Contact tracing for COVID-19: current evidence, options for contact tracing and case studies

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This document provides evidence on contact tracing strategies for the control of COVID-19.

Background

Contact tracing is an effective public health measure for the control of COVID-19. The aim of contact tracing is to rapidly identify and manage potentially newly infected persons who may have come in contact with existing cases, in order to reduce case number and further onward transmission.

The contact tracing method is a combination of quarantine and potential testing of contacts. The contacts are traced through an intervention where an index case with a confirmed infection is asked to provide information about people they have been in contact with, or places they have been, within a given time period before the positive test result. Relevant contacts are then informed about the risk, quarantined, and tested.

According to an ECDC Technical Report, contact tracing is a method of containing the virus, especially important during the de-escalation of current public health measures in order to avoid an increase in transmission. This method has successfully been proven in Singapore and several provinces in China, where the countries were able to limit the size of their initial outbreaks through widespread testing, contact tracing and quarantine. The identification of many cases by contact tracing, is proven to reduce the spread the likelihood of sustained transmission due to the reduced time from symptom-onset to isolation substantially.

What is a close contact?

A ‘close contact’ is defined by CDC as any person with the following exposure to someone with COVID-19 during the time that they are infectious:

- 15 minutes or more of face-to-face contact within 2 meters; or
- Having had physical contact or direct contact with infectious secretions (e.g. being coughed on); or

- In a shared enclosed space (such as a household or classroom) for 15 minutes or more; or
- In an aircraft, sitting within two seats (in any direction); or
- A healthcare worker or other person providing care to a case, or laboratory workers handling specimens from a case, without the recommended PPE.

Engaging communities

WHO states contact tracing begins with engaging communities about the disease, how to protect individuals and their communities, and how to suppress transmission[1]. Contact tracing requires individuals to agree to daily monitoring of their movements and social interactions, to be willing to report signs or symptoms of COVID-19 promptly, and to be prepared to go into quarantine for at least 14 days or into isolation if they become symptomatic.

Engagement with communities and their leaders should help identify potential challenges for contact tracing including language and literacy, access to food and medical care for other illnesses, education, information, as well as stigma and marginalization. Special consideration should be given to planning contact tracing for at-risk and vulnerable groups, including, but not limited to, minority groups, care-workers, the elderly and others.

By participating in contact tracing, communities will contribute to controlling local spread of COVID-19, vulnerable people will be protected, and more restrictive measures, such as general stay-at-home orders, might be avoided or minimized. All communities are likely to express concerns about privacy and confidentiality of their personal health information. Public health agencies implementing contact tracing for COVID-19 should be prepared to communicate how information will be used, stored, and accessed, and how individuals will be protected from harmful disclosure or identification.

It is critical that contact tracing and associated steps, such as quarantine of contacts and isolation of cases, not be used punitively or associated with security measures, immigration issues, or other concerns outside the realm of public health. Contact tracing activities should be available to all communities.

Contact tracing process

The CDC provides information on the principles of contact tracing[2]:

- Case investigation is part of the process of supporting patients with suspected or confirmed infection.
- In case investigation, public health staff work with a patient to help them recall everyone with whom they have had close contact during the timeframe while they may have been infectious.

[1] https://www.who.int/publications/i/item/contact-tracing-in-the-context-of-covid-19
[2] https://www.cdc.gov/coronavirus/2019-ncov/php/principles-contact-tracing.html

- Public health staff then begin contact tracing by warning these exposed individuals (contacts) of their potential exposure as rapidly and sensitively as possible.
- To protect patient privacy, contacts are only informed that they may have been exposed to a patient with the infection. They are not told the identity of the patient who may have exposed them.
- Contacts are provided with education, information, and support to understand their risk, what they should do to separate themselves from others who are not exposed, monitor themselves for illness, and the possibility that they could spread the infection to others even if they themselves do not feel ill.
- Contacts are encouraged to stay home and maintain social distance from others (at least 6 feet) until 14 days after their last exposure, in case they also become ill. They should monitor themselves by checking their temperature twice daily and watching for cough or shortness of breath. To the extent possible, public health staff should check in with contacts to make sure they are self-monitoring and have not developed symptoms. Contacts who develop symptoms should promptly isolate themselves and notify public health staff. They should be promptly evaluated for infection and for the need for medical care.

