# Evidence Search Service Results of your search request

## Critical analysis of NHS test and trace and contact tracking for Covid 19

**ID of request:** 27456  
**Date of request:** 3rd February, 2021  
**Date of completion:** 5th February, 2021

If you would like to request any articles or any further help, please contact:  Paul Lee at [paul.lee@slam.nhs.uk](mailto:paul.lee@slam.nhs.uk)

Please acknowledge this work in any resulting paper or presentation as: Evidence search: Critical analysis of NHS test and trace and contact tracking for Covid 19. Paul Lee. ( 5th February, 2021). LONDON, UK: Reay House Library and Knowledge Service.

**Sources searched**  
EMBASE (1)  
Google (Advanced) (4)  
HMIC (7)  
MEDLINE (11)

**Date range used** (5 years, 10 years): 2020-2021   
**Limits used** (gender, article/study type, etc.): Peer reviewed papers and reports   
**Search terms and notes** (full search strategy for database searches below):

See full search strategy

For more information about the resources please go to: [www.slam.nhs.uk/library](file:///C:\Users\Elaine.Watson\Downloads\www.slam.nhs.uk\library) .

## Contents

[A. Institutional Publications](#Content4)

BBC

[Coronavirus: Inside test-and-trace - how the 'world beater' went wrong](#Research838253)

NHS Providers

[Standing up to the test: learning lessons for the next phase of the national Covid-19 testing strategy](#Research838232)

National Audit Office (NAO)

[The government’s approach to test and trace in England – interim report](#Research838247)

Not specified

[Mining user reviews of COVID contact-tracing apps](#Research838254)

The Health Foundation

[NHS Test and Trace: the journey so far](#Research838228)

[NHS test and trace performance tracker](#Research838248)

UK Parliament

[NHS test and trace statistics (England) : methodology](#Research838233)

[Human rights and the government’s response to Covid-19: digital contact tracing: third report of session 2019–21: report, together with formal minutes relating to the report](#Research838234)

[B. Original Research](#Content5)

1. [Is NHS Test and Trace exacerbating COVID-19 inequalities?](#Research838225)
2. [Public acceptance of privacy-encroaching policies to address the COVID-19 pandemic in the United Kingdom.](#Research838224)
3. [Public attitudes towards COVID-19 contact tracing apps: A UK-based focus group study.](#Research838227)
4. [Quarantine and testing strategies in contact tracing for SARS-CoV-2: a modelling study.](#Research838226)
5. [Automated and partly automated contact tracing: a systematic review to inform the control of COVID-19.](#Research838251)
6. [Contact tracing: digital health on the frontline.](#Research838252)
7. [Covid-19: UK test and trace system still missing 80% target for reaching contacts.](#Research838238)
8. [Digital tools against COVID-19: taxonomy, ethical challenges, and navigation aid](#Research838229)
9. [Efficacy of contact tracing for the containment of the 2019 novel coronavirus (COVID-19).](#Research838237)
10. [Epidemiological changes on the Isle of Wight after the launch of the NHS Test and Trace programme: a preliminary analysis.](#Research838235)
11. [Ethical guidelines for COVID-19 tracing apps](#Research838239)
12. [Ethics of instantaneous contact tracing using mobile phone apps in the control of the Covid-19 pandemic](#Research838231)
13. [Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts.](#Research838240)
14. [Impact of delays on effectiveness of contact tracing strategies for COVID-19: a modelling study](#Research838230)
15. [The ethics and value of contact tracing apps: International insights and implications for Scotland's COVID-19 response.](#Research838236)

### [C. Search History](#SearchHistory)

## A. Institutional Publications

#### BBC

**Coronavirus: Inside test-and-trace - how the 'world beater' went wrong** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=78c1d664e14385f8f76340650db0241a)

Just half of close contacts given to England's NHS Test and Trace are being reached in some areas, a BBC investigation has found. Six months after Boris Johnson promised a "world beating" system, it can be shown the network is failing in areas with some of the worst infection rates. The research also found no-one from NHS labs was at a key government meeting with private firms about testing. ...

#### NHS Providers

**Standing up to the test: learning lessons for the next phase of the national Covid-19 testing strategy** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=aa3c68d4a6f22e69bdfe4079b9339b3a)

This report aims to show the size of the task ahead to build a national test and trace service that will be fit for purpose for this coming winter. It says testing and tracing is an essential part of the national strategy to combat Covid-19. The report concludes that, despite the good progress shown by NHS Test and Trace since its creation in May, there is a difficult legacy the new service has to overcome.

#### National Audit Office (NAO)

**The government’s approach to test and trace in England – interim report** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=0886617a7068a67b17b2290bcf5bcb6f)

