing ID list or if an individual hand-wrote their details on the tube instead of using the anonymised label. The operations team met with the laboratory staff twice a week to provide an estimate of the number of samples to expect to allow the laboratory to plan their workforce requirements.

**Testing supply logistics:** Communication between the laboratory and the procurement team was key to ensure that the testing laboratory had sufficient supply of materials to undertake the tests. In Phase 1, there were issues where the laboratory ordered directly from the supplier; this was altered as we moved into Phase 2 and the laboratory asked for supplies that the University then ordered from the supplier.

**Case Contacting Team:** Southampton Primary Care Limited (SPCL), a federation of local GPs, provided expert medical advice to people who tested positive, those whose sample was inconclusive or who needed other assistance. They provided advice around isolation and signposted individuals to additional help that was available. This provision was made in Phase 1 and adopted into Phase 2. Further details of the Case Contacting Team's work are given in section 2h.

**Testing frequency:** All participants were allocated a cohort according to location or staff/student/pupil group. Members of the Mathematics department at the University modelled the number of tests to be taken by each group to ensure that the number of tests being processed by the laboratory each day did not exceed 2,000. Producing a highly accurate model was not possible due to the number of variables included for which estimates had to be made, but it was still very helpful particularly for assessing the number of test packs needed and for laboratory workforce planning. See section 2f for more details of the modelling process.

**Resupply of packs:** During the programme, some students required supply of further test packs, which was managed by having packs available at the drop off locations for participants to pick up. Had schools required resupply, this would have been handled by a bulk delivery to the school, with the school taking responsibility for distribution.

**Finance team:** During Phase 1, it was decided that few people should control the budget and the cost code. This was handled by a senior project manager with verification from a senior management accountant. It was essential to have dedicated people at the start of the project to undertake financial management; this resource needs to be full time. This enabled the wider programme team to have minimal points of contact for any finance transactions or queries and so the finance team were able to react swiftly to situations as they arose. Both these members of the

team were kept up-to-date with changes as the project progressed, as any decision could have budgetary implications. From Phase 1 to Phase 2, the finance processes were refined to reduce the impact on the procurement team and allow them to order swiftly, e.g., a budget amount was set against a supplier up to which the procurement team could spend without referral back to the finance team. This team used a standalone budget spreadsheet at transactional level to record ordering activity/spend requests/forecasts outside of the corporate finance system. This allowed them to have a much earlier handle on the financial position (because the corporate system lags by days) and also produce reports which aligned to DHSC/funder requirements. The overhead on this is that the accountant needs to periodically reconcile back to the corporate system to ensure the numbers are complete.

### Lessons learnt and actions taken

**Procurement:** It was essential to have dedicated people at the start of the project to undertake procurement activities, including writing detailed specifications for tendering and awarding contracts. The team tried to use established routes to market to reduce time taken and risk involved. These individuals needed commercial experience as they also provided ongoing supplier relationship management. Other members of the procurement team dealt with the project's day-to-day buying of one-off supplies. Any contracts put in place needed to be agile and to acknowledge that timescales and scope may alter slightly over time. Simplified ordering and invoicing processes were put in place for Phase 2, which reduced the time taken to process orders.

**Collection points:** It is hard at the start to anticipate the number of returns at each location, so it was essential to have a backup sample collection box in some locations to enable collections to continue while more post boxes were procured. The signage around the boxes was essential to alert people to the fact they were not rubbish bins and, in the case of the collection point at the hospital, which testing programme the collection point was for. To reduce touch points, post boxes with flaps are not recommended, and the post boxes used in Phase 2 were adapted accordingly.

### Recommendations for wider rollout

The use of standard sized pots, bags and pads enabled the procurement team to work fast at buying and receiving the required number of items. It was suggested, but not implemented, that the sample bags or labels should be printed with a programme contact number in case the sample ends up in wrong place since some participants posted samples into Royal mail post boxes or took their samples to the laboratory at the hospital for testing.

The procurement team tried to push the programme team to plan ahead and have more regular scheduled orders. This was not possible for Phase 2 but would be recommended. This would provide stability and a clear oversight of goods required.

When awarding contracts to suppliers, their business continuity plans were looked at in detail and so provided assurance that the service could continue if a COVID-19 outbreak occurred.

Communications with suppliers is vital but there were times when communication solely by email meant that things were missed or ignored due to busy workloads. Therefore, other appropriate communication channels were used, e.g. use of an MS Teams site, which enabled multiple parties to comment on a query and thus reduce time taken to resolve issues or communicate information. Quick messages could therefore be sent with quick updates. Alongside this, regular face-to-face meetings were held by the procurement team twice weekly with the courier, and once a week with the fulfilment house.

Although we used post boxes, there were issues with potential touch points that were resolved by jamming open the flap. The courier company used bags inserted into the post box, which worked for the volume being collected, but this is not scalable. The process relied on keys held by the courier company with a copy held by the University, without a master key being available. This area needs a more appropriate solution for wider rollout into Phase 3.

We would recommend seconding people to cover procurement activities into the project for a reasonable amount of time during set up and for ongoing supplier relationship time.

For schools, it was suggested that each participant is provided with a pack that covers each half term, with a couple of spare pots, so that pupils and staff can easily keep a track on the programme and testing weeks. This will also reduce waste.

For each school, key contact information, with roles within the project, is required for key suppliers and members of the programme team.

## d. IT Systems – Development and management

### The Team and operational arrangements

The core development team was drawn from the University of Southampton's Clinical Informatics Research Unit (CIRU) and the University Hospital Southampton NHS Foundation Trust (UHS) Digital informatics systems team. This team was supplemented as required by the University of Southampton (UoS) iSolutions team and members of this programme's management team including the person responsible for oversight of the Southampton City Council Customer Services (SCCS) Enquiries Team. The team met via MS Teams for regular morning working sessions to report progress and discuss development tasks during the build phase and, once the programme was live, the focus switched primarily to resolving issues and answering system-related queries including those from the APHA testing laboratory, the Enquiries Team and schools' data managers.

Although new members joined the team after Phase 1 and integrated very quickly, it was a contributing factor to the high productivity and smooth running of this workstream that a number of the Phase 1 team continued to work on Phase 2, providing continuity and a level of knowledge and expertise relating to components that could be reused in Phase 2. Three times a week the team met for longer sessions to work on more technical issues.

### Overview of the Phase 2 IT system

#### Hosting of data

The components of the registration system, including the Household Subject Master Index (HSMI), were all hosted on a secure server infrastructure in University Hospital and Carelink, all having appropriate security infrastructure and certification.

#### Capturing applicants' data for registration

In this Phase, there were three routes developed:

##### 1. Bulk transfers

**UoS staff** (excluding contractors) registered via a University-developed online form, entering their own contact details and giving consent. Data were transferred to the system that creates the participant records on a daily feed as a bulk upload. Subsequently daily feeds captured new participants and updates.

**School Staff** (excluding contractors) and **pupils'** data were supplied by school data managers via a secure feed and transferred to the system that creates the participant records in one bulk upload. Schools provided the data from their internal systems including the Schools Information Management System (SIMS) in a defined format including staff and pupil national identifiers UPN (unique pupil number) which remains consistent throughout each pupil's time in school and stays permanently on the child's record. After the initial bulk upload, ad-hoc files were provided by the schools to capture new participants and updates. Participants could ask for their data to be removed, but formal consent was confirmed by supplying a sample.

##### 2. Via BANNER feed

**UoS students** recorded their consent on a new BANNER (student records system) form commissioned from the BANNER supplier, Ellucian. Data were transferred to systems that create a participant record on a daily feed as a bulk upload. Address data for those students living in University Halls were supplied in a feed from the University's Residences Room Service.

### 3. *Via the Enquiries Team*

**Contractors employed by Schools and the University** were invited to call the Enquiries team, run by Southampton City Council Customer Services, to give consent and register. The Enquiries team used a newly developed Oracle Apex form to capture registration details, which were passed to the participant record system to create a person record in the same way as the bulk upload routes.

#### *Enquiries Team support*

The Enquiries Team were provided with an Oracle APEX form to log enquiries and issues raised by callers as well as enabling them to make some amendments such as email address and mobile numbers and request extra or replacement labels. Giving access to the Enquiries Team and a restricted number of project management support staff to registration data and non-clinical data, such as number of tests taken, via an Apex form was a great improvement over Phase 1 and reduced delays waiting for the Systems Team to run bespoke enquiries on the database and report back.

#### *Reuse of Phase 1 system functionality*

The team reused or adapted code used in the Phase 1 pilot wherever it made sense and this included: NHS Spine matching; production of labels' files sent via a secure daily feed to the University print centre to produce individual sets of labels for registered participants; and results received from APHA for onward transmission of positive results to PHE, Test and Trace and the participant's GP, as well as the programme's own Case Contacting Team.

As in Phase 1, a set of sample identifiers (CV numbers) was allocated to each participant. These numbers were used to produce Laboratory Information Management System (LIMS) orders files to be sent to APHA to allow faster laboratory acknowledgement of samples, and a print file, which was used to produce label sheets and which included unique personalised instructions and information relevant to the participant's cohort. The print file was used by the University Print centre to produce physical labels for the participant to attach to the sample tube.

Application data were directed via an application programming interface (API) into the Household Subject Master Index (HSMI). Using the same approach as in Phase 1, each participant was matched and identified against the NHS Patient Demographic Service (Spine Matching) in real-time to link the participants to their NHS Numbers and gain access to their GP practice record.

The previous day's registration data were uploaded each morning to the externally hosted registration platform including the assigned cohort and sub workplace codes to split pupils in the schools into groupings of classes within year groups, and University students into Halls and private accommodation.

The use of SMS to send results was reused (supplemented by NHS emails this time) and the SMS service was also used to send out testing reminders and registration confirmation messages. Messages could be sent to specific cohorts, allowing bespoke testing reminders for the different testing regimes.

The HSMI used an Oracle APEX platform to give the Case Contacting Team within the programme access to participant records so that they could record clinical and public health assessments of the positive cases on the system.

## New and enhanced functionality for Phase 2

### **Apex form**

The functions within the APEX platform were extended to enable the Enquiries Team to have a means to record information relating to incoming enquiries against specific participants, so that a history of participant enquiries can be seen both by other members of the enquiry workforce and the Case Contacting Team to ensure there is an audit trail of the conversations.

### **Cohorts**

Phase 2 included an increased number of cohorts and subgroups. Tailored structures were specifically developed for delivering reminder messaging via SMS to these groups to help maximise participants' adherence to testing based on the required frequency of testing.

### **Returning results**

The capability of returning results to participants was expanded so that both SMS / Text messages and emails were sent to individuals or guardians. The HSMI sent a copy of the results to participants via NHS email. This follows the look and feel of national lighthouse laboratory results and ensures consistency.

Phase 2 has also provided additional reporting of positive cases to clinical staff within the Case Contacting Team as and when positive case information is received into the LIMS from APHA. This allows them to react to the needs of the programme more dynamically, rather than requiring them constantly to monitor the Case Contacting system. It is hoped that this approach can be deployed more widely to assist with the notification to schools to expedite the interventions they need to enact following a positive result in a school pupil.

### **Dashboard**

A dashboard was developed using Power BI to provide a centralised report on the state of daily registration, test completed and aggregated results for all cohorts.

## Lessons learnt and actions taken in Phase 2

### **People**

1. Deployment of a highly skilled empowered team, especially the continued involvement of some from Phase 1, enabled rapid progress and high productivity
2. Regular system team working meetings to sort out issues as they occur
3. Participation of members of the wider operation project management team and Enquiries Team at these systems meetings ensured efficient communications and assisted in problem solving and assessment of impact of in-flight changes to the testing programme
4. Reduce single points of failure and bottle necks by having more than one super user able to interrogate data, subject to data privacy regulations

### **Process**

1. Importance of conducting end to end walkthroughs of process and system interactions with representatives from all stakeholder groups e.g. IT systems, Project management, communications, call centres(clinical/non-clinical ) to agree and signoff the core system to surface issues early and agree solutions
2. Importance of maintaining one source of truth and making supporting documentation visible: data dictionary, label layout and text, process maps and communication schedule for SMS and emails

### Design

1. Reuse the best aspects of Phase 1, including ways of sharing data with the APHA testing laboratory and previously developed software tools. This saved a considerable amount of development and testing time
2. Improved data capture from front to back end reduced the number of data-related issues. In particular, this eliminated 'ghost' registrations experienced in Phase 1 that consumed a lot of effort to resolve
3. Avoid multiple entry points for data as this added an unnecessary level of complexity
4. The storage location and flow of data from University students and staff made automation difficult and moving timescales made it hard to decide how much time to spend on resolving it
5. Adherence to the 'Keep it simple' mantra underpinned the robust design and enable rapid turnaround of new requirements

### Recommendation for a wider rollout

#### People

1. Deploy highly skilled empowered team members. Consider the continued involvement of previous team members to ensure continuity and leverage of their experience gained on earlier Phases
2. Free up staff from their other roles to work on the programme
3. Implement an out-of-hours support service
4. Get call centre teams set up early and put in place an efficient process for managing access for additional staff

#### Process

1. Consider greater focus on change control and requirement signoffs to reduce rework
2. Master documents, such as data dictionary, to be held only once centrally and subject to version control
3. Need to implement an operational support service to fix problems, allowing developers to focus on new or amended functionality
4. Adopt an agile approach around user interfaces, communications and reporting. Regular show and tells of artefacts in progress to improve deliverables quickly, aid communication and acceptance
5. Rigorous validation of incoming data to avoid duplicate records, spurious dates of birth, cohorts and workplaces that aren't in the data dictionary, for example
6. Only have one label on the pot not one on the bag too and don't have pots with a specimen label on which people write their name and date of birth on when they can't find their labels

#### Design

1. Registration for Phase 3 needs a lot of consideration, especially the scope - e.g. is it strictly residents only or does it include everyone who works or goes to school within the geographical boundaries of the testing programme? How do we stop people from out of area who just want to be tested from using the project as a workaround if they can't get a test through the national scheme?
2. Open data principles matter, avoid locking down parts of the system so that other parts can't query it
3. Need to industrialise certain processes, for example with UHS account set-up for Southampton City Council and Southampton Primary Care Limited employees. The process was an email request. This approach was unreliable and untimely. Consider bringing in a new process via the new UHS service desk

4. Develop configurable processes that end users can use to reduce development and testing time for the systems team
5. Ideally have one system of registration with a unique id for each participant, household group and address location,
6. The idea of dynamic cohorts may be useful - don't tie cohort to testing frequency. Need a clever way for people to change frequency easily
7. Think carefully about reporting requirements early on to help inform systems design
8. Automation of reporting to Public Health England and Southampton Primary Care Limited
9. For future phases with much greater numbers of participants there is a need to carefully consider scalability, load testing and resilience of the system
10. Flexible design to accommodate different testing facilities and their Laboratory Information Management Systems (LIMS)
11. Consider moving the HSMI into a cloud delivery with direct access to NHS Personal Demographics Service (PDS) and messaging platforms to support possible wider adoption.

## e. Laboratory processes

### 1. Evaluation of the precise sample preparation conditions and workflow for high throughput saliva SARS-CoV-2 direct RT-LAMP detection

The precise sample preparation conditions and testing workflow for saliva Direct RT-LAMP testing methodology, developed in the initial pilot study in Southampton, have been examined in both spiked saliva samples<sup>1</sup> (Section 1.1) and paired positive and negative saliva and swabs provided by a Lighthouse laboratory (Section 1.2). The Direct RT-LAMP testing refinement and development work has been undertaken at DEFRA's Animal and Plant Health Agency (APHA) and Hampshire Hospitals NHS FT with leadership from Drs Veronica Fowler, Nick Cortes, Stephen Kidd and the APHA team, and with advice from the technical group at OptiGene.

#### 1.1 Determine the precise sample preparation method for high analytical sensitivity and specificity assay in spiked samples, and of positive controls suitable for RT-LAMP

Four saliva samples were collected from Hampshire Hospitals NHS FT staff and spiked 1 in 2 (100µl/100µl) with one of two Viral Transport Media (VTM) samples (VTM neat  $C_T$  (time taken to cross the critical threshold) of 20.77: A and 27.07: B) and titrated out 2-fold in lysis buffer (100 µl /100 µl). One of the four spiked saliva samples was also titrated out 10-fold in saliva. The samples were heated at 98°C for 2 minutes prior to adding to Direct RT-LAMP mastermix. This investigatory exercise demonstrated that lysis Buffer B can enable rapid direct detection of SARS-CoV-2 within saliva likely up to  $C_T$  values of 32-34 (as determined using primer design RT-qPCR).<sup>1</sup> Lysis Buffer B has been incorporated into the Optigene Direct Plus Kit (includes RapiLyze Sample Lysis Buffer as standard). The RapiLyze Sample Lysis Buffer is used 1:1 dilution with saliva; mucolyse and Chelex are not required during the sample preparation conditions.

Further validation was undertaken on 22 saliva samples; these came from four COVID-19 inpatients in Southampton, who were sampled repeatedly, largely during the recovery phases of their illnesses. The saliva samples had PCR  $C_T$  values greater than 30 or negative apart from two samples with  $C_T$  values of 27 and 28. As expected the direct RT-LAMP tests were negative apart the two samples with  $C_T$  values <30; LAMP testing in these two samples showed specific SARS-CoV-2 amplification but with a slightly wider anneal than the GenieHT had been trained to recognise. The files from these samples were sent to OptiGene to train the anneal algorithm to recognise samples like this for future analysis.

Optigene have developed a synthetic linear double stranded-DNA positive control for use with Direct RT-LAMP. This synthetic positive control has a higher annealing temperature than that of a positive sample, allowing for contamination of samples from the positive control to be identified. The software readout of the positive control result is uniquely identified by the GenieHT. The recommendation from this pilot is that an Optigene synthetic positive control is included for every LIMS reporting time point. DNA plasmid controls should not be used due to the increased risk of cross contamination.

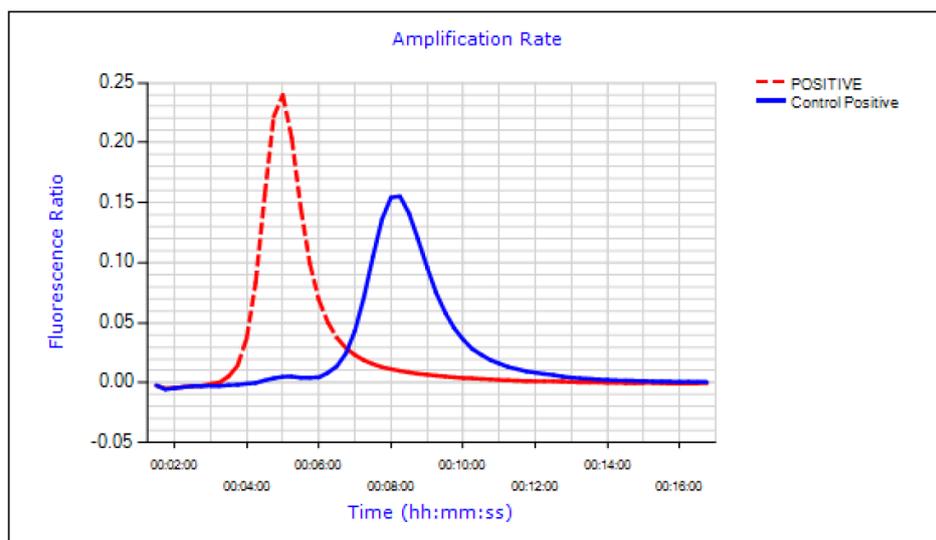
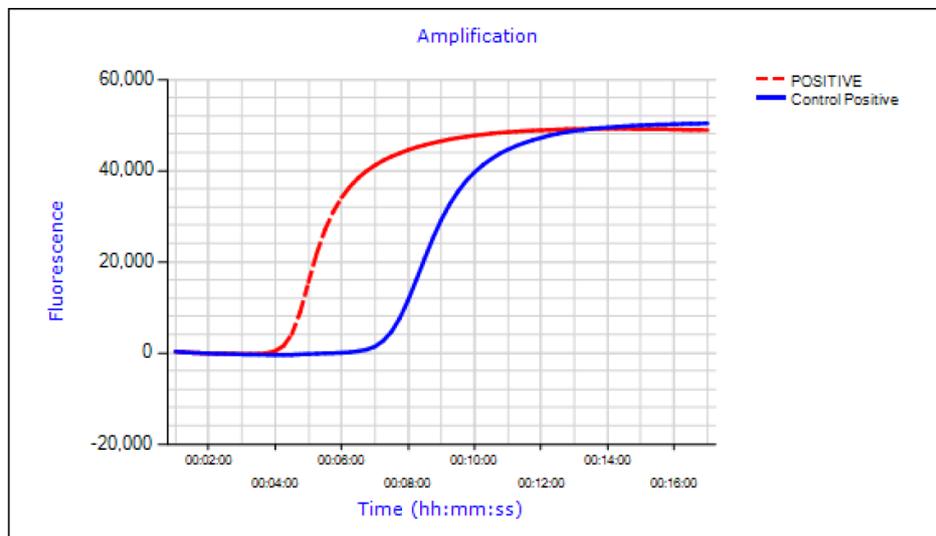
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<sup>1</sup> New sample preparation method for Direct RT-LAMP on swabs and saliva: Veronica Fowler, Bryony Armson, Sarah Fouch and Stephen Kidd

Example run:

**Control Positive (CD-COV19-100) - Blue line**

*POSITIVE (Genuine COVID-19 positive sample) - red dashed line*



T<sub>A</sub>:

**Control Positive (CD-COV19-100)**

**86.6°C (+/-0.5°C)**

*POSITIVE (Genuine COVID-19 positive sample)*

**83.4°C (+/-0.5°C)**

### 1.2 Determine the diagnostic sensitivity and specificity in clinical samples

The Phase 2 team contributed to and were part of the National Steering Group for the allied NHS-England/Improvement "Mission 2" pilot of daily saliva testing in NHS staff in Southampton, Basingstoke, Birmingham and Manchester; within this study, paired positive and negative saliva and swabs were subjected to RT-qPCR (Viasure), Direct RT-LAMP, RNA RT-LAMP and a subset were run on LamPore. The detailed results of this service evaluation and validation study are outside the scope of this report, but showed high acceptability of saliva testing, with good sensitivity and specificity of RT-LAMP testing across the range of viral loads that have been associated with

transmission of infection. Sensitivity in experienced laboratories has been 100% at high viral loads, and 75-85% at lower viral loads which are currently of uncertain clinical relevance in relation to transmissibility; increasing evidence indicates that replicating SARS-CoV-2 is not present in samples with a low viral load as measured by RT-qPCR.

Under Phase 3 of the programme, testing has continued in the four schools and the University, with 51,022 tests completed as of 14th November 2020. All positive tests have been confirmed by E gene PCR and no false positives have been recorded. In potential borderline viral load cases, false positives can be reduced by immediate re-testing of all positives from the original sample in duplicate, with the possibility of PCR confirmation where appropriate; the rapid laboratory and reporting turnaround mean such an approach can easily be operationalised. E gene PCR C<sub>T</sub> values for the positive samples have ranged from 17.4 to 34.0, similar to the range of C<sub>T</sub> values seen in cell culture positive samples in published reports.

### 1.3 Log reduction of SARS- CoV-2 for the heat and lysis steps used independently and sequentially

We have determined the viral inactivation kinetics of the best sample preparation condition(s), evaluating the effect of the heat and lysis steps on the viral inactivation of SARS-CoV-2 as determined by infectivity assays. All inactivation experiments had to be conducted under BioSafety level 3 containment and as such were undertaken at APHA.

Heat inactivation experiments (Tables 2e.1/2) were conducted utilising high titre live SARS-CoV-2 virus spiked into pools of saliva collected from APHA staff or in tissue culture supernatant (TCSN). Early experiments demonstrated that saliva had a high toxicity for tissue culture cells, even after heat inactivation demonstrating that toxicity was likely not enzymatic. As such further inactivation was undertaken on live virus TCSN. Heat inactivation experiments have demonstrated that SARS-Cov-2 in saliva is inactivated by heating at 60°C (10 min plus) or 70°C (all times, 2, 5 and 10 min). Inactivation at 56°C was not 100% effective at these incubation times, and additionally showed a loss in sensitivity following a 4 x 2-fold dilution (See Table 2e.2, P07102) at 10 and 30 minutes. Heating at 98°C for 2 minutes was found to inactivate the virus, in accord with data from other groups.

**Table 2e.1: Serial dilution of Patient VTM (C<sub>T</sub> 19) 1:1 VTM into Lysis Buffer and 98°C heat treatment without and without heat pre-treatment at 56°C for 10 or 30 minutes**

P07553 (C <sub>T</sub> 19)	1:2	1:4	1:8	1:16	1:36	1:64	1:128	1:256	1:512	1:1024	1:2048
VTM 1:1 into Lysis + 98°C	+	+	+	+	+	+	+	+	+	+	+
	+	+	+	+	+	+	+	+	+	+	+
56°C 10 mins pre-treat 1:1 VTM into lysis +98°C	+	+	+	+	+	+	+	+	+	+	-
	+	+	+	+	+	+	+	+	+	+	-
56°C 30 mins pre-treat 1:1 VTM into lysis +98°C	+	+	+	+	+	+	+	-	+	-	-
	+	+	+	+	+	+	+	+	-	-	-

**Table 2e.2: Serial dilution of Patient VTM (C<sub>T</sub> 19 to 32.08) 1:1 VTM into Lysis Buffer and 98°C heat treatment without and without heat pre-treatment at 56°C for 10 or 30 minutes**

Patient VTM	P07553 (C <sub>T</sub> 19)	P01127 (C <sub>T</sub> 23.97)	P07102 (C <sub>T</sub> 32.08)	P07392 (C <sub>T</sub> 24.55)	P01071 (C <sub>T</sub> 20.54)
VTM into 1:1 Lysis + 98°C	+	+	+	+	+
	+	+	+	+	+
56°C 30 mins pre-treat 1:1 VTM into lysis +98°C	+	+	-	+	+
	+	+	-	+	+

A pre-treatment 70°C for 5 minutes carried out on spiked saliva samples prior to the proposed direct LAMP assay has no effect on subsequent LAMP or PCR results. It is recommended that even if a pre-treatment is effective in inactivating the virus that downstream processes are carried out in UV hoods or with effective air-flow management to prevent cross contamination of the RT-LAMP assay. Comparison of (Betapropiolactone) BPL inactivated virus and live virus have demonstrated that BPL inactivation has resulted in lower sensitivity of detection. BPL inactivated virus is not an ideal substitute for live virus in spiking experiments. Any conclusions on assay sensitivity or performance have therefore been drawn from experiments on spiking of live virus in TCSN or saliva carried out in containment. Spiking of live virus into pooled saliva has demonstrated that direct detection by RT-LAMP is reliably seen in samples that give a  $C_T$  below 25/26 with extraction and PCR.

