



COVID-19

Considerations for the Implementation and Management of Contact Tracing for Coronavirus Disease 2019 (COVID-19) in the Region of the Americas

5 August 2021

Considerations for the Implementation and Management of Contact Tracing for Coronavirus Disease 2019 (COVID-19) in the Region of the Americas

5 August 2021

Washington, D.C., 2021

Considerations for the Implementation and Management of Contact Tracing for Coronavirus Disease 2019 (COVID-19) in the Region of the Americas, 5 August 2021

PAHO/PHE/IMS/COVID-19/21-0015

© Pan American Health Organization, 2021

Some rights reserved. This work is available under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO license (CC BY-NC-SA 3.0 IGO; <https://creativecommons.org/licenses/by-nc-sa/3.0/igo>).

Under the terms of this license, this work may be copied, redistributed, and adapted for non-commercial purposes, provided the new work is issued using the same or equivalent Creative Commons license and it is appropriately cited. In any use of this work, there should be no suggestion that the Pan American Health Organization (PAHO) endorses any specific organization, product, or service. Use of the PAHO logo is not permitted.

All reasonable precautions have been taken by PAHO to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall PAHO be liable for damages arising from its use.

Contents

1. Introduction	2
2. Purpose of this Document	3
3. Target Audiences	3
4. Ethical Duty to Conduct and Support Rigorous COVID-19 Contact Tracing	3
5. Definitions	4
6. Purpose of Contact Tracing within an Outbreak of COVID-19	7
7. Contact Tracing and Management in the Response to COVID-19.....	7
7.1 Planning and Preparation for Contact Tracing.....	7
7.2 Steps in Contact Tracing.....	9
7.3 Adjusting Contact Tracing to Transmission Scenarios	14
7.4 Contact Tracing in the Context of COVID-19 Vaccines.....	15
7.5 Contact Tracing in the Context of SARS-CoV-2 Genomic Sequencing	15
7.6 Contact Tracing in the Context of International Travel	16
7.7 Contact Tracing Indicators and Analysis	17
8. Use of Technologies for Contact Tracing	19
Annex 1. WHO COVID-19: Case Definitions	20
Annex 2. Example of a COVID-19 Contact List Form	21
Annex 3. Example of a Contact Monitoring Form	22
Annex 4. Definition of the Categories for Transmission Classification.....	23
Annex 5. Example of a Field Indicator Reporting Form	24
Annex 6. Digital Tools and their Uses for COVID-19 Contact Tracing.....	25

1. Introduction

On 11 March 2020, the World Health Organization (WHO) declared the outbreak of coronavirus disease (COVID-19) a pandemic. As the pandemic continues to evolve, countries and territories are implementing actions to reduce the rate of SARS-CoV-2 virus transmission in areas where COVID-19 virus is already circulating, while stepping up efforts to provide optimized care to infected patients.

Public health measures to control the spread and/or mitigate the impact of COVID-19 include isolation of cases, contact tracing of individuals who have been exposed to a confirmed or probable COVID-19 case,¹ quarantine, vaccines² approved by national regulatory authorities, and surveillance of SARS-CoV-2 genetic sequences and related metadata.³ Notwithstanding its feasibility depending on the transmission scenario experienced, contact tracing is intended to allow for the early detection of cases in individuals who have been exposed to SARS-CoV-2 virus and support the control of transmission.

Contact tracing has been used extensively as a primary means for control of infectious diseases with low prevalence (i.e., tuberculosis, HIV, sexually transmitted infections, vaccine-preventable diseases such as measles, Ebola virus disease, SARS, and influenza A/H5N1) and is intricately connected to case finding and investigation. It has been estimated that most secondary transmissions of SARS-CoV-2 are caused by a small proportion of individuals in high-transmission events or settings.⁴ Identifying the source of infection through case investigation (also referred to as “backward contact tracing”) is key to detecting chains of transmission and common points of exposure.⁵ More information on backward tracing can be found in [*Contact Tracing in the Context of COVID-19 in the Region of the Americas. Complement to the WHO Interim Guidance on Contact Tracing.*](#)

¹ World Health Organization. Global surveillance for COVID-19 caused by human infection with COVID-19 virus: interim guidance. Available from: <https://apps.who.int/iris/handle/10665/331506> [accessed on 18 May 2020]

² World Health Organization. Considerations for implementing and adjusting public health and social measures in the context of COVID-19: interim guidance. Available from: <https://apps.who.int/iris/handle/10665/341811> [accessed on 13 July 2021]

³ World Health Organization. SARS-CoV-2 genomic sequencing for public health goals: interim guidance. Available from: <https://apps.who.int/iris/handle/10665/338483> [accessed on 13 July 2021]

⁴ Endo A. et al. (2020) “Estimating the dispersion in COVID-19 transmission using outbreak sizes outside China” *Wellcome open research* vol. 5,8 doi: 10.12688/wellcomeopenres.15842.3 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7338915/>).

⁵ World Health Organization. Contact tracing in the context of COVID-19: interim guidance. Available from: <https://apps.who.int/iris/handle/10665/339128> [accessed on 13 July 2021]

WHO recommends that contacts of laboratory-confirmed COVID-19 cases be quarantined for 14 days from the last time they were exposed to the index patient.⁶ Index patients who are pre-symptomatic and asymptomatic individuals may transmit SARS-CoV-2; therefore, quarantine should be implemented promptly after exposure to reduce potential onward transmission.⁵

2. Purpose of this Document

This publication is an updated version of the June 2020 *Considerations for the Implementation and Management of Contact Tracing for Coronavirus Disease 2019 (COVID-19)* intended to complement the interim guidance by WHO on contact tracing in the context of COVID-19.⁵ This current revision includes guidance for contact tracing among vaccinated contacts and international travelers, and in settings with community transmission. It also includes the updated definitions for cases, contacts, and community transmission published by WHO. It aims at providing guidance and operational recommendations for implementing contact tracing for COVID-19 in the Americas. It will be updated as current knowledge on COVID-19 evolves.

3. Target Audiences

The target audiences of this publication are national health authorities, public health professionals, and other officials involved in developing and implementing policies and standard operating procedures on contact tracing operations in the Americas.

4. Ethical Duty to Conduct and Support Rigorous COVID-19 Contact Tracing⁷

As part of the multifaceted response to the COVID-19 pandemic, health authorities have the ethical obligation to conduct rigorous contact tracing and to act without delay based on information obtained. Public health authorities should further ensure that:

- Data are managed responsibly: The privacy of individuals and the confidentiality of their personal information should be protected. Public health teams must thus disclose the minimum amount of information required to achieve the objectives of contact tracing. For example, contacts should only be told that they have been exposed to the infection,

⁶ World Health Organization. Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19). Available at: <https://apps.who.int/iris/handle/10665/331497> [accessed on 18 May 2020]

⁷ Developed on the basis of: Pan American Health Organization. Ethics guidance on issues raised by the novel coronavirus disease (COVID-19) pandemic. Washington DC: PAHO; 2020. Available from: <https://iris.paho.org/handle/10665.2/52091>. World Health Organization. Guidelines on ethical issues in public health surveillance. Geneva: WHO; 2016. Available from: <https://apps.who.int/iris/handle/10665/255721>. World Health Organization. Guidance for managing ethical issues in infectious disease outbreaks. Geneva: WHO; 2016. Available from: <https://apps.who.int/iris/handle/10665/250580>

but not informed of the person who was the source of the exposure. Public health practitioners have the duty to warn individuals of their exposure.