The CDC states that public health agencies and their partners will need to monitor some key components of their programs to improve performance as needed.[3] Potential metrics routinely reviewed could include the following process and outcome measures:

- Case interviewing: Time to interview from symptom onset and from diagnosis; proportion interviewed; median number of contacts elicited; proportion with no contacts elicited.
- Contact notification: Proportion of contacts notified; time from first potential exposure to notification.
- Contact follow-up: Daily proportion of contacts whose status is evaluated; proportion of contacts with symptoms evaluated within 24 hours of onset of symptoms; proportion of contacts who complete their full self-monitoring period
- Contact tracing efficacy: Percent of new COVID-19 cases arising among contacts during self-monitoring period.

Contact tracing strategies

The CDC outlines three tracing strategies[4]. Their tool generates estimates of the number of personnel needed and the impact on case counts of COVID-19 if social distancing efforts are in place, or if they are lifted, or partially lifted, and replaced by one of three potential contact tracing strategies, labelled below:

Strategy 1: Case identification and isolation—(symptom-based strategy)

[3] https://www.cdc.gov/coronavirus/2019-ncov/php/principles-contact-tracing.html
[4] https://www.cdc.gov/coronavirus/2019-ncov/downloads/php/COVID_TracerManual-508.pdf

Symptomatic cases of COVID-19 are rapidly identified within the community and effectively isolated.

Strategy 2: Strategy 1 + contact tracing—(symptom-based strategy)

Symptomatic cases of COVID-19 are rapidly identified within the community and effectively isolated. Contacts of cases are identified and asked to self-monitor for symptoms and to self-report and isolate if they become symptomatic.

Strategy 3: Strategy 1 + contact tracing with monitoring and quarantine—(exposure-based strategy)

Symptomatic cases of COVID-19 are rapidly identified within the community and effectively isolated. Contacts of cases are identified, quarantined, and monitored through daily phone calls for 14 days, as selected by the jurisdiction. If contacts become symptomatic, they are re-designated as cases.

Identifying contacts

WHO suggests for the identification of contacts, a detailed case investigation and interview with the COVID-19 patient or their caregiver are needed[5].

Table 1 provides examples of ways contact tracing teams can identify contacts in various settings. Public health officials will need to identify contacts depending on the local context and culturally appropriate measures.

Table 1: Examples of identifying contacts in different settings

Setting	Specific contact by setting	Ways to identify contacts
Known/identifiable contacts		
Household and community/social contacts	• Face-to-face contact with a case within 1 metre and for >15 mins • Direct physical contact with a COVID-19 patient • Providing direct care for a COVID-19 patient in the home without proper PPE • Anyone living in the household	• Direct interview with the COVID-19 patient and/or their caregiver(s). This could be done in person or by telephone
Closed settings, such as long-term living facilities, and other high-risk congregational/closed settings (prison, shelters, hostels)	• Face-to-face contact with a case within 1 metre and for >15 mins • Direct physical contact with a COVID-19 patient • Providing direct care for a COVID-19 patient in the home without proper PPE	• Direct interview with the COVID-19 patient and/or their caregiver • List of residents, visitors, and all staff members working during the relevant timeframe

[5] https://www.who.int/publications/i/item/contact-tracing-in-the-context-of-covid-19

