# Purpose and scope of this document

The purpose of this document is to provide an outline, considerations, and/or starting point for jurisdictions to develop their own STI outbreak response plan. This guidance is not meant to be prescriptive, but rather is meant to (1) highlight content areas and considerations that jurisdictions might choose to address in local plans and (2) spur discussions within health departments as response plans are bring crafted.

This is a guide to be modified as necessary to meet the needs of each jurisdiction. This guide can inform discussion throughout the health department as part of developing an outbreak response plan. STI program managers should not expect to develop or manage each section but are encouraged to identify the stakeholders to be responsible for each section. Programs should review and update their outbreak response plans annually to ensure it remains current and in alignment with health department processes and evolving scientific knowledge.

We recognize that STI programs are currently strained, as many areas have been seeing increases in sexually transmitted infections in recent years, as well as other competing public health priorities. With these increases there have been questions and concerns about what constitutes an STI outbreak. In general, an outbreak is defined as an increase of disease among a specific population in a geographic area during a specific period of time. However, specific definitions for STI outbreaks are relative to the local context. For example, a small increase in congenital syphilis morbidity in an area without recent reported cases requires critical action, although it may not qualify as an "outbreak" based on statistical tests.

While the larger increase in STIs still requires resources and programmatic attention (and possible changes in approach or prioritization), this document is meant to address more defined increases that require a more focused and urgent response. The focus of this document is on the investigation aspect

of the response. The types of situations this document addresses include individual cases and/or clusters of:

- Organisms with clinically significant resistance (e.g., gonorrhea that is unsuccessfully treated with recommended therapy).
- Organisms not previously or recently detected in the jurisdiction (e.g., LGV, chancroid).
- New/rare clinical presentations of diseases (e.g., ocular syphilis).
- New populations or subgroups affected (e.g., syphilis among females, among attendees of a school).
- New geographic areas (e.g., syphilis on a Native American reservation that has not seen syphilis in many years).
- Any other distinguishing characteristic related to cases in a cluster.

# Outline for Outbreak Response Plan

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# Objectives

An initial step in development of an outbreak response plan is articulation of the objectives of a public health response to the local identification of an STI outbreak. Clear articulation of the objectives of a response may inform the scope and activities included in the response plan.

Possible objectives of a response include:

- Understanding why there are new increases in a particular STI
- Identifying opportunities for intervention and prevention of future outbreaks
- Establishing new partnerships with local clinical and community partners, as well as others within the health agency, to help improve health
- Limiting transmission within a community through rapid evaluation and effective treatment of partners

# Outbreak Preparedness

There are many actions STI programs can take ahead of time to prepare for an outbreak including determining the baseline level of disease and when the outbreak plan should be activated, establishing what roles are needed and who will be responsible for those roles, development of systems, capabilities, partnerships, or materials that may be utilized during an outbreak, and practicing an outbreak response.

In this section, consider what you can do to prepare your program for a potential future STI outbreak.

## **2.a.** Activation of the outbreak response plan

A program is responsible for determining the local threshold level of various STIs or circumstances that will trigger an activation of a response plan. These thresholds might not be based solely on surveillance data but could include concerning reports from DIS or clinical providers. In general, an outbreak can be defined as occurring whenever disease levels exceed what is expected in a given community. The community can be defined as small as a facility or establishment, census tract, neighborhood, city, county, region, or population defined by any number of sociodemographic characteristics (e.g., adolescents, persons who inject drugs). Unfortunately there are no magic numbers that can be applied in all situations for determining an outbreak; threshold levels need to be defined and determined based on local epidemiology (see CSTE Syphilis Outbreak Detection Guidance).

- What are the specific scenarios or thresholds when your jurisdiction will activate the outbreak investigation and response plan?
- At what frequency will data be reviewed to determine if an outbreak is occurring? Who is responsible for performing and reviewing these data analyses?
- What are the data systems to be used to identify the outbreak and to capture response efforts?
- Who is responsible for determining that an outbreak is occurring and if and what type of response structure to mobilize? Leading a response?
- Who in your organization needs to be notified of an outbreak?
- What are the specific jurisdictional responsibilities that can be determined in advance?