Background to the report Test and trace programmes are a core public health response in epidemics that can be used with other measures such as social distancing, barriers (such as masks) and handwashing to reduce infections. The basic principles of test and trace are identifying individuals, or groups of individuals, with an infectious disease, and tracing their contacts to limit further transmission. Through early identification, potentially infectious contacts can be encouraged or obliged to reduce interactions with other people, thereby reducing the spread of disease. At the start of the COVID-19 outbreak, Public Health England carried out comprehensive test and trace activities for the relatively low numbers of infections. As infection levels grew, government introduced a national lockdown as the main way of reducing transmission of COVID-19, suspending comprehensive contact tracing in mid-March. From April onwards, the Department of Health & Social Care significantly scaled up testing capacity in England. On 28 May 2020, government announced the launch of the new NHS Test and Trace Service (NHST&T), to lead on four areas of pandemic response, known as test, trace, contain and enable, and to bring these together into a single national programme. Scope of the report This is the first of two reports. This interim report provides an overview of test and trace services for addressing COVID-19 in England, including how the government’s approach has developed, and how it managed performance and capacity in the period from May to October 2020. This report does not cover post-October planning for mass testing. It covers some aspects of public engagement efforts in relation to improving compliance with tracing. We intend to publish a further report in spring 2021 which will provide a fuller value‑for‑money assessment of test and trace. This will include an update on spend and performance, and matters not covered here, including examining the end-to‑end process in more depth, the development and implementation of the contact tracing app, and a detailed look at elements of contract management. Concluding remarks This is an initial review of the aims, funding and performance of the government’s approach since May. We found that overall NHST&T had achieved a rapid scale-up in activity in respect of both testing and tracing, and had built much new infrastructure and capacity from scratch. However, issues with implementation and potentially the initial choice of delivery model mean that it is not yet achieving all its objectives. As it plans and rolls out further changes in COVID-19 testing, including the introduction of rapid turnaround tests and mass testing, government needs to learn lessons from its experience so far. It is very important that testing and tracing is able to make a bigger contribution to suppressing the infection than it has to date.

#### Not specified

**Mining user reviews of COVID contact-tracing apps** (2020)

Vahid Garousi, David Cutting, Michael Felderer

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=29fbd53a2842ed9764058940a9d58ddf)

Context: More than 50 countries have developed COVID contact-tracing apps to limit the spread of coronavirus. However, many experts and scientists cast doubt on the effectiveness of those apps. For each app, a large number of reviews have been entered by end-users in app stores. Objective: Our goal is to gain insights into the user reviews of those apps, and to find out the main problems that users have reported. Our focus is to assess the "software in society" aspects of the apps, based on user reviews. Method: We selected nine European national apps for our analysis and used a commercial app-review analytics tool to extract and mine the user reviews. For all the apps combined, our dataset includes 39,425 user reviews. Results: Results show that users are generally dissatisfied with the nine apps under study, except the Scottish ("Protect Scotland") app. Some of the major issues that users have complained about are high battery drainage and doubts on whether apps are really working. Conclusion: Our results show that more work is needed by the stakeholders behind the apps (e.g., app developers, decision-makers, public health experts) to improve the public adoption, software quality and public perception of these apps. [Researchers from Queens University Belfast and University of Innsbruck].

#### The Health Foundation

**NHS Test and Trace: the journey so far** (2020)

Briggs Adam, Jenkins Deborah, Fraser Caroline

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=05b01abf89bd1a62e11f7ef7f30becae)

Testing for Covid-19 to identify cases and close contacts of those who test positive, alongside asking those close contacts to isolate, is essential to control the spread of the disease. NHS Test and Trace launched on 28 May 2020 and although progress has been made, it is not yet the 'world-beating' contact tracing programme that was promised, with ongoing challenges around test capacity and contacting both cases and their contacts. Despite significant investment, only between 50 per cent and 60 per cent of contacts of known cases are being advised to isolate, yet the government's Scientific Advisory Group for Emergencies (SAGE) has suggested that for a contact tracing system to be effective, it needs to trace around 80 per cent of contacts of an index case. As cases in England rise, the government needs to urgently learn from the journey so far to ensure that tests are available for those who need them and that policies aimed at improving contact tracing do not further exacerbate the inequalities already exposed by Covid-19.

**NHS test and trace performance tracker** (2021)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=43069d797202beafd5cd6b6cd4b991ab)

About this tracker The NHS Test and Trace (NHSTT) system aims to control the spread of COVID-19 in England by ensuring that people can be tested when necessary, and by identifying close contacts of people who have tested positive (positive cases) and asking them to self-isolate. The government’s Scientific Advisory Group for Emergencies (SAGE) has recommended that at least 80% of close contacts of positive cases must be reached for the system to be effective. In this tracker, we monitor and reflect on the performance of NHSTT, analysing the latest statistics on the number of positive cases reached and the number of contacts who were asked to isolate each week since the launch of NHSTT on 28 May 2020. The tracker will be updated every 2 weeks. It was last updated on 4 February 2021 with additional data covering 21–27 January 2021.

#### UK Parliament

**NHS test and trace statistics (England) : methodology** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=14826d86caef47886432057acf9ed463)

DHSC publishes weekly statistics on coronavirus (COVID-19) contact tracing dating from when the NHS Test and Trace service started on 28 May 2020. These statistics cover: number of people tested for coronavirus in England number of people who tested positive for coronavirus in England time taken for test results to become available number of people testing positive for coronavirus in England that were then transferred to the contact tracing system, and the time taken for them to be reached number of recent close contacts identified, and the time taken for them to be reached This document sets out information on the data sources and methodology are used to generate each of these measures. It will keep being updated with further detail. [gov.uk webpage abstract]

**Human rights and the government’s response to Covid-19: digital contact tracing: third report of session 2019–21: report, together with formal minutes relating to the report** (2020)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=29fbe42129534c9195284bd0e2363dd8)

This report on the contact tracing app, concluding that if effective, the app could pave the way out of the current lockdown restrictions and help prevent the spread of Coronavirus, but there are significant concerns regarding surveillance and the impact on other human rights which must be addressed first.

## B. Original Research

1. **Is NHS Test and Trace exacerbating COVID-19 inequalities?**  
   Briggs Adam D. M Lancet (London, England) 2021;396(10267):1972.