#### **1.4 Define transportation chain requirements from sample collection to analysis**

Through collaborative efforts of this consortium and increasing scientific literature,<sup>2,3</sup> it is critical that saliva samples are not pre-treated (chemically or physically) prior to downstream processing using the Direct RT-LAMP protocol. If samples need to be stored for transport, immediate storage at -80°C, with only one freeze-thaw cycle is recommended. Samples should be stored at 4°C if they cannot be analysed within 24 hours of collection.

#### **1.5 Production of an end-to end protocol/SOP to enable highly sensitive, high throughput detection of SARS-CoV-2 for wide roll out**

The following steps have been optimised following this development Phase:

- 1) Analysis is not required in duplicate
- 2) A synthetic positive control should be included in the process for every LIMS reporting time point.
- 3) The mucolyse and Chelex steps have been replaced by dilution (50µl:50 µl) in Optigene Lysis Buffer B and subsequent 98°C heat treatment for 2 minutes

An updated protocol for Direct RT-LAMP testing of saliva is given as an appendix to this section (Appendix 1e.1).

#### **1.6 Comparison of Direct RT-LAMP data from GenieHT and Agilent AriaMX PCR machines**

In order to assess the feasibility of using PCR platforms in place of the GenieHTs, a serial dilution of a positive control was run on triplicate on both the GenieHT and Agilent AriaMX platforms. The AriaMX platform was set up to collect data every 15 s using the following thermal cycling programme (Figure 2e.1) to generate amplification curves (Figure 2e.2) and the standard melt curve generation programme for a typical SYBR green PCR assay (Figure 2e.3). The PCR machine was set to run a continuous 65°C step by running 72 cycles of 15s at 65°C, with a fluorescent data acquisition at the end of each cycle. To convert the PCR  $C_T$  value into a figure equivalent to  $T_p$  value the cycle number was divided by 4, as data were collected every 15 seconds. Table 2e.3 shows a summary of  $T_p$  values from serial dilutions of a positive control on the GenieHT and AriaMX PCR machines, demonstrating excellent performance of the GenieHT assay.

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<sup>2</sup> <https://www.medrxiv.org/content/10.1101/2020.05.07.20093542v2>

<sup>3</sup> <https://jcm.asm.org/content/58/9/e01438-20>

Figure 2e.1: AriaMX thermal cycling programme.



Figure 2e.2: Amplification plots

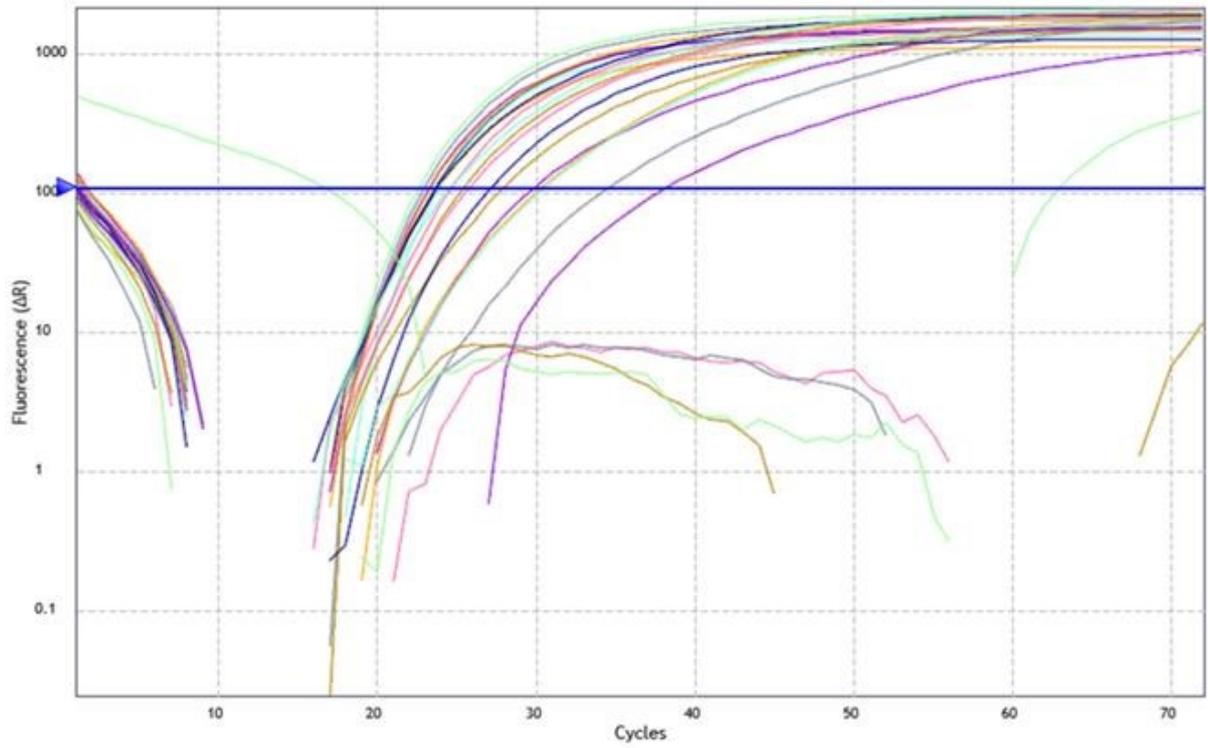
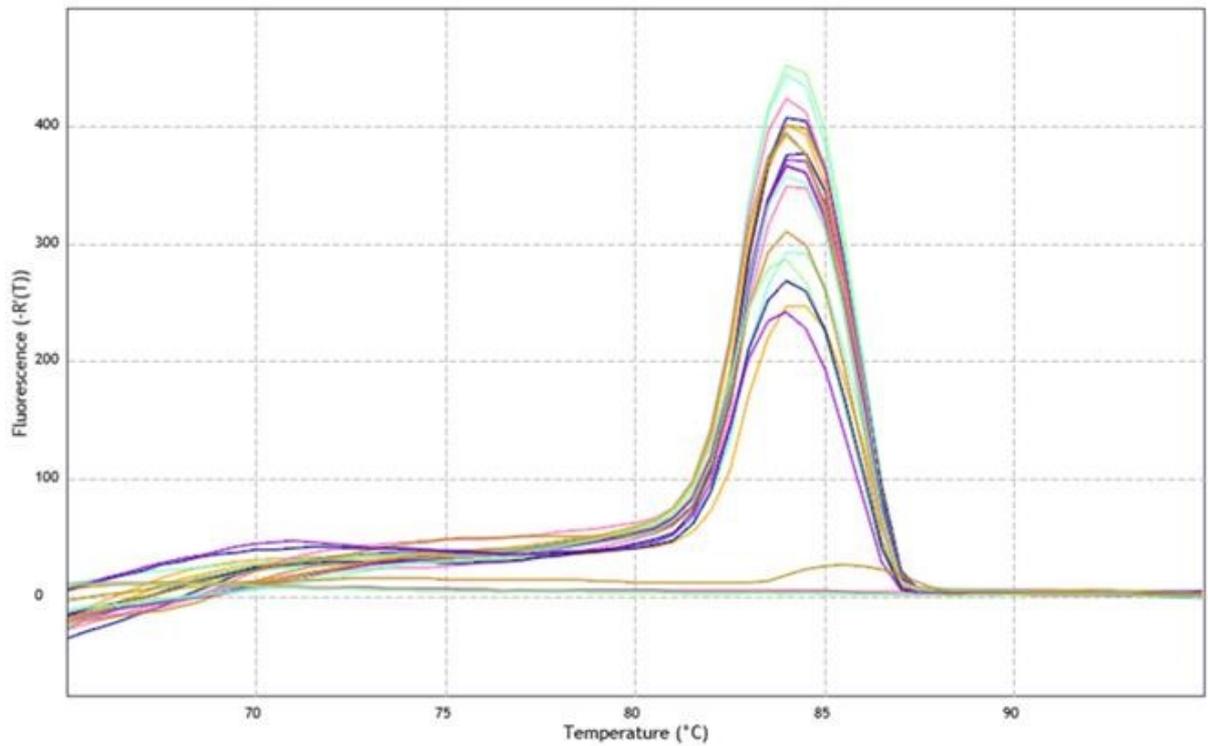


Figure 2e.3: Melt curves



**Table 2e.3: Summary of Tp values from serial dilutions of a positive control on the GenieHT and AriaMX PCR machine, C<sub>T</sub> values from the AriaMX are also provided.**

Control dilution	Genie Tp 1	Genie Tp 2	Genie Tp 3	Aria Tp 1	Aria Tp 2	Aria Tp 3	Aria C <sub>T</sub>	Aria C <sub>T</sub>	Aria C <sub>T</sub>
1:10	00:05:18	00:05:15	00:05:14	00:05:57	00:05:59	00:05:58	23.93	23.77	23.93
1:20	00:05:25	00:05:22	00:05:24	00:06:11	00:05:49	00:05:44	24.76	23.36	23.03
1:40	00:05:37	00:05:56	00:05:34	00:06:28	00:05:39	00:05:49	25.48	22.73	23.46
1:80	00:05:48	00:05:52	00:06:51	00:05:56	00:06:08	00:06:34	23.85	24.70	25.82
1:160	00:06:00	00:07:25	00:06:00	00:08:03	00:08:33	00:06:52	29.96	34.69	28.05
1:320	00:05:58	00:06:26	00:06:34	00:10:46	00:08:05	00:07:14	63.02	30.49	27.24
1:640	00:06:56	00:06:45	00:06:32	00:07:41	N	00:10:36	30.66	N	38.38

## Appendix 1e.1 OptiGene Ltd. COVID-19 Direct Plus RT-LAMP for the detection of SARS-CoV-2

### Version 1.2: RT-LAMP directly from sample (laboratory protocol)

#### 1 INTRODUCTION

This protocol describes the procedure for using the OptiGene Ltd. COVID-19 Direct Plus RT-LAMP Kit for the detection of SARS-CoV-2 directly from saliva or swab samples. This method is to be utilised as a screening test to identify positive samples. If higher sensitivity is required for weak positive samples, those which display no amplification can be subjected to confirmatory testing, such as the gold-standard qRT-PCR (or RT-LAMP) following RNA extraction.

The test uses loop-mediated isothermal amplification (LAMP) which amplifies the viral nucleic acid at a constant temperature of 65°C—therefore there is no requirement for thermal cycling. The test can be performed using the Genie® II, III or HT devices where the amplified product is detected using fluorescent dyes. The Genie® automatically runs an anneal curve at the end of amplification, where the reaction is heated then slowly cooled. This acts as a secondary confirmatory check—ensuring LAMP amplicons are specific to SARS-CoV-2. The final result is interpreted and reported automatically from both the amplification plot and anneal temperature.

**This protocol is suitable for the following samples:**

Sample type	Details
Oropharyngeal / nasopharyngeal swab	Sigma Virocult® samples (Medical Wire & Equipment, Corsham, UK [MW951S])
Saliva	Neat saliva samples

#### IMPORTANT NOTE:

**The use of gamma irradiated and heat inactivated standards/controls are not recommended due to the target sequence being degraded to levels not reliably detected by LAMP.**

#### 2 LABORATORY REQUIREMENTS

**Clean room [preparation of reaction mixes, aliquoting of RapiLyze]:** containing a suitable cabinet dedicated to the preparation of RT-LAMP reaction mixes. Original samples, RNA extracts, or post amplification material must **NOT** be handled or stored in this laboratory. Nuclease free water used for controls must be aliquoted and stored in this room.

**Sample processing room [addition of samples to RapiLyze; addition of sample in RapiLyze to Genie® strips]:** containing a suitable cabinet for handling of COVID-19 samples, dedicated to the processing of original samples. Minimal equipment/reagents should be stored in this laboratory.

**Amplification space [Genie® amplification]:** location of Genie® platforms.

**NOTE: All rooms should have their own dedicated supply of protective gowns, pipettes, tips and other equipment/reagents, which should not be shared with other rooms.**

**NOTE: The RT-LAMP assay is highly sensitive and therefore easily contaminated. Consequently, workspaces must be frequently disinfected or wiped with the appropriate solution.**

#### 3 MATERIALS

Materials	Details
Calibrated pipettes	1000 µl, 200 µl, 100 µl, 10 µl
Pipette tips (barrier tips)	1000 µl, 200 µl, 100 µl, 10 µl
Genie® II, III or HT device	OptiGene Limited.
Genie® tube strips	OptiGene Limited. (Catalogue Number: OP-0008)

Genie® Centrifuge	OptiGene Limited. (Catalogue Number: OP-FUGE)
Genie® Strip Holder	OptiGene Limited. (Catalogue Number: GBLOCK)
Mini vortex or PCR plate shaker	
Equipment for heating step	1) Screw cap tubes (suitable for heating to 98°C) and a dry heat block capable of heating to 98°C 2) PCR thermocycler and PCR plates / foil sealers (e.g. ThermoFisher Scientific catalogue Numbers: 10741725 and 232698)
Screw cap tubes or eppendorfs	1.5 ml or 2 ml (to make up reaction mix)
COVID-19 Direct Plus RT-LAMP KIT-500	Contains: 1) RapiLyze sample lysis buffer 2) Direct RT-LAMP Mastermix 3) 10X COVID-19 Primer Mix These should be stored at -20°C. After thawing, these can be stored at 4°C for up to a week*
Nuclease-free water	
DNA/RNA Degradation Solution	e.g. DNAzap™/ RNAzap™ or equivalent
Appropriate disinfectant	e.g. 'Virusolve+ EDS' or equivalent
Positive Control	e.g. Cell culture isolate, or OptiGene Limited. (Catalogue Number: CD-COV-100)

\*We do not advise pre-mixing and storage of Mastermix and Primer Mix for more than 1 hour at 4°C

## 4 PROCEDURE

### 4.1 Aliquoting of RapiLyze for samples and negative sample controls

In the clean room:

- 4.1.1. Wipe surfaces and pipettes with DNA/RNA Degradation Solution.
- 4.1.2. Prepare enough 50 µl aliquots of RapiLyze in either screw cap tubes or a 96 well PCR plate for the batch of samples to be processed, including one extra as a 'negative sample control'. Seal the tubes/plate for transport into the sample processing room.

### 4.2 Reaction mix preparation

In the clean room:

- 4.2.1. Wipe surfaces and pipettes with DNA/RNA Degradation Solution.
- 4.2.2. Ensure the RT Isothermal Mastermix and the Primer Mix are each well mixed before use. Prepare enough reaction mix for the batch of samples and at least one 'no template control' (NTC) and at least one 'negative sample control' per batch of samples, according to the Table below. For example, if testing 20 samples, prepare enough reaction mix for these samples, controls, plus extra for pipetting error.  
Additional reaction mix should be prepared if a positive control reaction (Cat: CD-COV-100) is required.

Reagent	Volume per reaction
Direct RT-LAMP Mastermix	17.5 µl
10X COVID-19 Primer Mix	2.5 µl

**NOTE: Prepare a fresh reaction mix before each batch of samples to be tested. The time at which reactions are stored at room temperature should be minimised. We recommend reactions are set up using a 4°C cooled block, for example Genie® Strip Holders. Keep made-up reactions on ice in the fridge. We do not advise pre-mixing and storage of Mastermix and Primer Mix for more than 1 hour at 4°C.**

4.2.3. After briefly vortexing, aliquot 20 µl of the prepared reaction mix into each required Genie® tube.

4.2.4. For the NTC: Add 5 µl nuclease free water to the NTC reactions and close these lids to the locked position. Ensure the reaction is mixed well.

4.2.5. Loosely close the remaining Genie® tubes (ensuring they do not lock) and transfer to the sample processing room.

### 4.3 Sample preparation

#### In the sample processing room:

4.3.1. Ensure the Microbiological Safety Cabinet (MSC) is clean and free from clutter before commencing work. Disinfect working surfaces and pipettes before use.

4.3.2. Label the tubes or PCR plate layout with the sample numbers to be processed.

4.3.3. For swabs, vortex the swab tube, then add 50 µl of the virus transport medium (VTM) from the swab container to a 50 µl aliquot of RapiLyze, resulting in a 1:1 dilution of the VTM. For Saliva, add 50 µl of the neat saliva sample to a 50 µl aliquot of RapiLyze buffer, resulting in a 1:1 dilution of the swab sample. For viscous samples, use a positive displacement pipette. Ensure that a 'negative sample control' is run alongside, by adding 50 µl non-freezable water to a 50 µl aliquot of RapiLyze.

**NOTE: Ensure that the pipette is decontaminated between samples.**

4.3.5. If using screw top tubes, ensure they are tightly shut. If using a PCR plate, seal the lid with a foil seal. Using a PCR plate shaker or vortex, vortex the plate briefly to ensure that the sample and RapiLyze are well mixed.

4.3.6. Heat samples to 98°C for two-minutes using either a dry heat block or PCR thermocycler.

4.3.7. Allow samples to cool. If using a PCR thermocycler, this can be achieved by programming a 4°C hold at the end.

**NOTE: Once heating is completed, samples can be briefly spun in a centrifuge to ensure the sample is at the bottom of the tubes.**

### 4.4 Addition of the sample

#### In the sample processing room:

4.4.2. For each reaction, add 5 µl of the sample in RapiLyze to a RT-LAMP reaction in a Genie® strip. Numerically label the end of the Genie® strips.

**CAUTION: Only open the lids of Genie® tubes for one sample at a time; keep the others loosely closed until required. Close to the locked position after addition of each individual sample. The time at which reactions are stored at room temperature should be minimised. We recommend reactions are set up using a 4°C cooled block, for example Genie® Strip Holders.**

4.4.3. Add 5 µl 'negative sample control' to the 'negative sample control' reactions. Ensure the reaction is well mixed. Close the lid to the locked position.

4.4.4. Add 5 µl 'positive control' to the positive control reactions, if required. Ensure the reaction is well mixed. Close the lid to the locked position.

4.4.5. Disinfect the Genie® tubes (ensure each tube is fully locked and spray with disinfectant) before removing from the MSC.

4.4.6. Reactions should be mixed by briefly vortexing or vigorously flicking the Genie® strips multiple times.

**CAUTION: The Genie® tubes must NOT be opened after the sample has been added.**

### 4.5 Setting up the Genie®

#### In the amplification room:

4.5.1. Turn on the Genie® II/III or HT machine at the main switch and wait for the software to initialise.

4.5.2. Ensure the Genie® strips are dry and free from disinfectant (wipe with a paper towel) before loading onto the machine. Additionally, ensure the liquid is at the bottom of the tube and there are no bubbles by spinning in a Genie® Centrifuge (5 seconds at 6000 rpm).

4.5.3. Load each Genie® strip into the chosen heat block.

4.5.4 Touch the screen

4.5.5. Select the “COVID-19 RapiLyze RT-LAMP” protocol on the start-up menu and select the heat block chosen.

4.5.6. Follow the screen’s instructions, enter the relevant sample details for each Genie® tube and start the test.

**NOTE: Heat blocks can be used independently of one another.**

## 5 RESULTS

5.1. Genie® software will automatically analyse results and report samples as positive or “No amplification”.

5.2. The results of each run are automatically saved with a unique run number ID e.g. 0031-01 and are stored by day and month.

**NOTE: For the Genie® HT, the last two digits represent the heat block that the run was performed on.**

5.3. A batch of samples should include at least one NTC, a ‘negative sample control’ and a positive control. The run will be counted as successful if a negative result is achieved in reactions for both negative controls and a positive result is achieved in the positive control reaction.

5.4. To view the results of a previous run, press the ‘file’ icon and choose the date of the test performed, where the runs from that date will then be visible.

### Troubleshooting

- A positive result in the NTC may indicate contamination of the clean room workspace.
- A positive result in the ‘negative sample control’ may indicate contamination at the sample processing stage during the set-up of the RT-LAMP.
- If contamination is observed, determine where the contamination has occurred, then thoroughly clean the workspace before repeating the RT-LAMP run(s).
- A negative result in the positive control reaction may indicate errors in RT-LAMP reaction set up. Please refer to the specific Positive Control instructions for additional information.

## f. Modelling to predict numbers

### Report of work and procedures developed

The laboratory was able to process up to 2,000 samples per day and it was important that this limit was not exceeded. Thus it was necessary to construct a model of the potential testing numbers during this Phase. The model is a simulation in Excel, and was developed by the Director of the Centre for Operational Research, Management Sciences and Information Systems (CORMSIS) at the University of Southampton. It used as inputs the expected number of registrations across the cohorts, the testing frequency, the percentage of those registering doing a test each week and, for students, a prediction of when they would arrive in Southampton. The information we had about when students were expected to arrive in Southampton was taken from a survey by the Student Services Team, which had responses from about 50% of students. This was used to try to predict arrivals in Southampton and whether students would need to quarantine. The model was constrained only to allow 2,000 tests a day, so if a day was full it moved excess tests to the next day. What we found, however, was that the number of students registering was significantly lower than expected, and also the percentage of those registered taking tests was lower than expected. The number of University staff registering was also lower than expected but had less of an impact on the overall numbers than did students, as they formed a smaller percentage of the total tests.

Once we had passed the arrival peak and had a better idea of how many students and staff were taking part, the model became more accurate, particularly as students in Halls of Residence were allocated a specific day on which to test and were sent reminders for that day. For the schools, the model was close to the actual number of tests carried, apart from a decline in numbers the week leading up to half term.

The screens below contain the input data for running the model in steady state and an example of the schedule produced.

APHA maximum daily capacity												
Cohort Name	Size of cohort	Expected % Take Up	Min %	Max %	Expected #	Use Fixed Arrival?	# Days Between Tests	Weekend Testing?	Testing Day	Proportion of Late Tests		
School staff: Maytree	63	80%	70%	100%	50.4	FALSE	7	FALSE	Monday	10%		
School staff: Mount Pleasant	62	80%	70%	100%	49.6	FALSE	7	FALSE	Monday	10%		
School staff: Cantell	180	80%	70%	100%	144	FALSE	7	FALSE	Monday	10%		
School staff: Swaythling	40	80%	70%	100%	32	FALSE	7	FALSE	Monday	10%		
Pupils: Maytree Year 1 and 2	167	75%	60%	95%	125.25	FALSE	7	FALSE	Tuesday	10%		
Pupils: Maytree Year R	66	75%	60%	95%	49.5	FALSE	7	FALSE	Thursday	10%		
Pupils: Mount Pleasant Year 5 and 6	165	75%	60%	95%	123.75	FALSE	7	FALSE	Tuesday	10%		
Pupils: Mount Pleasant Year 3 and 4	171	75%	60%	95%	128.25	FALSE	7	FALSE	Thursday	10%		
Pupils: Cantell Year 11	219	70%	60%	95%	153.3	FALSE	7	FALSE	Tuesday	10%		
Pupils: Cantell Year 7	253	70%	60%	95%	177.1	FALSE	7	FALSE	Wednesday	10%		
Pupils: Cantell Year 8	246	70%	60%	95%	172.2	FALSE	7	FALSE	Thursday	10%		
Pupils: Cantell Year 9 and 10	451	70%	60%	95%	315.7	FALSE	7	FALSE	Friday	0%		
Pupils: Swaythling	199	80%	60%	95%	159.2	FALSE	7	FALSE	Wednesday	10%		
Student - Glen Eyre Group 1	856	60%	70%	100%	513.6	FALSE	7	TRUE	Friday	90%		
Student - Glen Eyre Group 2	701	60%	70%	100%	420.6	FALSE	7	TRUE	Saturday	90%		
Student - Wessex	681	60%	70%	100%	408.6	FALSE	7	TRUE	Saturday	90%		
Student - Mayflower	532	60%	70%	100%	319.2	FALSE	7	TRUE	Sunday	90%		
Student - City Gateway	57	60%	70%	100%	34.2	FALSE	7	TRUE	Sunday	90%		
Student - Gateley	98	70%	70%	100%	68.6	FALSE	7	TRUE	Tuesday	90%		
Student - Romero	146	60%	70%	100%	87.6	FALSE	7	TRUE	Thursday	90%		
Student - Erasmus Park Winchester	117	60%	70%	100%	70.2	FALSE	7	TRUE	Sunday	90%		
HMO Students Group 1	4613	50%	60%	95%	2306.25	TRUE	7	FALSE	None	10%		
HMO Students Group 2	4613	50%	60%	95%	2306.25	TRUE	7	FALSE	None	10%		
Staff Group 1	441	75%	60%	95%	330.75	FALSE	7	FALSE	None	10%		
Staff Group 2	598	70%	60%	95%	418.6	FALSE	14	FALSE	None	10%		
Staff Group 3	526	70%	60%	95%	368.2	FALSE	14	FALSE	None	10%		
<b>Total</b>	<b>16,260</b>				<b>9,333</b>							

Category	Cohort Size	17-Oct	18-Oct	19-Oct	20-Oct	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct
		Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
School staff: Maytree	63	0	0	45	5	0	0	0	0	0
School staff: Mount Pleasant	62	0	0	45	5	0	0	0	0	0
School staff: Cantell	180	0	0	130	14	0	0	0	0	0
School staff: Swaythling	40	0	0	29	3	0	0	0	0	0
Pupils: Maytree Year 1 and 2	167	0	0	0	112	13	0	0	0	0
Pupils: Maytree Year R	66	0	0	0	0	0	45	5	0	0
Pupils: Mount Pleasant Year 5 and 6	165	0	0	0	112	12	0	0	0	0
Pupils: Mount Pleasant Year 3 and 4	171	0	0	0	0	0	115	13	0	0
Pupils: Cantell Year 11	219	0	0	0	138	15	0	0	0	0
Pupils: Cantell Year 7	253	0	0	0	0	159	18	0	0	0
Pupils: Cantell Year 8	246	0	0	0	0	0	155	17	0	0
Pupils: Cantell Year 9 and 10	451	0	0	0	0	0	0	316	0	0
Pupils: Swaythling	199	0	0	0	0	143	16	0	0	0
Student - Glen Eyre Group 1	856	460	0	0	0	0	0	50	460	0
Student - Glen Eyre Group 2	701	40	380	0	0	0	0	0	40	380
Student - Wessex	681	40	365	0	0	0	0	0	40	365
Student - Mayflower	532	0	30	285	0	0	0	0	0	30
Student - City Gateway	57	0	5	25	0	0	0	0	0	5
Student - Gateley	98	0	0	0	5	60	0	0	0	0
Student - Romero	146	0	0	0	0	0	10	75	0	0
Student - Erasmus Park Winchester	117	0	5	65	0	0	0	0	0	5
HMO Students Group 1	4612	417	0	0	457	457	457	457	457	0
HMO Students Group 2	4612	453	0	0	453	453	453	453	453	0
Staff Group 1	441	7	0	59	66	66	66	66	7	0
Staff Group 2	598	8	0	0	0	0	0	0	0	0
Staff Group 3	526	0	0	66	73	73	73	73	7	0
		1425	785	749	1443	1451	1408	1525	1464	785

### Lessons learnt and actions taken

Students tended to drop their samples off later in the day and so missed the morning pick up by the courier, which meant the laboratory did not test them until the following day. As the model was intended to model laboratory capacity the input data were changed to reflect this.

