



FOCUS on Field Epidemiology

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Contact Tracing

Introduction

Imagine that you are a tourist in a large city. You have been searching for a painting by a favorite artist, and you've heard that a small gallery somewhere in the city is displaying her recent work. But how do you find this gallery?

You ask the concierge at your hotel, who says he has heard of the gallery and knows it is located downtown somewhere. You trudge downtown, but the city is very large, and "downtown" extends for miles. How will you ever find one small artists' gallery? Would you start at one end, and walk up and down every street in the downtown area until you stumbled across it? Of course not.

Instead, you will stop and ask someone to point you in the right direction. To get the best directions, you will need to seek out someone "in the loop," someone who knows the area and is familiar with the local art scene. You are more likely to get useful directions from the owner of another art gallery or a local artists' guild than from a business person who only comes downtown for work.

The process is similar when you need to find someone who has been exposed to a disease. If you only know that a random person somewhere has been exposed, finding this person will be like looking for a needle in a haystack.

If, however, you can identify someone who can tell you who was exposed and when the exposure oc-

curred, you are much more likely to find the exposed person.

In many communicable disease investigations, your best source of information is the person who might have exposed someone else to disease. This type of tracking is called partner notification or contact tracing.

This issue of FOCUS discusses the steps involved in partner notification or contact tracing. This type of investigation can be very sensitive because it often involves discussing intimate relationships and diseases such as sexually transmitted infections (STIs), including HIV/AIDS.

Partner Notification

Partner notification is "the process of locating and notifying partners that they have been exposed to a disease." (1) A partner in an HIV/AIDS investigation, for example, is anyone who has engaged in sexual activity or shared needles with the original patient.

Partner notification is sometimes referred to as contact tracing, which may be a more appropriate term for diseases that are spread through non-sexual contact, such as tuberculosis and other communicable diseases.

The primary purpose of partner notification is to prevent further transmission of disease. (1) Partner notification for disease prevention has become even more important with the advent of HIV/AIDS.

Other goals of partner notification/contact tracing are:

- to educate and treat infected individuals, and
- to educate, test, and treat (if needed) individuals exposed to an infectious disease.

Use of Partner Notification

Partner notification is used most commonly for syphilis and HIV/AIDS. It can also be used for other STIs such as gonorrhea and chlamydia, depending on the resources of the health department. (2,3)

Contact tracing is used routinely for tuberculosis (TB), and in outbreaks of diseases such as measles, bacterial meningitis, Hepatitis A, and severe acute respiratory syndrome. Contact tracing systems have also been developed for diseases such as smallpox in response to the possibility of a bioterrorist act. (4)

Partner Notification of Sexually Transmitted Infections

Partner notification in STIs is guided by state law. Although there are variations in the process depending on the state, health department, and type of disease, the CDC recommends the following steps for effective provider referral case management of STIs (1):

Pre-Interview Analysis

The interviewer first reviews available medical and case data to learn the status of the case (new or recurrent), medical information on the patient, pregnancy status for women, and issues unique to the patient such as embarrassment, sexual orientation, drug use, cooperativeness, attitude, history of domestic violence, and psychiatric issues.

Based on this information, the interviewer establishes the time during which the patient could have spread the disease to others. This begins with the earliest date the patient could have been infected, and ends with the date of treatment. The information may be obtained from health department, physician, hospital, jail, or prison records.

Initial Interview

The purpose of the initial interview is to prevent further transmission of disease through identification and communication with the index patient and his or her partner (s). This is done by educating the patient about the seriousness of the disease and the importance of cooperation, by providing the patient with a risk reduction plan and appropriate community referrals (such as substance

Interviewing Challenges

Often interviewing is not as straightforward as it may sound. Challenging situations the investigator may face include:

- Finding a homeless individual who has no home address, only information about what soup kitchen or shelter he/she frequents.
- Finding a prostitute based only on his/her “street name,” physical description, and where he/she usually works.
- Working in dangerous neighborhoods or places (such as crack houses).

abuse treatment centers or prenatal care), and by eliciting partner information from the patient.

Partner elicitation is accomplished by asking the patient for the names (including nicknames) of sexual and needle-sharing partners. For each partner, the interviewer asks for frequency and dates of exposure, address, phone/beeper numbers, place of employment, and a physical description. The interviewer also asks who the partner lives with, where the partner hangs out, and whether the partner has been incarcerated. The interview can also provide information about other high-risk individuals (called “suspects”) who are not partners of the patient but may need medical evaluation.

The goal is to obtain enough information to find the partners and suspects so that the interviewer can provide them with education and risk-reduction counseling and refer them to medical care for testing and treatment, if needed.

Re-Interview

While ideally, all pertinent information is gathered during the initial interview, a re-interview is often needed to gather more partner information, re-emphasize risk reduction and referrals, clarify any illogical statements made by the index patient and elicit additional partners or suspects. Re-interviews are usually done within several days of the initial interview.

