

Control Measures

The purpose of outbreak investigations is to stop the current outbreak, determine how the contamination occurred, and implement prevention-based approaches to minimize the risk for future outbreaks. Whereas the investigation is critical for understanding the cause, effective control measures are critical for actually stopping the outbreak.

Specifically, the objectives of control measures are to

- Prevent additional exposures, and
- Alert the public, and tell people how to protect themselves.

In addition, investigation into the circumstances likely to have contaminated the food will lead to long-term prevention efforts.

The objectives of this phase of the investigation are to

- Prevent future outbreaks from the same uncorrected practices, and
- Identify changes in policy or practice changes that will prevent future outbreaks from similar causes.

6.0. Introduction

Rapid response is key. Rapidly assess information to identify suspected food or facilities, and send investigators into the field as soon as possible. Contaminated food may be served at the next meal, or an ill employee may repeatedly contaminate food products. Practices that led to the outbreak are likely to continue unless an intervention stops them. The source of the outbreak could be a nationally distributed food product, and a recall might be necessary to prevent additional illnesses across the country.

Jurisdictional differences determine when staff are sent to an implicated site. Some jurisdictions have policies of sending staff out immediately after a complaint about a food establishment. Others require multiple complaints about a site or wait until a specific food is implicated. Any time an outbreak is identified and potentially linked to a site, immediate response is critical.

The two major types of foodborne disease outbreaks—those originating from food-

service establishments or home processing and those originating from commercial processors/producers—require two different types of control measures. However, early in an outbreak, investigators are unlikely to know the actual cause of the problem. Some type of poor food handling practices can be found at any time in most restaurants. Going to a restaurant and identifying these poor food handling practices may distract from the outbreak investigation, if the outbreak is not local. Control measures will vary according to setting and time and might change as more information becomes available.

Communication is critical in determining what control measures to implement and when to change an intervention's focus. Field staff implementing control measures must constantly communicate with epidemiologists and laboratorians, who might uncover a different potential cause for the outbreak. Information gathered by field staff also can lead epidemiologists in a new direction.

6.1. Information-Based Decision-Making

6.1.1. Concurrent Interventions and Investigations

Control measures can be implemented concurrently with investigations. Waiting for laboratory results, confirmed medical diagnosis, or results of all investigations is not necessary before implementing initial control measures. Sometimes nonspecific control measures can be implemented immediately to prevent further transmission of disease, regardless of the type of disease or source (see section 6.2.1 below).

Sending at least two investigators to a food establishment implicated in an outbreak is best. One investigator can make certain food about to be served is safe (e.g., no implicated leftovers

are served, foods are at proper temperature, food was prepared without contact by bare hands, no ill food workers are preparing food). The second investigator conducts the investigation (e.g., obtains the menu to review everything served to cases, identifies persons who prepared suspected items, determines how the foods were prepared, determines what other groups were served the same foods). (See Chapter 5 for additional information about investigation steps.)

6.1.2. Considerations When Implementing Control Measures

Interventions such as recalling food or closing food premises can have major legal or economic consequences, just as inaction

6.1. Information-Based Decision-Making

or delayed actions can have important public health consequences. **The outbreak control team must balance potential consequences against the likelihood that any actions taken will prevent further cases of disease.** Issues to be considered when deciding whether to implement an intervention include

- **The quality of information.** Does evidence implicating a particular source include results of a controlled study (e.g., case-control study or cohort study)? If so, was the study well-designed and executed and of sufficient size to detect differences? What is the likelihood of information or selection bias or confounding? Are the findings of different studies consistent, e.g., several case-control studies undertaken at different sites or among epidemiologic, environmental, and microbiologic studies? Is the implicated source biologically plausible? Is the implicated source new or novel?
- **The outcome of the environmental assessment.** Do the findings from the environmental assessment support the conclusions drawn by the epidemiologic or laboratory team members? Does the environmental assessment establish a picture of events that could logically

support the overall epidemiologic picture of the outbreak?

- **The balance between consequences of taking and not taking action** For example, one is more likely to take action if the illness is serious or life-threatening (e.g., botulism or *E. coli* O157:H7), the population affected is at high risk for serious complications, or exposure is thought to be ongoing. Consider the potential impact on business or industry. Does taking action present a minor inconvenience or will it have resounding and lasting effects on the business or industry? Will the actions affect only one business or an entire industry? What is the burden on the involved public of taking action?

These considerations can add confidence to decision-making, but no one person should make decisions alone unless an imminent danger is obvious (e.g., an ill food worker is found preparing food and is excluded).