The model was simplified once we passed the student arrival period by modelling all students in a particular hall of residence together rather than splitting between UK and International students. All students not in University halls were grouped together rather than trying to model postgraduate students separately.

The model was used to provide estimates of tests to APHA twice a week.

### Recommendations for wider rollout

Models work better at predicting numbers once the programme is up and running and a steady state has been reached. At the outset, too many variables need to be estimated, and these induce uncertainty in the predictions. Examples of these variables are the rate of registration, size of cohorts and take up of tests once registered.

The model also needs to be reviewed regularly to see how the results compare with the actual number of tests done.

## **g. Enquiries team**

### **Establishment of the team (SCCCS)**

The Enquiries Team function was taken on by Southampton City Council Customer Services (SCCCS) for Phase 2, as staffing an Enquiries Team from volunteers from UoS Faculty Operating Service staff, as per Phase 1, was not sustainable as the new academic year approached. The Service Manager - Customer Operations at SCCCS identified two members of her existing team who were ready to start taking calls while she recruited a team of four customer services advisors, and soon after, two assistant team leaders. These staff were supplied by an agency, which had the benefit of being able to supply people very quickly, unlike traditional recruitment. One of the SCCCS permanent staff members acted as a Subject Matter Expert from the start, which was helpful to both UoS project management and the SCCCS team. Most of the team were physically located together, but three members of the existing SCC Digital team also answered webchat queries, and they were mainly working from home.

### **Training**

Training was provided remotely via MS Teams over several sessions to all Enquiries Team members by people involved in this function during Phase 1. Initial sessions explained the programme, including an overview of Phase 1, and a session from an academic member of the core management team was very useful in engaging the SCCCS team from the start. Thereafter, training centred around processes and in-depth, interactive demonstrations of the system, where the team were encouraged to follow along using their own systems where possible. As new members of the SCCCS Enquiries Team joined, additional sessions were provided for them. All sessions included the opportunity to ask questions and the team were encouraged to follow up and later ask questions directly to the UoS project managers. One issue was the timing of access to the system, which meant trainers only had access shortly before training had to be delivered. The trainers who were part of Phase 1 delivered the training, which mitigated this somewhat, as the system was quite similar, but if the system were substantially different or a new team were delivering training, this could be a major hurdle.

### **Access to system (approvals needed, email addresses)**

Unlike Phase 1, there was no need to arrange honorary contracts with University Hospital Southampton (UHS) for Enquiries Team staff, as the Data Sharing Agreement and Service Level Agreements allowed for the creation of user accounts directly. This setup process was speedier and seemed to have fewer issues. However, there was an issue for several SCCCS Enquiries Team colleagues where their (old) provided desktops could not connect to the UHS desktop and (newer) laptops were required. This remedied most issues but, for some, incurred a delay in being able to access the system while this was arranged. The shared email inbox used in Phase 1 was not reused in Phase 2 because SCCCS have access to a very effective webchat function on their website. This proved to be an excellent addition to the way the Enquiries Team operated and was especially popular with UoS students. One issue was the timing of access to the system, which meant the Enquiries Team was operational before they had access, so were not always able to answer early queries (although this was only a few days).

### **Process development**

Building on the processes of Phase 1, an initial set of processes were documented, including registrations, replacing missing packs and resending missing texts. These were later expanded to include other processes including, generating IDs, verifying UoS staff identities, dealing with inconclusive test results, managing expanded cohorts for registrations, and providing feedback. Process instructions were kept as simple as possible and were in bullet point form. Explanations and guidance on what to do or say at each step were included. As new processes were required, they

were be added into the document and changes cascaded to the Enquiries Team members via the assistant team leaders.

### **Hours to be covered**

The hours SCCCS operated were kept under regular review, with the ability to be flexible and responsive to demands, a key benefit of the setup. Regular daily reporting about call volumes and timings, along with periodic in-depth analysis of call types, allowed informed decision-making to take place. Initial opening hours were 7am to 7pm, Monday to Friday and 8.30am to 5pm weekends. This was to cover all anticipated peaks in calls – before school for parents, into the early evening for working people and students, and weekends for all groups. It was vital to have the ability for 7-day contact while participants were testing seven days a week and any of them could have had concerns about results on any day. On review in mid-October demand was seen to be lower early in the morning and on weekends, but reasonable into the early evening. Hours were changed to 8.30am to 6.30pm Monday to Friday and 11am to 3pm weekends, with the intention that these could be quickly ramped up again if the demands of the programme dictated a change. SCCCS (for which the standard opening hours are 8:30am-5pm Mon-Fri) had some concerns about staffing levels when call volumes were particularly low; this made rotas harder to fill, requiring high staffing numbers as well as worries about staff morale and possible retention issues as a result.

### **Frequently Asked Questions (FAQs) – writing**

During Phase 1 an extensive set of FAQs was created and these were used as the starting point for Phase 2 FAQs. All were reviewed for relevance in this Phase and updated where necessary. This was very much a whole-team effort, and including expertise across the range is vital, especially on areas such as medical and legal issues. Whenever appropriate, wording to match the main programme messaging was adopted. Once completed, relevant representatives of the Programme Management Team were authorised to give final approval to the FAQs. As new FAQs were required, these were developed by the appropriate experts in the team and approved. SCCCS Enquiries Team members were encouraged to make suggestions for new FAQs based on calls they received.

### **FAQs – management and access**

The master copy of the FAQs document was held within the main programme SharePoint site and a duplicate was provided to SCCCS within their SharePoint site. All changes and additions were always made to both documents. During initial training sessions, the SCCCS Enquiries Team were introduced to the FAQs and an explanation of how to use them was given. In particular, their attention was drawn to RED answers, for which it was vital that the exact wording was provided to callers. Generally, these FAQs are of a legal or medical nature where very specific and fully approved information needed to be provided. A small selection of these FAQs has been reworked into text for the SCC website and, for Phase 3, consideration should be given to providing more of this information online in a searchable format so that participants can find the information without calling the Enquiries Team.

### **Liaison with other parts of the programme**

Liaison was via UoS and SCC project managers who attended Daily Stand Up meetings and had rapid online access to Programme Management Team members. There was a weekly meeting between UoS project managers and SCCCS Enquiries Team assistant team leaders and a fortnightly meeting with UoS project managers and SCCCS management. Ad hoc queries were raised and posted on the Daily Stand Up chat or via email to members of the wider management team for specialist advice. Once answered, information was relayed back to the team for action and follow up, as necessary. The SCCCS Enquiries Team did not have direct access to the Case Contacting Team (CCT), and SPCL teams and calls were triaged by UoS project managers before referral to the CCT and SPCL, including medical colleagues, although this could be reviewed in future. Enquiries Team members were

excellent at urgently flagging up potential concerns and worries from calls, which allowed for rapid onward referral to the SPCL or local Public Health teams for calls and advice. Similarly, liaison with the systems team was via UoS project managers, who, in a later development, attended regular Systems meetings to raise systems queries directly with the systems team.

#### **Feedback mechanism for unanswered queries**

Phase 1 established a system of an On Shift Chat channel via MS Teams whereby all members of the Enquiries Team could post questions and ask for help in real-time during a call. It had the benefit of being accessible to all, so team members could see the answer to a question posed by a colleague and use that information themselves at any time in the future. This was replicated in Phase 2 and proved very popular. It made it easier for UoS project managers to identify unanswered queries and step in with advice or to post information as soon as it became available and bring it to the attention of the whole team. The system was not so widely used latterly, as several team members were based within the same location and as a result more use of verbal and email communications developed. However, when members of the SCCCS Enquiries Team were home working, the online On Shift Chat was necessary, so those colleagues did not miss-out on developing their knowledge.

#### **Access to results system**

As in Phase 1, no call handler at SCCCS could see test results for any participant. They could see that a result had been received by the system, when it was received and whether the participant had been texted with the result. They also had the ability to resend results' texts very easily if a participant had not received theirs, even though it was showing as received on the system. Often this would be done after a mobile number had been updated, for example. Not having sight of results was never raised as an issue by either call handlers or any participants, so would be the right decision going forward into Phase 3.

#### **Access to information sent to participants (texts, emails)**

Early on, a SharePoint site was established for UoS and SCCCS colleagues, accessible also via MS Teams. Numerous documents were shared at the start, and this was built on as Phase 2 has developed and new documents became available. UoS owns the SharePoint site and maintained most of the documents. SCCCS colleagues uploaded regular performance data reports, but nothing else. Documents were updated as and when there were changes made within the programme and relayed to SCCCS via messaging to the assistant team leaders for onward dissemination. A current list of documents is given in Appendix 2g.1 below.

Arguably, it would be more efficient and user-friendly to provide system users with a full(er) communication history via the system rather than call handlers having to access multiple, regularly updated information sheets and then working out which is relevant for the customer on the telephone.

#### **Referral mechanism for dealing with results**

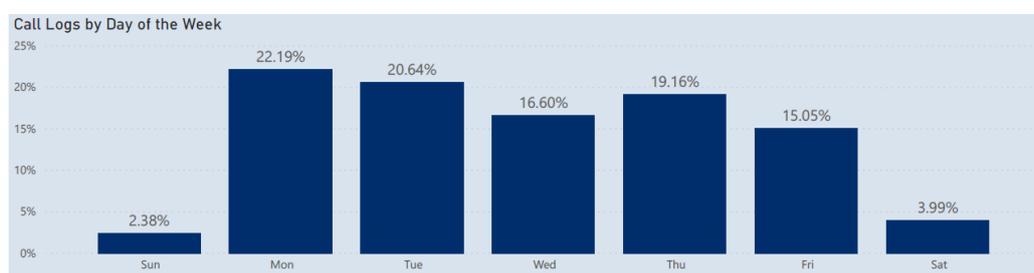
Although SCCCS Enquiries Team members did not see results of tests, they did occasionally receive calls from participants who had received a positive result or had been in contact with someone who has tested positive, and had questions on what to do next. The FAQs provide agreed information and answers but, if the caller requested further advice or had worries, the Enquiries Team raised this with UoS project managers to refer onwards to the CCT and SPCL teams. The SCCCS Enquiries Team did not have direct access to SPCL and calls were triaged by UoS project managers before referral to SCPL and medical colleagues. This could have been via MS Teams call with the core CCT, an email to SPCL or, most often, directly on the system to request a call out for advice and enable same-day follow up in most cases. This system worked well but in Phase 3 with far more participants likely and

possibly correspondingly higher numbers of positive results, without additional points of access delays may occur in getting timely support to participants.

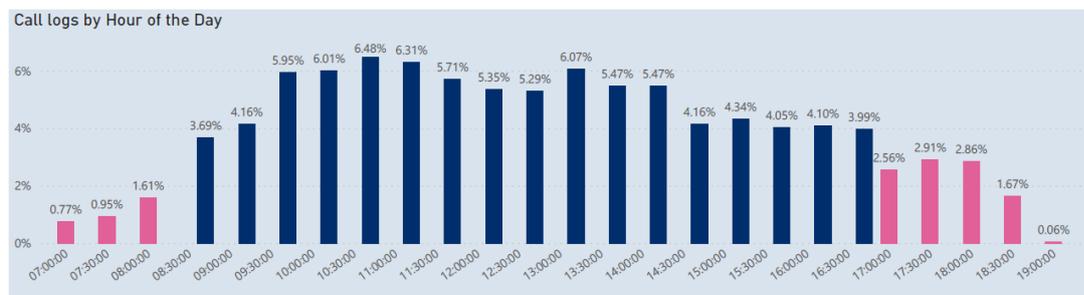
### Call logging and summary

The SCCCS telephony system recorded numbers and time of calls and webchats, speed of answer and percentage of calls answered. Between opening and 31<sup>st</sup> October 2020, 1,095 calls and 694 webchats were made. The average speed of answering calls was 11 seconds and 96% of all calls were answered.

Even though students could test at weekends, calls and webchats were predominantly received during the week (over 93%). Most UoS cohorts received reminder texts (schools did not receive reminder texts and instead all test weekly) on a Monday which may be why Mondays saw the highest proportion of calls and webchats, but all five weekdays saw broadly similar proportions of calls and webchats received. This is presented graphically below:



Most calls and webchats were received during normal working hours, although 5pm to 6.30pm did still account for around 10% of the calls and webchats. Very few calls were received between 7am and 8.30am which led to the decision to open at 8.30am while retaining the flexibility to increase hours again should it be required by the programme.



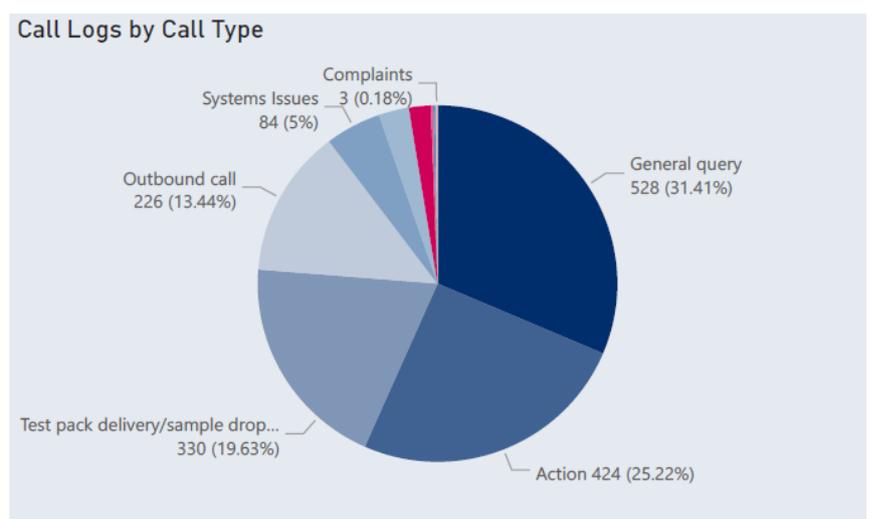
The busiest week was the week beginning 5<sup>th</sup> October during which 269 calls and webchats were received, which coincided with text messaging around testing and updating personal details that prompted a large number of UoS staff and students to ring with queries. The week beginning 14<sup>th</sup> September was the first full week of operation but at that time schools were not yet testing and UoS staff had not yet been invited, which accounts for the lower numbers.



Calls and webchats types were logged by the Enquiries Team member, and initially recorded on an Excel spreadsheet as the system functionality was not completed, and these data were stored for inclusion within the system data at a later stage. Although requested, the name of the cohort to which each participant belonged, such as UoS staff or Student in Halls, was not available in the log. The system recorded calls against a participant, which allowed for a list of all interactions with each person to be viewed by any Enquiries Team member. Each call was categorised by Call Type and Sub Type to enable analysis. The instructions on classification were not hugely prescriptive, which may mean classifications would differ between Enquiries Team members, depending on their judgement.

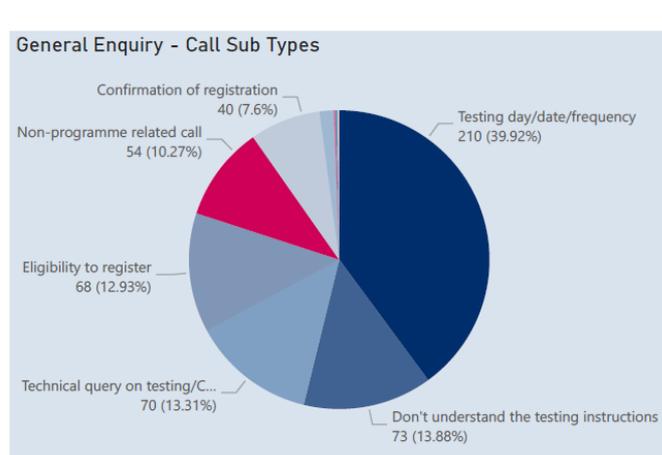
In total, 1,681 call logs were made, indicating around 6% of calls may not have been logged, which is considerably lower than the rate in Phase 1. Missing logs could be as a result of human error during busy periods, working across multiple systems and desktops with sporadic connectivity issues, plus calls being received but the caller disconnecting. Calls by non-participants were also recorded as were calls unrelated to the programme (54). Early on, these were predominantly requests from members of the public to take part, but these reduced over time, being overtaken by questions on the location of local testing centres and routine Council services queries.

Nine broad categories of call types were created, building on Phase 1 calls, and updated to allow for changes to the programme in Phase 2. Planned data uploads of participants from schools and UoS meant few people needed to call in to register, unlike in Phase 1 where around half of calls were concerning registration to take part. See the figure and table below for details:



Call Type	Count	%age
General query	528	31.41%
Action	424	25.22%
Test pack delivery/sample drop-off	330	19.63%
Outbound call	226	13.44%
Systems Issues	84	5.00%
Telephone registration	46	2.74%
(Not classified)	33	1.96%
Telephone system update	4	0.24%
Complaints	3	0.18%
Arrange call back	3	0.18%
	<b>1681</b>	<b>100.00%</b>

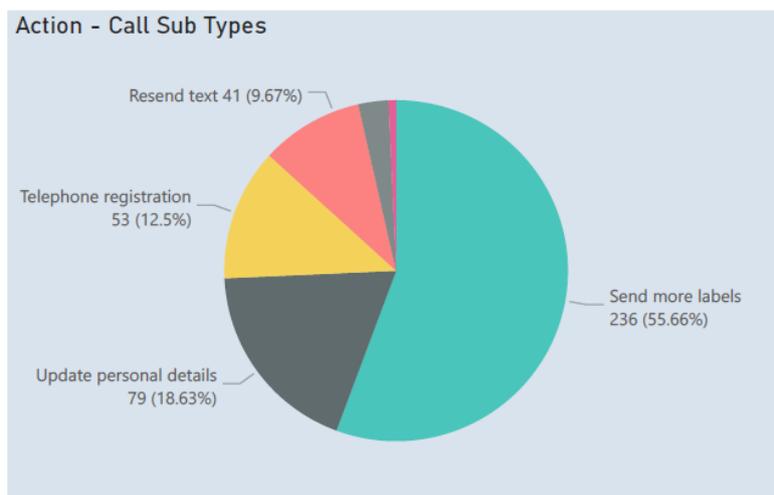
Almost a third of calls fell into the **General Query** call type and are broken down as follows:



Almost 40% of all General Queries were related to questions about 'Testing day/date/frequency'. They were along broad themes including when would text prompt be received, could they test sooner, or later, or more often, could samples be posted, and when to take their next test. 'Don't understand the testing instructions' accounted for almost 14% of General Queries, although a more in-depth analysis of these ruled out language issues as the reason for these calls. Instead, calls were about confusion over testing days, how many bags should be in the kit, does drinking coffee mean

the test has to be done the next day, and issues. 'Technical Query' covered a number of calls relating to science questions but also probably wrongly classified calls about updating details, what to do if someone was having symptoms or had been in contact with a person with symptoms. 'Eligibility to register' included calls from the public who wanted to book COVID-19 tests but also some UoS staff and students who had queries about registering.

One quarter of calls were classified as an **Action**, used to denote when one of several processes was instigated by the Enquiries Team via the system. These are summarised in the figure below:



More than half related to 'Send More Labels' but it should be remembered that this had been the key way for replacement packs to be sent to participants, so will account for a significant proportion, whether they had never received them or had used up their pack already. Other requests for labels included those who had lost their labels. 'Updating personal details' were frequently correcting mobile numbers and sometimes addresses. 'Telephone registrations' were mostly for UoS staff and contractors unable to register online and a small number of new starters at local schools. The ability to 'Resend Text' was a welcome addition to the system and allowed results texts to be resent for those where a person had an incorrect number recorded on the system.

Almost 20% of all calls related to Test Packs and drop off location, many of which were practical queries about hours of opening for drop off points and requests for extra kit where packs didn't arrive. Around 14% of calls were outbound calls, which included following up on queries where more information was required to assist a caller, and also updating addresses or advice about destroying labels where those had been allocated to the laboratory after participants had reused old labels or not used a label at all.

A full breakdown of call types is given in Appendix 2g.2 below.

#### Lessons learnt and actions taken

- Establish the core system ahead of time to allow adequate development of training and processes
- Rapid action - can-do mentality, flexibility and being prepared to try new approaches
- Good FAQs and make sure they are updated as required
- Communication between all groups is essential
- Subject-matter experts – developing expertise in the team and external links (go-to people)
- Go-to approval chains for unusual and tricky queries

- Involvement of end-users in system development who will see potential issues based on previous experience and help make the system even better

#### Recommendations for wider rollout

- Chat system online for Enquiries Team (possible in MS Teams)
- Liaison with sub-groups. We had limited groups (four schools and University) so as the number of cohorts grows understanding of the needs of each group will need to follow
- Need for sub-enquiries teams for specific organisations – need to consider if more effective based within a single organisation or hubs in different geographical locations
- Single viewpoint of a participant's record should be available to Enquiries Team, including test schedule, all texts/emails sent, all interactions with the Enquiries Team
- End-to-end testing of the whole system from registration to receiving results, including an overview of communications, to ensure the best customer experience for participants
- Webchat or similar method of electronic communications as well as a freephone phone number
- Consideration of hosting more FAQs/information online for those who find this a useful way of accessing information
- Direct link to the Case Contacting Team to ensure support for participants can be provided in a timely way

#### Appendix 2g.1. Documents developed and used by the Enquiries Team.

Documents currently posted are:

- *Addresses to update recording sheet*
- *Quick Reference Guide*
- *Cohort text Messages and Emails list*
- *Destroying Labels recording sheet*
- *Drop Off Locations*
- *Example Scenarios for Referring callers from PHE colleagues*
- *Generated IDs for Contractors recording list*
- *Invite Schedule*
- *Invitation/invite comms – UoS staff, visitors, students, and contractors*
- *Key lines to Say to callers*
- *Mastercopy FAQs*
- *People with late Results recording list*
- *Phonetic Alphabet*
- *Processes Document*
- *Registering UoS Contractors guide*
- *Registering UoS Staff guide*
- *Schools Testing Schedule*
- *Screenshots document*
- *SCTP leaflet (supplied in test packs)*
- *Text for SCC website*
- *UoS staff briefing sheet*
- *UoS staff registration enquiries recording sheet*
- *Updating Mobiles and Addresses in Banner*

## Appendix 2g.2. Full breakdown of Call Types

Row Labels	Count	% age
<b>General query</b>	<b>528</b>	<b>31.41%</b>
Testing day/date/frequency	210	12.49%
Don't understand the testing instructions	73	4.34%
Technical query on testing/COVID-19	70	4.16%
Eligibility to register	68	4.05%
Non-programme related call	54	3.21%
Confirmation of registration	40	2.38%
Request for test results certification	8	0.48%
(blank)	2	0.12%
General query	1	0.06%
-	1	0.06%
Other issue resolution (please specify)	1	0.06%
<b>Action</b>	<b>424</b>	<b>25.22%</b>
Send more labels	236	14.04%
Update personal details	79	4.70%
Telephone registration	53	3.15%
Resend text	41	2.44%
Remove participant	12	0.71%
-	3	0.18%
<b>Test pack delivery/sample drop-off</b>	<b>330</b>	<b>19.63%</b>
Drop off query	124	7.38%
Test pack didn't arrive	112	6.66%
Extra kit please	70	4.16%
Test pack damaged/incomplete	23	1.37%
-	1	0.06%
<b>Outbound call</b>	<b>226</b>	<b>13.44%</b>
Other issue resolution (please specify)	175	10.41%
Registration assistance	22	1.31%
Amending record assistance	14	0.83%
Test pack/replacement pack	9	0.54%
-	6	0.36%
<b>Systems Issues</b>	<b>84</b>	<b>5.00%</b>
System issue	49	2.91%
Registration system	15	0.89%
Text message - results	13	0.77%
Text message - registration	3	0.18%
Updating personal details	2	0.12%
-	2	0.12%
<b>Telephone registration</b>	<b>46</b>	<b>2.74%</b>
Couldn't use online self-reg	44	2.62%
(blank)	1	0.06%

Eligibility to register	1	0.06%
-	<b>33</b>	<b>1.96%</b>
-	33	1.96%
<b>Telephone system update</b>	<b>4</b>	<b>0.24%</b>
Couldn't use online change own details	3	0.18%
-	1	0.06%
<b>Complaints</b>	<b>3</b>	<b>0.18%</b>
Process/delivery/collection	2	0.12%
Comms/website	1	0.06%
<b>Arrange call back</b>	<b>3</b>	<b>0.18%</b>
Escalation to team leader	2	0.12%
-	1	0.06%
<b>Grand Total</b>	<b>1681</b>	<b>100.00%</b>

## h. Case Contacting Team

### Work structure and procedures

The Case Contacting Team consisted of two parts.

- i. A core Case Contacting Team (CCT) consisting of public health consultants, public health academics and public health specialty registrars. This team provided operational management of the contracted Case Contacting Team, and provided public health oversight and input to all aspects of the programme.
- ii. A contracted Case Contacting Team provided by Southampton Primary Care Limited (SPCL). This team consisted of a GP liaison providing primary care input and expertise to the programme; a GP supervisor managing and providing oversight to a team of clinical call handlers; clinical call handlers. The team made all calls to positive cases, and those who had an inconclusive result.

### Work programme for the core Case Contacting Team (CCT)

- Members of the CCT joined subgroups for the University and schools testing programmes to provide public health expertise.
  - Attended regular meetings of school testing subgroups
  - Liaison with University COVID-19 response team
  - Helped to create educational materials for schools
  - Public health advice and input to school and University communications teams
  - Q&A sessions for school staff
  - Liaison with single point of contact for COVID-19 cases in the University
  - Liaison with Head of Aspire Schools Trust
- Members of the CCT joined the core programme management team daily, to provide updates to the team on case contact issues and to provide public health advice and input to all other work streams.
- Members of the CCT provided regular liaison for the programme across partner organisations, including Southampton City Council (SCC) and Public Health England (PHE) South East Health Protection Team.