The disproportionate effects of COVID-19 on deprived population groups are well documented.1 Not only are case and fatality rates for COVID-19 higher than among people living in less deprived areas, policies that are aimed at preventing spread, such as social restrictions and lockdown, have a greater effect on vulnerable populations.2 NHS Test and Trace was launched on May 28, 2020, as a key part of the UK Government's strategy to control the spread of COVID-19. The test and trace system aims to reduce onward disease transmission by increasing the availability and speed of testing, and identifying close contacts of positive cases and asking them to isolate.3 However, ongoing testing delays and low levels of public adherence led to the UK Government's Scientific Advisory Group for Emergencies, in September, 2020, to describe the system as “having a marginal impact on transmission”.4 Local governments in England can be grouped into 149 upper tier local authorities (UTLAs) that cover the whole country (for this analysis, the City of London is combined with the London Borough of Hackney, and the Isles of Scilly combined with Cornwall). We divided these 149 UTLAs into deprivation quintiles on the basis of average Index of Multiple Deprivation (IMD) scores from 2019. Using NHS Test and Trace reporting statistics from May 28 to Nov 18, 2020 (appendix), we analysed the reported percentage of all cases and contacts who were successfully contacted by the UTLAs in each deprivation quintile. This analysis included all cases with a known UTLA (ie, 99% of cases [1 072 551 of 1 080 501]) and all contacts with a known UTLA who were not handled by Public Health England's specialist health protection teams (ie, 85% of contacts [2 369 588 of 2 797 547] for whom the associated case was not linked to a known outbreak in a specific high-risk setting).6 Since the launch of NHS Test and Trace, the percentage of positive cases and their contacts who have been successfully contacted was lower in the most deprived areas than in the least deprived (a graphical representation is shown in the appendix). In the least deprived areas (ie, the 20% of UTLAs with the lowest IMD scores), 86% of cases (131 677 of 153 567 cases) were successfully contacted compared with 83% (257 857 of 311 190 cases) in the most deprived areas (χ2, p<0·0001). The difference was greater for contacts of positive cases: 62% of contacts (230 598 of 370 348 contacts) were successfully contacted in the least deprived areas compared with 56% (375 579 of 671 565 contacts) in the most deprived areas (p<0·0001). The percentage of positive cases and their contacts who were successfully contacted decreased as deprivation increased. Reasons underlying these differences are unclear. Applying IMD scores to UTLAs hides important variation in deprivation levels within local authorities, and we are unable to adjust our results for possible explanatory variables, such as age, sex, employment status, socioeconomic status, ethnicity, or type of residence, because these data are not publicly available. Nor is it possible to evaluate the effects of the time taken by NHS Test and Trace to successfully reach cases and contacts, or how performance has changed over time, and how these factors might relate to local infection rates and social restrictions. Finally, the correlation that was observed could be driven by systematic or structural issues, such as the approach to contact tracing and the role of contact-tracing systems that are led by local authorities, or the levels of available support when isolating.5 Understanding these differences is crucial not only to improve NHS Test and Trace performance but to ensure that the inequalities that are exposed by COVID-19 are not exacerbated further. ADMB is a consultant in public health at Oxfordshire County Council with responsibility for the local contact tracing system. ADMB is affiliated with the National Institute for Health Research Applied Research Collaboration West Midlands. CF declares no competing interests. The views expressed are those of the authors and not necessarily those of the National Institute for Health Research or the Department of Health and Social Care. ADMB and CF had full access to all the data for this Correspondence and had final responsibility for the decision to submit for publication. All data used for this analysis are freely available, routine government data.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=9935ba14a4b5705b3436983f9326221a)

1. **Public acceptance of privacy-encroaching policies to address the COVID-19 pandemic in the United Kingdom.**  
   Lewandowsky Stephan PloS one 2021;16(1):e0245740.

The nature of the COVID-19 pandemic may require governments to use privacy-encroaching technologies to help contain its spread. One technology involves co-location tracking through mobile Wi-Fi, GPS, and Bluetooth to permit health agencies to monitor people's contact with each other, thereby triggering targeted social-distancing when a person turns out to be infected. The effectiveness of tracking relies on the willingness of the population to support such privacy encroaching measures. We report the results of two large surveys in the United Kingdom, conducted during the peak of the pandemic, that probe people's attitudes towards various tracking technologies. The results show that by and large there is widespread acceptance for co-location tracking. Acceptance increases when the measures are explicitly time-limited and come with opt-out clauses or other assurances of privacy. Another possible future technology to control the pandemic involves "immunity passports", which could be issued to people who carry antibodies for the COVID-19 virus, potentially implying that they are immune and therefore unable to spread the virus to other people. Immunity passports have been considered as a potential future step to manage the pandemic. We probe people's attitudes towards immunity passports and find considerable support overall, although around 20% of the public strongly oppose passports.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=9b88476de283287dc4ae2b080562995e)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=f42233c4397bafbdd58f49dc3d9272c8)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=3a624ab63882c8fa249e7a39cfdd34d4)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=046b2f47799e6870defc8e1cdad03e15)

1. **Public attitudes towards COVID-19 contact tracing apps: A UK-based focus group study.**  
   Williams Simon N. Health expectations : an international journal of public participation in health care and health policy 2021;:No page numbers.