- Risks are minimized: Contact tracing can entail risks of stigmatization and discrimination, along with economic loss and psychological distress. Contact tracing conducted in the context of other diseases, such as Ebola virus disease or tuberculosis, has shown that it may discourage contacts from seeking medical treatment for fear of loss of confidentiality and subsequent stigma, discrimination, or abuse. Officials involved in contact tracing operations must exercise caution to minimize these risks through: community engagement (e.g., involving and educating community leaders on COVID-19 and the community's role in the response); public communication and psychosocial support to overcome the fear associated with COVID-19; and a carefully designed risk communication strategy. Information about the evolution of the pandemic must be communicated with extreme care to the public to further minimize these risks.
- The population is informed: The public must be informed about ongoing contact tracing efforts, their essential role to control the spread of COVID-19 and protect the health of the population, and the commitment to conduct contact tracing ethically. It is the health authority's duty to provide this information in a way that is understandable for the public, which in turn is necessary to advance the trust in the public health authority and the cooperation with the measures required by the response to COVID-19 that are necessary for a successful response.
- Data are promptly shared: It is imperative that all parties involved in COVID-19 surveillance share data in a timely fashion. Considering the urgency and global dimension of the COVID-19 pandemic, timely data sharing of the highest possible quality is critical to inform decision-making capable of protecting the health of the public effectively.⁸

The population has the ethical duty to cooperate with contact tracing efforts. The population must always be treated respectfully, which entails explaining the importance of their contribution to these efforts, providing the information about the data that will be collected and how it will be used, and reassuring people that their privacy and the confidentiality of their information will be protected, and that this information will only be used for public health purposes.

5. Definitions

Contact tracing requires the application of definitions for what defines a confirmed or probable case of SARS-CoV-2 infection and a contact.

⁸ World Health Organization. WHO guidelines on ethical issues in public health surveillance, available from: <https://apps.who.int/iris/handle/10665/255721> [accessed on 18 May 2020]

Case of SARS-CoV-2 Infection⁹

Probable case (four options, A through D)

- A. A patient who meets clinical criteria (see Annex 1) **AND** is a contact of a probable or confirmed case or is linked to a COVID-19 cluster;¹⁰
- B. A suspected case (see Annex 1) with chest imaging showing findings suggestive of COVID-19 disease;¹¹
- C. A person with recent onset of anosmia (loss of smell) or ageusia (loss of taste) in the absence of any other identified cause;
- D. Death, not otherwise explained, in an adult with respiratory distress preceding death **AND** who was a contact of a probable or confirmed case or linked to a COVID-19 cluster.⁷

Confirmed case (three options, A through C)

- A. A person with a positive nucleic acid amplification test (NAAT);
- B. A person with a positive SARS-CoV-2 Ag-RDT **AND** meeting either the probable case definition or suspected criteria A OR B;
- C. An asymptomatic person with a positive SARS-CoV-2 Ag-RDT **AND** who is a contact of a probable or confirmed case.

Contact^{5,12}

A contact is a person who has experienced any one of the following exposures to a probable or confirmed case:

1. Face-to-face contact with a probable or confirmed case within 1 meter and for more than 15 minutes;
2. Direct physical contact with a probable or confirmed case;
3. Direct care for a patient with probable or confirmed COVID-19 disease without using proper personal protective equipment;¹³ or

⁹ World Health Organization. Public health surveillance for COVID-19: interim guidance. Available from: <https://apps.who.int/iris/handle/10665/333752> [accessed on 13 July 2021]

¹⁰ A group of symptomatic individuals linked by time, geographical location, and common exposures, containing at least **one** NAAT-confirmed case or at least **two** epidemiologically linked, symptomatic (meeting clinical criteria of Suspect case definition A or B) persons with **positive** Ag-RDTs (based on $\geq 97\%$ specificity of test and desired $> 99.9\%$ probability of at least one positive result being a true positive).

¹¹ Typical chest imaging findings suggestive of COVID-19 include the following (Manna 2020 [6]):

- chest radiography: hazy opacities, often rounded in morphology, with peripheral and lower lung distribution;
- chest CT: multiple bilateral ground glass opacities, often rounded in morphology, with peripheral and lower lung distribution;
- lung ultrasound: thickened pleural lines, B lines (multifocal, discrete, or confluent), consolidative patterns with or without air bronchograms.

¹² WHO. Considerations in the investigation of cases and clusters of COVID-19: interim guidance 2 April 2020; available at: <https://apps.who.int/iris/handle/10665/331668> [accessed 18 May 2021]

¹³ WHO. Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected: interim guidance 19 March 2020; Available from: <https://apps.who.int/iris/handle/10665/332447> [accessed 13 July 2021]

4. Other situations as indicated by local risk assessments.

Exposure must have occurred during the infectious period of the case, and is defined as follows:³

- Exposure to a symptomatic case: 2 days before and 10 days after symptom onset of the case, plus at least 3 additional days without symptoms (including without fever and without respiratory symptoms), for a minimum of 13 days total after symptom onset;
- Exposure to an asymptomatic case: 2 days before and 10 days after a positive test for SARS-CoV-2. Contacts should be managed in the same way as for a symptomatic case.

Quarantine of Persons⁶

The quarantine of persons is the restriction of activities and/or separation of persons who are not ill, but who may be exposed to an infectious agent or disease, with the objective of monitoring symptoms and early detection of cases. Quarantine is different from isolation, which is the separation of ill or infected persons from others, to prevent the spread of infection or contamination. Quarantine can be conducted in a medical facility or other setting established by public health authorities for that purpose (hotels, dormitories etc.) or in the contact's home (home quarantine).

Isolation of Persons

The isolation of persons is the separation of people who are sick or have presented symptoms, so that they may not infect others.

Monitoring of COVID-19 Contacts

The daily act of establishing communication with contacts and follow-up on presence or absence of symptoms of fever, feeling feverish, cough, or breathing difficulty.

Communication can be done face to face, via phone calls, text messages, app, or email at least once a day.

Self-monitoring

High-risk contacts, such as health care workers, can be contacted twice daily, and/or can conduct self-monitoring and report temperature and presence/absence of symptoms twice a day.

Contacts can monitor themselves for fever by taking their temperature twice a day and remain alert for cough or difficulty breathing. If they develop symptoms (feel feverish or develop measured fever, cough, or difficulty breathing) during the self-monitoring period, they should self-isolate, and seek advice by telephone from their local health department to determine whether medical evaluation is needed.