Decisions about implementing, or waiting to implement, an intervention require input from the entire investigation team, including epidemiology, laboratory, and environmental health specialists, and may need input from companies or trade associations.

6.2. Control of Source

6.2.1. Nonspecific Control Measures

6.2.1.1. *Neither food nor facility has been implicated*

If the pathogen causing an outbreak is known, limited control measures might be possible even before the mode of transmission is clear or a food or facility have been implicated. Control measures, at this point, will be nonspecific (i.e., not aimed at the definitive source of the outbreak) and focus on prevention of secondary spread among known cases and communications with health-care providers and the public.

Communications with health-care providers might include advice about specific treatment and follow-up of cases, instructions to cases on personal hygiene and ways to avoid spreading the infection to others, and infection control precautions for hospitalized and institutionalized patients. Communications with the public include practical measures to decrease risk for illness (e.g., avoidance of known high-risk foods or special instructions for their preparation) as well as basic food-safety messages and information about how to contact public health authorities to report suspected related illnesses.

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Alerting the public about an outbreak early in an investigation, when little is known (or can be done) about it, is not without controversy. Announcements about an outbreak (and even implication of a food without information about its origin) can alarm (and even panic) the consumers who can do little to protect themselves and cause them to undertake unnecessary or irrational actions. Such announcements can also negatively effect industry as the public strives to avoid all foods (or other products) possibly related to the outbreak.

The balance between possible harm to consumers and industry and likely benefit of such announcements must be carefully weighed. However, if such communications could prevent additional cases of the disease, they should be considered when the disease is serious, life-threatening, or widespread and/or may particularly affect individuals at high risk for poor health outcomes from the disease.

6.2.1.2. Facility has been implicated

Nonspecific control measures can be implemented when a facility has been implicated, even though a specific food has not yet been identified. **These steps are good public health practice and generally are effective, regardless of disease.** These critical first actions include

- Properly holding the leftovers for further laboratory analysis, if warranted;
- Stopping bare-hand contact;
- Emphasizing hand washing;
- Monitoring time and temperature control of food;
- Excluding employees ill with gastrointestinal symptoms (e.g., nausea, vomiting, diarrhea, stomach cramps); and
- Prohibiting serving of uncooked foods if any possibility of norovirus exists.

In deciding what control measures to implement, check with epidemiologists and laboratory team members to determine the type of pathogen thought to be the cause of the outbreak if the specific cause is not known. For example, on the basis of the symptoms of ill persons, these team members can characterize the type of agent involved—e.g., viral, bacterial, chemical. This information can assist in identifying and prioritizing control measures.

Check the history of the establishment for previous outbreaks or food-safety problems. What is the establishment's history of correcting violations? A history of serious hazards or of not correcting violations might warrant closure.

While taking these first actions, be sure to collect samples for laboratory analyses.

Discarding suspected food can help stop the outbreak, but isolating the etiologic agent from the food provides additional evidence of a particular food as the outbreak's source. It is important to collect food samples as early in the outbreak investigation as possible. Whether to analyze these samples can be decided later when more information is available. Storage capacity for samples collected for later analysis should be considered before an outbreak. Contact your public health laboratory to find out how much food to collect, how to collect it, and how to store it.

6.2.2. Specific Control Measures

When a specific food(s) has been implicated, specific control measures can be implemented. Although all of the following control measures are recommended, full implementation of all these practices might not be possible in many jurisdictions because of limited resources and competing priorities. Implementing as many as possible and as completely as possible will improve the effectiveness of the control measures.

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Control measures to be implemented vary depending on whether the implicated food is associated with food-service establishments (whether single or multiple facilities) or home processing or is processor/producer-based. The outbreak response team must initially determine whether a single facility or multiple facilities are involved.

6.2.2.1. Foods associated with food-service establishments or home processing

6.2.2.1.1. Removing food from consumption

- Samples should be collected of any foods discarded by the owner of an establishment or foods embargoed by public health officials.
- Ask that the owner discard or hold and discontinue serving all implicated food. If a facility, but no specific food, has been implicated, ask that the owner discard or hold and discontinue serving all food for which a link to the outbreak is biologically plausible. Before making this request, consider the severity of the illness and the nature of the implicated pathogen. For example, this action may be appropriate for *E. coli* O157:H7, but not for suspected norovirus. Reserve samples for testing.
- If the owner will not discard or hold and discontinue serving the food voluntarily, the agency might need to issue a public health order to require action. (This varies by jurisdiction; some agencies might be able to embargo food without a public health order.) In investigation and enforcement matters, issuing a written hold or embargo order establishes a clear expectation for holding the food. This will prevent the owner from destroying the food before the investigation is complete.
- Fully document the information that led to the decision (whether to remove or not remove food) and the process used to make the decision.