	• Sharing a room, meal, or other space with a confirmed patient • If contact events are difficult to assess, a wider definition may be used to ensure that all residents, especially high-risk residents, and staff are being monitored and screened	• Interview with coordinator or manager of facility
Setting	Specific contact by setting	Ways to identify contacts
Known context, but contacts unknown		
Healthcare settings	• Healthcare workers: any staff in direct contact with a COVID-19 patient, where strict adherence to PPE has failed. • Contacts exposed during hospitalization: any patient hospitalized in the same room or sharing the same bathroom as a COVID-19 patient, visitors to the patient, or other patient in the same room; other situations as dictated by risk assessment • Contacts exposed during outpatient visits: Anyone in the waiting room or equivalent closed environment at the same time as a COVID-19 should be listed as a contact • Anyone within 1 metre of the COVID-19 patient in any part of the hospital for >15 minutes	• Identify all staff who have been in direct contact with the COVID-19 patient or who may have been within 1 metre of the COVID-19 patient without PPE for >15 minutes without direct contact (e.g. chaplain) • Review the list of patients hospitalized in the same room or room sharing same bathroom • List of visitors who visited the patient or another patient in the same room during the relevant timeframe • Undertake a local risk assessment to determine whether any additional exposures may be relevant, such as in common dining facilities
Public or shared transport	• Anyone within 1 metre of the COVID-19 patient for >15 minutes • Direct physical contact with a COVID-19 patient • Anyone sitting within two rows of a COVID-19 patient for >15 minutes	• Contact identification is generally possible only where there is allocated seating • Airlines/transport authorities should be contacted to obtain

	and any staff (e.g. train or airline crew) in direct contact with the case	details of passengers and flight manifests • For public or shared transport where passenger lists or allocated seating is not available, a media release may be required to request passengers to self-identity. Media release may specify the date, time, pick-up location and arrival/destination, and stops along the way, requesting people self-identify as a potential contact
Other well-defined settings and gatherings (places of worship, workplaces, schools, private social events)	• Anyone within 1 metre of the COVID-19 patient for >15 minutes • Direct physical contact with a COVID-19 patient • When events are difficult to assess, the local risk assessment may consider anyone staying in the same close and confined environment as a COVID19 patient as a contact	• Undertake a local risk assessment and collaborate with organizers/leadership to notify potential contacts either actively or passively (for example, through 'warn and inform' messages to an audience of potential attendees) • Communication with focal points, such as faith leaders, about potential transmission events to raise awareness ('warn and inform') • For private social events, work from guest registration and booking lists • When necessary, consider media release specifying the event day and time, with request for people to self-identity as a potential contact

Resources

Workforce

The ECDC outlines the workforce needed for contact tracing[6] .Trained non-public health staff (e.g. staff working in other areas of the public service, or volunteers such as students, retired healthcare professionals, NGO workers, etc.) can be employed to carry out contact tracing activities. However, new staff should be fully supervised and receive comprehensive training.

Medical personnel should not be assigned to perform contact tracing[7] unless circumstances require supervisors should be assigned to all contact tracing teams to allow for technical and logistics support, problem solving, and quality monitoring.

Ideally, contact tracers are recruited from their own community and have an appropriate level of literacy, strong communication skills, local language proficiency, and an understanding of context and culture. They should be recruited from their own communities same communities, they should be familiar with and trained on the basics of COVID-19 transmission, prevention and control measures, how to monitor signs and symptoms, as well as the ethics of public health surveillance and quarantine.

All contact tracers need to maintain a safe distance (>1 m) when interacting with contacts or suspect COVID-19 patients, and conduct interviews preferably in well-ventilated areas or outside.

Equipment and logistics

Contact tracing teams may require administrative, material, and other logistics support, such as means of official identification, transport, electronic or paper materials to record information, mobile telephone, and telephone credit. Contact tracers should also be supplied with appropriate masks, hand sanitizer, and gloves.

Repurposing existing resources

Repurposing existing resources helps with contact tracing efforts, for example a call centre. Despite the existing purpose of the centre, volunteers can create a new team trained in contact tracing processes and data protection issues.