Closed Contact Monitoring

The monitoring of a contact is considered closed if they did not develop symptoms by the end of the quarantine period or if all necessary actions were taken and completed for symptomatic contacts. After the quarantine period, the person should continue to implement the public health measures recommended for the general population.

6. Purpose of Contact Tracing within an Outbreak of COVID-19

Within the COVID-19 response, contact tracing is part of a package of measures in place to control the outbreak. The goals of contact tracing are:

For the individual:

- To alert contacts to the possibility of infection and offer information and counseling;
- To offer diagnosis, counseling, and treatment to contacts who develop symptoms, especially those at higher risk of developing complications such as older adults and individuals with underlying medical conditions.

For the community:

- To interrupt ongoing transmission through prompt quarantine, and reduce the spread of an infection;
- To identify novel areas at high risk of infection and implement preventive measures;
- To identify areas for enhanced environmental measures for disinfection.

For public health decisionmakers:

- To better characterize the COVID-19 situation, guide the development of public health recommendations, and ensure the timely deployment of response countermeasures.

Any missed or lost to follow-up contact can be detrimental to accomplishing these goals.

The objective of contact tracing is to identify and monitor all social, familial, work, and health care workers' contacts who have had contact with a confirmed case (see Section 5. Definitions). At the end of the quarantine period and depending on laboratory resources, respiratory samples from quarantined persons should be sent for laboratory testing. Prioritization for testing asymptomatic contacts should be given to health care workers, people who are at risk of developing severe disease, and household contacts (for more information see ¹³).

Member States may consider contact tracing of a suspected case depending on the epidemiological situation including the extent of local transmission, and human and financial resources available.

7. Contact Tracing and Management in the Response to COVID-19

7.1 Planning and Preparation for Contact Tracing

A preparation phase is essential to set up coordination teams and deploy the necessary funding, infrastructure, materials, and human resources, so that contact tracing can be conducted effectively and in a timely fashion. The ministries of health of the Member States should start

disseminating messages to the community regarding contact tracing, so that people understand and know what to expect in the event they are identified as a contact and know what resources are available to them. Contact tracing and associated steps such as quarantine and isolation should not be used punitively or associated with security measures, immigration status, or other non-public health concerns. Thus, WHO recommends against using security services for contact tracing and for a voluntary participation of cases and contacts.

The national response team coordinates contact tracing activities across the country with regional and local teams coordinating the contact tracing activities at regional/local level. The national/regional staff may also act as surge teams in the event that the local efforts need support or strengthening. Contact tracing requires coordination across several local or regional public health jurisdictions. Contact tracing in Latin America and the Caribbean has usually been undertaken by public health officials, epidemiologists, and hospital teams; however, depending on the extent of the outbreak and the available resources, contact tracing teams may also involve adequately trained health care providers, community volunteers, or civil society members. These teams must speak the language of the interviewees and be familiar with the social and cultural milieu in which they operate.

The workforce required to conduct contact tracing will depend on the estimated number of cases and contacts to be traced. Other factors include the physical and technological logistics of reaching affected communities and contacts, cultural context, sociopolitical context, security concerns, and contact tracing modalities such as self-reporting versus daily visits and calls. More information on estimating the workforce can be found in [Contact Tracing in the Context of COVID-19 in the Region of the Americas. Complement to the WHO Interim Guidance on Contact Tracing.](#)

The availability of resources and the extent to which preparatory activities are needed will vary from country to country. Member States must obtain the necessary equipment, tools, and infrastructure, and train the appropriate personnel, before the start of contact tracing, home quarantine, and monitoring. Examples of resources required include:

- Staff training: staff at national and local levels need to be trained on the contact tracing activities and procedures (i.e., phone interviewing, data collection, follow-up, and reporting);
- Setting up of call centers with a toll-free number: a call center with staff for contact tracing activities and available to contacts if they become symptomatic;
- Use or development of new technologies, such as a mobile phone application to facilitate contact tracing and/or a tool-free, twice-daily short message service (SMS) to inquire about a contacts health);
- Stocking and pre-positioning personal protective equipment at the national (central stockpile) and regional/local levels, frequency of restocking, and minimal stock directives to avoid stock-outs (see https://www.who.int/docs/default-source/coronaviruse/covid-19-sprp-unct-guidelines.pdf?sfvrsn=81ff43d8_4), if face-to-face contact tracing is performed;

- Validated protocols, templates, and questionnaires (paper or electronic) for data collection (during phone interviews, for example);
- Setting up of a national database to collect, collate, and analyze all data obtained;
- Laboratory resources (human and materials) for sample taken at the place the contact is in quarantine and in case of developed symptomatology;
- Consideration of use of digital tools.

7.2 Steps in Contact Tracing

Case Investigation and Contact Identification

- Immediately after a patient meets the definition of a confirmed case of COVID-19, isolate the case and ensure that the rapid response team systematically identifies all individuals that may have been in contact with him/her as early as 48 hours before they developed symptoms. This is done by administering probing questions to the case, to delineate all the activities they performed and identifying those involved in the activities. No aspect of the case's daily activities should be missed. This process may also involve going to locations visited by the case to identify potential exposed individuals that the case did not know (restaurant, hotel, conference, market, etc.). In the event of a deceased case, parties that were involved in all situations surrounding him/her in the hours and days before death could be interviewed. Additional information is gathered from people with geographical proximity to the case, including family and neighbors. In order to ensure a complete and accurate list of contacts, several interviews of the case may need to be performed over time. The case should also be provided with an easy modality by which to reach the tracers in the event they recall more contacts.
- Countries may wish to use digital applications and new technology to help identify geographical locations attended by COVID-19 cases. Information can be provided to the community to aid in locating and identifying people that could be contacts.
- Each contact identified by the investigation team is reported on a "contact listing form," which collects information about contacts' interaction with or relation to the case, date of last contact, type of contact, contacts' residential location, and contact information (Annex 2).
- Each contact identified and listed should first be contacted over the phone or in person to confirm their exposure and decide whether they meet the contact definition and thus require monitoring. Once exposure is verified, monitoring is initiated.
- Once a potential contact has been confirmed as a COVID-19 contact, the individual should be notified that they must be quarantined, and the monitoring procedure should be explained. Contacts, as well as household members or caregivers where applicable, should be educated regarding the signs and symptoms of COVID-19 and protective measures. They should be given the contact information for the tracing team, and local public health office to alert if any symptoms develop, and instructions on when and where to seek care, the most appropriate mode of transportation, when and where to enter the

designated health care facility, and what infection control precautions should be followed, including:

- While traveling to seek care, the ill person should wear a medical mask;
- Avoid public transportation to the health care facility, if possible; call an ambulance or transport the ill person with a private vehicle and open the windows of the vehicle if possible;
- The symptomatic contact should be advised to always perform respiratory hygiene and hand hygiene; stand or sit as far away from others as possible (1 meter or more), when in transit and when in the health care facility.
- Any surfaces that become soiled with respiratory secretions and other body fluids during transport should be cleaned with soap or detergent and disinfected with regular household product containing a diluted bleach at 0.5%.