- Under what circumstances would you use an incident command structure to respond to an STD outbreak?

## **2.b.** Roles and responsibilities

As part of the development of a response plan, STI programs are encouraged to identify the person(s) responsible for determining whether an outbreak is occurring (has occurred). Programs are also encouraged to consider (1) the roles and responsibilities needed during an outbreak, (2) the job categories or specific persons that will fulfill the responsibilities of the roles, and (3) the management structure within which the outbreak response will operate.

The below list outlines possible roles and responsibilities that a program may wish to utilize during the course of an outbreak response and to define within an outbreak response plan. This list is not exhaustive, consider any additional roles necessary to effectively respond to an outbreak. As appropriate, individual persons may serve in multiple roles. Programs may opt to develop a phased approach, in which certain roles are activated initially and other roles are subsequently activated as needed, such as if an outbreak expands or becomes more complex. Additionally, an escalation of the response may necessitate that individuals shift roles: individual team members may be able to serve in multiple roles during a simple outbreak response, but may need to focus on a single role as an outbreak response increases in complexity. If using this phased approach, programs are encouraged to define the scenarios that would trigger activation of additional team members and roles. Flexibility is critical.  Specific roles that should be considered include:

- Leadership, management, and oversight of outbreak activities
- Surveillance activities
- Epidemiologic activities and investigation
- Data management and security
- Patient investigation, contact investigation, and partner services
- Laboratory specimen collection, transport, and testing oversight
- Clinical management of infected person and partners
- Control and prevention measures
- Risk communication and media liaison
- Coordination with external partners and agencies

- Outreach and guidance to and education of community healthcare providers
- Outreach to and communication with affected communities
- Support activities such as logistics and budgetary management

Programs are encouraged to specifically define the response structure, key roles and responsibilities, and identify specific staff or positions to fill those key roles while developing their response plan.

**Helpful Hint**: During an outbreak response it is important for people to be flexible; however, you don't want to pull staff in so many directions that nothing is accomplished.

## **2.c.** Additional staffing and resource capacity

During an outbreak response there may be a need for additional case investigation, data entry, epidemiologic analyses, and laboratory staff, as well as the need for staff that can implement outbreak specific responsibilities. For example, DIS are essential for contact tracing investigations and partner services, but DIS capacity within the jurisdiction can be quickly overrun during a large outbreak or multiple competing responses. STI programs may choose to determine the capacity of its DIS staff, clinical, and laboratory services before an outbreak occurs and to estimate at what point during an outbreak might the needs of the response exceed the capacity of existing staff. Additionally, programs may define how the daily responsibilities of those assigned to support the outbreak response will be re-defined or re-distributed to others that are not part of the response. Health departments can also consider how to shift resources during an outbreak and define the point at which (such as the number of cases) additional staff should be requested from local, state, or federal public health agencies. Developing memoranda of understanding (MOUs) and procedures to move staff within sections of a health department or between jurisdictions can be done in advance of an outbreak response.

It is important to connect with your Agency's emergency response/outbreak response office or division to understand what type of staffing, resources, and support they may be able to provide during future outbreaks. They may have preparedness tools, including other outbreak response plans, standard meeting schedules, and staff available to help manage a response.

Questions that jurisdictions can use to weigh these decisions are listed below:

- How many DIS currently work within the STI program? What is the average workload and estimated maximum workload of the DIS workforce?
- Are additional DIS, such as from neighboring jurisdictions or from a state program, available to assist during an outbreak? If so, how will the incoming DIS be credentialed and to what data systems will they need to access? What responsibilities will these DIS have during the response? How will travel and other costs be funded? What training will be required and who will supervise these individuals?
- Can other health department staff be cross-trained to assist DIS with contact tracing during an outbreak?
- What will the estimated impact be on other routine program priorities if and when health department staff are shifted to work on the response?
- What are the experiences or cultural competency of the DIS in working with the affected population?
- What are the available STI laboratory services and what is the workload capacity of the current laboratory workforce?
- What are the culture and antibiotic testing capabilities for the public health and other local laboratories?
- Assess the quality of the laboratory services
- What are the sources of STI care in the community?
- How well do STI clinical service meet the needs of the community? Staffing, training of clinicians, medication availability, etc.
- What clinics would be able to handle extra case volume if there was an outbreak?
- How can you prepare for potential needs for additional case investigation, data entry, and epidemiology staff?
- What MOUs or processes currently exist for transferring staff between departments or jurisdictions?
- What additional MOUs or agreements would be helpful to establish in advance?

**Helpful Hint**: You could consider working with the communicable disease groups and/or emergency response as they may already have outbreak plans in place and have thought through how to move staff during outbreak responses.

## **2.d.** Data security

Even during an outbreak, data security and confidentiality standards to protect personally identifiable information should be upheld. Having a plan in place prior to an outbreak may assist local staff with adherence to these standards during an outbreak.

- Identify which staff have a need for and permission to access laboratory, surveillance, and case management information, especially staff that does not normally work in the STI program.
- Ensure data collection is limited to information essential to the investigation and is maintained and transmitted in a secure environment.
- Data collection, analysis, and reporting should adhere to confidentiality and security statutes and protocols.

## **2.e.** Communications Plan

Clear and consistent communication amongst the team and with key stakeholders, local providers, the media, and the public may enhance the effectiveness of the response, minimize rumors and mistrust, strengthen partnerships, and minimize stigmatization of affected communities.

Programs may choose to designate one person, such as a public information officer, as the primary point of contact for media, and/or to clear all outbreak related messaging. Engagement of this person early in the response may enhance communication and coordination of messaging. Local and state health departments may have media relations offices that can serve as valuable resources. Follow the policies and procedures at your health department to work with your general council and media staff.

See also CDC's information on communicating during an outbreak or public health investigation.

Programs may also outline how best to engage and communicate with the affected communities. Pro-active development of communication approaches for affected communities may assist with explaining

complex scientific knowledge in a clear and understandable manner, and may facilitate cooperation with partner services and educational efforts. One potential way to communicate with the community may be through social media. Regular review of jurisdictional social media access and policies should be considered; identifying what is possible from a social media perspective in the midst of an outbreak is not ideal.

**Helpful Hint:** Health Alert Networks are a valuable tool in communicating with providers and other stakeholders. Ensuring ongoing recruitment of providers and updated contact lists are invaluable. CDC has STI Health Alert Templates available on our website.

## **2.f.** Identify partnerships and collaborations

Responding to an outbreak will often involve more than just health department staff. Taking advantage of existing partner relationships may be of exceptional value. Furthermore, establishing new partners prior to an outbreak will likely result in a more productive partnership than looking for partner assistance in the midst of a crisis. Partnerships may help to fill gaps in the capabilities or reach of an STI program or outbreak response team. While considering which partnerships to establish or strengthen, programs can consider what roles and responsibilities the partnering organizations may play prior to and during an outbreak. Programs can consider whether formal MOU should be established, whether the partnering organizations will be part of a response team or included in response team meetings, and the implications for and expectations regarding patient privacy and data confidentiality.

STI programs may wish to proactively partner with the health department's emergency response/outbreak response office. Health department emergency response offices may be able to provide to additional staffing, resources, and support during an outbreak. The emergency response office may also have preparedness tools, including other outbreak response plans and standard meeting schedules that may prove useful.

STI programs may also wish to collaborate with health department communicable disease groups, which may have outbreak response plans in place and may have experience with risk communication, logistical support, and staffing needs during a response.

STI programs may also wish to coordinate with health departments in neighboring counties or states and/or health departments in other geographical areas that may share sexual networks and transmission linkages with the STI program's own jurisdiction.

