1. Public Health Perspective

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Types of Information Collected through Contact Tracing

Data Collected from Infected Persons

Symptoms and Course of Illness

Information about COVID-19 patients’ signs, symptoms, and course of illness is important to public health because it provides a basis for refining clinical case definitions and informing health care providers and the general public (CDC 2020c). This includes the specific signs and symptoms manifested by persons who are COV+ as well as the relative frequency and durations of different signs and symptoms. This would also take into consideration those persons with no symptoms but who test positive—those who are presymptomatic (develop symptoms later), those who are postsymptomatic (clinically recovered but still infectious), and those who never manifest illness at all.

Typically, contact tracing begins with a case in which a person has confirmation of infection by means of a diagnostic test. However, in some cases test results are not reported until several days later and individuals may be identified as “presumptive positive” cases until testing can be completed. In these cases, contact tracing efforts will need to be updated when test results are returned. For example, if a test comes back negative, public health professionals will want to notify contacts that they no longer need to quarantine.
Movement and Contacts

In order to manage cases appropriately (identify and track the infected, isolate the sick, quarantine the exposed), public health officials need details on each case (Resolve to Save Lives, n.d.). First, they need to know who and where the individual is. That means personally identifiable information and contact information (address, phone numbers, email). It also means information about the nature, intensity, and duration of contact with individuals to whom they may have transmitted the disease. This may include information about where the individual works and the kind of work they do (e.g., health care worker), how they travel (e.g., bus, subway, car), and where they shop, or any other public venues they may have visited during a period of possible infectiousness (PIH 2020a). It may be helpful in certain circumstances for public health officials to ensure that suspected cases, contacts, or other high-risk individuals are following isolation and quarantine recommendations or orders.

Contact tracing involves identifying all individuals who have had significant exposure to confirmed or probable cases during the time prior to and after the onset of symptoms, both of which are times when the case is thought to be infectious (Africa CDC 2020). Contacts could be those who are caring for COVID-19 patients, especially if they lacked proper PPE, and those who had close interaction with the COV+ person over a sustained period of time, particularly in enclosed spaces (PIH 2020a). For COVID-19, contacts are identified by asking a person with a confirmed or probable case about people they may have been within 6 feet of for 15 minutes or more, starting from 48 hours before the onset of symptoms and lasting until the person is isolated (CDC 2020b).

Data Collected from Contacts of Infected Persons

Contact Details

In addition to the data collected from individuals with COVID-19, contact tracers will collect data from potentially exposed individuals (contacts). Information about the nature, intensity, and duration of contact with an infected person may be collected for a contact if information about the case is known to the contact. These details can help a contact tracer more accurately determine whether the contact is at high or low risk for SARS-CoV-2 transmission and help determine whether a contact should quarantine for 14 days (the upper bound of the SARS-CoV-2
incubation period). In addition, public health professionals may gather contacts’ demographic information and other personal data to contribute to population-level disease surveillance and situational awareness about an epidemic (CDC 2005). However, the information needed at baseline is only a person’s name and contact information.

**Symptoms (If They Develop) and Course of Illness, as well as Information about Close Contacts**

If a contact develops COVID-19 symptoms while in quarantine and/or tests positive for the virus, public health will then collect the data required for a COVID-19 case. This includes collecting information on the contacts that a person may have had (if any) in the days immediately before and during the course of their infection.

**How Contact Tracing Information Informs Public Health Action**

To reduce disease burden and help make “reopening” safer during the COVID-19 pandemic, the United States and other countries will need to identify, gather information about, and safely isolate cases and quarantine their contacts to reduce community transmission (Watson et al. 2020). Gathering information about possible cases and their contacts enables public health to break chains of transmission.

Contact tracing involves stages (CDC 2020a), including:

1. identifying an infected person as a COVID-19 case,
2. identifying the close contacts of that case (Africa CDC 2020),
3. getting in touch with contacts,
4. asking contacts to quarantine at home for 14 days,
5. assessing contacts for possible symptoms, and
6. following up with COV+ persons and their contacts to identify new or worsening symptoms and connect them with medical care if needed.