Quarantine of Contacts

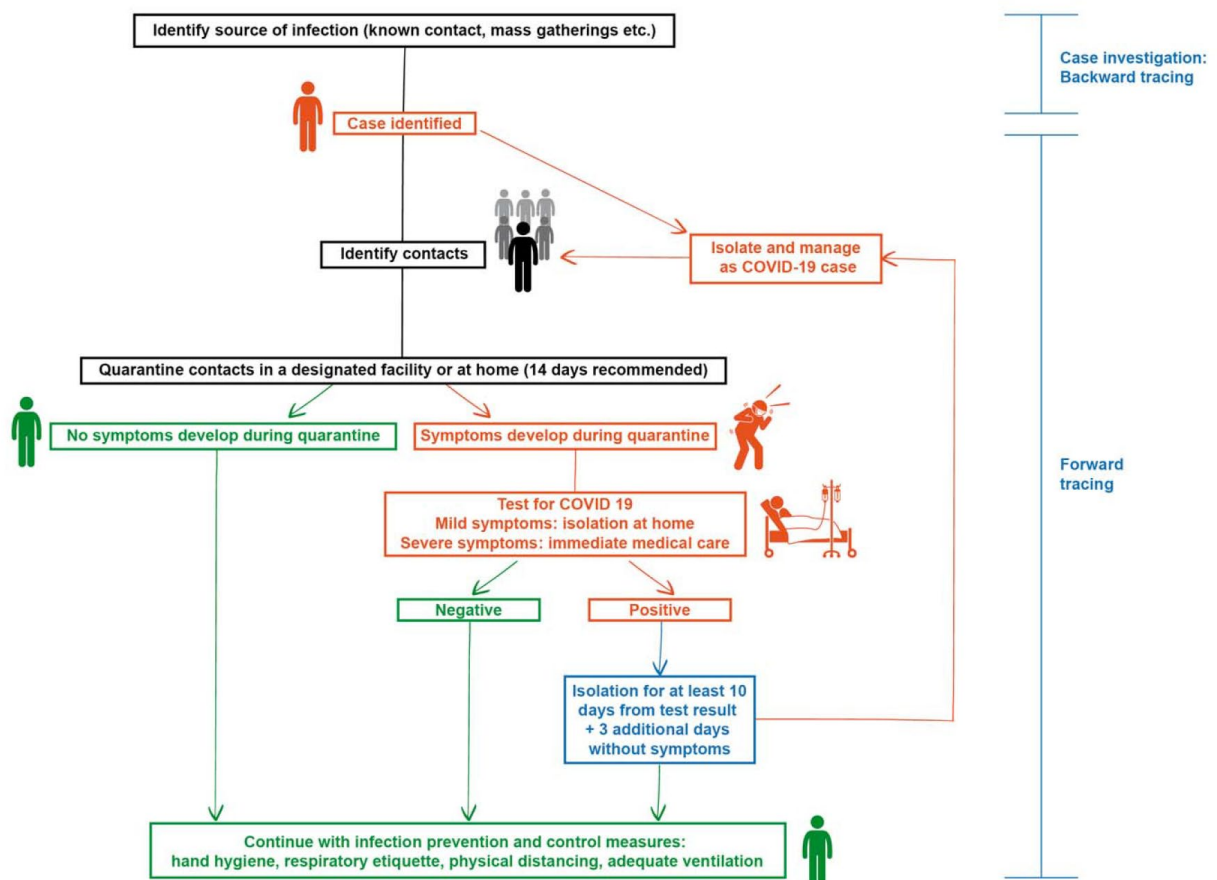
- All COVID-19 contacts should be quarantined in a designated facility or in a separate room in the household for a duration of 14 days from the last contact with the confirmed or probable case.⁶
 - Nearly all cases develop symptoms within 14 days of exposure, with a median incubation period of approximately 5–6 days.¹⁴ However, the day at which all cases develop symptoms varies, while it is estimated that 95% of all people infected would develop symptoms by 11.6 days after exposure.¹⁴
 - There are no data to suggest there is a change in the incubation period of the current SARS-CoV-2 variants of concern.
 - Shortening the quarantine period will result in larger proportions of contacts becoming infectious after leaving quarantine, but testing throughout and/or at the end of a shortened quarantine period can increase confidence that a contact is not infected at the end of the shortened quarantine.
- Individuals in quarantine should receive adequate food, water, protection, hygiene, and communication provisions, including:⁶
 - Access to education for children and paid leave from jobs or remote work options;
 - Adequate ventilation and infection prevention and control measures;
 - Requirements for monitoring of their health.
- Any person in quarantine who develops symptoms suggestive of COVID-19 should be treated and managed as a suspected case of COVID-19 and tested, according to national testing strategies and guidelines. If a contact becomes symptomatic and tests negative for COVID-19, the individual should still complete quarantine.

¹⁴ McAloon C, Collins Á, Hunt K, et al. Incubation period of COVID-19: a rapid systematic review and meta-analysis of observational research. *BMJ Open*. 2020;10(8):e039652.

- A subset of asymptomatic contacts who are at higher risk of developing severe disease and/or have higher levels of exposure should also be tested for SARS-CoV-2 when possible.
- Laboratory testing is not considered a requirement for leaving quarantine after 14 days for contacts who do not develop symptoms.

Figure 1 provides an overview of the steps involved in contact tracing, monitoring, and caring for contacts.

Figure 1. Chain of events for tracing, monitoring, and caring for contacts of probable and confirmed COVID-19 cases



Source: World Health Organization. Contact tracing in the context of COVID-19: interim guidance. Available from: <https://www.who.int/publications-detail/contact-tracing-in-the-context-of-covid-19>.

Questionnaires

When a contact is identified, the contact tracing staff should administer the initial questionnaire to collect information on the person's demographic information (i.e., name, sex, and age), contact information (i.e., address of residence, and phone number), profession (i.e., whether or not the contact is a health care worker), and relationship to the COVID-19 case (i.e., relationship to the case, date of last contact) (Annex 2).

Once the 14 days of quarantine start, the staff should administer a daily questionnaire to each contact under monitoring to record any signs or symptoms of disease. Administering the questionnaire can occur in person or remotely, according to the Member State's guidelines. For each contact, the staff should record the presence or absence of any of the signs or symptoms associated with COVID-19:

- Fever ($\geq 38^{\circ}$ C or feeling feverish);
- Dry cough;
- Shortness of breath or difficulty breathing;
- Others: sore throat, cough, muscle pain, loss of smell (anosmia) or taste, or diarrhea.

This information needs to be collected on each of the 14 days for each contact under monitoring (Annex 3). Digital capture tools should be used wherever possible to reduce the workload of contact tracers.

If contacts are in close proximity to one another, such as being in the same household, and one of them becomes a COVID-19 probable or confirmed case, the follow-up period of other contacts should be reset to 14 days (or locally established quarantine duration) after the last exposure to the new case.