Follow up of contacts

Current ECDC guidelines identify two types of contacts:

1. High-risk exposure contacts – have spent 15 minutes or more in close proximity to (2 meters or less) or in a closed environment with a case
2. Low-risk Exposure contacts - are still at risk but who have not been exposed to a case for as long as high-risk exposure contacts

[6] https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-Contract-tracing-scale-up.pdf
[7] https://www.cdc.gov/coronavirus/2019-ncov/downloads/php/COVID_TracerManual-508.pdf

Both contacts will receive an initial phone call with instruction on self-quarantine or physical distancing measures, ways to reduce transmission, information on COVID-19 compatible symptoms to look out for and advice on what to do if symptoms develop. High risk exposure contacts will receive daily phone calls, emails and/or texts messages until the risk of developing symptoms is over.

The follow-up contacts will only become unfeasible when the number of cases and contacts increases. However, there are options for changing the intensity of the follow-up:

- Phone calls are substituted with text messages or pre-recorded voicemail – including full instructions and a phone number for questions
- Daily text messages for high-risk exposure contacts
- Contacts that are healthcare workers or work with vulnerable populations are prioritized (healthcare workers in long-term care facilities, prisons, refugee camps, etc.)

Technology

- Contact tracing management software:

The software is used for managing the contact tracing process and data analysis as the number increases. WHO (World Health Organisation) has developed specific contact management software, called Go.Data, that allows for the registration of cases and their contacts. Some software's, such as the one used in Ireland, helps to direct calls to staff members.

The analyses of data from contact tracing provides vital information that can inform more effective response measures. Go.Data facilitates the analysis of contact tracing data, visualizes chains of transmission between cases and relations between cases and contacts by category. It also can export anonymised contact tracing data for sharing or detailed analysis in different software.

- Web-based applications:

Patients with existing cases of COVID-19 can use a web-based tool where they can enter details of their movements. The information from this tool fed into the main contact tracing management software which managed information gained from those cases who were followed up by phone.

- Mobile contact tracing applications (‘apps’):

Manual contact tracing remains the main method of contact tracing, however mobile apps should be able to complement ad support this process. The mobile app is most effective when accompanied by another method of contact tracing as not all of the population is a mobile user and some penetration in some key populations (e.g. elderly) will be low. The benefits of the mobile contact tracing app is as follows:

- Not reliant on memory (a case may be very ill at the time of the interview)
- Contacts unknown to the case can be traced (e.g. fellow passengers who sat close on a train)
- Potentially speed up the process
- May facilitate follow-up of contacts by health authorities via a messaging system. Some mobile apps use GPS instead of Bluetooth

Data protection

The ethics of public health information, data protection, and data privacy must be considered at all levels of contact tracing activities, in all training activities for contact tracing, and when implementing contact tracing tools. In particular:

- Safeguards must be in place to guarantee privacy and data protection in accordance with the legal frameworks of the countries where systems are implemented.
- Everyone involved in contact tracing must adhere to the ethical principles of handling personal information, to ensure responsible data management and respect for privacy throughout the process.
- How data will be handled, stored, and used needs to be communicated to those concerned in a clear and transparent manner. This is important for buy-in and engagement as well as to avoid misperceptions that could jeopardize the effectiveness of a contact tracing programme.
- Digital tools used for contact tracing should be assessed before use to ensure safeguarding data protection according to national regulations

Adapting resources to the local situation

In scenarios where there are low/no number of cases, for example in St Helena at the time of writing, contact tracing can be undertaken using existing public health structures (local public health teams with experience in contact tracing or who can be easily be trained in communicable disease control). Even with a limited number of cases, contact tracing can be resource-intensive, especially in situations where physical distancing is limited and number of contacts for each case is high. High number of cases can be caused by the culture of a community, the traditional activities, etc.

Traditional contact tracing involves all cases being interviewed within 24hrs of being diagnosed. The interview is generally conducted over the phone if the case is at home or it can be down face-to-face by infection control staff if the case is in hospital. All symptomatic contacts are tested as well as asymptomatic contacts who

work with vulnerable populations or are vulnerable themselves. High-risk exposure contacts are followed up by daily phone calls for 14 days since their last exposure and low-risk exposure contacts are also actively followed up.