### Work programme for the SPCL team

- Calls to all positive cases (65 calls during the programme, including multiple attempts for some participants)
  - Navigation call to all participants who tested positive, within a few hours of them receiving their test result.
  - Proforma questionnaire completed with the participant (Appendix 2h.1) includes
    - Details about symptoms, if any
    - Isolation advice for case and household
    - Asking if they will have any difficulties isolating
    - Signposting to other services where needed e.g. Student welfare, Southampton City Council Covid hub, social prescriber, Primary Care Covid hotline, Primary Care Covid assessment centre, GP, Health Protection Team (HPT)
- Call to all participants whose sample could not be processed - 'inconclusive sample' (93 calls during the programme, including multiple attempts for some participants)
  - Proforma questionnaire completed with the participant on APEX system (Appendix 2h.1)
    - Explain meaning of 'inconclusive' result (usually insufficient sample for processing)
    - Advise to complete another sample as soon as possible
    - Answer any questions and signpost to other services where needed
- Call to participants for other reasons

## *Confidential*

- Participants who submitted multiple samples on the same day, or consecutive days
- Participants who did not understand the test instructions
- Participants who raised complex queries that the Enquiries Team (hosted within Southampton City Council) felt unable to answer
  - Advice and information gathering call

### **Operational details**

The Process Map for Case Notification is in Appendix 2h.2. Processes were dynamic and had to change throughout Phase 2, as processes in local Health Protection Teams, National Test and Trace and Public Health England changed.

The CCT, GP Liaison and SPCL GP supervisor met twice weekly to discuss operational and strategic issues. A nominated member of the CCT liaised directly with the SPCL GP supervisor regarding positive cases, to discuss any issues and to give public health advice and support where needed.

The CCT trained SPCL call handlers in Phase 1 of the programme, and the GP Supervisor trained further staff in Phase 2.

The SPCL team were contracted to make calls between 4pm and 8pm daily, including weekends. This was to fit in with test results usually coming back from the laboratory at around 3pm. In practice, the SPCL team were very responsive and flexible in their approach. Positive cases were usually called within one hour of the result being released.

Median call duration to a positive case was 12 minutes (Inter-quartile range 9 to 17 minutes, range 6 to 52 minutes).

We were unable to describe the time from a participant submitting their sample to receiving their result, as there was no time stamping at sample drop off points, or when the samples arrived at the laboratory. This time stamping has been recommended for phase 3 of the programme.

All positive cases were given the direct dial number for the central clinical triage centre and could call this number from 8am to 10pm, 7 days a week for 14 days after their positive test. There was a central register of those who were given open access, which was managed in real time. There were five calls to this line in Phase 2 (out of 59 positive cases in total). This number was also given out in an answerphone message if the positive case could not be reached initially. This back up system ensured timely contact with all positive cases.

### **Lessons learnt**

#### ***Contacting those who test positive and had “inconclusive” results***

##### ***Operational issues***

Using a clinical triage centre that was already staffed from 8am to 10pm, to run the SPCL call team, made the operational processes very straightforward. Telephone lines, staff shifts and handover arrangements, IT facilities and clinical supervision processes were all already in place for the normal work undertaken by SPCL Ltd. The SPCL team were able to bring in extra staff rapidly to respond to increased workload as cases increased.

#### ***The faster a first call to a positive case can be made, the better***

We found that if there was a delay to calling a positive case, they had in the meantime taken advice from friends or family, which could be inaccurate or confusing, and in particular led to unnecessary

further testing. With the implementation of text message alerts to the SPCL team regarding positive cases, we were able to call positive cases usually within one hour of the result. The GP Supervisor was able to be very responsive to variations in workload, and to ask extra staff to help when the workload increased. This was valuable in ensuring that the case received timely and accurate information and advice.

Many students were not clear about the isolation requirements and needed to have these explained in detail. The opportunity to do this within a very short time of them receiving their positive result was felt to be valuable.

Feedback from SPCL team: *“The first contact success rate is higher the sooner this is done, to get in before they start ringing around those with whom they have been in contact and to sort shopping, support/ Uni etc. We need to get in first before everyone proffers their personal advice and guidance!”*

Feedback from SPCL team: *“Results came in late one evening - three positives which necessitated contacting a headteacher, and 15 inconclusives - an Advanced Nurse Practitioner and paramedic logged in to help clear the workload in a timely manner.”*

**Recommendations:**

- A text message alert about positive cases to the SPCL team allows for a rapid response in calling the case, without the need for permanent monitoring of the APEX system for results.
- Team needs to be available 8am to 8pm in order to respond. Flexibility to pull in extra staff during busy times is important.

**Systems relying on participants to inform the school / University of their positive result were not reliable**

At the beginning of Phase 2, the process in place relied on parents/staff informing schools of positive results, and on students/staff to inform the University. It became clear early on that this system was not robust. Students did not always complete the University notification form. For parents, informing the school was not their first priority when receiving a positive test for their child. Parents may not have out of hours contact details for head teachers, so may not have been able to inform the school if the case occurred in the evening or at the weekend.

Delays to notification of positive cases mean that settings are not able to take prompt action to perform risk assessments, identify contacts and liaise with the HPT / DfE for appropriate advice. This was identified as a key issue to address. A temporary process was put in place for the SPCL caller to ask the case for permission from the parent or participant to share their result with the setting. The SPCL caller then informed the setting. This worked well, but would not be practical at scale, as it would be too labour intensive. Permission to share results with settings really needs to be part of the programme legal framework and the ability to do this has subsequently been addressed by revising the relevant data sharing agreements and identifying a further lawful basis for processing.

Feedback from head teacher: *“A delay in being informed of a positive case in the school can result in a delay in contact tracing within the school, potentially leading to contacts remaining in school for an extended period of time or our not being able to stop contacts coming in the next day. Receiving a result when it is generated by the Lab will enable us to work efficiently and effectively and maximise our opportunity to minimise and mitigate the risk to our school community.”*

**Recommendation:** Settings registering with the testing programme should be asked at the point of registration to provide contact details, including out of hours, for two senior managers within the

setting. For example, for schools this should include the Headteacher and one member of the Senior Management Team. These people will receive notifications about positive cases in their settings, both within and outside normal working hours. Notifications can be automated if the necessary data sharing agreements and privacy notices are in place. Permission to share results with settings should be part of the programme legal framework.

### **Be prepared for participants to behave in unexpected ways**

The majority of students submitting a test understood the instructions, but a few had not read them. Among the school cohort, there were significant challenges with understanding the process of doing a test. These included:

- Samples contained insufficient or no saliva
- One person provided a urine sample
- Handwritten names on pots instead of using the labels provided
- Submitting multiple samples on same day, or consecutive days
- Three people submitted samples for other family members

Calls to inconclusive cases revealed anxieties that their test was ‘borderline’ and they might be positive for COVID-19. This terminology may not be helpful, as an ‘inconclusive’ result does not indicate that there is doubt whether the result is positive or negative. The most common reason was that there was insufficient saliva in the pot to process the sample.

Feedback from qualitative interview with SPCL team:

*“Inconclusive tests were a lot because the parents let the children do it themselves and there’s an empty pot, or the student didn’t read the instructions properly.”*

*“Generally high level of anxiety when they received ‘inconclusive’ result, so it was important to get to them quickly and tell them no it’s not because you have Covid it’s because there wasn’t enough spit etc. So maybe change inconclusive to insufficient or something like that as inconclusive in the medical world has different connotations.”*

### **Recommendations:**

- Testing instructions should be as simple and clear as possible. All processes for participants should have as little room for user variability as possible. There needs to be a mechanism for contacting people when the unexpected occurs.
- Inconclusive tests accounted for <1% of tests in schools and only 0.1% of tests within the University. Other programmes may wish to consider whether calling people who have an inconclusive result is a necessary step, or whether a text message asking them to repeat the test, together with an Enquiries line number if they have questions, may suffice.
- Other programmes may wish to consider the terminology used when informing participants of ‘inconclusive’ results.

### **Positive cases needed clinical and social support, as well as public health advice**

As more calls to positive cases were made throughout Phase 2, experience and understanding in where the value of this call lay was gained. As well as imparting public health advice and navigating participants to wider isolation support, the calls identified a real need for mental health support. One case required referral to the acute mental health crisis team, but many others expressed real concerns about coping with isolation. Students in particular felt daunted. Learning from the positive calls and qualitative interviews with students who were isolating was passed on to the University student welfare team and senior leadership team.

Feedback from researchers conducting student interviews:

*"Many are isolated to their rooms within their halls and are very lonely, some with acute mental health problems."*

*"Some people have said that their mental health has suffered more towards the end of the isolation period, as they've not been able to get outside for exercise, and the relationship with other people in isolation starts to become more frayed and 'toxic'."*

*"One person described the programme as a "lifeline" in light of the significant anxiety they had experienced since losing a family member to COVID-19 early on in the pandemic."*

Feedback from SPCL Team:

*"Mental health issues have come up a lot with especially the new younger students that don't have the same support groups or know how within the city."*

*"I cannot emphasise enough the change in the nature of the calls as Phase 2 developed and we realised the impact of a positive test on the individual and their household. It started as an exchange of information / instructions and morphed to delivery of a management, escalation and, on occasions, treatment plan. This could be seen an expensive use of resources at the front end but system wide it is a safer (fewer patient touch points and hand offs) and more effective way to deliver care which will be even more apparent as the prevalence of cases increases."* Member of SPCL team

#### **Recommendations:**

- We recommend that positive cases should receive a prompt call to discuss the clinical, social, psychological and practical implications of their positive result.
- The call to a positive case should carefully explore whether they can cope with isolating, specifically exploring any mental health concerns. This requires careful probing - concerns were often uncovered later in the conversation, after an initial response of 'I'll be fine'.
- The call is an opportunity to signpost and connect participants to the help available for them, enabling them to isolate successfully and without distress.

#### **Skill level of call handlers**

The GP Supervisor initially tried to train Band 4 Health Care Assistants to make the case contact calls, but this did not work as they were unable to cope with the level of input needed by positive cases, nor the types of questions they were asked.

Feedback from SPCL team:

*"Due to the high level of anxiety often associated with a positive result, especially in the cohorts: older, underlying medical conditions and Black, Asian, Minority Ethnic (BAME) groups - it is essential that the call handlers have the appropriate level of skills, competencies, and training to make this a 'one stop shop'."*

*"We tried band 4's, which were highly trained Health Care Assistants (HCA) but not clinical, and the way questions get answered has a massive calming effect on worries. Having contact details, something to get in contact with if there's a medical worry etc. A clinical team needs to be the core handlers for making the positive calls. Need long explanations that it's going to be alright, it's just two weeks and there are people there to support you if it's needed. A lot more of 'how are you doing'/wellbeing is involved than we thought there would be."*

*“Nurse practitioners and paramedics are also part of the triage team on the COVID case, so they’ve done lots of COVID calls since the first wave. They had great training from the public health Case Contacting Team about what the isolation rules were, what they had to do, whether to test again, this was hardest bit to train. Also did training on how to break it gently due to the extreme reaction that we were getting from some people. Also, lots of shadowing for first cases which we did collectively then shadow when they do their first cases on their own and also have senior clinical person on call if they have any questions e.g. for a new scenario popping up. They’ve been great.”*

**Recommendation:**

We have demonstrated that the Clinical baseline competencies needed are those of an ANP / Paramedic (Advance practitioners) to provide the required support to the positive case, and to be able to answer the questions and queries arising during the calls - this gives participants confidence in the service.

**Proforma and APEX system**

The Proformas are located on the APEX system where participants’ results are also shown. For any participant, when a ‘new outgoing call’ is selected, the caller can choose which proforma to use for the call. The questions in that proforma will then automatically populate, and information entered is stored in a call record for that participant.

The proformas from the Pilot Phase of the programme were altered slightly to fit with the objectives of Phase 2. Key additional questions were:

- Specific question to remind participants to inform school / University of their result
- Specific question to ask participant for permission for us to share their test result with the school / University
- Onset dates to be filled in for each symptom listed
- List of support services to consider referral to / signposting to

The APEX system on which the proformas were hosted was used to set workflow for the SPCL team. All test results are entered on to this system and calls to participants with inconclusive tests results were picked up by the SPCL team from here. For positive results, a text message was sent to the SPCL GP supervisor alerting them of a positive result entering the APEX system. This allowed them to be immediately responsive in calling the positive case. Most cases were called within one hour of receiving their test result.

Feedback from SPCL team

*“A single IT system and the move to outbound calls for communication was instrumental in ensuring coordination and continuity. This system set up allowed resilience and sustainability.”*

*“A significant number of individuals have been signposted to other support services in both the University and in primary care. This was facilitated by the beautifully documented details at the end of the proforma, which prompted an exploration of individual needs and the local knowledge of the clinical callers who are all working in the system already.”*

*“At the end the way the signposting questions work, is it means that it triggers to think about the wider, more holistic health and wellbeing.”*

**Recommendation:**

- a single system for managing results, call workload and documenting details of calls made has been efficient and easy to use. Access for different teams to the system, with appropriate controls over what they can see, has facilitated communication and made processes more

efficient. The proforma questions help to guide and prompt the conversation with the participants, as well as ensuring data is captured.

### *Asymptomatic case detection*

For those participants for whom data were available, 31% (16) of 52 participants who tested positive were asymptomatic at the time of the positive case call. This call was usually made on the same day that the sample was submitted, within one hour of the participant receiving their result.

Of the 36 symptomatic cases, 81% reported at least one of the core COVID-19 symptoms (fever, cough, loss of sense of smell and/or taste). Fever was the most common symptom, followed by fatigue, muscle aches, headache, sore throat, runny/blocked nose, cough, loss of sense of taste and loss of sense of smell (Table 1).

*Table 1: Descriptive statistics for positive cases*

	n	%
Symptomatic at time of call		
No	16	30.8
Yes	36	69.2
Symptoms reported		
Fever	21	58.3
Fatigue	15	41.7
Muscle aches	11	30.6
Headache	10	27.8
Sore throat	10	27.8
Runny or blocked nose	10	27.8
Cough	9	25.0
Loss of sense of taste	9	25.0
Loss of sense of smell	8	22.2
Loss of appetite	6	16.7
Nausea	4	11.1
Sneezing	4	11.1
Shortness of breath	3	8.3
Chest tightness	2	5.6
Hoarse voice	2	5.6
Diarrhoea	2	5.6
Abdominal pain	1	2.8
Vomiting	1	2.8
Dizziness	1	2.8

Interviews with students who used the saliva testing programme, instead of an NHS test, to test when symptomatic indicated two things. Firstly, they did not think that their symptoms were due to COVID-19 (one fifth did not have the core three COVID-19 symptoms). Secondly that they had not understood which test to use in which situation. This latter point was relayed to the University communications team to inform further messaging to students.

The majority of students (77%) who tested positive reported knowing someone who was positive or unwell. Many students who tested positive reported moving between accommodation or travelling to see friends and family within the previous week. Some of these students were already symptomatic at the time of travelling.

### **Qualitative insights from the SPCL team**

The following observations were made by the SPCL team who made calls to participants who had positive and/or inconclusive test results within the programme. Some observations were provided in a written summary from the SPCL GP supervisor, and some were recorded during an interview with the GP supervisor conducted by qualitative researchers:

#### ***The importance of working in partnership***

The shared workforce (Public Health England, University of Southampton, Southampton City Council and Primary Care) was invaluable in linking up with other services. For example, specialist public health advice helped respond to potential outbreaks in schools and coordinating the response to a potential outbreak in a University sports club. The Enquiries team, based in Southampton City Council, were integral in linking queries and challenges to the right person / team.

The direct links with Primary Care facilitated timely and appropriate care when positive cases were contacted who were symptomatic. Cases were assessed on the call according to local COVID criteria (extrapolated from the symptom log on the proforma). Other examples include: a student with acute mental health issues who was supported in contacting the local crisis team, and the SPCL team also initiated contact with the GP with which he had newly registered; two students and a parent were booked directly in for a same day clinical review; and another was added to the oxygen saturation monitoring list, a monitor was delivered to the student accommodation, and they had daily check-in from the clinical team until they were well.

Integration of services was key to the positive outcomes in these examples and is imperative for continuity.

#### ***Benefits of clinical involvement in case contacting process***

*“Because we run the extended hours GPs, the enhanced and urgent care access. We give them the number which takes them to the triage team and for 14 days after their result they can ring in directly if they have any medical issues or worries about their health. Three of them have. Also means that if they get worse off, COVID or not, they can come in for help/treatment.”*

*“One person we rang was having had an acute mental health episode and so we were able to contact the crisis team and their GP. So, we can get in touch with relevant people in the city in order to provide support.”*

*“Most GP practices have social prescribers linked into them so they can be signposted to university to welfare and also to the social prescribers.”*

*“Worst case scenario mindsets are managed by seeing people at the hot site or seeing people face to face. Therefore, anybody running this programme needs to have strong links in so that people have quick access if needs be, knows that there’s support and whole family can get tested if they’re really worried. Need to make sure they can access anywhere straight away – face to face clinical care and testing.”*

#### ***Content of calls***

*“Asymptomatic positive tests were harder to convince that they need to stay in. They wanted to have another test and if that was negative could they go out etc. Then there were people who had symptoms and were just relieved to have a diagnosis. Then the final group was those who had underlying conditions or were very worried due to media coverage and from them there was a fear of what a diagnosis meant. Responses and calls have been very varied. Sometimes it has been up to an hour explaining what self-isolation means, what’s going to happen etc. Lots of questions about*

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*medical symptoms, especially with asthmatic patients about what to expect and what symptoms to look out for.”*

*“There’s a lot of media around the people who are dying have underlying conditions. This means that when somebody with an underlying condition gets a positive result, or people within the BAME groups, there’s been difficult conversations where they automatically assume that they’re going to be critically ill and die.”*

*“Spit test definitely more acceptable to patients, due to accuracy and invasiveness.”*

**APPENDIX 2h.1 – PROFORMAS USED ON APEX SYSTEM**

**Select proforma: positive result call, inconclusive result call or other call**

**CALL TO POSITIVE CASE:**

1. Explanation of who we are
2. Date and time of call (date/ time box)
3. Attempt number (number automatically populates)
4. Answered or not (y/n)
5. If not answered then log as incomplete call (tick box) - flags on system as incomplete and shows as red (Q1-11 may need to be completed multiple times).
6. If not answered message left (on machine)
  - a. Free text box for any comments
7. If answered:
8. Is the case under 16? (tick box)
9. Spoke to case/parent/guardian/other household member (tick box)
10. If not the case, who (free text: name and relationship)
11. Message left with person (y/n) if not able speak to the case then flag as incomplete- above questions may need to be repeated multiple times.
12. If get to case/ appropriate guardian Confirm identity of person tested (ask caller for their details (tick done)
  - a. Please check the participants' address is correct on the system
13. Was a translator used to have this conversation?
  - a. Yes/no
  - b. If yes, which language
14. Have you received a test result notification by text? (Y/N)
  - a. If yes- what result did you get? (Positive/negative/inconclusive)
    - i. Was correct result given? (Y/N)
    - ii. What time? (date/ Time- all time 24 hours format please)
  - b. If no notify of result (tick box to confirm done)
15. Please remind case to tell school/University about result (tick box to say done)
16. Have you had any previous tests for COVID-19? (Y/N)
  - a. If yes then what were the results- dates of test\* add free text box or drop down to indicate how exact this date is eg. Accurate within a few days (positive/negative/inconclusive and date for each test)
  - b. Any other information that may be relevant to potential disease exposure or outbreak (Additional free text box) eg. Any epidemiological link to a known case
17. Do you currently have any symptoms that have been associated with COVID-19? Y/N  
List of symptoms- Tell me your symptoms and I will tick all that you mention: (tick all that apply). Onset date box and onset accuracy box for each symptom.
  - a. Cough,
  - b. High temperature,
  - c. Loss of or change in sense of smell
  - d. Loss of or change in sense of taste
  - e. Sore throat
  - f. Headache
  - g. Chest pain
  - h. Chest tightness
  - i. Shortness of breath

- j. Muscle aches
  - k. Loss of appetite
  - l. Diarrhoea
  - m. Abdominal pain
  - n. Vomiting
  - o. Nausea
  - p. Rash
  - q. Nose bleed
  - r. Runny nose
  - s. Hoarse voice
  - t. Sneezing
  - u. Fatigue
  - v. Confusion
  - w. Drowsiness or difficulty waking
  - x. Seizures
  - y. Other, please specify (free text)
18. Check whether urgent medical advice is needed AND GIVE REASSURANCE AS APPROPRIATE THAT MOST PEOPLE HAVE A MILD ILLNESS OR NO SYMPTOMS- tick box (done)
19. Do they require Covid related urgent care? Tick box y/n
20. Advice given
- a. Self-isolation for case (tick done)
  - b. Self-isolation for household (tick done)
  - c. Reducing household transmission (tick done)
  - d. Do you understand the advice about isolation measures for you and your household that you have been given? Is there anything you would like to discuss further? (tick done)
  - e. Do you give your permission for us to inform the school/ University about your test result? (tick box y/n)
  - f. Link to University reporting form included here so caller can remind students and provide the link
21. Are you and your household able to self-isolate without difficulty? Y/N If No please add detail. Some free text record of conversation and any other relevant info e.g. any difficulties, issues, anything they are struggling with, understanding of isolation measures, answer any questions they have.
22. Have you been contacted by the NHS test and trace scheme? (Y/N)
- a. If yes then when were you contacted?
  - b. If no then inform case that they will be contacted by the national test and trace programme and try to encourage engagement with Test and Trace process (tick box)
23. Other information and clinical assessment (free text box to record conversation and any other relevant information or actions)
24. Any further actions taken by caller (i.e. informing usual GP on onward referral to A&E, or referral to PHE/ public health actions etc.)
- Tick boxes:
- Advised to call SCCCS helpline 0808 196 2282
  - Requested SCCCS to call this person back
  - Advised to call Department for Education helpline
  - Advised to call local Health Protection Team
  - Referred to social prescriber
  - Southampton Covid Community support hub 023 8083 4800
  - Advised to call their GP
  - Advised to call NHS 111 or 999

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- Advised to order a government test
- Other (please specify): text box

25. Would the caller be happy to be contacted in the next few weeks, for a follow up discussion about their experience of this programme? To contribute to our evaluation. Tick box y/n
26. Handover box- free text -any relevant info for case team call handlers
27. Call end time

**INCONCLUSIVE RESULT:**

Q1-14 from positive proforma above

15. Explain the meaning of an inconclusive result. Usually due to not enough saliva to process sample in lab. (tick box to say done)

16. Are they currently isolating for any reason? y/n

If yes, advise cannot submit another sample (because cannot go out to drop off). If symptomatic order government test via <https://www.gov.uk/get-coronavirus-test-or-call-119>

If no, advise to do another saliva sample using spare pot provided and drop off as before

17. Free text box to record call information

18. Then Q23-27 from positive proforma are repeated (copied below)

19. Any further actions taken by caller (i.e. informing usual GP on onward referral to A&E, or referral to PHE/ public health actions etc)

Tick boxes:

- Advised to call SCCCS helpline 0808 196 2282
- Requested SCCCS to call this person back
- Advised to call Department for Education helpline
- Advised to call local Health Protection Team
- Referred to social prescriber
- Southampton Covid Community support hub 023 8083 4800
- Advised to call their GP
- Advised to call NHS 111 or 999
- Advised to order a government test
- Other (please specify): text box

20. Would the caller be happy to be contacted in the next few weeks, for a more in depth discussion about their experience of this programme? To contribute to our evaluation. Tick box y/n

21. Handover box- free text -any relevant info for case team call handlers

22. Call end time

**OTHER CALL:**

Q1-14 from positive proforma

18. Free text box to record call information

19. Then repeat Qs 23-27 from positive proforma (copied below)

20. Any further actions taken by caller (i.e. informing usual GP on onward referral to A&E, or referral to PHE/ public health actions etc)

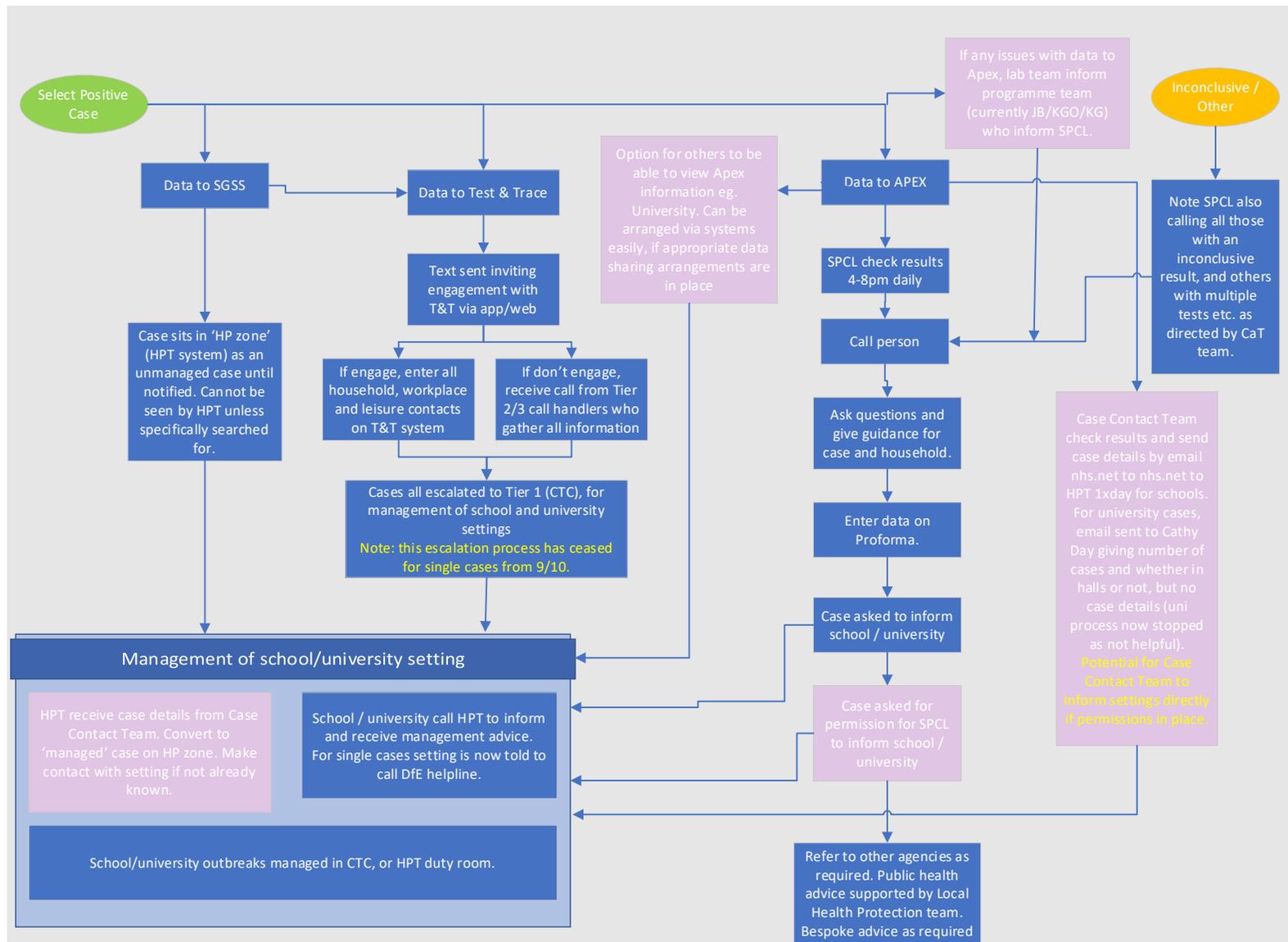
Tick boxes:

- Advised to call SCCCS helpline 0808 196 2282
- Requested SCCCS to call this person back
- Advised to call Department for Education helpline
- Advised to call local Health Protection Team

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- Referred to social prescriber
  - Southampton Covid Community support hub 023 8083 4800
  - Advised to call their GP
  - Advised to call NHS 111 or 999
  - Advised to order a government test
  - Other (please specify): text box
21. Would the caller be happy to be contacted in the next few weeks, for a more in depth discussion about their experience of this programme? To contribute to our evaluation. Tick box y/n
22. Handover box- free text -any relevant info for case team call handlers
23. Call end time

Appendix 2h.2 – Case Contacting Team Process Map



Boxes in purple indicate processes that needed to change during Phase 2, or recommendations for potential changes to improve data flows.