If the contact is not available for monitoring at the appointed time, the staff should contact the person again at the end of the day. If the contact is still not available, they should be marked as "not seen." If a contact is not seen for three or more days, they should be classified as "lost to monitoring."

The monitoring phase ends once the quarantine period has been completed, or if the contact develops COVID-19 symptoms, and/or is confirmed as a positive case. For symptomatic cases, 10 days after symptom onset plus at least 3 additional days without symptoms (including without fever and without respiratory symptoms) of **isolation** is recommended.¹⁵ For asymptomatic cases 10 days of **isolation** after positive test for SARS-CoV-2 is recommended.

¹⁵ World Health Organization. COVID-19 Clinical management: living guidance. Available from: <https://apps.who.int/iris/handle/10665/338882> [accessed 13 July 2021]

Monitoring of Contacts

- Monitoring should be carried out for all contacts. Each individual should be contacted at least once a day (depending on risk assessment) via phone calls, text messages, email, app, or face to face, and asked about symptoms of fever (measured or feeling feverish) or cough or other respiratory symptoms, for 14 days following the last exposure to a confirmed case of COVID-19. Even if a contact receives only one call per day, they should report records of symptoms for the morning and evening. It should be stressed that, considering that older persons, immunocompromised persons or those taking antipyretic analgesia may not present with fever, reporting other symptoms will be crucial. Special attention should be given to the monitoring of subpopulations that cannot shelter in place or are locally considered vulnerable populations such as the homeless, migrants/displaced, and indigenous populations.
- All COVID-19 contacts should have a contact tracing form completed to collect relevant demographic, epidemiological, and exposure data, as shown in Table 1 and Annex 3. This information will be collected on the first day of follow-up. If a contact develops symptoms, action should be taken to ensure his/her isolation, and the contact tracing staff will notify the appointed health officer medical evaluation, testing, and treatment. If, by the end of the monitoring period, the contact has not developed symptoms, the contact monitoring is considered “closed.” The contact should be advised to continue to implement the public health measures for COVID-19 recommended for the general population. If the contact is exposed to a new COVID-19 confirmed case (e.g., a person in the family tests positive), the 14-day count starts again.

Table 1. Key information to collect in COVID-19 contact tracing forms

Type of information	Recommended minimum data
Contact information (entered once)	<ul style="list-style-type: none">• Contact (unique) ID• Linked source case ID or event ID• Name (first, last)• Address (and geolocation, where possible)• Phone number and/or other contact details• Alternative contact details (important in settings with variable telecommunications reception)
Demographic information (entered once)	<ul style="list-style-type: none">• Date of birth (or age, when not known)• Sex/gender• Occupation (to identify health care workers, transport workers, other at-risk occupations)• Relationship with confirmed case• Language (in settings with diverse populations)
Type of exposure (entered once)	<ul style="list-style-type: none">• Setting of exposure (household, closed setting [specify], community, health facility, other)• Date of last contact with the confirmed or probable COVID-19 case

Type of information	Recommended minimum data
	<ul style="list-style-type: none"> Exposure frequency and duration (this may be used to classify contacts into high and low exposure should resources be too limited to allow for tracing of all contacts) Factors influencing exposure risk (public health and social measures in place, use of personal protective equipment, other factors as indicated by local risk assessments)
Vaccination status (entered once)	<ul style="list-style-type: none"> Vaccination status (received any dose of vaccine against SARS-CoV-2) Vaccination type Number of doses received Date of first dose Date of second dose
Daily follow-up of signs and symptoms (daily entry fields)	<ul style="list-style-type: none"> Fever (mention if perceived or measured, and whether reported or observed) Other signs and symptoms: sore throat, cough, runny nose or nasal congestions, shortness of breath or difficulty breathing, muscle pain, loss of smell (anosmia) or taste, or diarrhea
Absence or loss to follow-up	<ul style="list-style-type: none"> Reasons for non-reporting of daily signs and symptoms (contacts are unavailable, relocated, lost to follow-up) New address (if known) of where contact has relocated
Actions taken if symptomatic (entered once)	<ul style="list-style-type: none"> Date of symptom onset Referral criteria (based on severity and presence of vulnerability factors) Contact's location (self-isolation at home, other self-location facility, hospital) Whether a sample has been taken, date of collection

7.3 Adjusting Contact Tracing to Transmission Scenarios

Indicators related to hospitalization rate, mortality, case incidence, and testing should be used to classify the Member State's transmission scenario, including the four levels of community transmission (Annex 4). These indicators should be measured at the lowest administrative level possible, with separate analyses conducted for higher administrative levels and should be used together with other available epidemiological information every 15 days. Within these levels, contact tracing activities should be adjusted accordingly (Table 2).

Table 2. Targeted approaches to contact tracing according to SARS-CoV-2 transmission patterns

Epidemiological scenario	Description
No cases	A well-trained contact tracing workforce should be identified and ready to deploy and scale up (i.e., have the required tools) to respond to first cases.
Sporadic cases	Exhaustive contact tracing and case investigation for all cases is essential for rapidly suppressing transmission.

Epidemiological scenario	Description
Clusters	Contact tracing is essential to reduce transmission within clusters and to identify events that have led to high levels of virus transmission. Public health and social measures can then be implemented to reduce the occurrence of such events.
Community transmission (including 4 subcategories of increasing incidence)	Contact tracing remains an important activity in high-incidence scenarios where capacity to trace and follow-up all contacts may be at breaking point. Contact tracing activities should be targeted rather than abandoned. It is possible to prioritize tracing of higher-risk exposure contacts based on capacity.

7.4 Contact Tracing in the Context of COVID-19 Vaccines

As COVID-19 vaccines continue to be deployed across the Region, it remains important to maintain and enhance existing public health and social measures including contact tracing and quarantine to stop further transmission of SARS-CoV-2.

Health authorities may consider that contacts who have recently (within the past 3–6 months) had a SARS-CoV-2 infection or who have received full COVID-19 vaccination may be at lower risk of further infection and therefore may be exempt from quarantine. However, the lower risk of infection following full COVID-19 vaccination probably varies by COVID-19 vaccine.⁶

Given the lack of data for all available COVID-19 vaccines, WHO recommends countries adopt a risk-based approach for any policy decision to exempt individuals from quarantine. This should also consider the local epidemiological context (SARS-CoV-2 incidence and prevalence of SARS-CoV-2 variants of concern), and the context of the exposure (risk assessment of exposure), as some settings such as health care facilities may pose a higher risk, leading to classification of health care workers as high-risk contacts.

7.5 Contact Tracing in the Context of SARS-CoV-2 Genomic Sequencing

With the emergence of SARS-CoV-2 variants of concern and variants of interest, the global surveillance of genetic sequences and related metadata contributes to the COVID-19 outbreak response. This includes tracking the spread of SARS-CoV-2 geographically over time and ensuring that mutations that could potentially influence pathogenicity, transmission, or public health and social measures (including vaccines) are detected and assessed in a timely manner. Epidemiologically focused activities, including contact tracing, that integrate genomic data analysts directly into public health investigation and response teams are likely to have a greater immediate impact than those in which virus genomic analysis exists as a separate or secondary activity.