BACKGROUNDDuring the 2020 COVID-19 pandemic, one of the key components of many countries' strategies to reduce the spread of the virus is contact tracing.OBJECTIVETo explore public attitudes to a COVID-19 contact tracing app in the United Kingdom.SETTINGOnline video-conferencing.PARTICIPANTS27 participants, UK residents aged 18 years and older.METHODSQualitative study consisting of six focus groups carried out between 1st-12th May, 2020 (39-50 days into the UK 'lockdown').RESULTSParticipants were divided as to whether or not they felt they would use the app. Analysis revealed five themes: (1) lack of information and misconceptions surrounding COVID-19 contact tracing apps; (2) concerns over privacy; (3) concerns over stigma; (4)concerns over uptake; and (5) contact tracing as the 'greater good'. Concerns over privacy, uptake and stigma were particularly significant amongst those stated they will not be using the app, and the view that the app is for the 'greater good' was particularly significant amongst those who stated they will be using the app. One of the most common misconceptions about the app was that it could allow users to specifically identify and map COVID-19 cases amongst their contacts and in their vicinity.CONCLUSIONSOur participants were torn over whether digital contact tracing is a good idea or not, and views were heavily influenced by moral reasoning.PATIENT OR PUBLIC CONTRIBUTIONNo patients were involved in this study. The public were not involved in the development of the research questions, research design or outcome measures. A pilot focus group with participants not included in the present paper was used to help test and refine the focus group questions. Summary results were disseminated via email to participants prior to publication for feedback and comment.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=4814d306715844ac7e616c5fa02a7ccb)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=cbf55b7343c48a82b45d6917c5a16b11)

1. **Quarantine and testing strategies in contact tracing for SARS-CoV-2: a modelling study.**  
   Quilty Billy J. The Lancet. Public health 2021;:No page numbers.

BACKGROUNDIn most countries, contacts of confirmed COVID-19 cases are asked to quarantine for 14 days after exposure to limit asymptomatic onward transmission. While theoretically effective, this policy places a substantial social and economic burden on both the individual and wider society, which might result in low adherence and reduced policy effectiveness. We aimed to assess the merit of testing contacts to avert onward transmission and to replace or reduce the length of quarantine for uninfected contacts.METHODSWe used an agent-based model to simulate the viral load dynamics of exposed contacts, and their potential for onward transmission in different quarantine and testing strategies. We compared the performance of quarantines of differing durations, testing with either PCR or lateral flow antigen (LFA) tests at the end of quarantine, and daily LFA testing without quarantine, against the current 14-day quarantine strategy. We also investigated the effect of contact tracing delays and adherence to both quarantine and self-isolation on the effectiveness of each strategy.FINDINGSAssuming moderate levels of adherence to quarantine and self-isolation, self-isolation on symptom onset alone can prevent 37% (95% uncertainty interval [UI] 12-56) of onward transmission potential from secondary cases. 14 days of post-exposure quarantine reduces transmission by 59% (95% UI 28-79). Quarantine with release after a negative PCR test 7 days after exposure might avert a similar proportion (54%, 95% UI 31-81; risk ratio [RR] 0·94, 95% UI 0·62-1·24) to that of the 14-day quarantine period, as would quarantine with a negative LFA test 7 days after exposure (50%, 95% UI 28-77; RR 0·88, 0·66-1·11) or daily testing without quarantine for 5 days after tracing (50%, 95% UI 23-81; RR 0·88, 0·60-1·43) if all tests are returned negative. A stronger effect might be possible if individuals isolate more strictly after a positive test and if contacts can be notified faster.INTERPRETATIONTesting might allow for a substantial reduction in the length of, or replacement of, quarantine with a small excess in transmission risk. Decreasing test and trace delays and increasing adherence will further increase the effectiveness of these strategies. Further research is required to empirically evaluate the potential costs (increased transmission risk, false reassurance) and benefits (reduction in the burden of quarantine, increased adherence) of such strategies before adoption as policy.FUNDINGNational Institute for Health Research, UK Research and Innovation, Wellcome Trust, EU Horizon 2021, and the Bill & Melinda Gates Foundation.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=ec425ce2cfc8c7b2623cdd8a79fe31d2)

1. **Automated and partly automated contact tracing: a systematic review to inform the control of COVID-19.**  
   Braithwaite Isobel The Lancet. Digital health 2020;2(11):e607.

Evidence for the use of automated or partly automated contact-tracing tools to contain severe acute respiratory syndrome coronavirus 2 is scarce. We did a systematic review of automated or partly automated contact tracing. We searched PubMed, EMBASE, OVID Global Health, EBSCO Medical COVID Information Portal, Cochrane Library, medRxiv, bioRxiv, arXiv, and Google Advanced for articles relevant to COVID-19, severe acute respiratory syndrome, Middle East respiratory syndrome, influenza, or Ebola virus, published from Jan 1, 2000, to April 14, 2020. We also included studies identified through professional networks up to April 30, 2020. We reviewed all full-text manuscripts. Primary outcomes were the number or proportion of contacts (or subsequent cases) identified. Secondary outcomes were indicators of outbreak control, uptake, resource use, cost-effectiveness, and lessons learnt. This study is registered with PROSPERO (CRD42020179822). Of the 4036 studies identified, 110 full-text studies were reviewed and 15 studies were included in the final analysis and quality assessment. No empirical evidence of the effectiveness of automated contact tracing (regarding contacts identified or transmission reduction) was identified. Four of seven included modelling studies that suggested that controlling COVID-19 requires a high population uptake of automated contact-tracing apps (estimates from 56% to 95%), typically alongside other control measures. Studies of partly automated contact tracing generally reported more complete contact identification and follow-up compared with manual systems. Automated contact tracing could potentially reduce transmission with sufficient population uptake. However, concerns regarding privacy and equity should be considered. Well designed prospective studies are needed given gaps in evidence of effectiveness, and to investigate the integration and relative effects of manual and automated systems. Large-scale manual contact tracing is therefore still key in most contexts.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=6b9e5720818720280b8f27bed219f9ba)

1. **Contact tracing: digital health on the frontline.**  
   The Lancet Digital Health The Lancet. Digital health 2020;2(11):e561.