## i. Liaison with external organisations

During Phase 2, we continued to collaborate with partners and stakeholders across Southampton. Examples of joint working with stakeholders and partners include:

### Southampton City Council and the Director of Public Health

Local authorities have a wide range of responsibilities that have been heightened during the pandemic. These include public health, social wellbeing, educational attainment and economic development. In Southampton, the saliva testing programme has been an additional preventive intervention that has supported the Southampton City Outbreak Control Plan, and indirectly impacted on wellbeing, and the prospects of economic activity recovering. The City Council is fully integrated into the programme as partner, “client” and delivery agent.

As members of the Strategy Board and Steering Group, the Chief Executive, her Deputy and the Director of Public Health have shaped the programme, aligned the activities with local priorities and the work of the Health Protection Board and the Local Resilience Forum (LRF), and ensured that the schools element has linked to the COVID-19 plans of its Education Services.

Day-to-day liaison and operational problem-solving was facilitated through membership of the project management group. Close working with the Council’s public health team enabled data from the testing programme to add further granularity to the local epidemiology, and insights into patterns of transmission within the University. Combined with NHS testing data, it was possible to be more confident that transmission was not linked to common exposures in teaching settings, and that a mix of direct and online teaching could safely continue. The Council’s plans for an enhanced case contacting service are being informed by learning from the the programmes’s Case Contacting Team (SPCL) so that there is an effective and responsive service offered to people testing positive through all potential routes in the future.

The Council integrated call centre and web chat support for the programme into its existing Customer Services team. Embedding this team within SCC enabled direct referral to the many services and sources of help offered by the Council, which have supported participants to isolate. University participants were referred to equivalent services and support offered by the University.

### Health Protection Board

One member of the core CCT was also a member of the Southampton Health Protection Board. This group is chaired by the Director of Public Health and has wide representation from all key partners in the City. It oversees COVID-19 prevention and control. Active membership enabled regular communication about the saliva testing programme to the HPB and a better understanding of the wider context by the programme.

### NHS Test and Trace (NTAT)

Colleagues at Public Health England have kindly provided us with data extracted from the NHS Test and Trace system about positive cases from this programme. We included in our positive case proforma a reminder to participants that NTAT will get in touch with them, and encouragement to engage with this process. Contact tracing for all positive cases in the programme was conducted by NTAT, as per any other positive case.

We fed back issues identified during our programme to the NTAT team, in the hope that this feedback would help to improve national systems for contact tracing. A key issue identified was a delay of up to 24 hours in laboratory results being released to NTAT, which results in a corresponding delay to the contact tracing process commencing. In at least one case, there was a delay of several days between

us receiving a positive result, and an entry being created on NTAT for the participant. Another issue was that some results from our programme entered SGSS, but did not then appear in local reports of positive cases.

#### Public Health England and the local Health Protection Team (HPT)

We worked with local Consultants in Communicable Disease Control for Southampton, to ensure that all guidance was in line with current government recommendations. We liaised regularly with them to ensure that programme processes for case and setting notification fitted with the Health Protection Team. This was particularly important at a time when the HPT workload had increased dramatically, and national processes for public health advice to schools and universities changed frequently.

#### Other organisations interested in the work in schools

During the reporting period for this evaluation, levels of COVID-19 infection across England were rising. A government initiative for mass testing in Liverpool was announced, with schools highlighted as a key setting. As a result of the work we were doing around engagement with schools and children/young people in Southampton and the expertise in the UoS LifeLab scientific literacy team, we were approached by the government and asked for support in providing resources for schools to engage children and young people in the idea of surveillance/mass testing to increase acceptability and participation. Insights were provided to support rapid development of a resource for primary schools to use in the initial days of testing ([www.storicise.com](http://www.storicise.com)), which received instant praise for the resource from the Director of Education in Liverpool. Our support was also requested by the Scout Association in the development of activities to be rolled out through the Scout Association to increase engagement with and participation in mass testing programmes.

### 3. Schools

#### a. Legal

##### Context

At the start of Phase 2, there was not a clear understanding that the liability in terms of data transfer lies with individual schools as the data controllers and not with Local Authorities (LAs), Multi-Academy Trust Boards and so on. Therefore, regardless of the type of school status, schools will need to understand that the liability lies with them and they must execute their responsibilities carefully in line with both GDPR and Data Protection Law.

The initial view from Legal Advisers for the Trust, was that as testing was not compulsory the most appropriate legal basis was 'consent'. It was explained that there would be inclusivity concerns alongside significant delays in testing both at Phase 2 and into an up-scaled model if consent were sought from every individual - pupils and staff. The response was accepted by the Legal Advisers, however, there was a question over why University students were being invited to consent and not staff and students at the schools, both in the same phase of the same programme. The response centred on inclusivity and practicability – the difficulty in capturing students' data in schools vs students' data in the University. The Legal Advisers only accepted this point when the Information Commissioner's Office (ICO) took an 'apparently relaxed stance' on this issue.

Clearly engaging the ICO each time for reassurance is not scalable and therefore this mixed economy approach could create some similar uncertainty in the future. A potential solution could be that all education establishments – that is Schools, Further Education and Higher Education all share data with the NHS through a non-consent model and use public task as the lawful basis.

The legal basis for sharing the data was now confirmed by all parties to be on the basis of "necessary for a public task". Initially all parties failed to securely establish specific legal obligation or power that allowed schools to share the data with the NHS to comply with the Accountability requirements of Principle 7 of the General Data Protection Regulation (GDPR). The Local Authority did identify various statutory functions relating to public health (such as S2B of the National Health Service Act 2006 and Section 2 of the Care Act 2014). The Trust's Legal Advisers did not feel these are necessary for the school's "public task" because those public health functions impose duties upon the Local Authority and not upon schools, i.e. technically they are not available in the context of "public task". The ICO agreed with this view.

The Legal Advisers for the Trust identified that the following statutory duties are the most relevant: S. 175 of the Education Act 2002 (including the statutory guidance "Keeping Children Safe in Education 2020 KCSiE)

##### **Section 175 of the Children Act 2002**

"The governing body of a maintained school shall make arrangements for ensuring that their functions relating to the conduct of the school are exercised with a view to safeguarding and promoting the welfare of children who are pupils at the school"

The rationale from the Legal Advisers was that:

- *The governing bodies are agreeing that the respective schools take part in the testing scheme;*
- *The schools have to undertake certain steps in order for the testing scheme to commence – those steps, the sharing of data, is 'conduct';*
- *The governing body's function is to agree to permit the conduct to take place;*

- *The sharing of the data is to allow the pupils' involvement in the pilot testing scheme, which will assist in identifying COVID-19 infection, and therefore will both safeguard and promote the welfare of those pupils;*
- *In allowing the data sharing to proceed, the governing bodies are discharging their functions in a way that safeguards and promotes welfare of pupils and in particular will benefit the most vulnerable pupils.*

### **Keeping Children Safe in Education 2020 (KCSiE)**

The guidance defines safeguarding and protecting the welfare of pupils as:

- Protecting children from maltreatment;
- Preventing impairment of children's physical health or development;
- Ensuring children grow up in circumstances consistent with the provision of safe and effective care;
- Taking action to enable all children to have the best outcomes.

The rationale from Legal Advisers was that:

- *Through having access to the testing programme, the governing bodies are seeking to ensure that the children's health is not impaired;*
- *The action of taking part is going to assist in keeping schools open, enabling children to have fewer interruptions to their education and therefore enabling children to have the best outcomes.*

### **B. Data Protection Principles.**

#### **Principle 1 – Fair, transparent and lawful**

Lawful basis has been covered above.

*Fair and transparent* in this context means that the sharing of the data must not be unduly detrimental to the parents, pupils or staff, unexpected or misleading. Prior to the data sharing:

1. The schools notified the parents, pupils and staff about the programme – Letter 1
2. The schools reviewed and amended their privacy notices for staff and parents/pupils to cover the intended sharing of personal data with the NHS.
3. The schools went onto clearly explain that the administration of the exercise would involve the sharing of basic contact details with the NHS – Letter 2

N.B. All letters were translated into five key languages for the schools and were available online in that format.

#### **Principle 2 – Processed for limited purposes**

Review of the schools' privacy notices and subsequent amendment ensured we were clear about the purposes of processing personal data. Privacy notices vary by school and some provide broad purposes for sharing and others more specific.

For example, in the Aspire Trust, two out of the four schools extended data sharing with the NHS, yet two did not. A simple search online shows this variability exists nationally.

Staff and parents were notified of the data sharing (through the letters) in advance of it taking place, in a clear way which gave them reasonable time in which to object to their data being shared.

The data sharing agreement makes it clear the scope and the permitted purpose of the data share – *“funded activities in relation to the feasibility study, particularly to develop systems for conducting weekly saliva testing in various sub-groups of the population in Southampton where there is a higher risk of infection through major mixing events and assess the feasibility and acceptability of testing such as schools in areas with a high prevalence of vulnerable groups from BAME communities, deprivation – pupils, teachers, other workers and the household members of each group, participation in which safeguards and promotes the welfare of children who are pupils at the school.”*

### **Principle 3 – Data minimisation**

We shared only the minimum amount of personal data necessary to carry out the task. Email addresses were originally not part of the data and then became necessary to verify records held by the NHS. In actuality, email addresses needed to be used to supplement other contact details to ensure parents and staff were made aware of their test results if for one reason or another their phone was out of use.

No special category data was shared and does not need to be shared as part of this programme.

### **Principle 4 – Accuracy**

Schools made every effort to ensure the data being transferred were accurate and up to date. Screening of the database took place by key members of staff in school to quality assure the information being sent to the NHS. Schools will need to ensure their management information systems are more frequently kept up to date to ensure the system works efficiently and effectively.

### **Principle 5 – Storage limitation**

The data sharing agreement makes it clear that – *“For the avoidance of doubt, the encrypted Excel spreadsheet providing the data will be destroyed at the end of the schools testing programme and the Shared Personal data of any person who does not or whose child does not participate in the provision of the saliva samples will be deleted from the UHS database at the end of the feasibility study in both cases on or before October 2020”*

### **Principle 6 – Integrity and confidentiality/security**

All schools took appropriate and practical steps to ensure the confidentiality, integrity, availability and security of the personal data being shared. The data sharing agreement identifies who in the schools would be responsible for sharing the data and to whom in UHS. The data was encrypted and sent via email to an NHS address accessible by only the person receiving the data – in this case – Professor James Batchelor – [southamptonTesting@uhs.nhs.uk](mailto:southamptonTesting@uhs.nhs.uk)

### **Principle 7 - Accountability Principle**

All schools complied with the Accountability Principle by:

1. Taking legal advice
2. Consulting with the ICO
3. Carrying out a DPIA (even when one was not legally required)
4. Entering into a Data sharing Agreement (even where one was not legally required)
5. Documenting our decision and reasoning for relying on the legal basis of “necessary for a public task”.

We hope that as a result of the combined efforts of the Aspire Trust and the University of Southampton that in the future, schools will only need to undertake points 3-5 and our work in Phase 2 provides suitable templates for: individual privacy notices, joint privacy notices, data sharing agreement and DPIA.

### Phase 3

Moving into Phase 3 of the DHSC-funded Southampton pilot programme, we need to send an additional letter to parents, amend the data sharing agreement and joint privacy notices to include extension to dates and notification that data will be shared back to the school (positive test results), which currently relies upon parents informing schools, thereby resulting in delays to school duties to minimise and mitigate the risk to our communities.

## **b. Communication**

Letters, including the privacy notice, were sent by each school to parents and staff at the start of the school year providing details about the programme. The letter was translated into the main additional languages languages. These were compiled by members of the Aspire Trust, SCC, UoS LifeLab, and the communications and legal teams of the programme.

Alongside interactive engagement activities for school students, described elsewhere in this report, a weekly newsletter was produced (see Annex 5). This was distributed to all staff, students and parents at each school to keep them informed of the project and encourage continued engagement and participation. The newsletter offered an ideal opportunity to showcase particular activities, encourage engagement from families and to answer frequently asked questions, or address emergent issues/rumours.

The newsletter also provided an opportunity to remind people how to carry out the test and apply labels correctly. Content included links to short video pieces e.g. from the local premierships football team (Southampton Football Club), to highlight the support for this activity from wider members of the community ([https://www.youtube.com/watch?v=wABNm4x\\_6Zk&feature=youtu.be](https://www.youtube.com/watch?v=wABNm4x_6Zk&feature=youtu.be)). The newsletters were also translated into the main additional languages within the schools to increase accessibility.

## c. Results

### Background

School testing took place during Weeks 2 to 6 of the programme in four schools: Maytree Infant School, Mount Pleasant Junior School, Swaythling Primary School and Cantell Secondary School. Four pupils from an additional school, Springwell Primary, were included as they were educated at Mount Pleasant School. Week 2 is week beginning September 21<sup>st</sup> 2020. No schools' testing was done in Week 1. Two schools started testing in Week 2 (Maytree and Mount Pleasant) with Swaythling and Cantell starting in Week 3. The first testing of staff from Cantell was brought forward to the end of Week 2, as a staff member had tested positive on a Pillar 2 test and there was a need to reassure staff and parents that other staff were not infectious.

### Registrations and uptake of testing

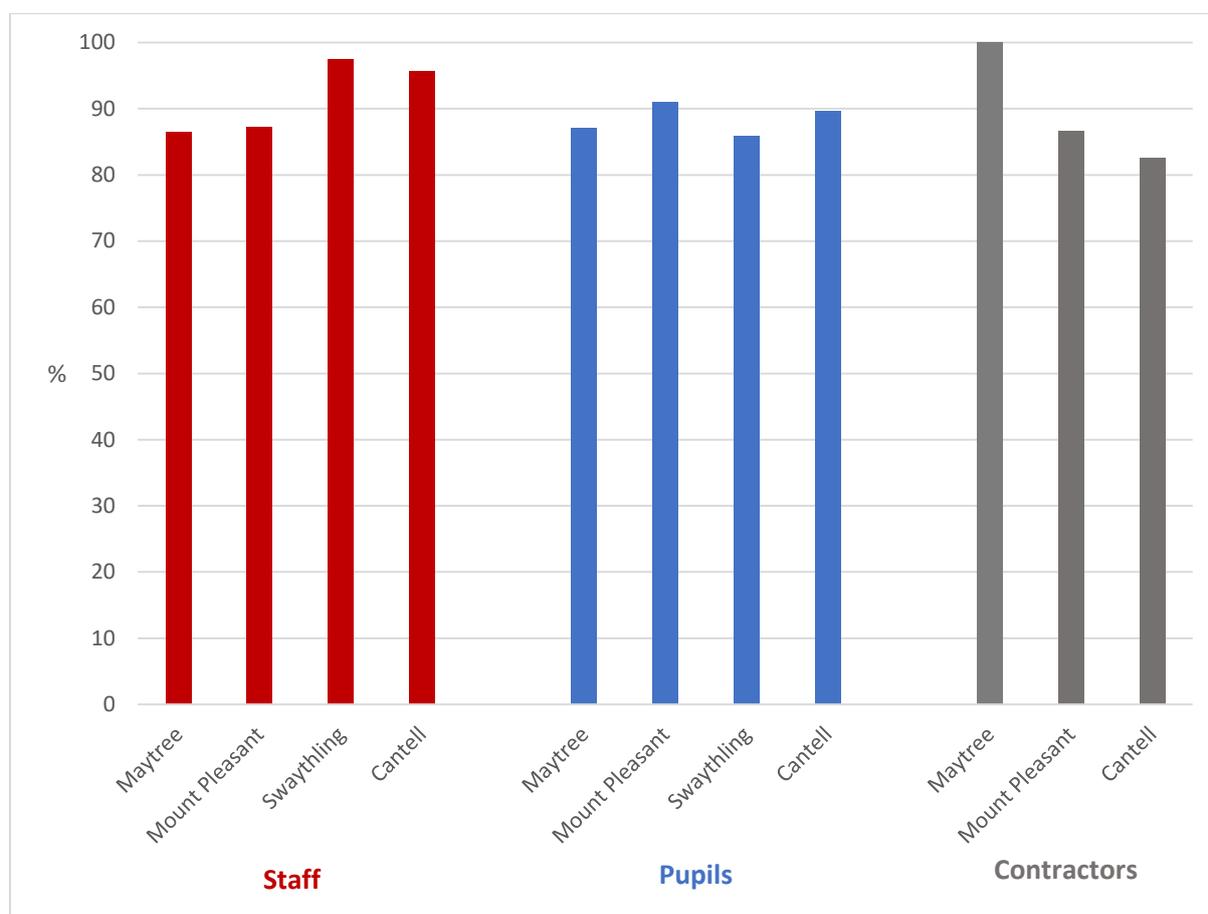
Uptake of testing was extremely strong in all four schools. The registrations were done by bulk transfer of data from the schools, but parents and staff were able to ask for their registration to be removed. Parents of five children and three staff members made this request. Thus, for pupils and staff, registration rates were almost 100%. This resulted in 1,939 pupils and 284 staff being registered for the programme, including the four pupils from Springwell, who attend Mount Pleasant School. Some 59 contractors, such as cleaning and building maintenance staff and peripatetic teachers, enrolled themselves by contacting Southampton City Council Customer Services who registered them on the system.

Table 3c.1 shows the registrations by staff, students and contractors within each school. It also gives the percentage of those registered who did at least one test during the five weeks of school testing. This is also illustrated in Figure 3c.1.

**Table 3c.1 Registrations and provision of at least one test by school, for pupils, staff and contractors**

	Registrations	≥1 test	%
<b>Pupils</b>			
Maytree	233	203	(87.1%)
Mount Pleasant	332	302	(91.0%)
Swaythling	199	171	(85.9%)
Cantell	1,171	1,050	(89.7%)
Springwell	4	2	(50.0%)
<b>Total</b>	<b>1,939</b>	<b>1,728</b>	<b>(89.1%)</b>
<b>Staff</b>			
Maytree	59	51	(86.4%)
Mount Pleasant	47	41	(87.2%)
Swaythling	40	39	(97.5%)
Cantell	140	134	(95.7%)
<b>Total</b>	<b>286</b>	<b>265</b>	<b>(92.7%)</b>
<b>Contractors</b>			
Maytree	4	4	(100.0%)
Mount Pleasant	15	13	(86.7%)
Cantell	40	33	(82.5%)
<b>Total</b>	<b>59</b>	<b>50</b>	<b>(84.8%)</b>
<b>Overall Total</b>	<b>2,284</b>	<b>2,043</b>	<b>(89.5%)</b>

**Figure 3c.1. Proportions of staff, pupils, and contractors who registered submitting at least one sample by school**



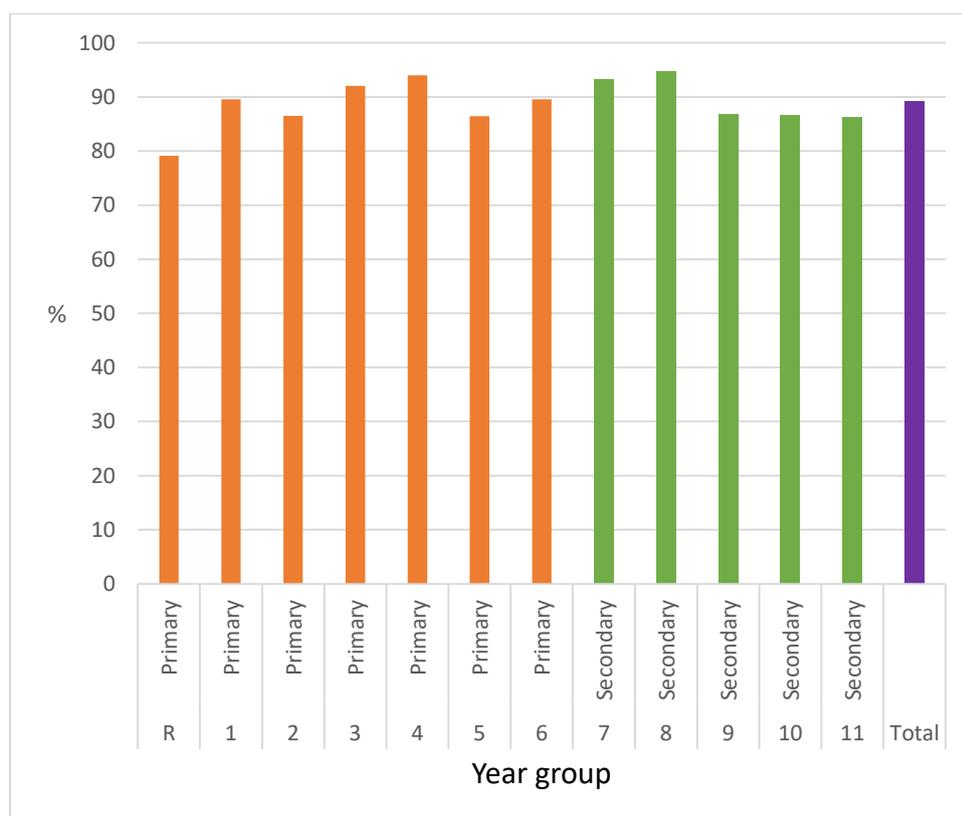
Almost 90% of those registered provided at least one sample. This is a very high response rate, especially as registration for staff and pupils was done automatically. Although staff and parents of pupils could ask for removal of their registration, another way of opting-out was not to provide a sample. That only around 10% of the school population did this shows how popular the testing programme was. If contractors are excluded, the proportion of pupils and staff returning samples was 89.6%, with slightly higher rates in staff than in pupils, as shown in Table 3c.1. Those not providing samples include those who were absent for illness or other reasons during the testing period. Of note, 19 pupils and one member of staff submitted two or more samples on the same day; this included two pupils who submitted three samples at one time.

Among pupils, there was some variation between year groups in terms of their engagement with the programme, as measured by the provision of one or more samples. Information about this is given in Table 3c.2 and Figure 3c.2. Year R rates were the lowest, which may reflect difficulties that very young children have in providing samples. This was noted in Phase 1 and was identified as a challenge for Year R at the outset, as the vast majority of this year group were only aged 4 years at the time of testing. Despite this, nearly 80% of Year R children succeeded in providing at least one sample. The age groups with the greatest engagement in the programme were Years 3 and 4, and Year 7 and 8, all with more than 90% of pupils providing one or more test. Of note, these are the first two years of junior and secondary education respectively.

**Table 3c.2. Registrations and numbers (%) providing more than one test by year group across schools**

Year Group	Registrations	≥1 test	%
R	91	72	(79.1%)
1	115	103	(89.6%)
2	111	96	(86.5%)
3	113	104	(92.0%)
4	116	109	(94.0%)
5	103	89	(86.4%)
6	115	103	(89.6%)
7	252	235	(93.3%)
8	242	229	(94.6%)
9	233	202	(86.7%)
10	217	188	(86.6%)
11	227	196	(86.3%)
Total	1,935	1,726	(89.2%)

**Figure 3c.2. Percentage of pupils providing at least one test, by year group across schools**



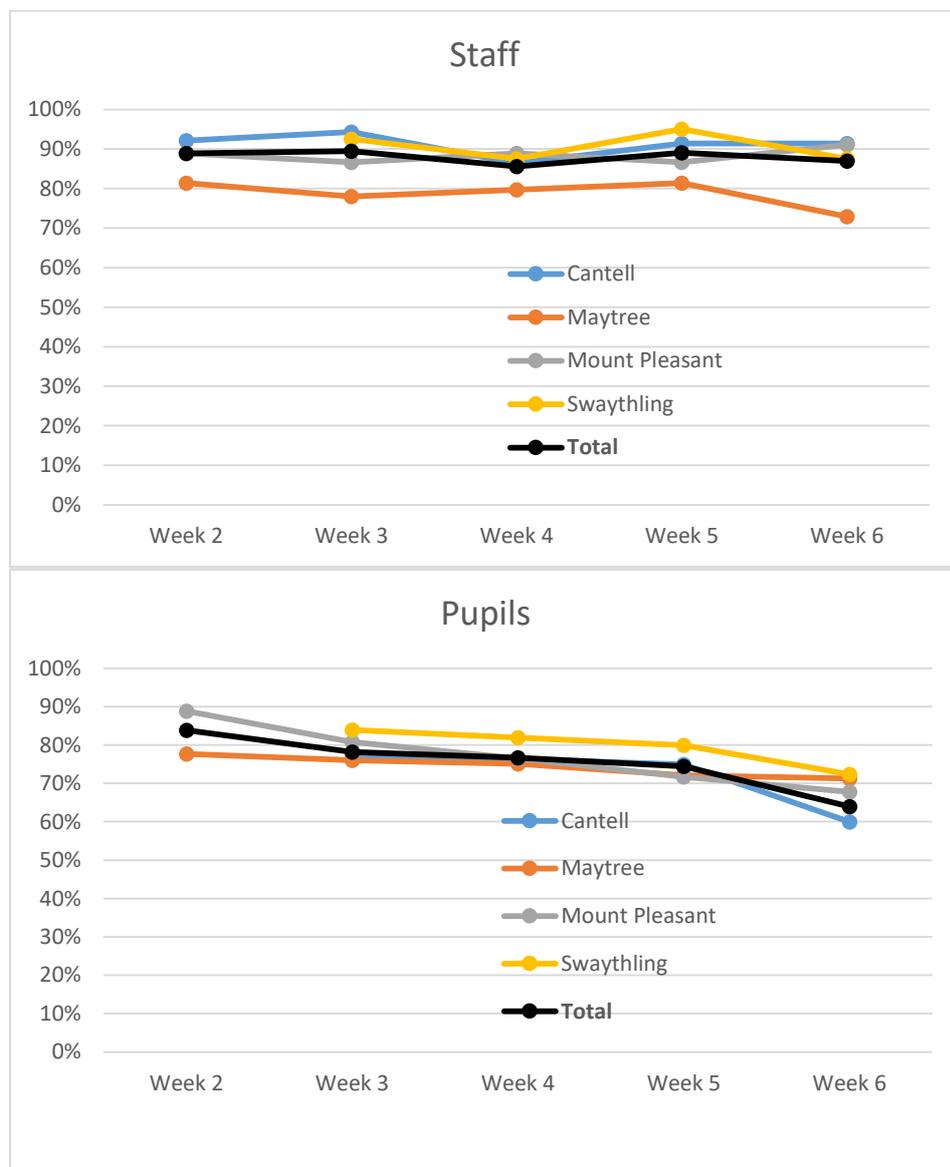
### *Sample provision by week of testing*

Table 3c.3 and Figure 3c.3 show the uptake of testing by week of the programme. Staff testing remained high throughout the programme at more than 85% each week, though slightly lower rates were seen among staff at Maytree, the infant school. Testing among pupils showed a decline through the period. This was most marked in Week 6. However, it should be noted that 62 students from Cantell were isolating during that week so were unable to participate in the testing. A further 44 students were isolating in Week 5, but, despite that, the return rate remained quite high that week. Another factor that might have contributed to lower rates in Week 6 is some pupils and their parents not wanting a positive result just before half term, though we have no formal evidence for that. The sample return rates were similar across the schools, but pupils at Swaythling primary school consistently had a slightly higher rate each week. The sample provision by contractors was low in Week 2, but contractors had to register individually and then have packs and labels distributed to them, so many may not have been able to provide a sample in the first week. They also showed a slight decline, and again it was most marked in Week 6.