6.2.2.1.2. Cleaning and sanitizing

- Ensure the facility is thoroughly cleaned and sanitized, followed by microbial verification of the effectiveness of the cleaning and sanitizing processes. This includes disassembling all equipment and retraining staff on proper cleaning and maintenance procedures for the equipment. The cleaning and sanitizing process is particularly important if norovirus is suspected.

6.2.2.1.3. Training

- Require training of staff on general practices of safe food preparation and, if the specific pathogen is known, practices specific to control of that pathogen
- Require the facility manager to document training of both current and newly hired staff.

6.2.2.1.4. Modifying a food-production or food-preparation process

- Ensure that food-production or food-preparation processes are appropriate and adequate to prevent further contamination of food or survival and growth of microbes already present in food.
- Modify processes if needed to reduce risk, such as changing a recipe, changing a process, reorganizing preparation processes, changing storage temperatures, or modifying instructions to consumers. Evaluate the proposed times, temperatures, pH, and water activity level for controlling the pathogen of interest, on the basis of sufficient scientific evidence.
- Conduct follow-up monitoring to ensure that modified processes have been implemented and are effective in addressing the food-safety problem.
- Put in place a Hazard Analysis and Critical Control Point (HACCP) system or other preventive controls.

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6.2.2.1.5. *Modifying the menu*

- Eliminate implicated foods from the menu until control measures are in place. For example, if shell eggs are implicated, remove all foods that contain shell eggs, and substitute pasteurized egg product until the investigation is complete and proper controls are in place.

6.2.2.1.6. *Removing infected food workers*

- Ensure that infected food workers are removed from the workplace (see section 6.3.3).

6.2.2.1.7. *Closing food premises*

- If the facility has multiple problems, and if the owner is unable or unwilling to take immediate corrective action, closing the premises might be necessary. The facility must meet closure requirements as defined in local regulations, such as lack of hot water, vermin infestation, or raw surfacing sewage, or be determined from observation or evidence that disease could be spread due to increased risk factors.
- Ask “If this place is not closed, are more people highly likely to become ill? Would I let a family member eat here?”
- If the food premises are in an institution in which residents have no alternatives, work with institution staff either to identify options for bringing in food or to leave food premises open but eliminate high-risk items from the menu.
- If the facility owner will not act voluntarily, employ other control measures, such as cease-and-desist orders, permit action, and hearing in front of a judge.
- Follow local regulations when requiring closure of food premises. Reopen only when risk factors have been eliminated and testing indicates the problem has been eliminated.

6.2.2.1.8. *Communication with the public*

- If the outbreak involves only one facility, determine whether public notification is necessary. All members of the outbreak response team (epidemiology, environmental health, and laboratory) should be involved in making this decision. Ask the following questions:
 - Is medical treatment necessary for persons who may have been exposed to the etiologic agent? If so, public notification is critical.
 - Is public reporting of suspected illness necessary to determine the scope of the outbreak? If so, public notification might be appropriate.
 - Is the outbreak short-term so no further risk exists to the public? If so, public notification generally is not necessary.
 - Does risk for exposure still exist? People take food home from restaurants, so public notification still might be appropriate.
- Prepare communication following the agency’s risk communication protocols. Seek assistance from the agency Public Information Officer or the Public Information Officer at another agency if the agency with jurisdictional responsibility does not have this resource.

6.2.2.2. *Foods associated with a processor/producer*

Implication of multiple food establishments in an outbreak or receipt of multiple, seemingly unrelated reports of illness from consumers eating the same type of food suggest an outbreak caused by food contaminated at the processor/producer-level. Traceback investigations can help identify the point in the production and distribution process at which the implicated food most likely became contaminated and allow for targeted environmental health assessments to determine how the food became contaminated and to recommend specific interventions.

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Depending on the outbreak and probable point of contamination, most of the specific control measures listed above (6.2.2.1. Food associated with food-service establishments, or home processing) will also be appropriate once the point of contamination is identified. However, food implicated in these outbreaks might be more likely to be in distribution, at retail establishments or in the homes of consumers. Therefore, public health and food-regulatory agencies also will need to decide whether to remove the suspected food from the market using the procedures defined in 6.2.2.2.1 below.