Sequencing can support the understanding of transmission events and/or evaluate the efficacy of infection control procedures in clusters identified during contact tracing and case

investigations.³ Contact tracing activities may also support sequencing when related to the analysis of SARS-CoV-2 infection among vaccinated individuals and/or when there is an unexpected increase or change in transmissibility, especially in the presence of SARS-CoV-2 variants of concern and interest.

7.6 Contact Tracing in the Context of International Travel

Member States should take appropriate measures to reduce transmission of SARS-CoV-2 during international travel, recognizing that comprehensive public health measures adapted to the local epidemiological context and capacities can mitigate the risk substantially but cannot achieve “zero risk.” The following factors should be considered for all countries:¹⁶

- The local epidemiology ([link](#)) in departure and destination countries;
- Travel volumes between countries;
- The public health and health services’ capacity and performance to detect and care for cases and their contacts, including among travelers, in the destination country;
- Public health and social measures implemented to control the spread of COVID-19 in departure and destination countries, and available evidence on adherence and effectiveness of such measures in reducing transmission;
- Contextual factors, including economic impact, human rights, and feasibility of applying measures, among others.

It is recommended that travelers should self-monitor for the potential onset of symptoms for 14 days on arrival and report symptoms and travel history to local health authorities, as per instructions received by authorities in the host country, prior to departure and/or on arrival. This recommendation can be adapted to country-specific strategies or protocols for international travelers. Any traveler identified as a contact of a COVID-19 case should be supported, quarantined, and tested if symptoms develop at any point during the quarantine period.

When a cluster or chain of SARS-CoV-2 transmission involves more than one country, international contact tracing should be conducted in a coordinated and collaborative manner through rapid information-sharing via the National IHR Focal Points. Whenever health information and/or personal details of an identifiable individual are exchanged between countries, these should be kept confidential in line with Article 45 of the International Health Regulations (2005) and national legislation.

¹⁶ World Health Organization. Considerations for implementing a risk-based approach to international travel in the context of COVID-19: interim guidance. Available from: <https://apps.who.int/iris/handle/10665/337858> [accessed 29 July 2021]

7.7 Contact Tracing Indicators and Analysis

Indicators for Monitoring and Performance

Key performance indicators (KPIs) for contact tracing in the context of COVID-19 inform stakeholders how well a system is performing and what aspects need to be improved. Indicators should measure the different stages of contact tracing which, measured over time, can inform decisions by assessing the impact of the contact tracing program.

At the end of each day of monitoring, the staff should sum the information and calculate the following indicators (see Annex 5 for an example of an indicator reporting form):

- Number of contacts scheduled to be followed today:
 - Equal to the total number of contacts that a staff member must contact and monitor on a given day. All contacts should be recorded on the staff's daily contact list.
- Number of contacts seen today:
 - Equal to the number of contacts who provided the required information to the staff member on a given day. If the contact provides the information before midnight on a given day, they should be classified as "seen."
- Number of contacts not seen today:
 - Equal to the number of contacts who did not provide the required information to the staff member on a given day. If the contact did not provide the information before midnight on a given day, they should be classified as "not seen."
- Number of contacts lost to follow-up (i.e., not seen for 3+ consecutive days):
 - Equal to the number of contacts who did not provide the required information to the staff member for three or more consecutive days. If the contact is not available for two days but provides information on the third day, they should be classified as "not seen" for the first two days but are not considered to be "lost to monitoring."
- Number of contacts who developed symptoms:
 - Equal to the number of contacts who develop one or more symptoms during the 14-day monitoring period. This number should be equal to the number of referrals that the staff make to the appointed public health officer for further medical evaluation and testing.

Note: The sum of contacts "seen" and contacts "not seen" should be equal to the total number of contacts to be monitored.

Indicators to Assess Contact Tracing Efforts

Monitoring of contact tracing efforts is essential in order to understand if they are successful in reducing disease transmission in the community. At the end of each reporting period, the contact tracing staff will calculate the following minimum set of indicators show in Table 3 to assess its understanding of the COVID-19 transmission chains.

Table 3. Example of key performance indicators for COVID-19 contact tracing processes

Key question	Rationale	Example indicators
Are procedures to organize and manage the contact tracing system available?	To ensure standard operating procedures and guidance are in place and operationalized	Contact tracing procedures and guidelines exist
How many trained human resources are available for the program?	To ensure the quality and efficiency of the system to identify and follow contacts	Number of contact tracers per supervisor Number of contacts per contact tracer
How quickly are contacts being identified and provided with information on quarantine?	To ensure timely quarantine and reduce subsequent onward transmission	% of contacts provided with information on quarantine within 48 hours of interview with the index case
What proportion of all traced contacts are provided with information on quarantine; and agree to comply?	To track the coverage and compliance with tracing and quarantine	% of traced contacts that agree to quarantine
What proportion of contacts are successfully being followed according to the agreed strategy?	To track the quality of the system to follow up contacts	% of contacts with regular follow-up information according to the agreed strategy % of contacts lost to follow-up

Contact Tracing Database

The effective management of information from contacts can be achieved using appropriate software designed to manage cases and their corresponding contacts. To streamline management of contacts during infectious disease outbreaks, WHO developed the Go.Data software. Go.Data is a tool to support outbreak response activities in terms of case and contact data collection, analysis, and production of related reports.

Regardless of whether the Member States choose to use Go.Data, a contact tracing database must include the following elements:

- Registration of cases and their relative information (demographics, location, date of symptom onset);
- Registration of contacts and their relative information;

- Monitoring communication with each contact for symptom follow-up, to be collected daily during the 14-day monitoring period.

Furthermore, the data must be aggregated in a way to allow for the development of the following information products:

- Predefined summary and detailed reports, including KPIs;
- Summary case and contact mapping;
- Visualization of chains of transmission.

If a contact becomes a case, the change in status should be linked, through a common identifier, to the Member State's case database (line list). The systematic use of common identifiers linking contact tracing, case line lists, and individual laboratory results is essential to providing an overview of the transmission scenario.

8. Use of Technologies for Contact Tracing

Successful contact tracing does not necessarily require electronic tools. However, the use of information technology can render the process more efficient, especially where outbreaks are extensive and resources are limited. There have been numerous tools developed around the world to facilitate and aid contact tracing (Annex 6):

Outbreak response tools are designed for public health response personnel involved in contact tracing activities and outbreak investigations; they encompass the management of relational data of cases and contacts through electronic data entry of case and contact information.

Proximity tracing/tracking tools use location-based (GPS) or Bluetooth technology to find and trace the movements of individuals in order to identify people who may have been exposed to an infected person; the risk of exposure depends on the probability of coming into close or frequent contact with people who may be infected.