The situation only becomes challenging when using traditional contact tracing for high number of cases and contacts as this approach is best feasible in a containment scenario or de-escalation phase. Public health authorities have never undertaken contact tracing on a large scale COVID-19 case and contact population.

With limited public health staff, they can be supplemented by people who do not have public heath backgrounds, such as government employees from other areas, medical students or volunteers (e.g. Red Cross, retired medical staff, etc.). Selected staff should be properly trained by the public health personnel in areas such as basic epidemiology, public health mandate, health communication, ethics and data protection. Additional to the training, they should be supervised by public health staff.

In a situation with a large number of cases, it may not be possible to sustain contact tracing with active follow-up of all contacts. Instead of phone calls, the initial information could be provided in a text message, unless a Country decides direct communication by phone is more valuable. Contacts who report symptoms, or who did not respond to the text message, could receive a follow-up phone call. Some countries are also beginning to use different technologies (e.g. mobile phone apps, websites for cases to enter data on contacts etc.) to help scale up their contact tracing efforts.

Information collected by public health authorities

A successful case interview allows for the collection of crucial information about the case and potentially exposed contacts, while providing support, referral, and answers to questions the case may have. Accurate information must be collected to inform the next steps in the contact tracing investigation.

Below you will find an overview of the categories of information that public health authorities may collect.

Information the case provides directly

Category of information	**Examples of that type of information**
Personal details	Name, email address, telephone number, address
Personal identification information	Title, date of birth, nationality, gender
Family, lifestyle and social circumstances	Dependents, marital status, next of kin and contact details

Individuals you have been in contact with	Name, email address, telephone number, address, title, date of birth, nationality, gender
Travel Details	Date, Port/Airport, length of stay, location
Health Information	Test date, test results, symptoms, health problems
Employer Details	Occupation, employer details

Information next to kin, patient, contact or health professionals may provide

Category of information	**Examples of that type of information**
Personal details	Name, email address, telephone number, address
Personal identification information	Title, date of birth, nationality, gender
Family, lifestyle and social circumstances	Dependents, marital status, next of kin and contact details
Travel Details	Date, Port/Airport, length of stay, location
Health Information	Test date, test results, symptoms, health problems
Employer Details	Occupation, employer details

Case studies

China

Evidence from China by ECDC suggests that the earlier cases are identified by contact tracing, the more likely the epidemic can be controlled.[8] China used a

[8] https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-Contract-tracing-scale-up.pdf

combination of approaches, such as mobile data and network search to track and trace contacts. The methods used were considered effective for prompt identification of the individuals at risk of infection. Chinese citizens use their mobile phone to scan QR codes when accessing building and other locations such as parks and clubs. It also allows health authorities to identify where the person has been in the past 14 days, if tested positive to COVID-19. The apps will ask the Chinese citizens for their national identity or passport number as well as their mobile number. They are also required to complete a questionnaire about travel history and current symptoms.

Authorities then verify this information and are assigned a colour based on the persons current health status: green indicates unrestricted movement, yellow indicates that the person has been in close contact with a sick person (quarantine for 7 days), and red indicates self-quarantine for 14 days.[9]

In the first known coronavirus research in China, researchers studied 391 COVID-19 patients and their 1,286 close contacts. These patients was identified through the effectiveness of symptomatic surveillance and contact tracing. From the data analysis, the researchers could estimate an attack rate of 11.2% among household contacts and 6.6% overall.[10]

Falkland Islands

Despite being a COVID-19 free environment since 27 April, Falkland Islands continues with border and quarantine controls, including surveillance swabbing, contact tracing and anti-body testing. The Falkland Islands government (FIG) adapted the approach used in New Zealand where the public are advised to stay in small groups also known as the three-bubble limit (3 households) to reduce the risk of fast transmission and will make contact tracing managed more easily. [11] 'Bubbles' help make decisions about who they meet with socially and how they mix.

If people do become ill with the virus, limiting the contact between different bubbles will help to stop the spread. The whole bubble must isolate if one of the persons becomes unwell with COVID-19 like symptoms. They are also required to contact health authorities.