South Korea, China, and Singapore have successfully used digital contact tracing to control the spread of COVID-19, often putting public interest above individuals' right to privacy. Despite initial enthusiasm for this approach in the USA, Israel, and Europe, privacy concerns and technical issues inhibited uptake of digital contact tracing, and recent attempts to stem the first wave of SARS-COV-2 infections failed. The Lancet Digital Health has published the first study reporting an assessment of the UK's Test and Trace contact tracing pilot programme on the Isle of Wight in May, 2020. Michelle Kendall and colleagues, who advised the UK Government on the design of the contact tracing programme, present modelling analyses that indicate significant decreases in COVID-19 incidence and R immediately after the launch of the Test and Trace programme. The Isle of Wight went from having one of the highest Rs in the UK (R=1·3) before the programme was launched on May 5, to one of the lowest (R=0·5) on June 14. The results indicate that Test and Trace interventions could have a positive impact in suppressing the UK COVID-19 epidemic. However, the study does not present causal evidence, and the data from cases traced by the contact tracing mobile app were not available, so the authors could not evaluate the effects of individual aspects of the Test and Trace programme. In April, a Rapid Review published by the Ada Lovelace Institute reported that premature deployment of ineffective apps could undermine public trust and hamper the widespread uptake of tracking technologies. Uptake during the Test and Trace pilot programme on the Isle of Wight was only 38% and, in wider roll out of the programme, uptake could be as low as 10%. In August, Braithwaite and colleagues published a Systematic Review, in which they highlighted that control of COVID-19 will require a high population uptake of contact tracing apps (56–95%). Similar to the network effect phenomenon, where increasing participants of a service directly increases the value to each user (eg, social networks), evidence of effectiveness directly affects uptake, while uptake directly affects effectiveness. In May, Microsoft Research conducted a survey of over 4500 Americans to gauge the relationship between effectiveness and installing the app. Their results suggest that more than 60% of Americans would install an app that reduces their infection rate by 50%, and more than 75% of Americans would be willing to install an app that reduces their infection rate by 97%. Therefore, transparent analysis of the efficacy of contact tracing apps is needed to better engage the public and improve the effectiveness of contact tracing programmes. In a modelling study published in The Lancet Infectious Diseases, Kucharski and colleagues concluded that contact tracing alone is not likely to contain the virus. They estimated that digital tracing alone reduced R by 44% and manual tracing of all contacts reduced R by 61%. Braithwaite and colleagues' Systematic Review did not find empirical evidence of the effectiveness of digital contact tracing without support from traditional contact tracing approaches, alongside measures such as remote working by a large proportion of the population and physical distancing. Effectiveness and uptake of technology are not the only factors in determining the success of a contact tracing programme. Other factors include whether users self-isolate and get tested quickly. Reports predict that less than 20% of people in England fully self-isolate when asked to do so. We know that people without privilege and wealth have limited capacity to self-isolate at home, therefore it is vital that contact tracing strategies recognise the financial barriers to complying with public health measures. Furthermore, inadequate testing and delays in producing results have hindered efforts to contain major outbreaks in the UK and USA. On Sept 26, SAGE warned the UK Government that the daily coronavirus death toll is set to more than double within 4 weeks. Given the scale and speed of the pandemic, digital contact tracing is imperative to curtail the second wave of COVID-19. Contact tracing must be adopted widely and integrated into public health strategies, including financial support to allow for quarantine and widespread rapid testing. The Lancet Digital Health calls for robust evaluation of global contact tracing approaches to stop the spread of SARS-COV-2 and future epidemics. The digital health community are on the frontline and, at this watershed moment, we must galvanise to end this pandemic.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=bb77e79ae07fbff27bc34b1ac54f9b45)

1. **Covid-19: UK test and trace system still missing 80% target for reaching contacts.**  
   O'Dowd Adrian BMJ (Clinical research ed.) 2020;370:m2875.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=7885c5c024a9d53ca5ca1101b6c8e463)

1. **Digital tools against COVID-19: taxonomy, ethical challenges, and navigation aid**  
   McCradden Melissa D. Lancet Digital Health 2020;2(8):No page numbers.

Data collection and processing via digital public health technologies are being promoted worldwide by governments and private companies as strategic remedies for mitigating the COVID-19 pandemic and loosening lockdown measures. However, the ethical and legal boundaries of deploying digital tools for disease surveillance and control purposes are unclear, and a rapidly evolving debate has emerged globally around the promises and risks of mobilising digital tools for public health. To help scientists and policy makers to navigate technological and ethical uncertainty, we present a typology of the primary digital public health applications that are in use. These include proximity and contact tracing, symptom monitoring, quarantine control, and flow modelling. For each, we discuss context-specific risks, cross-sectional issues, and ethical concerns. Finally, recognising the need for practical guidance, we propose a navigation aid for policy makers and other decision makers for the ethical development and use of digital public health tools.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=b38aa005f8045e403597fd6ae8f88c8a)

1. **Efficacy of contact tracing for the containment of the 2019 novel coronavirus (COVID-19).**  
   Keeling Matt J. Journal of epidemiology and community health 2020;74(10):861-866.