Contact tracers also play an important role in providing resources for COV+ persons who are in home isolation and their contacts who are
in home quarantine. Knowing who and where cases and contacts are can enable provision of supplies, such as digital thermometers or masks. Effective contact tracing that enables isolated cases and quarantined contacts to remain at home also requires providing a range of social support services, or “care packages,” from delivering food and medicines to trash pickup. Furthermore, vulnerable individuals who are homeless or otherwise unable to sufficiently isolate or quarantine in their current living conditions may need to have alternative housing arranged to safely remain separated from others (CDC 2020b).

Finally, contact tracers explain what quarantined contacts should do if they begin to develop symptoms consistent with COVID-19 (Africa CDC 2020). Depending on the context, contact tracers may engage in active monitoring by regularly communicating with contacts about their health status through phone, text message, or possibly mobile applications. In rare cases, public health can make quarantine mandatory and may monitor a quarantined individual to ensure that they do not break quarantine. Contact tracers may also facilitate access to health care by providing telemedicine resources or other information and support for accessing medical care.

**Characteristics That Make Data Useful to Public Health for Reducing Disease Transmission**

**Data Access**

If digital contact tracing technology and closely related digital health products (together DCTT) are intended to support the public health actions described above and directly amplify public health capacity to conduct case identification and contact tracing, then data collected through DCTT must be accessible to public health authorities. Identifying information and location data for cases and contacts of cases are necessary for public health use so that contact tracers can do their work to uncover ongoing transmission and enable isolation and quarantine. These data should also be durable, meaning that public health can return to the data in order to interact with and support cases and contacts. These data can also be useful at a population level, if de-identified and aggregated, by illuminating trends in community transmission and providing support for decisions about resource allocation.
Data Format
Data should be provided to public health authorities in a usable format that is compatible with public health systems and that has the granularity and specificity of personal information that is needed for use in contact tracing. Without personal identifiers, the data cannot be used by public health workers to undertake contact tracing. Data should also contain information about the nature of a contact, including the proximity of the contact and number of minutes that the person was in contact with an infected individual. Location data can also help public health authorities to conduct contact tracing, particularly when contact occurred in a crowded area and involved people who don’t know one another. Location data from a case can help public health professionals identify contacts even when those contacts themselves are not using a contact tracing app because the data shows contact tracers where to look for additional contacts.

Data Accuracy
Data that identifies individuals as having sustained contact with a case must be as accurate as possible. If criteria for being considered a contact are too restrictive, it may result in missed contacts and sustained chains of disease transmission. If criteria are too broad, it may result in unnecessary restriction of movement, which could have significant personal and economic consequences.

Timeliness of Data
Data from cases and contacts must be timely in order to enable case-based management that will help reduce community transmission. For contact tracing to be effective, infected individuals need to be isolated, and their contacts identified and quarantined, as quickly as possible. Testing for SARS-CoV-2 can take time, sometimes many days for a test result. Especially because SARS-CoV-2 is transmissible during the pre-symptomatic period, data on symptomatic individuals should be made available to public health officials even before a positive test is returned in order to enable identification and quarantine of contacts right away. If this information is delayed until a test result is received, it may be too late to identify and quarantine contacts because contacts (if infected) will already be contagious and may have spread the virus to others.
**Volume/Availability of Data**

The more that individuals opt to share their information to support contact tracing, the more effective contact tracing will be in breaking chains of viral transmission and controlling epidemics of COVID-19. The exact proportion of cases and contacts that need to be identified in order to avoid large surges of cases, which overwhelm health care systems, is uncertain, but the goal is to identify all infected cases and all close contacts of each case ([PIH 2020b](#)).

**Recommendations**

- Technologies or apps with the goal of enhancing public health capacity to identify cases and trace contacts in order to control the spread of SARS-CoV-2 should be designed to match functionality with that goal.

- Technologies or apps may produce some false negatives or false positives, but they should be accurate enough that public health authorities feel confident that they support, and don’t detract from, contact tracing efforts.

- DCTT approaches for public health should be designed to facilitate the following:
  - identifying contacts, including those who may not be easily found otherwise;
  - finding and notifying contacts rapidly, before they develop symptoms if infected;
  - analyzing the nature of contact to determine whether contact is high, medium, or low risk, and to support decisions about whether a contact should quarantine; and
  - following up with cases and contacts so that public health can provide resources to support isolation and quarantine.

- Data collected through DCTT should be made available to public health professionals and to researchers in de-identified form to support population-level epidemiologic analysis.