Requirements within the three-bubble limit:

- A household can meet up and socialise with up to 2 other households at any one time (three households in total). On a different occasion, a bubble could interact with two different bubbles.

- When a person does get together, they should still need to stay physically distant from each other.

[9] https://futurism.com/contact-tracing-apps-china-coronavirus
[10] https://www.cidrap.umn.edu/news-perspective/2020/04/study-contact-tracing-slowed-covid-19-spread-china
[11] https://fig.gov.fk/covid-19/public-updates/108-15-july-2020-change-to-fig-covid-19-response-level-zero-cases-in-the-falkland-islands

- When people visit a person's home, they will need to wash and dry their hands before they touch anything and only come to visit that person if the two persons are well. This keeps your extended bubble protected.

- People who provide essential services can enter a bubble if a person decide they can keep you safe. These people might provide health services, therapy, or they might provide other essential services, such as plumbers, electricians, or food deliveries. People entering a home will need to wash and dry their hands and keep two meters distance.

- Part of the contact tracing is to keep a diary of all social interactions. If someone becomes unwell, the health authorities can then quickly and easily trace their contacts.

- KEMH (King Edward Memorial Hospital) will let persons know if they should not meet up with people from outside your household. Unfortunately, some people may not be able to change how they have been behaving, for example if you have a medical condition that puts you more at risk than most people.

Due to the limitation of having any testing kits on the islands, FIG advised the community to reduce the having contact with a huge number of people. This was done by closing schools and reducing non-essential activities.

Surveillance samples are taken from people across the community and if a positive result does show up, the KEMH has a testing and tracing policy to help identify anyone else who may have been exposed, and require them to isolate. Taken together, these systems help to reassure us that the Covid-19 virus is not currently in the community.[12]

Hong Kong

Since 19 March 2020, all arrivals to Hong Kong from overseas are required to undergo a mandatory 14 day quarantine at home or at designated hotel. The Hong Kong government operates a mobile app that uses geofencing technology to ensure that the person subject to quarantine has not left the designated quarantine location. [13]Each person is also given a mandatory electronic wristband with a unique QR code that is pair with a mobile tracking app. The user must regularly scan the QR code to confirm that the user is at the same location as their mobile device. The tracking app was designed in consultation with the HK Privacy commissioner to track the user's location relative only to the calibrated perimeter.

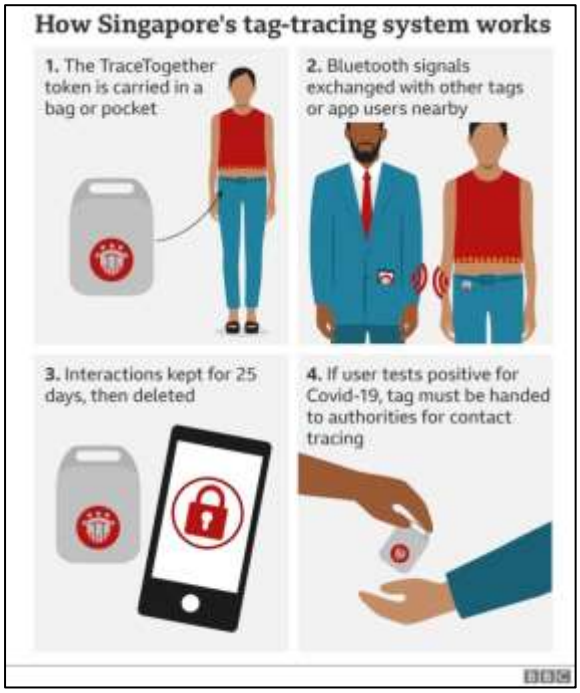
The app does not use GPS location tracking and does not track or record the user's exact geographic location. Instead, using geofencing technology, which detects

[12] https://en.mercopress.com/2020/05/06/falklands-the-bubbles-system-socially-connected-physically-protected

[13] https://digital.freshfields.com/post/102g5my/contact-tracing-apps-in-china-hong-kong-singapore-japan-and-south-korea

surrounding communication signals such as Wi-Fi, Bluetooth and GPS, it tracks the user's location relative only to the calibrated perimeter.