Case Closure

A case is closed when the investigator and his or her supervisor agree that all reasonable steps to intervene in disease transmission have been taken.

Cluster Interviewing

Another method used in contact tracing/partner notification is **cluster interviewing**, which expedites the intervention process when there is not enough partner information to allow investigators to reach partners individually. Cluster interviews gather information about previously unnamed partners or cases and about any persons who might benefit from a medical examination. This method may identify partners whom the case patient is unwilling to identify.

For example, a syphilis patient may provide limited information about his sexual contacts due to confidentiality concerns. A cluster interview would attempt to find others at risk by interviewing the patient's partners and suspects who are not known to be infected. During interviews the investigator does not disclose the names of those individuals who are infected or at risk of infection, but instead conveys only that syphilis has been diagnosed in the area.

The investigator then provides each person with information about syphilis and encourages the person to get tested. The investigator also emphasizes that the person can decrease risk in her social network by offering names of partners and other high-risk individuals to be similarly interviewed. Information obtained from cluster interviews may be used to determine risk profiles and geographic locations of target groups for screening.

Tuberculosis in a Transgender Network

In the summer of 1998, the Baltimore City Health Department was notified of 4 cases of tuberculosis among young men. (5) During initial interviews, all the men indicated they were part of a transgender social network and participated in "houses" (social guilds for men who have sex with men and transgender persons).

Investigators began by conducting a traditional contact investigation (i.e., identifying close contacts of ill persons) and thus identified 14 contacts. Then, through additional interviewing, investigators developed a profile of people participating in the social network. People met the profile if they had a history of membership in a "house," had attended specific events, or reported cross-dressing. The process was similar to cluster interviewing in that the people identified through the profile were not necessarily close contacts of confirmed TB cases.

Using the profile, the investigators identified an additional 91 contacts. Thus, by employing a combination of traditional contact tracing and social network profiles, the investigators found 6 additional cases of tuberculosis.

Partner Notification/Contact Tracing of Tuberculosis

Contact tracing for non-sexually transmitted diseases is similar to that for STIs. In 2005, the CDC and the National Tuberculosis Controllers Association published guidelines for TB contact tracing (6), which recommend that a contact investigation be conducted when a patient has confirmed or suspected pulmonary, laryngeal, or pleural TB, and a sputum smear or chest radiograph indicates TB.

As with STI partner notification, the first step in a TB contact investigation is to gather background information about the patient from the medical record, reporting physician, or hospital infection control nurse. This background information can be used to determine the infectious period for the patient.

Interview

The patient interview should occur within 1 business day of reporting for an infectious patient and within 3 business days of reporting for a non-infectious patient. If possible, the interview should be conducted in person. The interviewer gathers information about places where disease transmission could have occurred, including the patient's home and congregate settings such as schools, nursing homes, correctional facilities, and homeless shelters.

For each place, the patient is asked for names, phone numbers, and addresses of people who may have been exposed. As you can imagine, depending on the infectious period of the patient, this can be a time-consuming process.

It is important for the interviewer to get as much information as possible while maintaining rapport with the patient. This may mean prioritizing the places of likely disease transmission and possibly following up with another interview.

Site Visit

By visiting the places of likely disease transmission, the investigator may identify additional contacts, including children, and determine the likelihood of disease transmission. For example, a visit to a homeless shelter will allow the investigator to see how many people sleep in the same room, how much ventilation there is, whether people eat together in a common area, and whether the shelter provides screening or other health services.

Prioritizing Contacts

Because resources for investigation and follow-up are often limited, the guidelines provide some criteria for prioritizing contacts. The most important criteria are age

under 5 years and compromised immune status, such as HIV infection. Secondary criteria are the type of exposure to the patient and other medical conditions such as diabetes.

Exposure is classified by the amount of air volume shared between the patient and the contact. The smallest amount—such as inside a car—indicates a high level of exposure, while the largest size—any space larger than a house—indicates a lower likelihood of exposure.

TB Investigation in Ohio

In January 2005, a woman came to the Ashtabula County Health Department in Ohio to have a tuberculin skin test as part of a pre-employment physical. (7) The skin test was positive, and the woman subsequently developed active tuberculosis, as indicated by chest radiograph and a positive sputum smear. Once the patient was diagnosed with active TB, public health nurses interviewed her to obtain information about all of her contacts. All of her contacts tested negative for TB.

However, additional cases of TB were reported to the health department in March 2005, and contact investigation of these patients resulted in more useful information. The son of one of the patients had been experiencing symptoms consistent with TB for the previous 4 years. Although various medical professionals had suspected TB, none had started the patient on TB treatment or notified the health department about the case.

The complete contact investigation uncovered 6 cases of TB after skin testing of 81 exposed contacts. Without the investigation, proper treatment would have been delayed for most of the cases.