- What established partnerships are there within the health department that can be or should be harnessed given the nature of the outbreak (e.g., HIV, hepatitis, maternal and child health, mental health)?
- What established partnerships do you already have with medical providers, professional provider organizations, community based organizations, local businesses, laboratories, media outlets and other possible partners?
- What new partnerships can and should be established? (Including any non-traditional partners for your priority populations [e.g., churches, barbershops])
- What roles and responsibilities should these partners have during an outbreak?
- Are MOUs with key partners already established or necessary?
- Will they be included in outbreak team meetings?
- What kind of privacy and confidentiality protocols and expectations are necessary? Confidentiality protocols can pertain to individual cases and sensitive information about the outbreak.

# Considerations for Managing a Response

During an outbreak response your program will likely not be able to function normally. Demands on staff will likely be higher and routine policies and procedures may have to be amended. This section covers several aspects of managing and conducing a response.

## **3.a.** Management Structure

Health departments and STI programs may wish to outline whether (or under what circumstances) an incident command structure (ICS) will be established to manage the outbreak response. An ICS fosters rapid and efficient movement of resources and clear and efficient lines of communication, and may be able to provide additional resources. However, an ICS may need to be organized in a way that addresses unique aspects and sensitivities of STI control efforts. Discussions between the STI program and local emergency response staff or communicable disease groups that have responded to outbreaks in the past may help inform whether an ICS is appropriate for particular responses. Consider conditions under which the ICS would be instituted at the local city or county health department versus at the state health department.

Regular meetings during the outbreak response that include various aspects of the health department (DIS, surveillance, laboratory, clinical providers, leadership, communications, and outside partners) can be helpful so that everyone remains focused and engaged on the outbreak and information is shared efficiently.

Possible discussion topics may include:

- Purpose and scope of investigation
- Review of available information and the status of the outbreak, including successes and barriers
- Case definitions and updates
- Available resources and needed resources or capacities
- Roles of each group involved in the outbreak response
- Discussions of political sensitivities or possible stigma related to the outbreak and response

- Development of and updating of media messaging and strategies
- Communication of status updates to local, state, and federal public health officials

In addition, daily "chalk talks" with a subset of the response team (such as surveillance and DIS staff) about the status of specific patients and partners may be beneficial.

**Helpful Hint:** Working with your emergency management group may give you access to additional resources (e.g., staff, established organizational systems, logistical support, additional funding) when an outbreak is declared.

## **3.b.** Informing, Coordinating and Engaging with Partners

STD programs work with many partner organizations and it is important to inform and engage the partner organizations when there is an outbreak.

State and local health departments will likely need to work together as many outbreaks will spread beyond local jurisdictions and "surge support" may be required. State health departments may need to coordinate with health departments in neighboring states. Cases may present in surrounding jurisdictions so it is important to alert them of an outbreak and determine how these cases will be investigated. You can consider sending an Epi-X report alerting jurisdictions of the outbreak and calling for information on cases outside of your jurisdiction. It is also important to notify CDC of outbreaks you are investigating. Your CDC DSTDP project officer can help you identify additional resources (if appropriate) and can connect you to other state and local partners who may have insights into the specific outbreaks you are responding to. Additionally, keeping CDC in the loop may help streamline outbreak related communication.

Health care providers are important partners that may be able to provide new screening protocols to increase case finding and to extend clinic hours to ensure more people are tested and treated. Releasing a Health Alert Network (HAN) bulletin to providers can alert them to the problem and remind them of common signs and symptoms of disease and appropriate screening and treatment guidelines. STI Health Alert Templates are available on CDC's website.

Additionally, other community partners can help spread the word about the outbreak, teach individuals how to recognize signs and symptoms and how to protect themselves, and potentially even offer screening.

Partnerships to consider strengthening or developing for STI outbreaks include:

- Key healthcare providers (e.g. those serving large numbers of at-risk populations such as MSM)
- Community-based organizations
- Local businesses (e.g. bars, massage parlors or bath houses)
- Professional provider organizations
- Local laboratories
- National Network of STI Clinical Prevention Training Centers (NNPTCs)

**Helpful Hint:** Your emergency management group may maintain a list of healthcare providers and contact information that may be helpful for distribution of health alerts.