OBJECTIVEContact tracing is a central public health response to infectious disease outbreaks, especially in the early stages of an outbreak when specific treatments are limited. Importation of novel coronavirus (COVID-19) from China and elsewhere into the UK highlights the need to understand the impact of contact tracing as a control measure.DESIGNDetailed survey information on social encounters from over 5800 respondents is coupled to predictive models of contact tracing and control. This is used to investigate the likely efficacy of contact tracing and the distribution of secondary cases that may go untraced.RESULTSTaking recent estimates for COVID-19 transmission we predict that under effective contact tracing less than 1 in 6 cases will generate any subsequent untraced infections, although this comes at a high logistical burden with an average of 36 individuals traced per case. Changes to the definition of a close contact can reduce this burden, but with increased risk of untraced cases; we find that tracing using a contact definition requiring more than 4 hours of contact is unlikely to control spread.CONCLUSIONSThe current contact tracing strategy within the UK is likely to identify a sufficient proportion of infected individuals such that subsequent spread could be prevented, although the ultimate success will depend on the rapid detection of cases and isolation of contacts. Given the burden of tracing a large number of contacts to find new cases, there is the potential the system could be overwhelmed if imports of infection occur at a rapid rate.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=b096feb8d5913cf56c3638ce48eddaf8)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=bb37693d6d31101c578eadd40197ed0d)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=a0f9097eeed3642391ac9084d0e84bcd)

1. **Epidemiological changes on the Isle of Wight after the launch of the NHS Test and Trace programme: a preliminary analysis.**  
   Kendall Michelle The Lancet. Digital health 2020;2(12):e658.

BackgroundIn May 2020, the UK National Health Service (NHS) Test and Trace programme was launched in England in response to the COVID-19 pandemic. The programme was first rolled out on the Isle of Wight and included version 1 of the NHS contact tracing app. The aim of the study was to make a preliminary assessment of the epidemiological impact of the Test and Trace programme using publicly available data.MethodsWe used COVID-19 daily case data from Public Health England to infer incidence of new infections and estimate the reproduction number (R) for each of the 150 Upper-Tier Local Authorities (UTLAs) in England and nationally, before and after the launch of the Test and Trace programme on the Isle of Wight. We used Bayesian and maximum-likelihood methods to estimate R and compared the Isle of Wight with other UTLAs using a synthetic control method.FindingsWe observed significant decreases in incidence and R on the Isle of Wight immediately after the launch of the Test and Trace programme. The Isle of Wight had a marked reduction in R, from 1·3 before the Test and Trace programme to 0·5 after by one of our measures, and went from having the third highest R before the Test and Trace programme, to the twelfth lowest afterwards compared with other UTLAs.InterpretationOur results show that the epidemic on the Isle of Wight was controlled quickly and effectively after the launch of Test and Trace. Our findings highlight the need for further research to determine the causes of the reduction in the spread of the disease, as these could be translated into local and national non-pharmaceutical intervention strategies in the period before a treatment or vaccination for COVID-19 becomes available.FundingLi Ka Shing Foundation and UK Economic and Social Research Council.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=6580cba327c8338206e452fdfd18d035)

1. **Ethical guidelines for COVID-19 tracing apps**  
   Morley J. Nature 2020;582(7810):29-31.

Protect privacy, equality and fairness in digital contact tracing with these key questions. [Figure not available: see fulltext.]<br/>Copyright &#xa9; 2020, Nature.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=b3eadea6aacac73a159ae2ece965d63b)

1. **Ethics of instantaneous contact tracing using mobile phone apps in the control of the Covid-19 pandemic**  
   Parker Michael J. Journal of Medical Ethics 2020;46(7):No page numbers.

In this paper we discuss ethical implications of the use of mobile phone apps in the control of the Covid-19 pandemic. Contact tracing is a well-established feature of public health practice during infectious disease outbreaks and epidemics. However, the high proportion of pre-symptomatic transmission in Covid-19 means that standard contact tracing methods are too slow to stop the progression of infection through the population. To address this problem, many countries around the world have deployed or are developing mobile phone apps capable of supporting instantaneous contact tracing. Informed by the on-going mapping of 'proximity events' these apps are intended both to inform public health policy and to provide alerts to individuals who have been in contact with a person with the infection. The proposed use of mobile phone data for 'intelligent physical distancing' in such contexts raises a number of important ethical questions. In our paper, we outline some ethical considerations that need to be addressed in any deployment of this kind of approach as part of a multidimensional public health response. We also, briefly, explore the implications for its use in future infectious disease outbreaks. [Abstract]

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=f2db53dcbc7ce93f03cffca96ea81834)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=4b8a999e8b5ac447fbfc105cfd0684e1)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=4150aabdeb850d8d4c3f0dec5e9447f8)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=5233c4804c4ca505520baccb2f0d69a9)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=03f9341ea05ec7ad455050b7b63854cb)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=f55845bc62538c4e2efafa25929a9f66)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=f3726492ceedfc1b961c2923bb080c66)

1. **Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts.**  
   Hellewell Joel The Lancet. Global health 2020;8(4):e488.