Symptom tracking tools use applications designed to routinely collect self-reported signs and symptoms to assess disease severity or the probability of infection due to COVID-19; they are helpful where there are physical or security barriers to in-person visits, and they could augment in-person visits by receiving reports from contacts more than once a day.

Digital tools offer an opportunity to strengthen contact tracing capacity for COVID-19, including improved data quality and the ability to trace large numbers of contacts in a shorter time period, to provide analysis and real-time situational awareness, and to perform coordination and management of contact tracing teams.

Annex 1. WHO COVID-19: Case Definitions

WHO COVID-19: Case Definitions

Updated in Public health surveillance for COVID-19, published 16 December 2020



World Health
Organization

Case Definitions

Suspected case of SARS-CoV-2 infection

- A** A person who meets the clinical **AND** epidemiological criteria:
- Clinical Criteria:**
- Acute onset of fever **AND** cough; OR
 - Acute onset of **ANY THREE OR MORE** of the following signs or symptoms: Fever, cough, general weakness/fatigue¹, headache, myalgia, sore throat, coryza, dyspnoea, anorexia/nausea/vomiting¹, diarrhoea, altered mental status.
- AND**
- Epidemiological Criteria:**
- Residing or working in an **area with high risk of transmission of virus**: closed residential settings, humanitarian settings such as camp and camp-like settings for displaced persons; anytime within the 14 days prior to symptom onset; or
 - Residing or travel to an **area with community transmission** anytime within the 14 days prior to symptom onset; or
 - Working in **any health care setting**, including within health facilities or within the community; any time within the 14 days prior of symptom onset.
- B** A patient with **severe acute respiratory illness**: (SARI: acute respiratory infection with history of fever or measured fever of $\geq 38^{\circ}\text{C}$; and cough; with onset within the last 10 days; and requires hospitalization).
- C** Asymptomatic person not meeting epidemiologic criteria with a **positive SARS-CoV-2 Antigen-RDT**²

¹ Signs separated with slash (/) are to be counted as one sign.

² NAAT is required for confirmation, see [Diagnostic testing for SARS-CoV-2](#)

See [Antigen detection in the diagnosis of SARS-CoV-2 infection using rapid immunoassays](#)

Note: Clinical and public health judgment should be used to determine the need for further investigation in patients who do not strictly meet the clinical or epidemiological criteria. Surveillance case definitions should not be used as the sole basis for guiding clinical management.

Probable case of SARS-CoV-2 infection

- A** A patient who meets **clinical criteria** above **AND** is a **contact of a probable or confirmed case**, or linked to a **COVID-19 cluster**³
- B** A **suspect case with chest imaging** showing findings suggestive of COVID-19 disease⁴
- C** A person with recent onset of **anosmia** (loss of smell) or **ageusia** (loss of taste) in the absence of any other identified cause.
- D** **Death**, not otherwise explained, in an adult with **respiratory distress** preceding death **AND was a contact of a probable or confirmed case** or linked to a **COVID-19 cluster**³

Confirmed case of SARS-CoV-2 infection

- A** A person with a positive **Nucleic Acid Amplification Test (NAAT)**
- B** A person with a **positive SARS-CoV-2 Antigen-RDT** **AND** meeting either the **probable case definition** or **suspect criteria A OR B**
- C** An **asymptomatic person with a positive SARS-CoV-2 Antigen-RDT** who is a **contact of a probable or confirmed case**

³ A group of symptomatic individuals linked by time, geographic location and common exposures, containing at least **one NAAT-confirmed** case or at least **two** epidemiologically linked, symptomatic (meeting clinical criteria of Suspect case definition A or B) persons with **positive Ag-RDTs** (based on $\geq 97\%$ specificity of test and desired $>99.9\%$ probability of at least one positive result being a true positive)

⁴ Typical chest imaging findings suggestive of COVID-19 include the following:

- **Chest radiography**: hazy opacities, often rounded in morphology, with peripheral and lower lung distribution
- **Chest CT**: multiple bilateral ground glass opacities, often rounded in morphology, with peripheral and lower lung distribution
- **Lung ultrasound**: thickened pleural lines, B lines (multifocal, discrete, or confluent), consolidative patterns with or without air bronchograms.

© World Health Organization 2020. Some rights reserved. This work is available under the [CC BY-NC-SA 3.0 IGO](#) licence.
WHO reference number: WHO/2019-nCoV/Surveillance_Case_Definition/2020.2



World Health
Organization

Source: World Health Organization. WHO COVID-19 Case definition. Geneva: WHO; 2020. Available from: <https://apps.who.int/iris/handle/10665/333912>

Annex 2. Example of a COVID-19 Contact List Form

[illegible]

* Options include household member, health-care worker, co-worker, neighbour or other (list).

Source: World Health Organization. Protocol to Investigate Non-seasonal Influenza and Other Emerging Acute Respiratory Diseases. Geneva: WHO; 2018. Available from:

<https://apps.who.int/iris/handle/10665/275657>

Annex 3. Example of a Contact Monitoring Form

[illegible]

* Days of follow-up will depend on the event and can be extended to any number of days.

Tick "0" if the contact has not developed disease symptoms

Tick "X" if the contact has developed symptoms or has died

Source: World Health Organization. Protocol to Investigate Non-seasonal Influenza and Other Emerging Acute Respiratory Diseases. Geneva: WHO; 2018. Available from:

<https://apps.who.int/iris/handle/10665/275657>

Annex 4. Definition of the Categories for Transmission Classification

Category name	Definition
	<i>Countries/territories/areas with:</i>
No (active) cases	No new cases detected for at least 28 days (two times the maximum incubation period), in the presence of a robust* surveillance system. This implies a near zero risk of infection for the general population.
Clusters of cases	Cases detected in the past 14 days are predominantly limited to well-defined clusters that are not directly linked to imported cases, but which are all linked by time, geographical location, and common exposures. It is assumed that there are a number of unidentified cases in the area. This implies a low risk of infection to others in the wider community if exposure to these clusters is avoided.
Community transmission – level 1 (CT1)	Low incidence of locally acquired, widely dispersed cases detected in the past 14 days, with many of the cases not linked to specific clusters; transmission may be focused in certain population subgroups. Low risk of infection for the general population.
Community transmission – level 2 (CT2)	Moderate incidence of locally acquired widely dispersed cases detected in the past 14 days; transmission less clearly focused in certain population subgroups. Moderate risk of infection for the general population.
Community transmission – level 3 (CT3)	High incidence of locally acquired, widely dispersed cases in the past 14 days; transmission widespread and not focused in population subgroups. High risk of infection for the general population.
Community transmission – level 4 (CT4)	Very high incidence of locally acquired widely dispersed cases in the past 14 days. Very high risk of infection for the general population.

* Note that in situations where COVID-19 surveillance is not robust, a lack of identified cases should not be interpreted as an absence of transmission.

