

[Narrator] How many people do you think you've interacted with in the last three days? Could you remember everyone you talked with or spent time near? Your classmates? Other people on the bus or in your after-school activities? People eating near you at your favorite restaurant? And don't forget about your family! Have you given up counting yet?

Now, what if you found out that you were sick and could have exposed all of them to your infection? Would you remember everyone you were around *and* be able to provide their names and phone numbers so they could be notified of their exposure? Tracking everyone down can be quite the challenge. This type of investigation is kind of like a police detective looking for suspects. But instead of a crime investigation, public health workers do a case investigation — and your infection would be the first case!

A health department might launch a case investigation when they receive a weekly report that shows an unexpected number of cases of a particular disease, or even a single report of someone who has been newly diagnosed with a particularly contagious disease such as bacterial meningitis. Contagious diseases can be spread from one person to another, and the health department wants to control and reduce further person-to-person transmission as soon as possible!

Public health experts begin by interviewing the person who is infected to gather clues about the source and timeline of their infection. Investigators may ask questions about where the infected person has been and who or what they have been around recently.

Consider someone newly diagnosed with active tuberculosis, or TB. Where might the person have been infected, and could other people be at risk?

But this investigation would not end with the person infected with TB. TB is caused by bacteria that are transmitted through respiratory droplets that can come out of one's mouth and nose when laughing, sneezing, coughing, or even singing. The person infected with TB produces these droplets and can infect other people nearby. People who have been exposed to the infected person are called close contacts and are at risk of becoming infected themselves.

Health department staff conduct contact tracing to identify the contacts and see that they receive appropriate follow-up. Contact tracing is used for contagious diseases where timely intervention can reduce the spread of disease.

Meet Pavati, a public health nurse who works for the local health department. Pavati plays an important role in preventing disease and promoting community health and safety. She provides essential services such as vaccinations and community health education. She also serves as a contact tracer.

As a contact tracer, Pavati does two important things: one, she identifies and locates contacts to inform them of their exposure and two, she provides contacts with information and resources, all while respecting the privacy and confidentiality of her patients.

Educating people who are infected, and their close contacts, is important to reduce new infections because it can help them understand the importance of limiting close contact with

others. This can help reduce the number of people moving around in a community who unknowingly may be spreading disease. When appropriate for some diseases, Pavati might also help contacts access preventive treatment to keep them from developing the infection.

Before Pavati does contact tracing, she reviews the case investigation data. This includes information on the date of onset of symptoms in the person with the disease and information on people who were possibly exposed.

She also looks at the time when each contact was exposed and the circumstances surrounding the exposure. Remember, for a contagious disease, exposure means being close enough to an infected person for enough time for the infectious agent to spread from one person to another.

Being exposed to someone who has a contagious disease doesn't always lead to a new infection.

Sometimes the exposed person isn't susceptible. Maybe they have immunity because they recently had the disease and recovered, or they were already protected through vaccination. A person who is not susceptible may not become infected, even if exposed to the infectious agent.

Or a person may be susceptible, but not enough of the infectious agent spread to them. A person who is not exposed to enough of the infectious agent may not become infected, even if exposed.

After an infectious agent enters a person's body, it begins to multiply. The person is usually not aware of the infection at this stage. It can take some time for the agent to multiply enough for the person to start having signs or symptoms of illness. During the time before symptoms appear, the person is considered to be presymptomatic. When symptoms finally do appear, the individual becomes symptomatic.

The time period between a person's exposure and start of symptoms is called the incubation period. The incubation period may be relatively short, such as 6 to 72 hours for salmonella food poisoning, or longer, like the 2 to 3 months it takes for symptoms to appear after infection with the virus that causes hepatitis B.

The incubation period can also vary for the same disease, depending on the amount of exposure, how the agent gets into the body, and the infected person's immune response. For example, the incubation period for Ebola can range from 2 to 21 days.

Just as the incubation period can vary from person to person, symptoms can vary, too. Some people have symptoms severe enough to require a doctor's visit or hospitalization, or to cause death. Others may have mild symptoms that don't bother them very much. It's possible that some people may never experience any symptoms at all. People with infections but no symptoms are called asymptomatic. While being asymptomatic might seem lucky for the person,

it unfortunately means they are more likely to spread the infection because they likely don't know they are contagious.