Partner Notification in an Outbreak

In addition to its importance for routine public health work, partner notification/contact tracing is critical during a possible outbreak because it can identify additional cases infected with the disease and pinpoint possible sites of disease transmission.

San Francisco Syphilis Outbreak

In the summer of 1999, the San Francisco Department of Public Health learned of 2 cases of early-stage syphilis. (8) Both patients had met most of their sexual partners in the same Internet chat room.

When investigators interviewed the patients, they discovered that the patients did not have any identifying information about many of these sexual partners other than their Internet screen names. This required that investigators

modify the traditional partner notification process. They sent notification e-mails to the screen names and requested a reply.

Partners who responded were advised to undergo medical evaluation. Through this process of contact tracing, along with efforts to increase community awareness of the syphilis cluster, investigators identified 5 additional cases of syphilis.

Responsibility for Partner Notification

Depending on the situation and the persons involved, either a public health professional or the patient may notify partner(s). Generally there are 3 ways to approach partner notification: through the health care provider, the patient, or contract referral. (9)

Provider Referral

Provider referral occurs when a public health professional or health care provider notifies partners of their potential disease exposure. This notification is confidential and is done with the consent of the infected person.

Often a disease intervention specialist, who is a public health professional specially trained in partner notification, is responsible for partner notification of sexually transmitted diseases. However, other persons, such as clinicians or other public health department staff, may also perform partner notification duties.

For TB contact investigations, some health departments have team members devoted exclusively to contact tracing, while others employ public health nurses and other members of multidisciplinary investigation teams. (10) When TB is diagnosed in a hospital, the infection control practitioner or employee health nurse may be involved in contact tracing. (11)

Self/Patient Referral

Sometimes the patient takes responsibility for notifying his or her partners of their potential exposure and referring them to medical care. In such cases, the public health department staff work with the patients to help them prepare for the interactions with their partners.

Contract Referral

Contract referral is a combination of self referral and provider referral. The patient agrees to notify and to refer to medical care all partners within a certain time period. If the patient fails to do so, the provider has permission to notify and refer the partners.

Training of Investigators

Training varies depending on the background and job description of the investigator. Some receive intensive training through their state health department or the CDC.

For example, the CDC has a contact tracing self-study module. (11) If investigation responsibilities include drawing blood in the field, investigators should be trained in Occupational Safety and Health Administration (OSHA) standards and venipuncture. Other aspects of training may include role playing with practice interviews, HIV counseling and testing, confidentiality, and hands-on field experience with a mentor.

Training is very important because an investigator must know how to take sexual histories; effectively elicit partners' names; identify and locate contacts; refer persons for testing, treatment, and social services; and educate and counsel persons on high risk behavior.

Moreover, they must be able to apply all of these skills with individuals who often do not trust them, who may not be particularly happy to see them, who are concerned about their confidentiality, and who may not be motivated to cooperate. To do this successfully, the investigator must gain the trust of the patient and maintain patient confidentiality.

In addition to these interviewing skills, the investigator must be familiar with the epidemiology of the disease in question.

Legal Authority for Partner Notification

The legal authority for partner notification of sexually transmitted infections resides with the states. (1) The legal authority for mandatory disease reporting is derived from state law (12), and states may have slightly different organizational structures and approaches to partner notification depending on their state laws.

All 50 states require that certain diseases be reported to the appropriate state or

local health department, although the list of reportable diseases varies by state.

Confidentiality

Maintaining patient confidentiality about disease status throughout the entire process is imperative. Not only does this promote a trusting relationship between the investigator and the patient, but it is required by law to protect the privacy of the patient.

To this end, investigators should always attempt to interview cases and partners in a private setting. They should try to notify partners face to face and should never reveal the identity of the original case to the partner.

Investigators should not leave verbal or written messages for the patient that mention the disease, nor should they give confidential information to others such as spouses, friends, or family members. Furthermore, investigation documentation is confidential material and must be treated as such.

In addition to state and federal confidentiality laws, each public health department has specific confidentiality guidelines and legal regulations that investigators are required to follow.

Conclusion

Contact tracing may be carried out for different infectious diseases such as HIV, syphilis, and TB. It may be done by provider, patient, or contract referral.

While specific contact tracing procedures differ by state, the primary goal of contact tracing is to intervene in the transmission of an infectious disease. Education, testing, and treatment are additional goals of contact tracing.

Glossary

Index patient: A patient who is newly diagnosed with a disease and who is a candidate for an interview. Typically, the index patient is the first patient identified in a cluster of patients.

Partner (in the context of sexually transmitted infections including HIV/AIDS): A person who engages in any type of sexual activity or needle sharing activity with the case.

Suspects: Individuals who are identified as a result of an interview with an infected person, but who are not partners of that person. Three categories of suspects exist: people with symptoms of the disease, unnamed partners of an infected person, and others who might benefit from examination.

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- Risk Communication
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