Table 3c.3. Samples submitted by week in schools

Staff	Registrations	Tests returned										
		2		3		4		5		6		Total
Cantell	140	129	(92.1%)	132	(94.3%)	121	(86.4%)	128	(91.4%)	128	(91.4%)	
Maytree	59	48	(81.4%)	46	(78.0%)	47	(79.7%)	48	(81.4%)	43	(72.9%)	232
Mount Pleasant	45	40	(88.9%)	39	(86.7%)	40	(88.9%)	39	(86.7%)	41	(91.1%)	199
Swaythling	40	N/A		37	(92.5%)	35	(87.5%)	38	(95.0%)	35	(87.5%)	145
<b>Total</b>	284	217	(88.9%)	254	(89.4%)	243	(85.6%)	253	(89.1%)	247	(87.0%)	1214
<b>Pupils</b>												
Cantell	1171	N/A		903	(77.1%)	894	(76.3%)	877	(74.9%)	702	(59.9%)	3376
Maytree	233	181	(77.7%)	177	(76.0%)	175	(75.1%)	168	(72.1%)	166	(71.2%)	867
Mount Pleasant	332	295	(88.9%)	268	(80.7%)	254	(76.5%)	238	(71.7%)	225	(67.8%)	1280
Swaythling	199	N/A		167	(83.9%)	163	(81.9%)	159	(79.9%)	144	(72.4%)	633
Springwell	4	1	(25.0%)	1	(25.0%)	1	(25.0%)	1	(25.0%)	2	(50.0%)	6
<b>Total</b>	1939	477	(83.8%)	1516	(78.2%)	1487	(76.7%)	1443	(74.4%)	1239	(63.9%)	6162
<b>Contractors</b>												
Cantell	40	7	(17.5%)	29	(72.5%)	33	(82.5%)	27	(67.5%)	25	(62.5%)	121
Maytree	4	3	(75.0%)	1	(25.0%)	3	(75.0%)	1	(25.0%)	1	(25.0%)	9
Mount Pleasant	15	6	(40.0%)	12	(80.0%)	9	(60.0%)	9	(60.0%)	7	(46.7%)	43
Swaythling	0											
<b>Total</b>	59	16	(27.1%)	42	(71.2%)	45	(76.3%)	37	(62.7%)	33	(55.9%)	173

Figure 3c.3. Sample return rate by week and school for staff and pupils



Four pupils from Springwell School who were registered for the programme have been excluded from this figure.

Pupil figures for Weeks 5 and 6 do not take account of pupils at Cantell who were isolating

An analysis of sample provision by year group and week is presented in Table 3c.4 and Figure 3c.4. The lowest provision was among pupils in Years 9 and 10. Year 11 pupils were thought to be the group that might be less engaged and considerable effort was put in by the headteacher and the engagement team to maximise provision. This appears to have paid off and shows the importance of good engagement to enhance participation.

**Table 3c.4. Number of tests by week and year group for all schools combined**

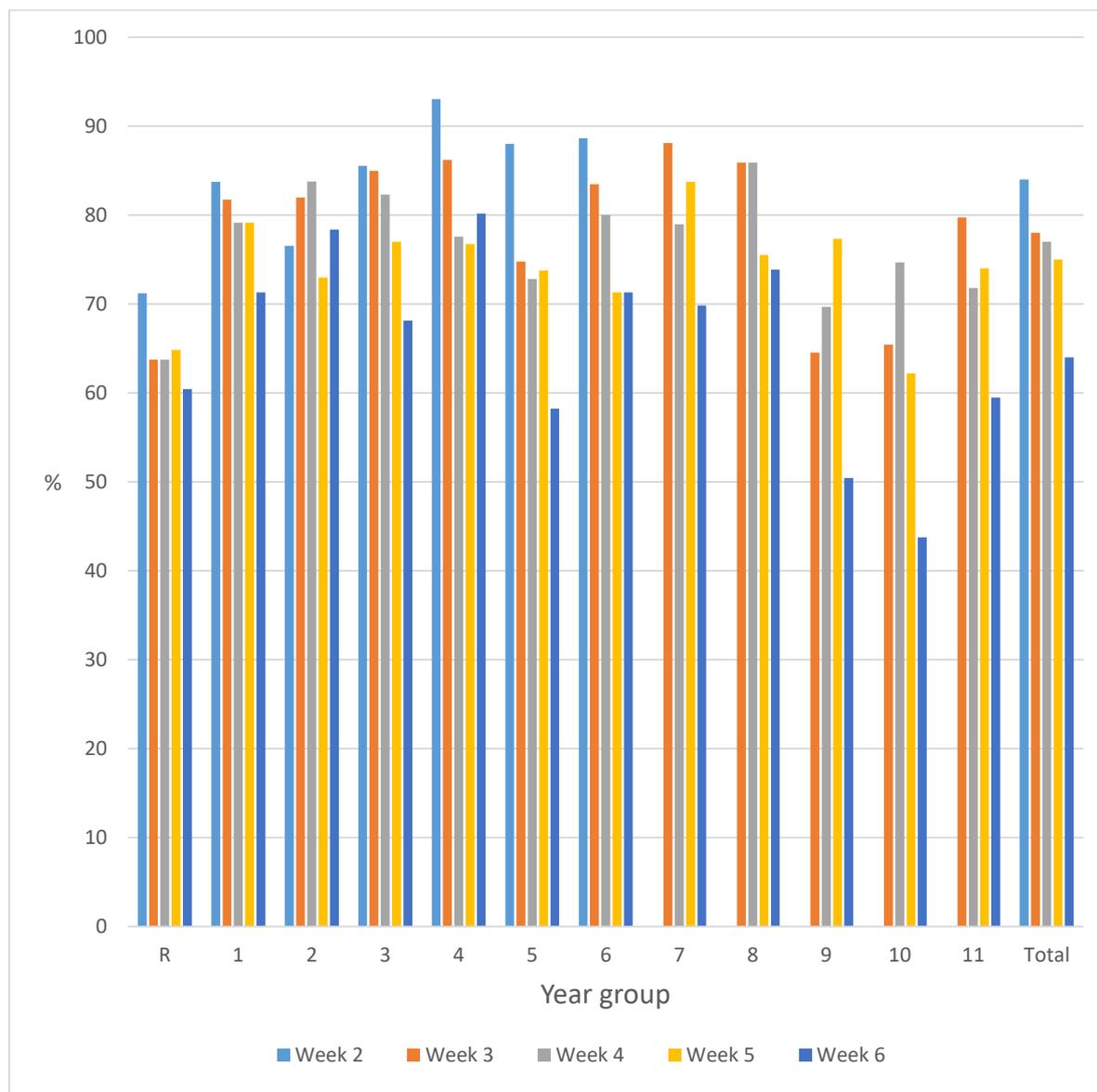
Year group	Registrations				Week of testing						
	Cantell	Maytree	Swaythling	Mount Pleasant	2	3	4	5	6	Total	
R		66	25		47 (71.2%)	58 (63.7%)	58 (63.7%)	59 (64.8%)	55 (60.4%)	277	
1		86	29		72 (83.7%)	94 (81.7%)	91 (79.1%)	91 (79.1%)	82 (71.3%)	430	
2		81	30		62 (76.5%)	91 (82.0%)	93 (83.8%)	81 (73.0%)	87 (78.4%)	414	
3			30	83	71 (85.5%)	96 (85.0%)	93 (82.3%)	87 (77.0%)	77 (68.1%)	424	
4			30	86	80 (93.0%)	100 (86.2%)	90 (77.6%)	89 (76.7%)	93 (80.2%)	452	
5			28	75	66 (88.0%)	77 (74.8%)	75 (72.8%)	76 (73.8%)	60 (58.3%)	354	
6			27	88	78 (88.6%)	96 (83.5%)	92 (80.0%)	82 (71.3%)	82 (71.3%)	430	
7	252					222 (88.1%)	199 (79.0%)	211 (83.7%)	176 (69.8%)	808	
8	241					207 (85.9%)	207 (85.9%)	182 (75.5%)	178 (73.9%)	774	
9	234					151 (64.5%)	163 (69.7%)	181 (77.4%)	118 (50.4%)	613	
10	217					142 (65.4%)	162 (74.7%)	135 (62.2%)	95 (43.8%)	534	
11	227					181 (79.7%)	163 (71.8%)	168 (74.0%)	135 (59.5%)	647	
<b>Total</b>	<b>1171</b>	<b>233</b>	<b>199</b>	<b>332</b>	<b>476 (84.2%)</b>	<b>1515 (78.3%)</b>	<b>1486 (76.8%)</b>	<b>1442 (74.5%)</b>	<b>1238 (64.0%)</b>	<b>6157</b>	

Notes:

Cantell and Swaythling did not start testing until week 3. The denominators for the percentages for week 2 are thus based on Maytree and Mount Pleasant only

Four pupils from Springwell School who were registered for the programme have been excluded from this table.

Figure 3c.4. Sample return rate by year group



Four pupils from Springwell School who were registered for the programme have been excluded from this figure.

### Test results

Positive results were rare in the schools. Only three pupils tested positive during the testing period. All were at Cantell School, one in Year 7 and two in Year 10, so none were found in the primary sector schools. None of the positive tests arose from contact in the school so there were no outbreaks declared at Cantell School during the testing period. No staff or contractors tested positive.

There were 57 inconclusive results among pupils, out of 6,157 tests (<1%). Four pupils had two inconclusive tests and one had five, so inconclusive results occurred for 49 pupils. Inconclusive tests occurred slightly more commonly among the younger pupils but did occur at any age. There were only four inconclusive tests among school staff and none for contractors. Details of management of the positive and inconclusive results is given in section 2h of this report.

#### d. Engagement and participant experiences

##### What did we do to ensure engagement?

We knew that engaging children and young people in understanding the importance of surveillance testing for COVID-19 was essential. This was an opportunity to not simply provide tests and require individuals to participate, but to engage and inform to ensure motivation to participate over a potentially lengthy time period. Engaging children and young people directly gives them agency over their participation and enables them to consider the impact of their participation not just at an individual level, but so they appreciate the consequences of their choices on their families and communities. We also know how important children and young people can be as agents of change in their families. High uptake to population prevention programmes (e.g. mass testing) is key to their success in preventing transmission and will also be essential to build a strong positive response to a vaccination programme. As experienced educators, we knew that engagement couldn't simply be information giving, but had to involve interactive activities, allowing space for discussion to allay concerns and address misconceptions. This also required professional development (virtually and in-person) for the teachers involved to provide:

- reassurance that this was not unreasonable extra workload;
- opportunity to see the resources / understand the interactive activities developed for their pupils;
- opportunities to ask questions – of the teaching staff, but also the wider programme team (epidemiology and public health experts);
- confidence to be able to deliver the sessions and facilitate discussions.

This helped to generate buy-in from teachers, ensuring that throughout the schools there were champions who could encourage and motivate children and young people's participation throughout the programme.

Different approaches were used to engage the pupils in different educational phases:

For the primary education phase (4-11 years), 'escape room' style activities were developed to engage children with the public health messaging around the pandemic and develop their understanding of why these measures are in place. These included interactive activities around the 'hands, face, space' messaging as well as how testing can help to make schools safer and how all children can play a role in this. The activities were delivered in school by class teachers, some with support from the UoS LifeLab team, the day before testing was due to commence, and culminated with the children being issued with their testing packs to take home. There were some additional activities provided for teachers to share with the children in the following weeks of testing including a short Prezi found here: <http://bit.ly/LifeLabJourneyOfYourSaliva> about what happens to the saliva when it arrives at the laboratory for testing. An online version of the escape room was also developed - hosted here: <https://www.efolio.soton.ac.uk/blog/lifelab/escape-coronavirus-virtual-escape-room/> so children could engage with it outside school and share the experience with their families too.

For the secondary education phase (11-16 years), year group assemblies were delivered virtually via Zoom by the LifeLab team and again focused on engaging young people with understanding why the public health measures are in place. Activities focused around hands, face, space messaging and included interactive white boards and polls. These sessions were delivered the day before the year group was due to take their first test and culminated with the young people receiving their test packs to take home. There was additional content for teachers to share with the young people over the subsequent weeks of testing to keep them engaged, including the Prezi and the online version of the escape room. Four weeks later, the LifeLab team delivered a second virtual assembly to each year group. This provided the young people with an update of the project, additional information around the epidemiology of the virus, a reminder of the messaging and, in addition, a piece about

vaccinations. This allowed the team to discuss the benefits of a mass testing programme whilst a vaccine is being developed. This follow-on session was designed to boost engagement with testing in the week before half term.

### How did we evaluate the engagement?

We aimed to explore influences on the decision to participate in the testing programme and experiences of taking part. Semi-structured interviews and focus groups were conducted with three samples of people recruited using purposeful sampling: one group had agreed to participate in the testing programme (school pupils and staff); another was parents who were not invited to take part, some of whom were interviewed with their children who did take part and some interviewed on their own; and the third sample was of school senior leaders who set up and ran the programme. Participants were interviewed within one week of completing the programme. The samples were recruited through the school: Head Teachers identified staff to take part in a focus group; children and their parents filled out consent forms for the pupils to take part in a focus group; parents contacted the qualitative researcher whose contact details were included in the weekly school newsletters; and snowballing methods such as word of mouth. The telephone interviews and focus groups took place between the 2<sup>nd</sup> October and 6<sup>th</sup> November 2020. At the beginning of the interview and focus groups, the interviewer informed the participants and parents of the procedure including that their data would remain anonymous and confidential. At this point, they were informed that they would receive an incentive for their time. Participants and parents gave permission for the interview/focus group to be audio recorded. After the interview, the recording was stored on an encrypted laptop and the interviewer typed up observation notes, which contributed to the main themes and findings in this report. Sufficient participants from each programme were interviewed for data saturation to be reached. Observation notes and recordings were rapidly analysed to produce the findings and recommendations below. Additional data were extracted from feedback about the functioning of the programme from emails, letters, social media and Post-It notes gathered from approximately 80 participants and others who had experience of the programme (Annex 6) and showcased in this short video: <https://youtu.be/MuBpoRcfuGw>.

**Table 2d.1: Description of participants who took part in interviews (n=24) and focus groups (n=9) about their experiences of the programme (total n=88)**

Groups	Negative test result	Positive/ Inconclusive test result	Total number of people
School pupils	30		30
School staff	20	1	21
Pupil/parent pairs (6 pairs)	3	3	12
Parents	10	3	13
Senior school leaders			12
<b>Total</b>			<b>88</b>

### 1. What made people engage with the screening programme?

#### Communication

- Staff and parents were very positive about the creative information activities for the pupils, which they felt were pitched at the right level, and gave the children a good understanding. Some teachers felt that older children were less engaged in the activities but had good recall of the information. They also felt this increased recruitment to and compliance with the programme.

- Staff felt that their training was very informative and gave them confidence to communicate with and influence the children about the programme. Senior leaders recommended having meetings with headteachers at the start of testing programmes to get them on board and to ask questions.
- Pupils and parents felt confident about all the school procedures that were put in place. Parents felt that the school had built up trust throughout the pandemic through transparent communication.
- Staff appreciated both text and email as forms of communication.
- Pupils found the instruction booklet easy to follow and the programme's school newsletters clear and informative.
- Pupils felt comfortable to speak to their teachers about their results, especially the safeguarding teachers.
- Lots of communication from schools reassured parents whose children tested positive.
- Senior school management said it was really beneficial to have template letters that could be used by the schools to send out to reduce their workload.

#### **Community spirit**

- Pupils expressed the feeling that 'we are all in this together' and that it was important to be tested to keep the community safe. They also suggested that the programme should be scaled up to the wider community.
- Pupils influenced, motivated and reminded each other to take part, as everyone else was, and do the test and return it to school. Younger children were motivated by their teachers who encouraged them to take part.
- Staff shared their results on the team WhatsApp and felt that they were in this together. Parents also felt that there was a positive community spirit about the programme. Many spoke about the programme on their WhatsApp groups.
- Parents felt schools were very supportive when a child received a positive result. Some schools, for example, sent food parcels to the affected families.

#### **Rewards**

- Families could visit their friends and families after receipt of their negative test result. Parents motivated their children to do the test to protect their grandparents.
- Children felt as though their life could continue after receipt of their negative test result, including seeing friends and attending after-school clubs.
- School senior leadership praised pupils and classes for bringing back their tests.
- The programme allowed many more children to go into school which supported their learning and social interaction.
- Some felt that it was inevitable that they would get the virus, therefore they felt more protected by the programme as at least they would find out their status.
- The programme gave the school leaders important oversight of the number of cases in their community and also to help them to identify contact between people to stop the spread.

#### **Participant acceptability.**

- Many felt that the saliva test was more comfortable and less invasive than the current NHS test or blood test, especially for children. The process was perceived to be very simple with an easy to follow step-by-step guide.
- Pupils felt that the test was easy to do and that the instructions were clear. This made them feel able to do their own test (Year 5 onwards).
- It was felt that the schools made the process convenient for the pupils and their families by giving reminders and having some level of flexibility for pupils who may forget to bring their test in on the allocated day. Staff were also grateful that the drop off point was at the school, which was very convenient and they appreciated the quick results.

- Staff felt that collection days ran very smoothly and that the colour coding of the labels was almost 'fool-proof' for children.
- Staff spoke of addressing pupil issues about producing enough saliva such as advising to spit on the spoon, mainly for younger children. Some older children didn't use the spoon.
- Success was achieved in the infant school by the staff giving each child their tube with their sticker on it to take home every week and bring back to school.
- Senior school leaders said that use of process mapping was very useful to plan for potential issues and barriers at the start of the programme.

## 2. How could engagement with the screening programme be improved?

### *Extra support for positive cases*

- Pupils said that they feared stigma from others at school if they received a positive result and had to isolate. Staff also felt unsure about how to act if their colleague or pupil got a positive result.
- Pupils and staff felt that other pupils might not take part in testing if they had to isolate and miss out on certain important events.
- Some pupils said that they would feel guilty that everyone would have to isolate if they got a positive result.
- Parents spoke about the financial challenges of isolating due to being self-employed.
- There were some concerns about how people shielding would return their tests and how family members would isolate from each other in the same house, especially for more vulnerable household members.
- Parents felt confused when one of their children was told to isolate due to a positive case in their year group but the others were allowed to go to school. Another family had one positive test result and two negative tests, which confused the parent and made them question the accuracy of the tests.
- Senior school leaders felt that the school should be notified about the positive cases as well as the parent so that they could action-plan faster.

### *Build trust*

- A few staff spoke about a rumour linking the government to the participant's DNA test samples, which might have put people off taking part.
- Other staff felt that some pupils and families might not engage due to fear of invasion of their data privacy. Some, including the pupils, wanted more clarity on how the data are stored. Staff speculated that some pupils wouldn't engage due to their parents not engaging, not understanding the importance of the test or losing faith in the testing. Some speculated that some parents didn't let their children take part as these parents complain about many school initiatives.
- Pupils, staff and parents wanted continuous feedback and updates about the results of the programme.
- Some pupils felt forced into the testing programme and wanted to be more informed about the benefits of doing the saliva test before deciding to take part.
- Some felt that members of the community were still sceptical about the seriousness of the virus and therefore would not take part in the programme.
- Parents wondered why their child's school had been chosen when the cases were relatively low compared to the North of England.

### *Increased accessibility*

- Staff expressed difficulties in communicating with parents for whom English was not their first language and suggested translations into a variety of languages and more visual instructions and training activities would be useful.
- Some pupils found it hard to find the programme website to obtain more information.

- Large families reported having trouble organising their children to do the tests and bring them into school.
- Some felt that spitting was not a socially acceptable thing to do.
- Staff felt that pupils might not have the privacy or space at home to do the tests and siblings might mock them.
- Some felt the test should be made simpler for children.
- Staff suggested making the 'how to' video more accessible to adults and older pupils wanted it more tailored to their age group.
- Pupils, parents and staff wished that the programme would continue.
- Some felt that the programme should be extended further to those who come into a lot of contact with people.
- Senior leaders spoke of creating a headteacher toolkit for other schools to be able to participate.

### **Practical improvements**

- Parents of younger children (under 5 years) said their children found it difficult to produce enough saliva in the morning. Other pupils were uncertain about the amount of saliva to produce. Older pupils suggested a traffic light system could be added to the tubes indicating too little, the minimum amount and a sufficient amount of saliva in the tubes.
- Staff felt that compliance with testing was dropping after every week, so it was vital to keep motivation up. Some felt more visual reminders to do their test would help (posters) and others suggested incentivising children with stickers might increase their uptake and compliance.
- Staff felt that general pupil disorganisation such as losing labels might be a barrier to compliance. They suggested that the school have a backup plan if children lose labels.
- Pupils found it is hard to remember to do the test in the morning and had difficulties producing saliva due to having a dry mouth.
- Pupils also recognised that they often forgot to bring tests back to school and were confused about when to bring the test in. They suggested a postal option as an alternative for those who have forgotten.
- Pupils considered how to reduce the burden on the University generated by test processing and returning the results to pupils and staff, by recommending having one year group at a time returning tests on separate days.
- Staff wanted a booklet in the testing pack instead of a link to the website.
- Senior school leaders felt there would be difficulties scaling up the LifeLab educational activities to more schools, especially schools that haven't already built a relationship with LifeLab or the University.
- Senior leaders spoke of legal and data agreement issues at the beginning of Phase 2, which are now resolved for Phase 3.
- Some wondered about the need for the second bag in the test kit as it was seen as bad for the environment and confusing that the two bags are the same.
- Parents felt that the text message giving the test result was too long, which made it harder to see where their result was in the text. This raised concern about possibly testing positive.
- Parents said that children miss their test when they stay at grandparents' houses.
- It was recommended that one senior manager should be responsible for the programme in each school.
- Senior school leaders felt that improvements needed to scale up the programme included issues of sample misidentification. If a sample is incorrectly labelled, it can be remedied now, but upon scaling such issues would have to result in sample disposal.
- Reasons for inconclusive tests included not using two bags to pack the test, using their own plastic bags, urinating rather than spitting in the test tube, not producing enough saliva, doing

all five tests at once and handwriting the labels. These participants felt that the instructions should be clearer.

### 3. What were the impacts on participants of engaging with the screening programme?

#### *Altruism and pride*

- Teachers perceived that children were excited and felt honoured to be involved in the programme, which has national importance. They felt that this led to higher compliance and understanding of the programme.
- Pupils, parents and staff felt lucky that their school was part of the testing programme as they were aware other schools were not participating.
- Parents motivated their children to do the test to protect their grandparents, who they could then go to visit.

#### *Reassurance*

- Staff, children and parents all felt reassured by the programme keeping their school community safe and reducing the transmission of the virus. Teachers felt confident to go to work with a minimal fear of catching COVID-19.
- Parents felt reassured that they could visit loved ones such as grandparents on receipt of their child's negative test.
- A few teachers had noticed complacency in relation to preventative behaviour such as physical distancing due to the reassurance of the programme.
- Staff feared that continuous negative test results would create the belief among the pupils that COVID-19 won't affect them.
- Pupils expressed feeling safe when they received negative result and relieved that they wouldn't spread it to their friends, family, and wider school community. This also ensured that fewer people would have to isolate.
- Schools had invested in 'fogs' which clean classrooms within 10-15 minutes, which made staff, pupils and parents feel at ease.
- The programme gave reassurance to families who lost loved ones to COVID-19.
- Pupils felt that the programme helped to save lives.
- Parents and staff spoke of how the programme helped to keep schools open which they felt provided children opportunity for crucial learning and interaction with each other.

#### *Increased knowledge*

- Teachers, parents and pupils spoke of the increased knowledge they had gained about the virus, the transmission, and preventative behaviour from the LifeLab engagement activities. Many felt that this also brought science to life. Teachers also felt that this increased registration and compliance.
- Pupils felt that taking part in the testing programme increased their knowledge on protective behaviours and COVID-19 guidelines.

#### *Environmental concerns*

- Pupils felt very concerned about the amount of plastic used in the testing kit and questioned the need for more than one bag within the test kit.

#### *Transmission fears*

- Some staff felt that all testing should be done on the same day as pupils mix outside their bubbles outside school.
- Pupils felt anxious about transmission when a child in their year group tested positive. They also felt concerned about transmission due to the delay in parents receiving a potential positive result for their child and then informing the school, while their child was still at school mixing with other pupils.
- Parents spoke about the challenges of potentially isolating their child away from more vulnerable family members within the same household.