This brings us back to the importance of contact tracing as a way to prevent disease from spreading in a community.

By knowing the infectious agent involved and when the person developed symptoms, Pavati can estimate their infectious period. This is when the person can spread the infection to their contacts.

For some infectious diseases, the infectious period begins when symptoms begin, such as when a person develops a fever or skin rash. For someone with a foodborne infection, the infectious period begins when they start racing to the bathroom. When people have symptoms that are obvious, transmission tends to be limited. Symptomatic people know they are sick and are more likely to stay home and away from others, which reduces the spread of disease.

For other diseases, the infectious period can begin late in the incubation period but before symptoms begin. This is an especially difficult situation because people can start spreading the infectious agent to others before they know they are infected! Examples include chickenpox and COVID-19.

Contact tracers use the information about where the infected person has been and who or what they have been around recently from the case investigation to identify contacts who might have been exposed during the person's infectious period.

For example, a contact tracer for TB would look for anyone who has been in close contact with a person with an active case of TB for more than 15 minutes. These are the people who have the highest risk for infection and usually include members of the same household, and can include coworkers, fellow students, and social contacts. Close contacts do not generally include fellow passengers sitting apart on public transportation, neighbors, or people with whom a person has had brief interactions, such as a store clerk.

The key to stopping further spread is to prevent these people from coming into close contact with others and infecting even more people, so contact tracers must act fast!

When Pavati reaches out to the contacts on her list, she tells them they were exposed to an actively infected person. It's important to note that Pavati would not say who the infected person is, to protect the infected person's privacy.

Pavati will give any close contacts resources about monitoring themselves for signs and symptoms, getting tested as needed, seeking medical care, and how to prevent spreading the infection to others, such as through wearing a mask and self-quarantining.

Self-quarantine means that the contact stays home and away from others for a certain amount of time - often the maximum incubation period - even if they do not have symptoms. This is important because a contact could be presymptomatic or asymptomatic. If a contact continues

to live life normally — like going to school, talking with friends in their after-school club, going to restaurants, or working their part-time job — they could spread the disease to others!

Pavati will also remind contacts who test negative that they should still continue to self-quarantine until the end of their potential incubation period, because they could still be infected. Remember, it takes time for infectious agents to multiply — a negative test might mean that there is no infection, or it might mean there were too few infectious agents in the body to be measured at the time of testing. In other words, a person who is infected, but just beginning their incubation period, may test negative at first, but later develop symptoms or test positive as the agents continue to multiply!

Contact tracers may schedule routine follow-up visits with contacts to monitor their health, and remind them about important resources and preventive actions. Contact tracers can also use a text messaging or an app-based monitoring system to check on contacts.

This allows the contact to report any signs and symptoms or any positive test results. If a lab test comes back positive or the contact starts to experience symptoms, the contact tracer can then consider them a person with a case of disease and instruct them to self-isolate.

Self-isolation is when an infected person stays home and away from others for the entirety of their infectious period. So, the timeline for self-isolation starts the day that a person first has symptoms or receives positive results on a laboratory test and does not include the days that they had already been self-quarantining as a contact. This is very important because most symptomatic cases can spread the infection to others.

Because the contact now is infected, the health department will be back in touch with them shortly to conduct a case investigation, which will start this whole process over again.

This is why staying home and self-quarantining is important--so that if you are exposed, and later do have symptoms or test positive, you will have prevented yourself from spreading the disease to your friends, family, and your community!

As a quick recap, we can now answer the question “Why is contact tracing so important?”

Contact tracing is a way to stop the spread of disease. By interviewing people who have been exposed, are showing symptoms, or test positive for a disease, public health experts like Pavati can build a timeline of events such as exposure and the start and end of incubation and infectious periods.

They also create a list of people with whom the infected person came in contact. People on this list can be notified about their possible exposure. Contact tracers can also educate close contacts about signs and symptoms of disease and getting tested. Contacts would also be advised to prevent the spread of infection by self-quarantining. In some cases, it may be recommended that contacts be treated to prevent infection.

Contact tracers monitor contacts and, if they develop symptoms or test positive, can provide them with more information on self-isolation and seeking medical care and treatment. This new infection will be the start of a new case investigation and then contact tracing will begin again!