Questions to ask in considering whether to remove food from the market

- Is risk to consumers ongoing?
- Is the product still on the market?
- Is the product likely to be in the homes of consumers?
- Does the information justify removing food from the market? Remove the food if
 - Definitive lab results show the outbreak pathogen is present in the product. The results must be based on a food sample that is representative of the food eaten by the cases and has been handled properly to avoid cross-contamination.
 - The illness and consumption of that food show a strong epidemiologic association (e.g., through a case-control or cohort study), even if the pathogen has not been isolated from the food. Strong epidemiologic association requires a good quality analytic study that definitively links the implicated food to the cases.
 - Epidemiologic association is not strong, but pathogen is so hazardous that the risk to the public is very high. Under these circumstances, there may be no analytic, controlled studies, but the descriptive epidemiology suggests an association between the disease and the suspected food.

Fully document the information that led to the decision (whether to remove or not remove food) and the process used to make the decision.

6.2.2.2.1. Procedures for removing food from the market

Once a decision is made to remove food from the market, the goal is to remove it as quickly and efficiently as possible. Foods with short shelf lives (e.g., fresh produce, meat, dairy products) generally are consumed or discarded within 7–10 days and already may have been disposed of. Foods with longer shelf lives most likely will still be around. Try to prevent additional exposure by ensuring suspected food is not eaten.

Contact the federal or state regulatory agency that has jurisdiction over the product. The Food and Drug Administration regulates the safety of most foods, except meat, poultry, and pasteurized egg products which are regulated by the U.S. Department of Agriculture. FDA (or USDA) will contact the manufacturer about the decision to remove the product from the market and will obtain the manufacturer's cooperation. The manufacturer may decide to issue a food recall. In addition, ask retailers within your jurisdiction to voluntarily remove the product from their shelves and distributors to voluntarily withhold the product from distribution.

Recall of food at the processor level generally requires federal and/or state action. In some jurisdictions, the local health jurisdiction will embargo (impound) the food (tagging the food to make sure it is not moved or sold or ordering it destroyed). USDA or FDA do not have authority to mandate such action without court order, so they may ask a state or local health jurisdiction to embargo the food temporarily. However, state and local jurisdictions must evaluate the merits of an embargo independently, according to their statutes or ordinances.

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The following recommendations for manufacturers and retail establishments can help ensure the recall is effective:

Manufacturers

Recall preparedness (before an outbreak occurs):

- Maintain product source and shipping information for quick access in conducting tracebacks and traceforwards during an investigation and/or recall.
- Develop the ability to rapidly notify all customers of a recall through blast e-mail and fax, calls, and mail to retail establishments who purchased recalled foods.
- Identify and develop procedures to prevent common errors that lead to recalled food being put back into commerce (e.g., recalled food is returned and accidentally put back into distribution by workers).

After a recall is announced:

- Quickly remove recalled contaminated product from the distribution system.
- Notify customers through the regulatory agencies and news media as needed.
- Ensure retail customers have clearly defined storage areas and handling processes for recalled products, including denaturing or other process to ensure foods are not resold.
- Put in place systems for safe handling or disposal of recalled products to avoid cross-contamination to other products, accidental redistribution, diversion, and creation of other hazards.

Retail Establishments

Recall preparedness (before an outbreak occurs):

- Maintain product source and shipping

information for quick access in conducting tracebacks and traceforwards during an investigation and/or recall.

- When store cards are issued, obtain customers' e-mail addresses, and inform them they will receive notifications of any recalls concerning items they purchase. Develop a standardized template for consumers giving permission to retail stores to provide their store card information to outbreak investigators.
- Develop the ability to rapidly notify all customers of a recall through blast e-mail and fax, calls, and mail to people who purchased recalled foods.
- Identify and develop procedures to prevent common errors that lead to recalled food being put back into commerce (e.g., recalled food is returned and accidentally put back onto shelves or into distribution by workers; product is pulled from sale, but another shipment arrives and is put onto the shelves or into distribution).

After a recall is announced:

- Quickly remove recalled contaminated product from commerce at the site.
- Notify customers through the regulatory agencies and news media as needed.
- Post signs at the point of sale to advise consumers about the recall.
- Put in place fail-safe systems that do not allow sale of recalled products (e.g., cash register flags recalled products and prohibits sale). Ensure stores have clearly defined storage areas and handling processes for recalled products, including denaturing or other process to ensure foods are not resold.
- Put in place systems for safe handling or disposal of recalled products to avoid cross-contamination to other products, accidental restocking, diversion to unsuspecting consumers, and creation of other hazards.

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Consider the possibility of homeless persons removing discarded product from the trash.