### **Feelings of uncertainty**

- Teachers and parents felt anxious about the programme ending and wanted it to continue.
- Some pupils reported feeling nervous before starting the programme as they were unsure if they could do the test correctly and produce enough saliva. Others felt reassured when they read the school newsletter and started the programme. Some also felt uncomfortable spitting into a tube but felt reassured when they started.
- Staff felt extremely worried if the result came late as they predicted that they had a positive result. They would also feel annoyed or anxious if other staff got their result before them. One suggestion was to have more clarity on how the tests were analysed to prevent this concern about the timing of test results. Most wanted their results at the same time.

### **More responsibility**

- Staff felt that it was a lot responsibility for the child to do their test and remember to bring it into school.
- Staff felt responsible for chasing up pupils' results, and pupils felt that their teachers would be able to speak in confidence about their results.
- Parents felt responsible for reminding their children to do the test and take it back into school. For younger children, it was felt that the swab test was slightly easier as the parent can do it for them, whereas the young child is in control of producing enough saliva, which many found difficult to do.
- Parents and senior leaders felt that the programme might start becoming a chore for the children, which might decrease compliance.
- Parents felt that there was a moral obligation attached to taking part as they would be responsible for isolating if their child got a positive test.

### **Cultural concerns**

- Staff suggested that some families would not engage with the testing for religious reasons (e.g., a Polish family did not engage as it was against their Christian beliefs).
- Pupils who were fasting wanted information on the time of the day to take the test.
- Some spoke about different cultures and the possible reasons why people do and don't take part. Senior school leaders heard that some parents from different cultures (Romanian and Polish) didn't trust the data protection and the government, and they speculated that it might be because of historical mistrust of governments in different countries. Parents also spoke about how some cultures like to keep themselves to themselves.

Appendix 2d.1 below gives the view of the headteacher of the secondary school about the programme.

### Appendix 2d.1. View from a Headteacher – Harry Kutty, Cantell Secondary School on the Southampton Saliva Testing Programme

I was approached by the Service Lead for Education in August to ascertain whether we would be interested as a school in taking part in a saliva testing programme. The detail had not yet been established; however, I was informed that the pilot had been successful in Phase 1 and was now moving into Phase 2 involving testing at school setting. I had not heard about the Phase 1 pilot and I think this is an important consideration moving forward into Phase 3.

My initial reaction was that our community being involved in a testing programme could only enhance the control measures we were planning on putting in place and have now successfully implemented and embedded. In the absence of a viable vaccine, mass produced and readily available, I saw saliva testing on a weekly basis as a way of keeping our school open in the safest way that we could. This was a key priority for me as we planned for our school re-opening to all pupils across every year group. Having been open only to key workers and towards the end of term, to Year 10 pupils, I saw first-hand the damage being done to many of our youngsters, particularly those from the most vulnerable and disadvantaged backgrounds. I was particularly concerned with the 'social isolation' being experienced by students, impacting clearly on their well-being and no doubt slowing their academic and social development.

I did have some initial concerns about taking part in the programme:

1. The potential intrusiveness of the test – was it going to be like the swab test?
2. The efficacy of the test result – the % of false negatives or the % of false positives.
3. The potential impact of tests results on the education provision at the school.
4. The potential logistical and administrative burden on facilitating the tests on the school; leadership of the school and other staff.
5. The potential of a lack of control of the process - it being done unto, rather than with.
6. The potential reputational damage to the school of identifying asymptomatic cases against other schools where this would not be picked up; where it would be business as usual.

Following a meeting on the 14th of August, many of my concerns were either partially or fully addressed and it was very clear that the benefits of being part of the programme would outweigh any of the negatives. Not only would we be protecting ourselves and our families, we would also be helping in the national fight against the coronavirus.

I also agreed with the programme leaders that this was also an opportunity to better educate our pupils on the science behind COVID-19. This was something I was particularly passionate about having spent the preceding months trying to find out as much as I could on the data, science and public health information from a variety of sources to better inform the decisions impacting our community.

The programme team did an exceptional job in managing the workload to ensure there was minimal disruption to the school. Southampton City Council and the University of Southampton worked on:

1. The comms to parents, which were jointly signed by the Director of Public Health, Programme Lead and myself.
2. The translation of the comms into the five main languages of the pupils in our school.
3. The logistics of getting testing kits and labels to the school with drop off boxes.
4. The creation of educational materials and the delivery of those resources were carried out by the excellent LifeLab team.

5. The collection of the boxes, with samples, by courier.
6. Processes for informing participants of test results and any subsequent contact tracing.
7. Support for that testing positive from the Local Authority Health Protection Team.

We saw our responsibilities as:

1. Deciding who did the tests on which days.
2. Organising the classes so that the educational materials could be delivered before the testing.
3. Ensuring letters got out promptly.
4. Gently encouraging pupils and staff to bring back their tests.
5. Ensuring pupils safely brought the tests back and deposited them in the boxes as per their day.
6. Ensuring efficient pick up by the courier on a daily basis.
7. Picking up and dealing with cases as per PHE guidance.

Prior to starting the testing programme, a member of staff and a pupil had tested positive for COVID-19 in the same week. This was at a time when the rate of infections in the City were still low and no other secondary school had reported a case locally. Whilst I was confident that both cases were unrelated - the teacher did not teach the pupil, any other pupil in that year group, carry out any duties within that bubble and so on - I was not convinced that our community would share my confidence. We were fortunate to be able to discuss our situation with the programme team and it was decided that time-frames could be adjusted to bring the testing of staff forward. I decided to close the school for two days, to carry out a deep clean and to ensure we were able to test the staff and for them to receive results to confirm on the balance of probability that the two infections were isolated and transmission did not take place in School.

All staff tested negative and I was able to write to parents to that effect resulting in a greater confidence in our control measures and indeed a positive first engagement with the testing programme.

Since this time, the saliva testing programme has picked up three cases at the school. At the time of testing, all pupils were asymptomatic.

In one case, a year 10 pupil of British Indian origin tested positive, however his twin brother tested negative at the same time. I believe the infection was picked up early and therefore we were able to protect the rest of his family and extended family who live with him.

On another occasion two brothers, one in Year 7 and one in Year 10 tested positive. The father said to me afterwards that he had been ill preceding the diagnosis of the brothers and did not think it could be or would be COVID-19. He went onto say that he would not have got any of the family tested, despite the mother being clinically extremely vulnerable. In this example, being part of the programme helped to ensure the mother received the necessary clinical support.

On the occasion mentioned above. I was able to write to parents with the following contextual information:

- “1) Both students tested negative in the week beginning 5th of October.*
- 2) Of the 1,032 samples tested last week, only these 2 test results came back as positive.*
- 3) All teachers of both students have tested negative last week.*

- 4) Of the 33 Year 7 and 28 Year 10 students, only a very small number did not take a test last week. The significant majority that did take the test all tested negative.
- 5) 87% of Year 10 and 84% of Year 7 took a test last week.
- 6) The two Year 10 students (one from last week) are not 'contacts' of each other.

*In summary, as a result of this contextual information, I agree with Public Health England's view that these two cases are highly likely to be isolated and not connected to the previous cases at Cantell School.*

***The School remains open and your child should continue to attend if they are well."***

The final line, in bold, is a standard line from the PHE template letter that all schools send to parents once a case has been identified and when there is no outbreak resulting in the need to close the school. The contextual information above, that we gain from taking part in the saliva testing programme, gives a great deal of confidence to our staff and parents; in this case parents of students in Year 7 and Year 10. As such, our attendance since September has remained stable and above the national averages, which have seen a recent decline.

Parents and staff were extremely pleased to hear that the testing programme would be extended in our School to the end of December. As Head, it has helped me enormously to create a new normal that is as close to the normal that we all know and love in our school. Leaders and teachers up and down the Country are working in challenging conditions in what are unprecedented times to create a 'new normal' for their communities, staff and students.

In summary, the lockdown from the 23rd of March 2020 was incredibly challenging for many, not least those from the most disadvantaged backgrounds, those who were vulnerable and those that lacked parental support at home. These students struggled with creating new 'healthy' routines mixing work with play. They suffered the greatest with social isolation, missing out on social activity and human interaction. Other students struggled to engage with 'home learning' resulting in gaps in their knowledge and understanding for which it is vital they are in school so that staff can effectively catch them up. Many students who relied on free school meals or discounted meals at schools for food and healthy nutrition found this compromised. In essence their one 'good' meal of the day gone. Some students were sadly at risk of increased exposure to violence or exploitation.

The saliva testing programme, that is staff and students being tested on a weekly basis, enhances the control measures in a school and increases confidence in the community. By identifying asymptomatic cases, with active infection and at an early stage, schools can consequentially adapt their provision to ensure transmission in the school either does not occur or is reduced giving parents, staff and other stakeholders a great deal of confidence. Saliva testing could also be adapted to focus in on particular year groups or bubbles to maintain their education.

I see saliva testing, in the absence of a vaccine that is mass produced and readily available, as the only viable way we are going to keep schools open and at the same time minimise disruption to leaders, teachers and other staff. In that way we avoid what some of our students went through in the past.

## 4. University

### a. Legal

Underpinning the testing programme is the requirement to share personal data, including data about health, which is special category data.

The parties were aware that they must adhere to the key principles in data protection legislation when sharing data, in particular accountability (documenting all aspects of data sharing), data minimisation (ensuring it is reasonable and proportionate to share data) and ensuring that the data are kept secure. Please refer to the detailed analysis of compliance with the Data Protection Principles under Schools Legal in section 3a above.

While not prescribed, it is accepted good practice to put in place data sharing agreements between controllers sharing and receiving data so that the parties are clear about the purpose of data sharing and what happens to the data at each stage. In advance of sharing data in the programme, Data Protection Impact Assessments (DPIA) were completed by all of the relevant parties, which informed the data sharing agreements that were entered into.

In Phase 1, data were shared between the University, Southampton City Council and University Hospital Southampton NHS Foundation Trust.

The University's lawful basis for processing personal data for operational delivery of the programme was

- GDPR Article 6(1)(f) – the processing is necessary for its legitimate interests.

For Southampton City Council, the lawful basis for processing personal data was:

- GDPR Article 9(2)(i) – the processing is necessary for reasons of public interest in the area of public health

For UHS, the lawful basis or statutory duty for processing personal data was:

- GDPR Article 6(1)(e) – the processing is necessary for the performance of its official tasks carried out in the public interest in providing and managing a health service
- GDPR Article 9(2)(i) – the processing is necessary for reasons of public interest in the area of public health
- Data Protection Act 2018 – Schedule 1, Part 1, (2) (2) (f) – health or social care purposes
- Public Health (Control of Disease) Act 1984
- Health Protection (Notification) Regulations 2010

Each data controller contacted potential participants and invited them to take part in the programme by registering on the Programme Registration database and providing contact details and consent to participate. This worked well for Phase 1. In Phase 2, although the lawful basis was legitimate interests and this was set out in the Privacy Notice, students and staff of the University were still invited to register rather than there being a download of their data and they were required to confirm that they had read the privacy notice. However, it was realised that this would be difficult to scale up and introduced unnecessary complications and delays, therefore, reconsideration of the lawful basis going forward was suggested.

In Phase 2, with the introduction of schools testing, it was realised that compiling the registration database in advance would allow for provision of test kits and labels in advance and participants would be able to confirm participation by return of their sample, which was voluntary.

Significant challenges were encountered when dealing with data protection issues in Phase 2 of the Programme, which emphasised the need to build trust in terms of the use of any data at an early stage and to provide reassurance that data would only be used for the purposes intended, would be kept secure and would be destroyed at the end of the programme.

Issues in relation to recruiting staff and students of the University were resolved fairly quickly, and the original DPIA was revised to take account of the different processes that were to be used in Phase 2. Concerns were raised by the School's legal advisors, having been provided initially with the Phase 1 Privacy Policy, data flows and the SCC DPIA (while the revised Privacy Notice and revisions to the data sharing agreement were in preparation), as to which was the appropriate lawful basis for the processing. In their preliminary view the most appropriate or possibly only lawful basis available was consent, whereas the view of the University and SCC was that in all the circumstances, public task was the most appropriate lawful basis, and that consideration could also be given to legitimate interests. This was discussed at length with the advisors and two very useful conversations were held with the Information Commissioner's Office (ICO), who were clear that public task and legitimate interests were available options subject to the advisors conducting an analysis of the processing and identifying and minimising data protection risks (by use of a DPIA).

The ICO made clear that the expectation was not that all risks are eradicated but that all should be considered, assessed, documented and consideration given as to whether any remaining risks are justified. The ICO also concurred that the pandemic and social context of those being tested should form part of the assessment and that the cornerstone was transparency in dealing with the data subjects.

Public task was accepted and this lawful basis was inserted in the Privacy Notice

The lawful basis used by the Schools was

- GDPR Article 6(1)(e) – the processing is necessary for the performance of a task carried out in the public interest

Public task as the lawful basis would allow for swifter and more efficient downloads of data.

During the course of Phase 2, it was realised that reliance on Test and Trace meant that neither the University nor the Schools were receiving notification fast enough to allow swift action to stop the spread of the virus within the relevant institution. Individuals or parents and guardians also did not have informing the Schools or the University at the top of their list and not everyone gave permission to SPCL to inform either the Schools or the University about a positive test.

As a result, consideration has been given to addressing this and for the purposes of the extension of Phase 2 and essential for scaling up, is applying public task as the lawful basis supported by the Health Service (Control of Patient Information) Regulations 2002.

Using public task as the lawful basis, is clearly the least complicated way of supporting data processing for the programme and provided this: is supported by the necessary assessment through the DPIA process; is transparent in communications, which must be formulated to develop the trust and confidence referred to above: and is clear in the privacy notice, then this is the strong recommendation for any scaling up.

## **b. Communications**

### ***Student communications about the programme***

Communication to University of Southampton students started in the middle of August, with the incorporation of testing into University messages to new and returning students. The core communications team worked closely with the Student Communications team to ensure its work was aligned to the programme.

Lack of clarity and responsiveness about DHSC plans for announcements severely impeded the local announcement plan, materially affecting preparations to launch testing effectively, on schedule. The first formal opt-in email invitation from the programme mailbox was sent at the beginning of September, followed by a comprehensive, coordinated campaign of encouraging reminders employing a range of different messages and language.

Communications included emails, targeted flyers in halls, intranet posts and social media updates (Facebook, Twitter, Instagram, LinkedIn and WeChat). A briefing note was also shared with student-facing staff at the University, to facilitate conversations with students.

Additional temporary resource was required to manage sending further daily invitations by email throughout the term, as more students enrolled and arrived at the University. Resource constraints meant the programme was unable to monitor replies sent to the programme mailbox (which auto responded with a redirect to the customer services team), which may have been frustrating for participants looking for quick answers to questions, and likely impacted trust/reputation.

From October, following the main registration phase, the emphasis of communications shifted towards the importance of continued participation. There was a concern in this period that the programme was over-reliant on email, but anecdotal feedback suggested that some students saw University emails as a 'single source of truth' among lots of conflicting advice. Statistics from the Student Communications team showed that one email early in October was opened by 60% of recipients.

It is crucial to note that we were communicating without them thorough and obtaining regular insights into student attitudes towards the virus, testing and their return to University. This did result in instances of responding to limited anecdotal inputs, without a clear picture of how representative/relevant these were to the wider student body. Stronger resourcing of insight will be critical to future work.

In terms of participation rates and uptake, expected to be high, it is important to note the communication context. For students this was an incredibly busy, unsettling and potentially anxious period of their lives, even without pandemic conditions, and it was reasonable to expect that significant numbers would not engage.

That context encompasses multiple other calls to action from the University at the same time as part of the already overwhelming welcome and return to campus process. Anecdotally, it was noted by student-facing teams at the University that getting more than 50% of students to do anything should be considered an achievement.

### ***Student registration system***

Students were required to opt-in to the programme, but the process was convoluted, with new students needing to create their IT accounts, log in to one system, update their details in another, read a very detailed privacy statement and then consent. In one instance, a communication

generated 850 clicks through to the sign-up page but only 250 of these converted to new participants.

Opting-in triggered a confirmation text message from the NHS up to 24 hours later. In terms of user experience and compliance, it is imperative that future registration processes are much more user friendly and reflect the simplicity of processes that participants experience in their daily lives, with immediate confirmation.

### ***Staff communications about the programme***

The University began communicating about the extension of the pilot programme (Phase 1) in August. Email invitations to staff to opt-in to the programme followed at the end of September, but staff were only asked to register if they were satisfied the eligibility criteria in relation to face-to-face contact with others or other risks. The invitation was extended to formal University visitors, Students' Union staff and University contractors. Further information and reminders were distributed via staff newsletters and the University's intranet. Printed copies were produced for staff without regular access to emails.

### ***Staff registration system***

University staff opted-in to the programme by completing a Microsoft Form and self-identifying which testing cohort they fell into. These data were validated against the University's staff records. Like students, opting-in triggered a confirmation text message from the NHS.

### ***Prompts to test***

Students and staff were prompted by text message and email to take their tests – and their instructions encouraged them to take a test only when prompted. A number of factors may have contributed to a feeling that participants didn't know when to test, including a lack of clarity upfront about the anticipated frequency, a number of changes to this frequency throughout the Phase and several messages sent in error.

Enabling participants to get into the habit of testing would likely be strengthened by clarity and consistency in their testing schedule, with any changes clearly explained. Similarly, under this setup some participants who were testing fortnightly were also left unsure about when to test if they registered just after the last round of text messages. In future, all participants could be told to test as soon as they get their test packs and then follow the text prompts.

### ***University engagement***

Having successfully run engagement events in schools, members of the University's LifeLab team helped to run socially-distanced Gazebo Chats at halls of residences to gather more insights into student attitudes to testing. They also developed a COVID-secure Escape Room-style event to engage student participants more creatively.

The University's Safe Campus ambassadors were also asked to speak to students on campus about the testing programme and document their feedback. This information was fed into the evaluation of the programme.

### c. Results

Testing of University students started in Week 1 of the programme (week beginning September 14<sup>th</sup> 2020). University staff were brought into the programme later. One staff member was tested in Week 1, and 11 were tested in Week 3, but staff testing really started properly in Week 4 (week beginning October 5<sup>th</sup>).

Currently, there are 18,823 students currently enrolled at the University of Southampton and there are 10,813 members of staff. All students were invited to register. However, due to limited laboratory capacity, staff were asked to register only if they fulfilled one or more of the following criteria:

- those whose roles require them to work face to face with and within two metres of other people for fifteen minutes or more at a time
- those whose roles may cause them to have contact with bodily fluids e.g. cleaning staff or first aiders
- those in people-facing roles (such as teaching and reception staff) who are on campus for four or more hours per week

Students were sent emails with invitations to register. Not all students arrived in Southampton until after the testing started, and some, due to the pandemic, may have decided not to return at all. Thus it is difficult to estimate the registration rate among students. Students in halls of residence were asked to register and collected their packs and labels on arrival.

The staff were asked to decide for themselves whether they were eligible to register or not and there was no central register of such staff to enable a calculation of how many staff should be included under the eligibility criteria.

Thus, it is hard to define the denominators for calculating the registration rates and in all the tables that follow, the numbers of registrations are used as the denominators.

If staff and students were not attending the campus in any week, they may reasonably have decided not to provide a sample. Some who lived far from the campus reported a reluctance to travel to campus simply to drop off a sample (see section 4d for more details). The group for which it is easiest to assess sample return rates is the students in halls of residence. They were asked to test weekly, mainly at the weekend, and the drop-off points for the samples were in their halls, so they had easy access to them.

#### ***Registrations, uptake of testing and test results in University students***

In the tables that follow, the number of registrations each week is the number of people who had registered by the Friday of the previous week.

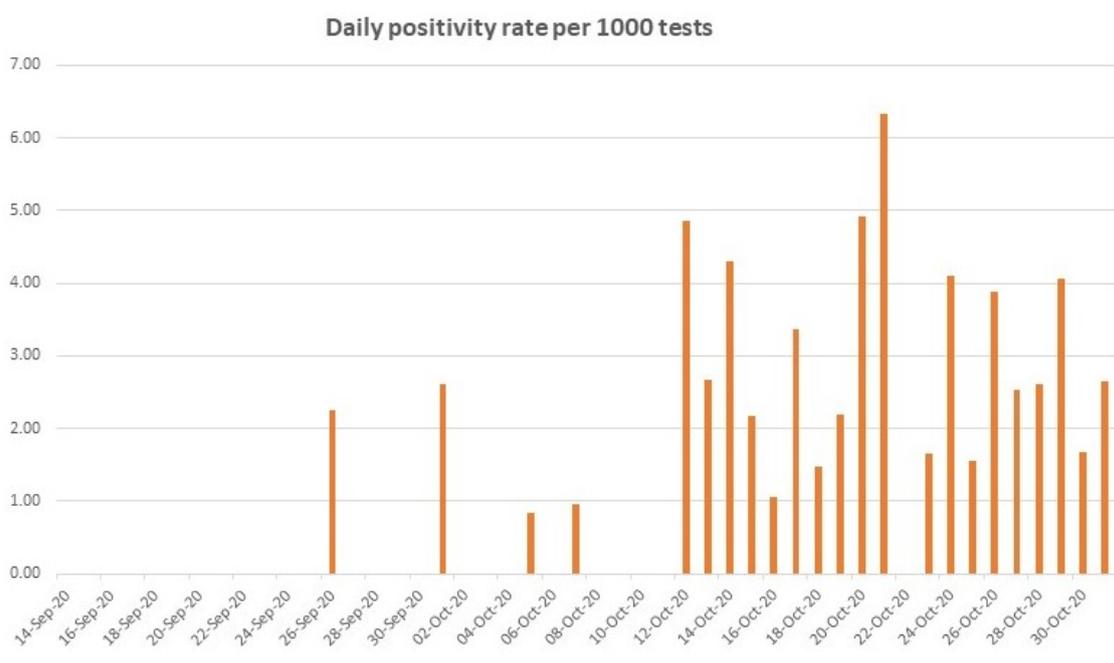
Students in halls of residence were asked to provide samples on a weekly basis. Those in private accommodation were on a fortnightly rota. Students were sent texts asking them to provide samples on particular days within their testing regime.

Table 4c.1 shows the combined table for all students. Registrations rose from just under 6,000 before testing started to 12,353 prior to the final week of testing. Rates of tests performed rose through the first few weeks as students arrived in Southampton, with 48% of students testing in week 4. The highest number of tests occurred in week 7, but the data for this week have to be

interpreted with caution as students were asked to perform two tests in that week, as there was extra laboratory capacity due to the four schools being on the half-term holiday.

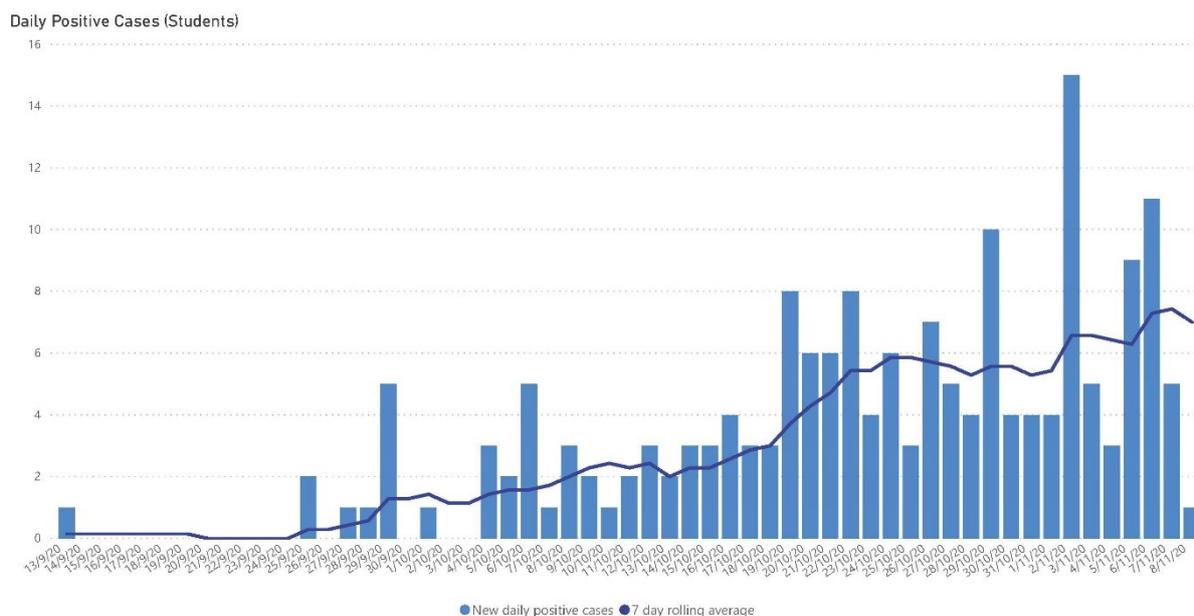
The rates of positive tests were very low in the first few weeks of the programme but were higher in the last three weeks after students arrived in Southampton. Figure 4c.1 shows the number of positive results per 1,000 tests per day. During the time period covered by the programme, test positivity rates increased exponentially in Southampton and in almost all other universities, but such a rise was not seen in the University of Southampton population in spite of continuation of some face-to-face teaching; the regular testing programme was felt likely to have contributed to this suppression of transmission.

**Figure 4c.1. Daily positivity rates per 1000 tests among university staff and students**



As a comparison, it is worth noting the overall numbers of positive tests (from both Pillar 2 testing and this saliva testing programme) as students arrived at University during the period of this testing programme, and beyond. This is shown in Figure 4.c.2. Up to October 31st, 56 of these were identified from the saliva testing programme and 103 through the NHS symptomatic Pillar 2 testing.

**Figure 4c.2. Total numbers of students testing positive from saliva testing and NHS Pillar 2 tests**



The highest positive rate occurred in week 6 at 0.4%. Positive rates are widely reported as numbers of positive cases per 100,000 rather than as percentages. A rate of 0.4% equates to 400 per 100,000 per week. Results were inconclusive for 25 samples from students (out of 25,905 tests (0.1%)) and the tests had to be repeated. Some 55 students submitted more than one test on a day; six were from Halls of Residences and 49 from private accommodation. Of note, 15 students in private accommodation each submitted five tests on one day, having misunderstood the instructions.