BACKGROUNDIsolation of cases and contact tracing is used to control outbreaks of infectious diseases, and has been used for coronavirus disease 2019 (COVID-19). Whether this strategy will achieve control depends on characteristics of both the pathogen and the response. Here we use a mathematical model to assess if isolation and contact tracing are able to control onwards transmission from imported cases of COVID-19.METHODSWe developed a stochastic transmission model, parameterised to the COVID-19 outbreak. We used the model to quantify the potential effectiveness of contact tracing and isolation of cases at controlling a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)-like pathogen. We considered scenarios that varied in the number of initial cases, the basic reproduction number (R0), the delay from symptom onset to isolation, the probability that contacts were traced, the proportion of transmission that occurred before symptom onset, and the proportion of subclinical infections. We assumed isolation prevented all further transmission in the model. Outbreaks were deemed controlled if transmission ended within 12 weeks or before 5000 cases in total. We measured the success of controlling outbreaks using isolation and contact tracing, and quantified the weekly maximum number of cases traced to measure feasibility of public health effort.FINDINGSSimulated outbreaks starting with five initial cases, an R0 of 1·5, and 0% transmission before symptom onset could be controlled even with low contact tracing probability; however, the probability of controlling an outbreak decreased with the number of initial cases, when R0 was 2·5 or 3·5 and with more transmission before symptom onset. Across different initial numbers of cases, the majority of scenarios with an R0 of 1·5 were controllable with less than 50% of contacts successfully traced. To control the majority of outbreaks, for R0 of 2·5 more than 70% of contacts had to be traced, and for an R0 of 3·5 more than 90% of contacts had to be traced. The delay between symptom onset and isolation had the largest role in determining whether an outbreak was controllable when R0 was 1·5. For R0 values of 2·5 or 3·5, if there were 40 initial cases, contact tracing and isolation were only potentially feasible when less than 1% of transmission occurred before symptom onset.INTERPRETATIONIn most scenarios, highly effective contact tracing and case isolation is enough to control a new outbreak of COVID-19 within 3 months. The probability of control decreases with long delays from symptom onset to isolation, fewer cases ascertained by contact tracing, and increasing transmission before symptoms. This model can be modified to reflect updated transmission characteristics and more specific definitions of outbreak control to assess the potential success of local response efforts.FUNDINGWellcome Trust, Global Challenges Research Fund, and Health Data Research UK.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=e6ab0585b6adc0750651aa6405530ca4)

1. **Impact of delays on effectiveness of contact tracing strategies for COVID-19: a modelling study**  
   Kretzschmar Mirjam E. Lancet Public Health 2020;5(8):No page numbers.

BACKGROUND: In countries with declining numbers of confirmed cases of COVID-19, lockdown measures are gradually being lifted. However, even if most physical distancing measures are continued, other public health measures will be needed to control the epidemic. Contact tracing via conventional methods or mobile app technology is central to control strategies during de-escalation of physical distancing. We aimed to identify key factors for a contact tracing strategy to be successful. METHODS: We evaluated the impact of timeliness and completeness in various steps of a contact tracing strategy using a stochastic mathematical model with explicit time delays between time of infection and symptom onset, and between symptom onset, diagnosis by testing, and isolation (testing delay). The model also includes tracing of close contacts (eg, household members) and casual contacts, followed by testing regardless of symptoms and isolation if testing positive, with different tracing delays and coverages. We computed effective reproduction numbers of a contact tracing strategy (RCTS) for a population with physical distancing measures and various scenarios for isolation of index cases and tracing and quarantine of their contacts. FINDINGS: For the most optimistic scenario (testing and tracing delays of 0 days and tracing coverage of 100 per cent), and assuming that around 40 per cent of transmissions occur before symptom onset, the model predicts that the estimated effective reproduction number of 1.2 (with physical distancing only) will be reduced to 0.8 (95 per cent CI 0.7-0.9) by adding contact tracing. The model also shows that a similar reduction can be achieved when testing and tracing coverage is reduced to 80 per cent (RCTS 0.8, 95 per cent CI 0.7-1.0). A testing delay of more than 1 day requires the tracing delay to be at most one day or tracing coverage to be at least 80 per cent to keep RCTS below 1. With a testing delay of three days or longer, even the most efficient strategy cannot reach RCTS values below 1. The effect of minimising tracing delay (eg, with app-based technology) declines with decreasing coverage of app use, but app-based tracing alone remains more effective than conventional tracing alone even with 20 per cent coverage, reducing the reproduction number by 17.6 per cent compared with 2.5 per cent. The proportion of onward transmissions per index case that can be prevented depends on testing and tracing delays, and given a 0-day tracing delay, ranges from up to 79.9 per cent with a 0-day testing delay to 41.8 per cent with a 3-day testing delay and 4.9 per cent with a 7-day testing delay. INTERPRETATION: In our model, minimising testing delay had the largest impact on reducing onward transmissions. Optimising testing and tracing coverage and minimising tracing delays, for instance with app-based technology, further enhanced contact tracing effectiveness, with the potential to prevent up to 80 per cent of all transmissions. Access to testing should therefore be optimised, and mobile app technology might reduce delays in the contact tracing process and optimise contact tracing coverage. FUNDING: ZonMw, Fundacao para a Ciencia e a Tecnologia, and EU Horizon 2020 RECOVER. [Abstract]

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=eb2c3f5d35c71d992ffe075cc364a8f1)

1. **The ethics and value of contact tracing apps: International insights and implications for Scotland's COVID-19 response.**  
   Pagliari Claudia Journal of global health 2020;10(2):020103.