## **3.c.** Prioritization of disease

You may need to change disease prioritization during an outbreak. For example, if you are seeing a large number of early syphilis cases in a location that does not normally see syphilis cases, you may no longer have time to follow-up on gonorrhea cases. Additionally, if you are seeing an LGV outbreak but do not normally interview chlamydia cases, you may need to specify that suspected LGV cases should be interviewed, provide guidance to the DIS, and decide how to prioritize these cases. The outbreak response can help establish new disease priorities to ensure staff resources are used most effectively. You can also reach out to your CDC project officer for guidance on how to reprioritize activities during an outbreak.

- What changes should be made to your standard disease investigation priorities during the outbreak?
- Will you change policies related to field testing/treatment during an outbreak? Or who receives preventative treatment?

During an outbreak, DIS capacity may be overwhelmed quickly. Health departments can increase DIS capacity by shifting internal staff (e.g., by deploying current staff who previously worked as DIS) or moving staff from other jurisdictions. If an outbreak starts to exceed the state's current DIS resources, the state can request additional DIS support from other states. Some considerations before requesting additional DIS:

- How many DIS are needed and for how long?

- What skill sets are needed? (e.g. phlebotomy, rapid HIV testing, other languages)
- What are the expectations of responding staff? What are the expected responsibilities and duties, work hours, and command structure (i.e., to whom will the DIS report)?
- How will travel and other costs be funded?
- How will the incoming DIS be credentialed? What confidentiality agreements may be required? What data systems and other local resources will they be able to access? Could/should they be issued cell phones by the health department? How should they conduct field work?
- What are the health department's plans after responding DIS leave?

# Outbreak Investigation and Response

This section is optional to include in your outbreak response plan, but may be helpful for conducting a response.

An outbreak investigation identifies the characteristics of affected persons in the outbreak and the characteristics of the underlying risk network—information that can guide intervention efforts to improve health outcomes, prevent additional infections, and ultimately control the outbreak. An outbreak investigation includes the examination of current data and potentially the collection of new data to identify factors associated with transmission. The following are the goals of an outbreak investigation:

- Determine the size and scope of the outbreak and the risk network (e.g., undiagnosed cases, diagnosed cases not previously linked to the outbreak, persons at risk of infection)
- Identify factors associated with transmission
- Understand connections between cases
- Assess risk for ongoing transmission
- Determine the interventions that might stop the outbreak

There is no single correct list of steps for an outbreak investigation, but it is important to have a systematic approach so that during the intensity of the identification and response, critical steps will not be overlooked. The steps are not fixed in this specific order and are often not linear (steps occur simultaneously and may recur). Additionally, many components are dynamic and could change as additional information is gathered.

## **4a.** Determine the existence of an outbreak

Please see CSTE Syphilis Outbreak Detection Guidance for more information on how to determine the existence of an outbreak. Though this document is geared towards syphilis, it is applicable to any STI. In general, you need to determine if the observed numbers exceed the expected levels by establishing a baseline of disease. This could include changes that might not be routinely reported in surveillance data, such as changes in rates among sub-populations or unique clinical findings. Sometimes DIS or an

astute clinician may identify an outbreak that is not apparent in surveillance data. For something like a case of gonorrhea that failed treatment, one case may justify an investigation. Local health officials may take different views of the normal rise and fall in cases and whether changes merit an investigation.

- Describe how your health department will detect outbreaks.
- What systematic analysis and reviews of surveillance data will occur, and how frequently, as well as the threshold when the plan is to be initiated.
- How might the observations and experiences of the DIS be incorporated into the analysis? DIS may have epidemiological and contextual information that are not captured by surveillance reports.
- How will you include partner services and contact-investigation data, as well as observations by health department, community-based organization partners, and clinical staff?
- How do you want to be notified of an outbreak and what initial information should be collected about the outbreak?