**Table 4c.1. Cumulative registrations, weekly tests performed and test results for all University students by week**

Week	Registrations	Tests performed		Positive		Inconclusive		Negative	
		n	%	n	%	n	%	n	%
1	5,903	751	12.7	-	-	-	-	751	100.0
2	8,236	2011	24.4	1	0.0	3	0.1	2007	99.8
3	10,164	2235	22.0	1	0.0	-	-	2234	100.0
4	10,858	5247	48.3	2	0.0	5	0.1	5240	99.9
5	11,641	4900	42.1	16	0.3	6	0.1	4878	99.6
6	12,045	4417	36.7	16	0.4	5	0.1	4396	99.5
7	12,353	6344	51.4	20	0.3	6	0.1	6318	99.6

Table 4c.2 gives the same information but restricted only to the students in halls of residence who were asked to do weekly testing. Testing rates reached 71% in week 4 but dropped off a little in subsequent weeks. Again, the results for week 7 should be interpreted cautiously as many students contributed two samples. The highest positivity rate was 0.4% (400 per 100,000 per week) in week 6, with 18 students in halls testing positive during Phase 2.

**Table 4c.2 Cumulative registrations, weekly tests performed and test results for University students in halls of residence who conducted weekly testing by week**

Week	Registrations	Tests performed		Positive		Inconclusive		Negative	
		n	%	n	%	n	%	n	%
1	1,511	10	0.7	-	-	-	-	10	100.0
2	1,977	472	23.9	-	-	1	0.2	471	99.8
3	2,618	1,068	40.8	-	-	-	-	1068	100.0
4	2,801	1,989	71.0	-	-	1	0.1	1988	99.9
5	3,010	1,712	56.9	7	0.4	3	0.2	1702	99.4
6	3,124	1,741	55.7	7	0.4	1	0.1	1733	99.5
7	3,184	2,122	66.6	4	0.2	1	0.0	2117	99.8

Table 4c.3 provides the breakdown for students who live in private accommodation and were on a fortnightly testing regime. Not surprisingly, the testing rates are lower than for those in halls due to the less frequent requests to test. The highest rate was in week 4 with a rate of 40.4%. This is a high rate given that only about half the students in this group would have been asked to do a test that week. The highest rate was in week 7, but that, undoubtedly, in part reflects the response to the request to provide two tests. Again, the highest positivity rate was 0.4% (400 per 100,000 per week) with 38 students in private accommodation testing positive during the seven weeks of the programme.

**Table 4c.3 Cumulative registrations, weekly tests performed and test results for University students in private accommodation who conducted fortnightly testing by week**

Week	Registrations	Tests performed		Positive		Inconclusive		Negative	
		n	%	n	%	n	%	n	%
1	4,392	741	16.9	-	-	-	-	741	100
2	6,259	1,539	24.6	1	0.1	2	0.1	1,536	99.8
3	7,546	1,167	15.5	1	0.1	0	0.0	1,166	99.9
4	8,057	3,258	40.4	2	0.1	4	0.1	3,252	99.8
5	8,631	3,188	36.9	9	0.3	3	0.1	3,176	99.6
6	8,921	2,676	30.0	9	0.3	4	0.1	2,663	99.5
7	9,169	4,222	46.0	16	0.4	5	0.1	4,201	99.5

### **Registrations, uptake of testing and test results in University staff and contractors**

Staff and contractors self-identified whether they were eligible for testing. Only 21 contractors registered throughout the period so their data have been combined with those for staff. Staff and contractors were grouped into three testing cohorts. The first was for those who were offered weekly testing. The other two groups had fortnightly tests with one cohort being asked to test on even-numbered weeks of the programme (labelled 'Fortnightly A') and the other on odd-numbered weeks (labelled 'Fortnightly B'). As dropping off a test required the staff/contractor to drop off the sample at a University site, some did not provide their samples until the subsequent week.

Table 4c.4 gives the details of the testing among all staff and then separately for the three cohorts (weekly, fortnightly A and fortnightly B). In any one week, no more than 50% of staff provided a sample, but not all staff were asked to do so. Among those who were on the weekly testing regime, rates exceeded 70% in two weeks. There was a slight fall in week 7, which might be attributable to the fact that school children were on half term so parents may have taken leave that week. The

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fortnightly testing groups show the pattern of testing, but over any two-week period in the latter part of testing, 70-80% provided samples. Four staff each submitted two samples on the same day.

All 2667 tests conducted in staff and contractors were negative, with the exception of four that were inconclusive. All these occurred in the Fortnightly A cohort, with two inconclusives in Week 5 and two in Week 6.

**Table 4c.4 Cumulative registrations, weekly tests performed and test results for University staff and contractors by week**

Week*	Full cohort			Weekly testing			Fortnightly testing A (even weeks)			Fortnightly testing B (odd weeks)		
	Registrations	Total tests performed n	%	Registrations	Total tests performed n	%	Registrations	Total tests performed n	%	Registrations	Total tests performed n	%
1	2	1	50.0	2	1	50.0	-	-	-	-	-	-
2	403	-	-	63	-	-	207	-	-	133	-	-
3	950	11	1.2	211	-	-	399	6	1.5	340	5	1.5
4	1,212	490	40.4	310	144	46.5	489	290	59.3	413	56	13.6
5	1,394	665	47.8	364	260	71.4	546	69	12.6	484	336	69.4
6	1,503	736	49.1	417	292	70.0	575	386	67.1	511	58	11.4
7	1,593	764	48.0	452	294	65.0	602	78	13.0	539	392	72.7

\*With the exception of two inconclusive tests in each of weeks 5 and 6, all test results were negative.

**Adherence to testing schedule**

Table 4c.5 shows the adherence to the testing schedule based on the number of samples each group should have submitted. Overall 21% of registered staff and students did not provide any samples. The proportion was slightly lower in staff than it was in students. Students in private accommodation were the group that had the highest rate of not providing samples. It is of note that those on weekly testing were less likely to provide all the samples requested than those on fortnightly testing. However, that is not surprising as those on weekly testing had to provide more samples to adhere to the schedule, and those on fortnightly testing had an opportunity to 'catch-up' by providing a sample in the following week, even though that was not according to their schedule (see Table 4c.4)

**Table 4c.5 Adherence to schedule**

Cohort	Registered	Did not provide any samples		≥1 sample but adherence incomplete		Adhered to testing schedule	
		n	%	n	%	n	%
<b>Students</b>							
Resident in halls	3,184	628	19.7	1,909	60.0	647	20.3
Resident in private accommodation	9,169	2,120	23.1	2,118	23.1	4,931	53.8
<b>Total</b>	<b>12,353</b>	<b>2,748</b>	<b>22.2</b>	<b>4,027</b>	<b>32.6</b>	<b>5,578</b>	<b>45.2</b>
<b>Staff</b>							
Weekly	452	75	16.6	262	58.0	115	25.4
Fortnightly A	602	102	16.9	70	11.6	429	71.3
Fortnightly B	539	60	11.1	43	8.0	436	80.9
<b>Total</b>	<b>1,593</b>	<b>237</b>	<b>14.9</b>	<b>375</b>	<b>23.5</b>	<b>980</b>	<b>61.5</b>
<b>Overall Total</b>	<b>13,946</b>	<b>2,985</b>	<b>21.4</b>	<b>4,402</b>	<b>31.6</b>	<b>6,558</b>	<b>47.0</b>

Table 4c.6 shows the adherence by age and gender. Women were marginally more likely to submit at least one sample or fully to adhere to the testing schedule than men. Some 21% of those aged 16-24 years did not provide any samples, but the highest proportion of non-providers was in the 25-29 year age group. Thereafter the proportions providing no samples decreased with age. Those in the youngest age group were the least likely to adhere fully to the testing schedule but were more likely than other ages to adhere partially to the testing regime.

**Table 4c.6 Adherence by age and gender for University students, staff and contractors.**

Factors	Did not provide any samples (n = 2,985)		≥1 sample but adherence incomplete (n = 4,402)		Adhered completely to testing schedule (n = 6,558)	
	n	%	n	%	n	%
<b>Age</b>						
16-24	2265	21.0	3670	34.1	4,843	44.9
25-29	301	27.0	285	25.6	529	47.4
30-39	187	23.2	194	24.1	425	52.7
40-49	115	20.0	115	20.0	345	60.0
50-59	80	17.6	92	20.3	282	62.1
60-69	34	17.0	42	21.0	124	62.0
<b>Gender</b>						
Men	1490	22.4	2079	31.2	3,085	46.4
Women	1494	20.5	2321	31.9	3,471	47.6

#### d. Engagement and participant experiences

##### What did we do to ensure engagement?

The first formal invitation to opt in for saliva testing was sent to students by email from the programme mailbox at the beginning of September, and there followed a thorough and coordinated campaign of encouraging reminders, including emails, flyers in halls, intranet posts and social media updates (Facebook, Twitter, Instagram, LinkedIn and WeChat). We collaborated with communications teams within the University on messages for their students. Additional resource could have been deployed to specifically focus on social media messages for students. Funding could also have been used to embed additional resource within other teams (for example, within the Student Communications and Students' Union communications teams) to ensure that messages about saliva testing were embedded throughout wider communications. After participants were registered and segmented by cohort, we were able to contact them directly by text message and email via the NHS systems team. Having successfully run engagement events in schools, members of the University's LifeLab team helped to run socially-distanced Gazebo Chats at halls of residences to gather more insights into student attitudes to testing. They also developed a COVID-secure Escape Room-style event to engage student participants more creatively. The University's Safe Campus ambassadors were also asked to speak to students on campus about the testing programme and document their feedback. This information was fed into the evaluation of the programme.

##### How did we evaluate the engagement?

We aimed to explore influences on University of Southampton staff and student decisions to participate in the testing programme and their experiences of taking part. Semi-structured interviews and focus groups were conducted with two samples of staff and students recruited using purposeful sampling: one group who had declined to participate in the programme and another group who had agreed to participate. Individuals who participated in the programme, and also provided interview data, are subsequently described as 'participants'. Participants were interviewed within one week of completing the programme. Participants were recruited in a number of ways: when they gave permission for their contact details to be shared with the qualitative researchers; when providing feedback through the Southampton City Council feedback form, which was also shared on social media and intranet posts; and through snowballing methods such as word of mouth. Senior University leaders were also interviewed about their experience of setting up and running the programme. Table 3d.1 summarises the details of those who took part in the interviews and focus groups.

The telephone interviews and focus groups took place between the 2<sup>nd</sup> October and 6<sup>th</sup> November 2020, starting with participants. Interviews with those who declined were sought throughout. At the beginning of the interviews and focus groups, the interviewer informed the participants and decliners of the procedure stressing that their data would remain anonymous and confidential. At this point, they were informed that they would receive an incentive for their time. Participants and decliners gave permission for the interview/focus group to be audio recorded. Recordings were stored on an encrypted laptop and the interviewer typed up observation notes, which contributed to the main themes and findings in this report. Sufficient participants from each programme were interviewed for data saturation to be reached. Observation notes and recordings were rapidly analysed to produce the findings and recommendations below. Additional data were extracted from feedback about the functioning of the programme from informal conversations with University student ambassadors (n = approximately 250) and from Southampton City Council online feedback forms (n = 215 as of 11/11/20).

**Table 3d.1: Description of people who took part in interviews (n=25) and focus groups (n=11) about their experiences of the programme (total n=108)**

Groups	Negative test result	Positive/ Inconclusive test result	Total number of people
<b>Participants in the programme</b>			
- University students	62	14	76
- University staff	21		21
- Senior university leaders			5
<b>Decliners from the programme</b>			4
<b>Total</b>			106

### 1. What made people engage with the screening programme?

#### Communication

- Students and staff reported effective communication via email and texts including helpful reminders. Students said that texts were preferred as they receive many emails. They appreciated that the test result was in the first line of the text and which showed up as a notification even if they didn't open the text.
- Students liked the escape room activity as it helped to myth-bust about the virus and the programme, particularly correcting misinformation about accuracy of the saliva test. It also made students feel that the University cared about them and it gave them something fun to do as many were bored because of restrictions on their movements associated with COVID-19. They also appreciated the Just Eat voucher.
- Students with a positive result received a phone call from a doctor who informed about the meaning of the test result and what to do next. Students felt reassured and trusted what the GP was advising. They also appreciated that the Student Union were also offering mental health support.
- Participants who received an inconclusive result appreciated the communication about their result, which reassured them.
- Senior University leaders felt it was important for the call handlers ringing positive cases to think about the participants' mental health during those conversations. GPs took on the role of call handlers, though more paramedics and nurse practitioners are currently being trained for this role, as it was felt that this role would need a clinical background. It was emphasised that the call handlers had strong links with services in the community in order to be able to refer participants needing urgent support. It was also essential to have communication between contact teams, which was coordinated through a single system and point of contact.
- Senior University leaders spoke of the new relationship that the saliva testing programme had forged between the University and the City Council, particularly with the Public Health Team. They emphasised that the testing programme is the cornerstone of the University's response to COVID-19 and is one piece of the whole response along with the NHS Test and Trace.
- Senior University leaders felt that the systems within the testing programme communicate with each other well and could be scaled-up effectively.
- Communication with Cabinet Office is positive which contributed to a feeling of inclusiveness and build-up of mutual trust over time.

- Senior University leaders fully supported the programme, perceiving it to be effective, allowing the University to stay open for the first term including during the lockdown, improving public and student perception of the University, and highlighting to students and staff that they were taking COVID-19 precautions seriously. The programme also provided the University with data on the number of cases so that they could action-plan.
- University students appreciated that their feedback was being implemented.

### **Community spirit**

- Senior University leaders' response to the testing programme came from a city-wide vision, which was based on nurturing relationships with the Trust and City Council. They spoke of how the relationship built through the testing programme is strategic for becoming more embedded in the city, which in turn makes Southampton a more attractive place to study for student applicants. They recommended ensuring that applicants are aware of the city-wide COVID-19 response.
- Senior University leaders wanted to extend the invitation to all of the University community.
- Senior University leaders felt that the testing team were productive, had open communication, respect, trust, and inclusiveness, which had been built upon since Phase 1 and was felt to contribute to the successes of the programme. This culture was led from the top by the head of the core team. Senior leaders felt humbled by the commitment of the team members, with many pausing parts of their lives to work on this project for the greater good for society.
- Senior University leaders felt that the testing programme has highlighted the ability of the University to provide a multi-disciplinary team capable of setting up and running such a logistically complicated programme.
- One lesson learnt from Phase 1 by senior leaders was about the strength of community engagement needed to ensure high levels of uptake.
- Student leaders were perceived to be very active in prompting and reminding other students to take the test. Some suggested more campaigns to get students to encourage one another.
- Students reported that they had set up WhatsApp Groups to remind each other to provide samples as an additional motivation to take part.
- Some students who tested positive decided to isolate together in their flat and made the time fun and supportive for one another. They also appreciated food parcels from University and from their friends.
- Students were influenced by their friends to take part.
- Senior University leaders felt that the local community would appreciate and see the benefit having a University with high impact COVID-19 research, which can only improve the relationship between the University and local community.

### **Rewards**

- Participants reported feeling reassured to carry on with 'normal' daily activities and also visit relatives, including the elderly and vulnerable, on receipt of a negative test result. Some deliberately took the test just before seeing family for this reason.
- Students were grateful that the tests were free of charge as they wouldn't be able to afford them otherwise.
- Senior University leaders spoke of the advantage of knowing how many cases they had in the University community and identifying hotspots to prevent the spread of the virus.

### **Participant acceptability**

- Students and staff found most of the programme requirements easy and the logistics convenient including simple registration, convenient drop-off points, clear and simple instructions suitable for those who had English as a second language, colour-coordinated labelling, easy testing compared with the swab test and quick turnaround of the test results.
- Students felt prepared to isolate and follow strict instructions if they received a positive test result.

- Participants were impressed with the overall organisation of the programme and understood its importance.
- Saliva testing was favourably compared to the NHS Test and Trace app, which some students couldn't download because they had older phones and were not able to afford the software upgrade necessary.
- Students who received a positive result were aware of the support offered by the University.
- Senior University leaders were grateful that the programme had been carefully budgeted for and that there were no financial implications for University budgets.

## 2. How could engagement with the screening programme be improved?

### *Extra support for positive cases*

- Students who received a positive result and were symptomatic received some mixed messages including one GP misdiagnosing as tonsillitis until they received a positive saliva test a week later. Another believed their symptoms were a winter cold until receiving the positive saliva test result and then made the rapid decision to travel home to their family before receiving guidance, despite the risk of onward transmission of the virus. On this occasion, the NHS Test and Trace contact took 4 days, by which time the participant had already communicated with those with whom they had been in contact.
- Students who received a positive result and were asymptomatic felt shocked initially as they didn't suspect an illness, but many showed symptoms a few days later. The call handlers found this group hard to motivate to isolate.
- Students seemed unclear about the need to also take the NHS test if they started having symptoms. Many did the saliva test if they felt unwell.
- Some students living in University halls who tested positive felt frustrated and bored that they needed to isolate for 10-14 days, especially those who were asymptomatic.
- Students who tested positive struggled with loss of smell, which led to loss of appetite.
- Time to receipt of the negative results (1 day) was quicker than the positive result (2-3 days), which caused feelings of anxiety. One student reported feeling very upset when she received a positive result and was worried that she had infected people. Other participants receiving positive test results were scared and unsure about what to do.
- Some students who received a positive result felt overwhelmed with the number of automated calls from NHS Test and Trace. One participant missed the calls and didn't get a follow up call and others spoke about how the helpline didn't have many answers to their questions.
- Senior leaders emphasised the mental health implications for students who were isolating, especially those staying in their rooms within their flats in halls. Call handlers had long conversations with these students who needed lots of reassurance and mental health support. BAME students perceived that getting COVID-19 was particularly worrying for them.
- Some said that they would feel guilty having to tell their family, friends, colleagues and children's schools that they had a positive result because of the implications for them.
- Some felt that other students and staff were not taking part because they didn't want to isolate should they receive a positive result. In these cases, they felt ignorance was bliss, made significant by their concerns about the legal and financial implications including no sick pay. This was also a concern in relation to false positive results.
- Some suggested that it would have been helpful to have a flow chart showing what they should do if they received a positive test result, information on the support that students would receive from the University if they had to isolate, and how to communicate with NHS Test and Trace.
- Senior University leaders felt that the term 'inconclusive' created anxiety for participants who saw this as a more medical term. 'Insufficient' was instead suggested.

### *Build trust*

- Students suggested that other students didn't register due to concerns about the accuracy of the test. Some believed there to be a 30% error rate.

- Many wanted information on the accuracy of the test before they decided to take part in the programme, including how it compared to other tests. They also wanted weekly/monthly tracker/feedback of error rate or feedback of current community results, publications etc.
- Some students wanted clarification on what was meant by a 'trial' and who was responsible for it.
- International students said that their international student friends were concerned about data privacy and storage of DNA. More information on this would be welcomed.
- Many spoke about the credibility of the sources of communication, as there were many email addresses emailing about the programme. They suggested that all communication should come from one email address with specific subject titles.
- Senior leaders considered potential challenges for Phase 3 to be sustaining trust and open communication.
- Students who received inconclusive tests asked for a phone call back but didn't hear anything.
- Senior university leaders suggested we talk to more of those who have decided not to take part in the programme so these issues could be overcome, and also to build trust.

### **Increased accessibility**

- For those working night shifts, it was unclear what time in the morning to take their test; whether this was 6am when they finished their shifts or 6pm when they woke up, and when the 3.30pm drop off point would already be closed.
- Students perceived that low registration of students was due to laziness and recommended an opt-out scheme rather than opt-in.
- Students also said that other students might not be returning tests as they had gone home (outside of Southampton). As all their lectures were online, there was no need to be in Southampton and to take part in the programme. This also included students on placement.
- Some students living in private accommodation far from the University drop-off points, found it difficult to drop the kits off especially as many weren't going regularly to the University campus for lectures anymore. Some private accommodation was 30+ minutes walk away from a drop-off point.
- For students who didn't have a British mobile number, there was no communication by text, and emails were too overwhelming. These participants wanted other forms of communication to reach them. This could include an app.
- Some felt that a postal return of the test would make the programme more accessible and support those self-isolating.
- Senior University leaders encouraged more engagement with participants to improve compliance in Phase 3.

### **Practical improvements**

- Students and staff reported challenges in producing enough saliva and suggested clear labelling of a 2ml level on the tubes.
- Students and staff reported confusion about the frequency of taking the tests and wanted clearer communication about this. One staff member connected to student wellbeing services said she received multiple calls from students regarding this but her team were not linked up to the testing programme so were unsure on the correct information.
- Students expressed feelings of being overwhelmed by the number of emails, which caused them to stop paying attention to them. Participants also received emails asking them to register, which confused some about the need to register again.
- Many students wanted clearer instructions about the drop-off points on the Council website, including a map or pictures for non-native English speakers.
- Students suggested adding announcements about the programme on Facebook.
- Students also suggested that the tests could be used to allow students to attend face-to-face lectures and seminars.

- Students and staff requested reminders the day before the test or first thing in the morning and making the drop-off times later than 3:30, but with the communication that these tests may take longer to process. Others wanted to know where to pick up new testing kits.
- Others asked if the rapid tests could be possible (30-90 minute return). This was due to the risk of receiving the results when out in public or visiting family and friends, which might lead to transmission.
- Some wanted the ability to do the test at any time in the day, not just first thing in the morning, which many found hard to remember. They wanted to know the rationale for this.
- Senior leaders felt that the programme would have been too expensive to implement without government support but might be prepared to cover the costs in future given the greater risks of having to close the University in an outbreak.
- Senior leaders felt that they overestimated registration by students and felt they would consider the complexities of students' lives and the ever-changing environment more in preparation for Phase 3.
- Students who received a positive result were confused about whether they needed to take another test when isolating. There was little communication about this and different government guidance online.
- Students mentioned keeping the test packs in case of an illness scare, coming into contact with someone with COVID-19, or wanting to check before returning home.
- Students who received positive results struggled to isolate in University halls.
- Students who received positive test results had issues communicating with NHS Test and Trace, including too many calls, not calling back and or not being contacted at all. They would also like to receive the Test and Trace 'code' in order to log their results and support the contact tracing.
- Reasons for not taking part included inconvenient drop-off points and not wanting to go on public transport, receiving the invitation email at a busy time, not wanting to disrupt their life if they had to isolate on a false-positive result, not wanting their DNA to be harvested, feeling that the resources should go towards something more helpful, and not taking the virus seriously. They wanted more information at the beginning of the programme.

### 3. What were the impacts on participants of engaging with the screening programme?

#### *Altruism and pride*

- Students reported how students from other universities were envious of the routine testing, which may give the University of Southampton a competitive edge.
- Students and staff felt lucky to be able to take part in this programme.

#### *Reassurance*

- Students and staff expressed reassurance on receipt of a negative test including reduced anxiety for those in shared accommodation and international students.
- Students and staff had a general feeling that the programme protected the community and they were not taking tests away from others who might need them more.
- Students and staff felt comforted that they weren't spreading the virus.
- Students with positive test results felt reassured and trusted that a doctor called them and also their personal academic tutor and NHS Test and Trace.
- Participants who received an inconclusive result appreciated the communication about their result, which reassured them that it was due to issues with doing the test rather than a positive result.
- Southampton residents saw testing as a way to protect the wider city from the influx of potentially asymptomatic students.

#### *Increased knowledge*

- Students liked the escape room activity as it helped to myth-bust about the virus and the testing programme.

### ***Environmental concerns***

- Many expressed concerns about the amount of plastics used in the testing kit. Some spoke of ways to upcycle the test tubes and plastic bags.

### ***Transmission fears***

- Students and staff felt some anxieties about accidentally getting COVID-19 from the tests.
- Reports of drop-off bins overflowing caused some to have transmission concerns.
- Students who received a positive result worried about the people they had been in contact with and if they had spread the virus.

### ***Feelings of uncertainty***

- Some students reported receiving their test results at different times, which caused some anxiety. They suggested the need for more communication on the likely turnaround of the results.
- Students and staff expressed concerns about the consequences of receiving a positive result.
- Students who received a positive result felt very anxious and worried about their result.

### ***Cultural concerns***

- Some students from different cultures spoke of data privacy concerns as they didn't trust their government in their home country.

## **Overall conclusions about engagement in relation to both schools and the University**

To ensure engagement in testing and screening for COVID-19:

- the programme team should communicate transparently and continuously, harness the genuine community spirit that exists in connection with responding to the pandemic, consider how the testing could be incentivised for participants, and ensure that all logistical aspects of the programme work well for participants;
- the programme team should provide extra support for participants and households testing positive, build trust around the programme through honest, consistently framed messaging from a trusted preferably local source, increase accessibility and inclusivity of the programme and collect data to feed back in real-time on the practical improvements that need to be made;
- the programme team should consider the positive and negative impacts of participating on participants, including a sense of pride, reassurance and increased knowledge of COVID-19 and their infection status, but also participants' fears of transmission and uncertainty, responsibility, cultural and environmental concerns.

## 5. Abbreviations

A&E	Accident and Emergency
ANP	Advanced Nurse Practitioner
APEX	Oracle Application Express
APHA	Animal and Plant Health Agency
API	Application Programming Interface
BAME	Black, Asian and Minority Ethnic
CEO	Chief Executive Officer
CIRU	Clinical Informatics Research Unit
CCT	Case Contacting Team
CHIE	Care and Health Information Exchange
CO	Cabinet Office
CORMSIS	Centre for Operational Research, Management Sciences and Information Systems
DEFRA	Department for Environment, Food and Rural Affairs
DfE	Department for Education
DHSC	Department for Health and Social Care
DNA	Deoxyribonucleic acid
DPA	Data Protection Agreement
DPH	Director of Public Health
DPIA	Data Protection Impact Assessment
DSA	Data Sharing Agreement
FAQ	Frequently Asked Question
FT	Foundation Trust
FTE	Full Time Equivalent
GDPR	General Data Protection Regulation
GP	General Practitioner
HCA	Health Care Assistant
HPT	Health Protection Team
HSMI	Household Subject Master Index
LRF	Local Resilience Forum
LIMS	Laboratory Information Management System
MP	Member of Parliament
MS	Microsoft
MSC	Microbiological Safety Cabinet
NHS	National Health Service
NTAT	National Test and Trace
NTC	No Template Control
PDS	Personal Demographics Service
PHE	Public Health England
PCR	Polymerase chain reaction
Q&A	Questions and Answers
RNA	Ribonucleic acid
RT-LAMP	Reverse Transcription Loop-mediated isothermal amplification
RT-qPCR	Reverse Transcription quantitative PCR
SCC	Southampton City Council
SCCCS	Southampton City Council Customer Services
SGSS	Second Generation Surveillance System
SIMS	School Information Management System
SLA	Service Level Agreement
SoS	Secretary of State

*Confidential*

SPCL	Southampton Primary Care Limited
TCSN	Tissue Culture Supernatant
UHS	University Hospital Southampton NHS Foundation Trust
UoS	University of Southampton
UPN	Unique Pupil Number
UV	Ultraviolet
VTM	Viral Transport Media

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