The COVID-19 pandemic has put health systems, economies and societies under unprecedented strain, calling for innovative approaches. Scotland's government, like those elsewhere, is facing difficult decisions about how to deploy digital technologies and data to help contain, control and manage the disease, while also respecting citizens' rights. This paper explores the ethical challenges presented by these methods, with particular emphasis on mobile apps associated with contact tracing. Drawing on UK and international experiences, it examines issues such as public trust, data privacy and technology design; how changing disease threats and contextual factors can affect the balance between public benefits and risks; and the importance of transparency, accountability and stakeholder participation for the trustworthiness and good-governance of digital systems and strategies. Analysis of recent technology debates, controversial programmes and emerging outcomes in comparable countries implementing contact tracing apps, reveals sociotechnical complexities and unexpected paradoxes that warrant further study and underlines the need for holistic, inclusive and adaptive strategies. The paper also considers the potential role of these apps as Scotland transitions to the 'new normal', outlines challenges and opportunities for public engagement, and poses a set of ethical questions to inform decision-making at multiple levels, from software design to institutional governance.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=02f3e638df26e7140025b1cbd142271b)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=ecd8c9de5a1affbe21424aa83e373cd0)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=192c535c56f9516125aeda1e71b96952)

### Opening Internet Links

The links to internet sites in this document are 'live' and can be opened by holding down the CTRL key on your keyboard while clicking on the web address with your mouse

### Full text papers

Links are given to full text resources where available. For some of the papers, you will need an **NHS OpenAthens Account**. If you do not have an account you can [register online](https://openathens.nice.org.uk/).

You can then access the papers by simply entering your username and password. If you do not have easy access to the internet to gain access, please let us know and we can download the papers for you.

### Guidance on searching within online documents

Links are provided to the full text of each document. Relevant extracts have been copied and pasted into these results. Rather than browse through lengthy documents, you can search for specific words as follows:

**Portable Document Format / pdf / Adobe**  
Click on the Search button (illustrated with binoculars). This will open up a search window. Type in the term you need to find and links to all of the references to that term within the document will be displayed in the window. You can jump to each reference by clicking it.

**Word documents**  
Select Edit from the menu, the Find and type in your term in the search box which is presented. The search function will locate the first use of the term in the document. By pressing 'next' you will jump to further references.

## C. Search History

|  | **Source** | **Criteria** | **Results** |
| --- | --- | --- | --- |
| 1. | Medline | (test\* ADJ2 (tracing OR trace)).ti,ab | 782 |
| 2. | Medline | (test\* ADJ2 track\*).ti,ab | 1579 |
| 3. | Medline | (track\* ADJ2 (tracing OR trace)).ti,ab | 278 |
| 4. | Medline | ("contact tracing").ti,ab | 2340 |
| 5. | Medline | "CONTACT TRACING"/ | 4951 |
| 6. | Medline | (1 OR 2 OR 3 OR 4 OR 5) | 8788 |
| 7. | Medline | (covid OR coronavir\* OR sars-cov\*).ti,ab | 106763 |
| 8. | Medline | "COVID-19"/ OR exp "CORONAVIRUS INFECTIONS"/ | 65276 |
| 9. | Medline | (7 OR 8) | 114317 |
| 10. | Medline | (NHS OR "National Health Service\*" OR UK OR "United Kingdom" OR England OR British OR Britain OR Wales OR Scotland OR "Northern Ireland").ti,ab | 294247 |
| 11. | Medline | (6 AND 9 AND 10) | 70 |
| 12. | EMBASE | (covid OR coronavir\* OR sars-cov\*).ti,ab | 105571 |
| 13. | EMBASE | exp CORONAVIRINAE/ OR CORONAVIRUS/ OR "CORONAVIRUS DISEASE 2019"/ | 105884 |
| 14. | EMBASE | (12 OR 13) | 117931 |
| 15. | EMBASE | (NHS OR "National Health Service\*" OR UK OR "United Kingdom" OR England OR British OR Britain OR Wales OR Scotland OR "Northern Ireland").ti,ab | 516874 |
| 16. | EMBASE | exp "UNITED KINGDOM"/ | 426476 |
| 17. | EMBASE | (15 OR 16) | 733003 |
| 18. | EMBASE | (test\* ADJ2 (tracing OR trace)).ti,ab | 679 |
| 19. | EMBASE | (test\* ADJ2 track\*).ti,ab | 1415 |
| 20. | EMBASE | (track\* ADJ2 (tracing OR trace)).ti,ab | 316 |
| 21. | EMBASE | ("contact tracing").ti,ab | 2644 |
| 23. | EMBASE | (18 OR 19 OR 20 OR 21) | 4951 |
| 24. | EMBASE | (14 AND 17 AND 23) | 60 |
| 25. | HMIC | (covid OR coronavir\* OR sars-cov\*).ti,ab | 873 |
| 26. | HMIC | (NHS OR "National Health Service\*" OR UK OR "United Kingdom" OR England OR British OR Britain OR Wales OR Scotland OR "Northern Ireland").ti,ab | 101862 |
| 27. | HMIC | (test\* ADJ2 (tracing OR trace)).ti,ab | 32 |
| 28. | HMIC | (test\* ADJ2 track\*).ti,ab | 8 |
| 29. | HMIC | (track\* ADJ2 (tracing OR trace)).ti,ab | 5 |
| 30. | HMIC | ("contact tracing").ti,ab | 68 |
| 31. | HMIC | (27 OR 28 OR 29 OR 30) | 101 |
| 32. | HMIC | (25 AND 31) | 29 |

**Disclaimer**  
We hope that you find the evidence search service useful. Whilst care has been taken in the selection of the materials included in this evidence search, the Library and Knowledge Service is not responsible for the content or the accuracy of the enclosed research information. Accordingly, whilst every endeavour has been undertaken to execute a comprehensive search of the literature, the Library and Knowledge Service is not and will not be held responsible or liable for any omissions to pertinent research information not included as part of the results of the enclosed evidence search. Users are welcome to discuss the evidence search findings with the librarian responsible for executing the search. We welcome suggestions on additional search strategies / use of other information resources for further exploration. You must not use the results of this search for commercial purposes. Any usage or reproduction of the search output should acknowledge the Library and Knowledge Service that produced it.