## **4b.** Verify the diagnoses

An investigation could be initiated when the defined threshold for a particular STI is crossed. Furthermore, routine meetings including diverse program staff (DIS, clinicians, epidemiologists, surveillance staff, etc) can help identify possible increases of concern that may require more vigilant monitoring that might not be detected through surveillance data. A program's response will be tailored to the individual circumstances surrounding the increase. The intensity and scope of an investigation and response may differ depending on the number of cases, the magnitude of increase in a specific population, or some other factor.

It is important to be aware of changes in local reporting practices, changes in diagnostic methods, influx of populations, or a new physician or clinic in town with differing testing practices that may be an "artificial" cause of increases in reported cases. You can reach out to surrounding jurisdictions to see if they are also seeing an increase. If you are concerned about a change in clinical symptoms of STIs in your area, such as ocular syphilis, you could reach out to providers that normally report a high volume of STIs to see if they have noticed any of these symptoms in their patients. Programs may also want to review cases that have been interviewed, consider testing in high-risk settings, or perform cluster

interviews of individuals related to a possible outbreak. It is also important to verify that a laboratory or other diagnostic error is not the reason for the increase in cases. In regards to STIs, this might be particularly important for clusters involving LGV, chancroid, or antimicrobial-resistant gonorrhea. Programs may need to review clinical data to ensure cases fit the case definition and have been classified appropriately.

- If an increase in disease is identified, what are possible alternative explanations other than an outbreak? For example, did a new provider report a large number of cases at once? Are there data entry or data merging errors? What steps would be undertaken to determine this?

## **4c.** Establish a case definition and find cases

You will need to develop an outbreak case definition. This may be a modified surveillance case definition that should include information about the case in terms of person, place, and time. Person information may include age, sex, ethnicity, and sex of sex partners. Place information usually includes a geographic location (county, city) but can be as small as a school, party, or business establishment. Time information should be specific dates or a period of time that cases occurred. These cases may be a subset of the total number of STI cases occurring in the jurisdiction (e.g., gonorrhea among homeless population), so it is important that everyone understands the case definition and uses it consistently.

Chlamydia cases, or others that might not normally be investigated or interviewed for partner services by health department staff, may require an interview if they are considered part of an outbreak or cluster (e.g., LGV cluster). Having a structured questionnaire may be helpful when investigating outbreaks and can be developed ahead of time with modification during an outbreak.

Finding cases may require active, direct contact with selected physicians, clinics, certain institutions such as jails or prisons, other jurisdictions, or by public announcements. Case finding may include collecting and reporting pertinent information on cases including descriptive information about cases such as age, sex, residence; information about symptoms and onset of disease; and for sexually transmitted infections this could include name, sex, and contact information of sexual partners, how they met partners (i.e. specific venues, websites or phone applications), HIV status, etc.

## **4d.** Describe the data in terms of time, place, and person

Data on cases may come from multiple sources including surveillance data, investigator notes, clinical notes, jail databases, and social network sites.

- Review how case report data are formatted and stored and know what information is available for analysis.
- Review what agencies are reporting cases – clinicians, laboratories, health department staff, correctional facilities, substance abuse treatment centers, hospitals, or STI clinics?
- Review how data are collected from the source of the report and entered into the system, and review data completeness and accuracy.
- Explore how data linkages may be accomplished. Important case level data may exist in HIV surveillance systems, or in acute communicable disease case reporting. Linking these systems together could improve efficiency and provide useful data for characterizing and interrupting the outbreak.

Creation of a simple line list of outbreak cases can be helpful for describing and visualizing the data. A line list should include information in terms of time, place, and person (i.e., name, contact information, demographics, clinical and laboratory data, and some important risk factor information). Don't wait until the outbreak is over to describe the data. Looking at data from the beginning of and during the investigation can help you target interventions and determine where to put resources. You should re-evaluate periodically during the outbreak to determine whether the situation has changed.