- For a highly dangerous condition such as botulism, food seizure by the health department or regulating agency is appropriate to ensure immediate and complete removal of the suspected food from the market

To improve the effectiveness of recall measures and industry response, health departments can

- Develop a list of control measures to implement immediately when an outbreak-related or illness-related recall has been identified.
- Identify industry needs, and develop guidance for interacting with health or agriculture officials investigating an outbreak. Provide retailers and manufacturers with 24/7 contact numbers and e-mails for regulators at the local, state, and federal levels, including FDA and USDA/FSIS.
- Develop guidance for communicating with the news media.
- Develop guidelines for mitigating impact of the recall, such as providing refunds for returned product.
- Develop templates, message maps, or community information sheets for common foodborne agents for use during an outbreak.

Regulators responsible for retail food facilities need a means to notify all food facilities in their jurisdiction immediately through e-mail, blast fax, or phone calls.

Identifying subcategories of facilities is highly recommended so notices can be targeted to specific facilities (e.g., notices of a seafood recall sent specifically to seafood restaurants). Lack of such a system is not acceptable. This process should include food bank donation centers and other sites that might have received food donations.

If any distributors or retailers refuse to remove the food, issuance of a public health warning and order to require action might be necessary. The appropriate agency for taking this action depends on the type of food and etiologic agent.

Monitor to ensure the food is completely removed. This often requires close cooperation among local, state, and federal agencies on recall effectiveness checks. If the product is not immediately removed, determine why. (Did the manufacturer notify the distributor? Did the distributor notify retailers of the recall? Did notifications occur but no action was taken? Was returned recalled product diverted and sold elsewhere?)

6.2.2.2.2. *Communication with the public*

Messages to the public about foodborne disease outbreaks should follow good risk communication practices. Ideally, templates for public messages should be prepared before the outbreak and used consistently. See general communication section below.

Notify the public if the outbreak involves distributed product. Provide information about how to handle the suspected product (discard, special preparation instructions, or return to retailer). Provide information about the disease, including symptoms, mode of transmission, prevention, and actions to take if illness occurs.

If the manufacturer refuses to recall the food, it should be advised promptly that public health agencies or regulators might issue their own notice to the public, and the notice could include the message that the firm declined to voluntarily recall the product. **The message to the public should describe the problem and provide clear actions.**

Means of notification depend on the public health risk and might include press releases, radio, television, fax, telephone,

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e-mail, or letters. The manufacturer, public health agencies, regulatory agencies, retail food establishment, or all four can initiate notification. These releases should be coordinated and include consistent messages to avoid confusing the public.

Attempt to reach all members of the population at risk, including non-English-speaking and low-literacy populations.

Provide only objective, fact-based information about the outbreak. Do not give preliminary, unconfirmed information. If a specific food—such as a particular brand of bagged baby spinach—is implicated, the press releases need to inform consumers whether the local jurisdiction is interested in obtaining the product from households that still have it, and if not, the proper method of disposal.

If the outbreak is large or the etiologic agent is highly virulent, consider setting up an emergency hotline so the public can call with questions. Persons answering the phones should be trained to give consistent responses. This may require authorizing emergency overtime to answer phones after the early evening news.

If press releases are to be issued by retailers or manufacturers, relevant local, state, or federal officials should review and approve them before release. Manufacturers often seek guidance on the contents of their press releases, and public health agencies can provide needed information.

The state or local agencies responsible for the investigation should issue their own press releases, even if the affected industry or business also is issuing a release. Local press releases often result in better coverage from the local media. If more than one state or local agency is involved, coordination of press releases is important. If time allows, give affected industry members or businesses an opportunity to comment on your releases. However, avoid prolonged negotiations about wording.

6.2.2.2.3. Postrecall reporting by the business

If a business or manufacturer recalls a product, it should prepare interim and final reports about the recall. The contents of these reports are used to determine the need for further recall actions.

The reports should include copies of all notices distributed to the public and through the distribution chain, as well as the following information:

- Circumstances leading to the recall and actions taken,
- Extent of distribution of the suspected food,
- Result of recall (percentage of suspected food recovered),
- Method of disposal or reprocessing of suspected food,
- Difficulties experienced in recall, and
- Actions taken to prevent recurrence of food-safety problems and any recall difficulties.

6.3. Control of Secondary Transmission

6.3.1. Information for Health-Care Providers

Communicate with health-care providers in the community to encourage them to report

cases of the illness under investigation and to provide specific treatment and infection control guidance. Encourage health-care providers to collect appropriate patient specimens.

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6.3.2. Information for the Public

Any outbreak is an opportunity—or “teachable moment”—to reinforce basic food-safety messages to the public and to inform the public about how to contact appropriate authorities to report suspected foodborne illnesses.