Singapore



Freshfields Bruckhaus Deringer mentioned [14]The volunteering app 'trace together' in Singapore, launched by the Singaporean government collects data using Bluetooth; monitoring devices that been in close proximity of the user during a specified time period. If the users tested positive for COVID-19, the stored data will allow the health authorities to contact the users encounter history.

BBC News states the app has been downloaded by a fifth of the Singapore population[15] however the app will only work effectively if the users has the app open constantly. All users have to carry a TraceTogether token (battery life of 9 months without needing charging). These tokens were first distributed to elderly people who do not use smart phones. If the users' tests positive for the disease, their device must be handed in as data cannot be transferred via the internet. Human contact-tracers will then use storage data from the device to identify and advice others who might have been infected

South Korea

Freshfields Bruckhaus Deringer also mentioned[16], the Ministry of the Interior and Safety developed an app for quarantined individuals to contact case workers and to keep track of their location using GPS. The health authorities also uses telephone calls as the app is not mandatory as individuals may not be able to use the app or have privacy concerns.

There are also third-party apps and websites that provides users with near real-time updates. It alerts users when they come within 100 metres of a location that has been visited by an infected person.

South Korea also plans to build a "smart city" database operated by the Korea Centre for Disease Control and Prevention (KCDC). It will give real-time data feeds on patients, including their location, time spent at specific locations, CCTV footage and credit card transactions

[14] https://digital.freshfields.com/post/102g5my/contact-tracing-apps-in-china-hong-kong-singapore-japan-and-south-korea
[15] https://www.bbc.co.uk/news/technology-53146360
[16] https://digital.freshfields.com/post/102g5my/contact-tracing-apps-in-china-hong-kong-singapore-japan-and-south-korea

Isle of Man

According to our world data[17], Isle of Man decreased to zero confirmed cases in May 2020. The number has stayed constant for the past 3-4 months.

The Isle of Man government mentions[18] contact tracers collect information manually, either by the case providing it, or by people the contact tracer assume the case would be on contact with. Some of the information is collected automatically as part if using the IT facilities.

NHS

The NHS states [19]that their COVID-19 App become part of the department of Health and Social Care's NHS Test and Trace Programme. The programme aims to help to control the rate of reproduction, reduce the spread of the infection and save lives. Their ambition also is to develop an app which will enable anyone with a smartphone to engage with every aspect of the NHS Test and Trace services, from ordering a test through to accessing the right guidance and advice.

Persons who have possibly been infected by the disease will be contacted by email, text or phone. Children under the age of 18 will be contacted by telephone wherever possible and asked for their parent or guardian's permission to continue the call. From there, contacts must sign in to the NHS Test ad Trace contact tracing website.

Guernsey

Guernsey Press mentions[20] the separate contact tracing will run alongside the NHSx app. While the app works automatically, a legion of human contact tracers is being recruited to manually gather information about the places infected people have visited and others they have been in contact with to get a detailed picture of who might be at risk of infection.

Additional information will be collected when persons enter certain controlled business premises, such as restaurants, gyms, sports facilities, place of work, church and worship groups, etc. The information collected may include the person's name and their contact details. This data may be captured using computer based reservations/booking systems or in a hard copy form.

The Guernsey government states[21] that all businesses, events and establishments which operate in an uncontrolled environment must maintain social distancing of 2 meters with enhanced hygiene measures continuing to be observed. Those operating in this way in Phase 4 are not required to notify Environmental Health of

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[17] https://ourworldindata.org/coronavirus/country/isle-of-man?country=~IMN
[18] https://covid19.gov.im/privacy-notice/
[19] https://www.gov.uk/government/news/next-phase-of-nhs-coronavirus-covid-19-app-announced
[20] https://guernseypress.com/news/uk-news/2020/05/15/contact-tracing-what-does-it-do-why-is-it-crucial-and-can-i-be-recruited/
[21] https://www.gov.gg/covid19businessnotification

their intention to do so, but will be required to undertake a risk assessment and make this available to the relevant authorities if requested.