Other examples of how to describe the data include:

### Time

Produce an "epidemic curve" by plotting the number of cases (y-axis) over the time of onset of illness (x-axis). This may help you get a better understanding of the course of the outbreak and potentially how many more cases you expect to see.

### Place

Mapping cases by place of residence, work, or another location may help visualize affected areas. This can be more important with other diseases where visualizing wind currents, sewage disposal outflows, or water supplies might help identify the vehicle or mode of transmission.

### Person

Reviewing the characteristics of cases such as age, sex, race, sex of sex partner, travel history, social networks, or other risk factors can help you define the group at risk.

## **4e.** Determine who is at risk of becoming ill

Collect additional information, including potential review of medical records and interviews or case investigations, as needed. Now you should have some basic knowledge of the number of ill people, when and where they were when they became ill, their general characteristics, and have a working case definition. This information can help you understand what population is at risk and help you target interventions, who should be targeted for increased screening, what clinics may need to provide extended hours, etc.

Possible ways to generate hypotheses include:

- Conducting key informant interviews or focus group(s) with disease intervention specialists and clinicians. Explore reasons for the increase in cases and attempt to define some commonalities of cases that have been interviewed.
- Construct hypotheses using information from interviews with several related cases
- Review medical records of selected cases for risk indicators and other demographic data
- Compare cases with disease during the period of increase with STI clinic and other clinic attendees without disease
- Outreach to and key informant interviews with members of the affected community
- Review of the surveillance system and clinical, laboratory, and programmatic operational policies to identify systems issues that would lead to increase or a perceived increase in cases
- Review available clinical services
    - Where are the cases seen initially?

- What are the hours of the local STI clinic?  Have the hours changed?
- What is the volume of patients at the STI clinic?  Has it changed?
- What are the policy regarding patient scheduling—appointments, walk-ins, a combination?
- Is there a co-pay?  Has the policy changed recently?
- Have there been medication stock-outs or other changes in the supply chain?

Discuss feasibility of hypotheses with key persons from public health, clinical, and affected communities in the local area. Inform public health officials, health care providers, clinical and laboratory managers, affected communities, and the media of the findings of the outbreak investigation and outline the response plan. Keep state and federal partners updated as well.

## **4f.** Data Analysis and Study Design

Programs may opt to outline planned epidemiological investigations and data analyses so that the new collection of supplemental epidemiological data or use of existing data sources can be conducted efficiently.

To guide the response, such analyses should ideally be conducted in a timely manner during the outbreak response and results communicated to response leadership.

Develop a hypothesis that explains the etiology of the outbreak and test this hypothesis by appropriate statistical methods

Case-control studies can help evaluate specific exposures and are the gold standard in outbreak investigations. However, they are time consuming and finding appropriate controls may be a challenge, and may not be applicable in all situations. Ecologic analysis of varying data sources may also be appropriate for exploration of hypotheses. For example, if one hypothesis is that *increased* access to health care may (and resulting increases in testing) suggest an increase in reported disease, exploring trends in insurance and health care access among the population at risk and test volume over time may be valuable. The initial hypothesis is a starting point and should address the at-risk population, transmission source, mode of transmission, exposures and risk factors for the outbreak. In general for STIs, the specific exposure that caused disease (condomless sex with an infected partner) is known.

### Compare the hypothesis with established facts

The hypothesis should align with the clinical, laboratory, and other epidemiologic facts of the investigation. Does the proposed exposure, mode of transmission, and affected population fit with the known facts of the disease? It may be necessary to pose new hypotheses and perform additional questioning if your analysis of your original hypothesis does not match with known facts of the disease. Keep in mind there may not be an obvious "smoking gun", as many health outcomes are multifactorial. By triangulating data across all hypotheses and discussing the findings collectively with partners, etiologic pathways may become apparent as well as opportunities for prevention and intervention.