6.3.2.1. *Personal protection from disease outbreak*

- Thoroughly wash hands with soap and warm water after defecation and urination, and before preparing or consuming food. Also wash hands after changing diapers, assisting a child at the toilet, and handling animals or animal waste. Hand washing is the single most important measure to protect the health both of an individual and other people.
- At home or at a social gathering (e.g., potluck dinner), avoid eating food that has not been handled properly (e.g., hot food that has not been kept hot, cold food that has not been kept cold).

6.3.2.2. *Proper food preparation*

- Use best practices when handling food at home (thoroughly cook food; keep hot food hot and cold food cold; thoroughly clean all food-preparation surfaces and utensils with soap and water; avoid contaminating food that will not be cooked, such as salads, with food that must be cooked, e.g., chicken; and wash hands frequently with soap and water).

6.3.2.3. *Advice on personal hygiene*

- If you are ill, avoid preparing food for others until free of diarrhea or vomiting.
- Wash hands as described above (Section 6.3.2.1).
- If someone in the household has diarrhea or vomiting, clean toilet seats and flush handles, and wash basin taps and washroom door handles with disinfectant after use. If young children are infected, undertake these cleaning procedures on their behalf. If norovirus (which is highly resistant to adverse

environmental conditions) is involved, promptly clean contaminated surfaces with at least a 1:50 dilution of chlorine bleach and then rinse. Wash clothes, towels, and linens soiled with vomitus or stool at the highest temperature the item will allow.

6.3.3. Exclusion of Infected Persons from Settings Where Transmission Can Occur

(including food-preparation, health-care, and child-care settings)

Persons with an enteric illness can shed viruses, bacteria, or parasites for weeks after symptoms end. Infected skin lesions can be a reservoir for pathogens, which can be transmitted to food through bare-hand contact.

In general, if a person has been ill and is considered a possible source of pathogens, he or she should be restricted to specific areas and tasks that provide minimal risk for transmitting the disease. Even if given duties not involving food preparation, workers infected with norovirus can transmit infection, must wash their hands carefully, and avoid bare-hand contact with food.

If restricting the individual is not possible, excluding him or her from the facility might be necessary until all likelihood of shedding pathogens has passed. Testing the person may be necessary to ensure no further risk. Persons who are no longer ill with vomiting or diarrhea usually can return to work without testing if they practice good personal hygiene and are adequately supervised. The potential for risk is agent-dependent. For example a person shedding *E. coli* O157:H7 or *Shigella* is more likely to be a public health threat than someone shedding *Salmonella*.

For pathogen-specific guidance and other information about restriction and exclusion of food workers, consult the latest version of the FDA Food Code at <http://www.cfsan.fda.gov/~dms/fc05-toc.html>. State and local

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health departments may not have the legal authority to exclude food workers unless that individual has acute symptoms. In addition, scientific evidence supporting exclusion of food workers may not be reflected in state or local food codes or may not be available at all. However, if the outbreak control team believes a public health threat exists, the team should strongly recommend exclusion of food workers. Consult your local ordinances and state statutes to understand the legal authorities under which you must operate.

One issue to consider in deciding whether to exclude infected persons is the occasional retaliation by employers against workers, either by having their pay docked during or after the exclusion period or being fired. This can hamper investigations because employees may be reluctant to provide truthful health information to avoid exclusion. Strategies that can mitigate this concern include developing regulations that prohibit retaliation and helping employers identify alternate jobs that ill food workers can perform.

Identify and dispose of or embargo all food potentially contaminated by the ill or infected worker. When determining which food is at risk, consider food-preparation procedures, dates the food worker worked, and dates the food worker probably was able to transmit disease.

6.3.4. Infection Control Precautions

Work with the facility operator to create a risk-control plan or consent agreement so the operator knows exactly what steps need to be taken and has committed to control the situation and prevent additional outbreaks. The risk-control plan or agreement can include actions above and beyond those required by regulation (e.g., extra temperature checks and logging of temperature, mandatory glove use by all food workers, routine inquiries of staff before their shifts about whether they

have had diarrhea or vomiting in the last 24 hours). Ideally both epidemiologists and environmental health specialists are involved in creating this plan or agreement. Important aspects of the plan are (a) employee training and (b) adequate oversight to ensure employees follow proper procedures.

Educate food workers about the implicated disease (symptoms, mode of transmission, and prevention) and about general infection control precautions.

Emphasize the importance of thorough hand washing and not working when ill.

Reinforce the following:

- Policy of no bare-hand contact with ready-to-eat foods,
- Proper use of gloves and utensils when handling ready-to-eat foods,
- Proper holding temperatures, and
- Proper procedures for rapid cooling and thorough cooking and reheating of foods.