The government pledged it would recruit 18,000 contact tracers. 3,000 of which would be qualified public health and clinical professionals, and the remaining 15,000 will be call handlers.

The BBC mentions[22] Guernsey has not recorded a new coronavirus case since 30 April partially because of its "test, trace and isolate" system. Guernsey government recommended to individuals to keep a diary of their activities to assist with contact tracing if this was ever needed as there are no mobile contact tracing apps.

Gibraltar

According to EasyJet[23], Passengers travelling to Spain, another country or remaining in Gibraltar are required to complete a COVID-19 contact tracing form. The government uses this information to contact passengers who was seated close to someone who has developed coronavirus symptoms.

Mobile ID World states[24]

Gibraltar also launched a contact tracing app for school in the Middle East. The app takes advantage of a school's existing CCTC surveillance infrastructure to help maintain social distancing requirements and manage the flow of people. The 'Wai-Eye' app can be used for contact tracing, and to coordinate transportation, visitation and pick up and drop off schedules. The Wai-Eye app also includes facial recognition capabilities that can be used for access and attendance tracking.

Advantages and disadvantages of Bluetooth and GPS-enabled tools for case investigation and contact tracing

Advantages

1. Potentially creates a higher likelihood of buy-in from patients and users by prioritizing individual trust.
2. Augments capacity of case investigator and contact tracer workforce (e.g. may decrease burden of manual contact elicitation, help to identify contacts in a timelier manner, facilitate communication with contacts, and help ensure rapid isolation of contacts to interrupt the chain of transmission).
3. Augments contact identification by identifying potentially unknown contacts.
4. Provides more comprehensive mobility history, which allows the contact to better detail their movements and provides public health authorities with more accurate information in the aggregate.

[22] https://www.bbc.co.uk/news/world-europe-guernsey-52904982

[23] http://www.easyjet.com/ejcms/cache/medialibrary/files/entry-declaration-forms/phase-3/gibraltar-covid-19-contact-tracing-form---english-version.pdf

[24] https://mobileidworld.com/gibraltar-releases-wai-eye-contact-tracing-app-schools-middle-east-080705/

5. Provides granularity of proximity and associated temporal data that may be useful in stratifying contacts into different exposure risk categories that PHAs can match with differing levels of tracing, notification and monitoring.

Disadvantages

1. Has inherent socioeconomic and technology literacy biases – requires that client and contacts have access to a smartphone, knowledge of how to install apps, and literacy to navigate app menus.
2. May not be effective until a “critical mass” of users in a community are using the apps.
3. Requires individuals to keep their smartphones on them at all times with the appropriate functions enabled and depends on users to elect to share their information with PHAs.
4. Disparate data formats from multiple apps may not be interoperable and could add burden on PHAs for integrating data seamlessly into their case management and contact tracing systems and workflows.
5. Expansion of tool capabilities will require more consultation on the ethical and legal issues related to electronic tracking.
6. Hacking and other unauthorized access or use of data may compromise data security and confidentiality.

Overall Result

The benefits of contact tracing depend substantially on adherence to isolation and quarantine among individuals who are traced, which could be enhanced through policy measures such as voluntary out-of-home accommodations, income replacement, and social supports. Prompt testing, diagnosis, and notification of individuals with infection are needed to ensure that contacts can be traced and quarantined early enough to prevent transmission. Testing contacts without symptoms could improve program benefits by identifying new cases to trace and potentially improving quarantine adherence.

Limitations of this analysis include lack of network or household structure or explicit consideration of high-risk venues. Nevertheless, by examining a range of scenarios that reflect key uncertainties and program features, we provided benchmarks to aid in developing evidence-based mitigation and containment strategies.