### Plan a more systematic study

Though the field investigation and analysis may be over, there may still be a need or desire to evaluate something more systematically. You may want to better define the extent of the outbreak, evaluate new laboratory methods, determine the cost/effectiveness of an intervention or aspects of the response, etc. Sometimes these studies are performed after the outbreak but can help future responses. Weigh the value of collecting data to fill in gaps in understanding or that may be valuable in informing program priorities or outbreak planning in the future. While collecting enhanced data may be valuable, there is also the potential that such efforts could burden the response staff and/or impede the timeliness of the response.

## **4i.** Implement prevention and control measures

Unlike responses to many other outbreaks, STI outbreak responses can be sensitive, complicated, and often prolonged. Control and prevention measures should be aimed at interrupting transmission or limiting exposure, initiated throughout the response, and honed as information is gathered during the investigation. Interventions may include appropriate clinical management of cases and partners, partner services (including suspects, associates, and social networks), enhanced surveillance (targeted screening or enhanced case finding activities at jails, venues frequented by cases, or health clinics/emergency departments in areas with high rates), expanded clinical and laboratory services to ensure appropriate clinical management of cases and partners, and enhanced health promotion (such as provider training, media campaigns, or health alerts). Determining who should be offered prophylactic treatment and whether field testing and treatment will be performed are important considerations for program leadership.

Partnerships with community stakeholders can expand opportunities for intervention and outreach to affected populations. It is important that media is contacted by a Public Information Officer who can ensure that similar information is shared to media and community partners to avoid confusion and stigmatizing the affected population.

More information on STI outbreak prevention and control measures are available on CDC's STI Outbreak Preparedness, Detection, & Response website and in the Program Operations Guidelines.

# Considerations for the Recovery Phase

Within an outbreak response plan you can outline criteria for determining when to scale back response activities. After every outbreak investigation and response, a debrief or after-action meeting, including representatives from all areas of the health department and partnering organizations, may be held to discuss the response and how to improve for next time.  Notes taken from the meeting can inform improvements for the outbreak investigation and response plan. Preparedness counterparts may be helpful in providing tools and technical assistance on evaluating a response.

If you plan to evaluate the effectiveness of the response plan or your actions during an outbreak, consider early in the response (or even prior to the response) what data you will need for an effective evaluation. An evaluation should focus on effectiveness of the outbreak response, cost of the response, efficient use of resources, productivity of interventions, and relationships with providers and community based organizations, as well as effectiveness of the management structure of the response effort. Some outputs to consider for review include:

- Number of contacts and clusters initiated and the percent examined as a result of the outbreak response
- Number of new cases identified as a result of the outbreak response, by provider type
- Ratio of cases that were identified through active versus passive surveillance during the outbreak
- Number of sex partners and clusters receiving preventive treatment during the outbreak
- Increase in clinic attendance during the outbreak in STI clinics within the target area

Following an outbreak investigation, it is important to document the investigation, findings, and recommendations for many reasons. Sometimes documentation is needed before certain actions will be taken.  Including a description of the outbreak and response, interpretation of outbreak and response data, and listing of final recommendations, can serve as a useful record to inform future responses. A report can also serve as a record of accomplishments, how many interviews were contacted, partners elicited, brought to treatment, and the overall time and resources spend on the response. This data can help document the magnitude of the health problems, changes in disease trends, and serve as concrete evidence of program justification and needs. The process of writing a report and describing step by step

events can help see the investigation as a whole, from an unbiased view, and can also help with final interpretation and recommendations. The findings can also be shared with the broader public health community through conference presentations or journal publications. An example of a simple after action report is available in Appendix X.

# Appendix X.  After Action Report Template

**Name of the outbreak:**

**Location:**

**Dates:**

**Staff Hours Contributed:**

**Total travel costs:**

**Collaborating Entities:**

**Goals and Objectives:**

**Executive Summary**: Summary of the outbreak response, information should include

- Dates when the outbreak response was initiated and deactivated
- Activities preformed during response
- Total # of new cases identified
- Outcome or disposition of those cases
- # of contacts identified (dispositions)
- Contact index and cluster index
- # of cases identified as result of investigation activities
- Disposition of contacts

**Successes:**

**Challenges:**

**Recommendations for Improvement:**