Infection control precautions for hospitalized and institutionalized persons with infectious diarrhea (particularly easily transmissible infections such as *Salmonella* serotype Typhi, *Shigella*, and norovirus) include

- Isolation of patients (e.g., in a private room with separate toilet if possible);
- Barrier nursing precautions;
- Strict control of the disposal or decontamination of contaminated clothing, surfaces, and bedding; and
- Strict observation of personal hygiene measures (see above).

Use chlorine solutions or other approved effective sanitizers or methods (e.g., steam cleaning carpets) rather than standard cleaning chemicals to clean and disinfect all surfaces after a norovirus outbreak.

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Recommended practices for infection control frequently are changed and updated. Routinely check key sources, such as CDC, to ensure your organization's recommended practices are current.

6.3.5. Prophylaxis

Set up processes with area hospitals, physicians, local health departments, specialty clinics, or other health-care providers to provide prophylaxis if needed. Have tested plans in place for large-scale prophylaxis.

Develop processes to identify and communicate with persons who may need prophylaxis. Depending on the organism, this might include giving special consideration to protecting special risk groups. For example,

- Certain groups are at higher risk than others for severe illness and poor outcomes from foodborne disease, including infants, pregnant women, and immunocompromised persons. Safe food-preparation practices and hand washing particularly need to be emphasized to these groups.
- Specific advice might need to be issued to certain groups, such as advising pregnant women and immunocompromised persons against consuming unpasteurized dairy products or other products potentially containing *Listeria*.
- Persons with underlying chronic hepatitis B or C may need to be advised to be vaccinated against hepatitis A.

6.4. Communication

6.4.1. With Other Members of the Investigation and Control Team

Communicate actions taken and outbreak status information to all persons involved in an outbreak investigation, including those in different agencies or different departments within the agency.

Keep the owners or managers of the implicated establishment informed, and notify them that they must share any new reports of illness or other new information that could affect the investigation. Illness complaints reported to retail food chains or the manufacturer about a commercial product may lead to expansion of a recall if additional product codes are associated with illness.

6.4.2. With Agency Executives and Other Agencies

Ensure that agency heads routinely receive information about the status of the outbreak investigation and cleanup.

If the outbreak is potentially multijurisdictional, ensure that other relevant agencies and organizations routinely receive status reports. These might include local, state, and federal health, agriculture, and regulatory agencies. If an outbreak potentially involves a food from a source outside the jurisdiction identifying the problem, notify all appropriate surrounding health jurisdictions, and call the manufacturer and the retail food store chain (if one is involved) to determine whether they also have received illness complaints. This early communication may help to identify the source quickly.

6.4.3. With the Public

If the public has been informed about an outbreak, periodically issue updates about the outbreak's status.

Recognize that the public obtains news from multiple sources—the Internet, television, radio, and newspapers. Use all available sources to disseminate information. Know the typical deadlines for local news outlets, and try to release information within those timelines.

6.4. Communication

If the public is not receiving needed information from the public health agency, people will get it from other sources (which might not be accurate). The public health agency should be seen as and act as the most reliable source of information.

An agency cannot wait until all the facts are available before communicating with the public. People need enough information to help them make good decisions to protect their health.

Important terms (e.g., risk, bacteria) might seem common but in fact often are misunderstood. Adopt a standardized format for reporting risk information. Communications about foodborne disease risks should be routine (meaning the same process should be used each time); this helps make the process more familiar and reduces concerns about the message.

In communication planning, adopt standardized scripts for reporting complex procedural or technical information about the investigation and actions the public should take. Messages to the public should be tested first with representatives of the target population.

6.4.4. With the Industry

Contact the firm(s) directly linked to an outbreak as soon as possible, and tell them as much as possible. Tell them about the findings that have implicated their product and clearly explain the significance of the findings. Advise them about potential outbreak control measures, such as voluntary recall of an implicated product. This communication can be complicated by an enforcement action that may result from the investigation, but honesty and forthrightness with the regulated firms remain important. Large firms often have their own staff who understand risk communication and know what decisions to

make. Some medium-sized and many small firms do not have such expertise and need more guidance. Laws and policies of state and local governments differ for these situations.

Understand your own legal framework so you know how to interact with firms potentially linked to an outbreak.

The food industry has many trade associations. Some overlap, but in general, every segment of the food industry has an association.

State, local, and federal agencies need existing working relationships with these associations before an outbreak. At the time of an outbreak, outreach by government agencies to the appropriate associations with information about the outbreak and about actions members should take is helpful to prevent spread of the current problem or similar problems in their firms. Similarly, establishing working relationships with food manufacturing facilities in an agency's jurisdiction can help smooth the investigation and control process should an outbreak be associated with those facilities.