Source: World Health Organization. Critical preparedness, readiness and response actions for COVID-19. Geneva: WHO; 2021. Available from: <https://apps.who.int/iris/handle/10665/341520>

Annex 5. Example of a Field Indicator Reporting Form

REPORTING FORM FOR THE FIELD TEAMS

Variable	Date:
Team name	
Team members	
Towns assigned	
No. of towns	
No. of households	
Name of towns	
Towns visited	
No. of towns	
No. of households	
Name of towns	
Total cases under follow-up	
Total contacts under follow-up	
Contacts who have completed 14 days of follow-up today	
Total cases followed-up today	
Contacts who developed symptoms	
Details of community alerts responded to	
Remarks/other issues	

Source: World Health Organization. Contact tracing during an outbreak of Ebola virus disease. Geneva: WHO; 2014. Available from: <https://apps.who.int/iris/handle/10665/159040>

Annex 6. Digital Tools and their Uses for COVID-19 Contact Tracing

Tool category	Characteristics and use	Considerations for implementation, opportunities, and challenges
Outbreak response tools	<ul style="list-style-type: none"> • Outbreak response tools are designed for public health response personnel involved in contact tracing activities and outbreak investigations • Outbreak response tools facilitate all elements of contact tracing activities, from case investigation to identification, listing and tracing of contacts to data management and analysis. They are especially useful for initial localized outbreak response, early cluster investigations, and limited populations. Some may have monitoring dashboards • Set up relational databases linking lists of contacts to line lists of cases, allowing the incorporation of information from various sources (contact tracing, laboratory, case notification, etc.) • Allow for tailored case investigation forms, contact listing forms, and contact follow-up forms to be set up • Enable electronic data capture by contact tracers directly through smartphones or tablets • Streamline the data flow and data management process, by avoiding data entry errors, pushing the information automatically through the system, reducing processing time, and improving timeliness of analysis and monitoring • Software packages may allow for automated and semi-automated analytical outputs 	<ul style="list-style-type: none"> • Open-access and open-source software allow for increased transparency, and continuous improvement of tools • Incorporation or linkage to case data is required to relate contacts and cases • Standardized data formats/data dictionaries and reporting templates are needed to link case-based line lists with contract-tracing data and laboratory testing data • Different roles and responsibilities should be incorporated in outbreak response tools to mirror the data collection and data verification process (such as field data collectors, team lead for data collectors, and epidemiology lead functions taking care of data quality, reducing data entry errors, duplicate removal, and data approval) • Where possible, the implementation of new outbreak response tools should augment, rather than replace, existing electronic surveillance tools • Tools should optimally be designed for field staff and run on smartphones or tablets that can synchronize across mobile and Internet networks
Proximity tracking/tracking tools	<ul style="list-style-type: none"> • Using either GPS location or Bluetooth signals, proximity tracing tools can help identify contacts by identifying when individuals have been in close physical proximity and have had prolonged contact with a case. • Location-based tools are based on GPS location of users. They may be 	<ul style="list-style-type: none"> • Proximity tracing tools require individuals to have a charged smartphone and to always carry it; necessary updates to changes in people's case status may require mobile network connectivity. People who do not have smartphones may be excluded from approaches that rely heavily on proximity tracing tools. As such, proximity tracing tools do not replace the need for rigorous contact

Tool category	Characteristics and use	Considerations for implementation, opportunities, and challenges
	<p>used to identify people who have been in the same location as cases, to facilitate contact identification</p> <ul style="list-style-type: none"> • Linkage to other information systems can provide users direct notifications of contact events with confirmed cases, testing locations, or other helpful information such as where to access masks • Other location-based apps have been developed that preserve anonymity by not linking to other databases, but still maintaining the ability to provide location-based information for contact tracing • Bluetooth signaling between devices enables users to know if they have been in close proximity to a case without providing location information. Data can help contact tracers identify potential contacts of cases 	<p>identification and listing, but could augment such activities, particularly in public spaces and other settings where contact identification remains challenging.</p> <ul style="list-style-type: none"> • GPS or Bluetooth wearable devices could potentially be developed for people without smartphones or to increase consistent use • There are many privacy issues regarding the disclosure of location history, case and contact status, and possibly other personal data. Privacy concerns and data protection need to be carefully considered with location-based approaches • Proximity tracing tools do not directly provide information about exposures, which may vary independently of proximity, such as being in an enclosed vs. open-air space. • A critical mass of the population needs to use proximity tracing tools for optimally identifying potential contacts • Proximity tracing tools are suitable for use in increasing intensity of transmission, from clusters to community transmission • Bluetooth-based tools should be able to send, receive, and record Bluetooth signals even in background mode (when the phone is locked). • Companies have developed joint application programming interfaces that allow cross-platform functionality using Bluetooth communication, which had previously been a barrier. • Location-based proximity tools can be used to identify locations with a high concentration of confirmed cases, and hence provide some assessment of transmission risk • Proximity tracing tools could potentially have other uses, such as monitoring public health measures (for example physical distancing)
Symptom tracking tools	<ul style="list-style-type: none"> • In the context of contact tracing, symptom tracking tools may be useful to help daily monitoring of contacts 	<ul style="list-style-type: none"> • Using symptom tracking tools for contact tracing requires careful consideration of data ownership and of privacy and data protection

Tool category	Characteristics and use	Considerations for implementation, opportunities, and challenges
	<ul style="list-style-type: none"> • Used for self-checking and self-reporting of signs and symptoms by people through mobile phone apps or SMS technology • Can have value when traditional in-person contact tracing capacity is not possible • Can be used to generate syndromic data at population level, and allow for real-time monitoring of self-reported syndromic data • Self-reporting symptom tracking tools require the data to be integrated with other surveillance and monitoring data 	<ul style="list-style-type: none"> • Can be useful if contacts cannot be seen daily due to access issues, or to complement in-person visits by contact tracing teams • Could be considered in scenarios where the number of contacts exceeds the capacity of contact tracing teams • Is dependent upon how individuals assess their own health and is difficult to provide verification or validation • Self-assessment questions and algorithms must consider up-to-date evidence on the most sensitive and specific symptom combinations to achieve best possible sensitivity and specificity • Symptom tracking tools have limited ability to offer differential diagnoses, and as such must be used with caution to not increase the risk of adverse clinical outcomes for diseases not encompassed in the tool • Symptom tracking tools need to be integrated with health care systems so that users have a clear referral pathway if medical attention is required • Interpretation of the data is limited due to uncertainty in the reporting denominators, potentially low specificity due to other respiratory pathogens, and limited positive predictive value, especially in low-incidence settings • Some tool developers are exploring extensions beyond user self-reporting of signs and symptoms to include monitoring of breathing patterns using microphones in smartphones and the integration of wearable devices that monitor parameters such as oxygen saturation • Written consent should be obtained before sharing health-related data

Source: World Health Organization. Digital tools for COVID-19 contact tracing: annex: contact tracing in the context of COVID-19. Geneva: WHO; 2020. Available from: <https://apps.who.int/iris/handle/10665/332265>