Outbreaks can be a teachable moment for the food industry. When the news media carries stories about an outbreak, communication within the industry is lively, often with misinformation. Food-safety and public health agencies need to dispel misconceptions before they lead to other problems. These agencies also need to explain their response to the outbreak and restore public faith in the future safety of the implicated product.

Food-safety and public health agencies also can collaborate with industry on long-term development of training materials for members and can speak at industry meetings to clarify the prevention message.

6.5. End of the Outbreak

6.5.1. Determining When an Outbreak is Over

Most outbreaks are considered over when two or more incubation periods have passed with no new cases. This arbitrary rule may not apply to clusters with low attack rates, and cases from some sources may appear intermittently for years.

6.5.2. Determining When to Remove Restrictions

Remove restrictions when no further risk to the public exists, i.e., when

- Risk factors in the facility have been eliminated,
- Ill food workers have recovered and are no longer shedding pathogens,
- Tests indicate no further contamination,
- Employees have been taught how to avoid a problem, and
- Managers agree to provide appropriate oversight.

6.5.3. Postoutbreak Monitoring

Monitor the population at risk for signs and symptoms to ensure the outbreak has ended and the source has been eliminated. Consider conducting active surveillance, working with health-care providers to increase their vigilance for cases, and collecting stool samples from the population at risk.

Monitor the implicated foods or facilities to make sure no further contamination is occurring.

Maintain communication with the implicated facility, and tell them if additional information becomes available.

Increase the number of routine inspections at the implicated facility to ensure they comply with all required procedures. Old, unsafe practices often are difficult to change, and new practices might need to be used for ≥ 1 months before they become routine. Consider customized training to support the desired behavior change. Determine whether behavioral change has occurred long-term. If the inspection program is fee-based, consider charging more for additional inspections needed when a facility is implicated in an outbreak.

6.6. Debriefing

All members of an outbreak control team should be briefed about the results of the investigation. The complexity of the debriefing depends on the size of the outbreak. For a small outbreak associated with a single facility or event, a short written summary may be sufficient. For a large outbreak involving multiple agencies, a formal debriefing meeting is appropriate.

A formal debriefing meeting should

- Identify the cause of the outbreak and measures to prevent additional outbreaks at this and other facilities;

- Identify the long-term and structural control measures, and plan their implementation;
- Assess the effectiveness of outbreak control measures and difficulties in implementing them;
- Assess whether further scientific studies should be conducted;
- Clarify resource needs, structural changes, or training needs to optimize future outbreak response;
- Identify factors that compromised the investigations, and seek solutions;

6.6. Debriefing

- Identify necessary changes to current investigation and control guidelines and development of new guidelines or protocols as required; and
- Discuss any legal issues that may have arisen.

If additional information becomes available in the weeks or months after the outbreak and the official debrief, disseminate that information to the outbreak control team and appropriate external partners.

6.7. Outbreak Report

Prepare reports for all outbreaks. Again, the complexity will depend on the size of the outbreak. For small outbreaks, a simple summary (following a template established by the agency) should suffice. The report can be used to educate staff and to look for trends across outbreaks that can be useful in future investigations.

Use outbreak reports as a continuous quality improvement opportunity. If all the after-action reports say the same thing, then nothing is being corrected.

The final report of a large outbreak should be comprehensive, with information provided by all team participants, and should be disseminated to all participating organizations.

Sample outbreak reports are available on the CIFOR Clearinghouse website.

Given that outbreak reports, especially reports for large outbreaks, are likely to be subject to Freedom of Information Act requests, they should be written with public disclosure in mind. **The reports should not identify individuals or other legally nonpublic information unless absolutely necessary, nor should they include inappropriate language.** Proper care in writing the report will save time redacting information when the report is released to the public. Some jurisdictions allow or mandate the inclusion of identifying information, so know your local policies and laws.

6.8. Other Follow-Up Activities

6.8.1. Future Studies and Research

The outbreak investigation findings may indicate the need for future research. For example, investigators may determine that for certain pathogens in certain foods, standard control measures do not seem effective or that routine handling practices and their role in outbreaks are not completely understood. Such observations should be considered for in-depth study, either by the food-safety or public health agency or by research centers. **Identifying issues that need follow-up research is important to improving the practice of responses to outbreaks of foodborne diseases.**

6.8.2. Publication of Outbreak Results

If something unusual characterized the outbreak (e.g., unusual exposure, presence of a pathogen in a food where it had not previously been seen) the report should be disseminated more widely (Epi-X, *MMWR*, or other national forum; peer-reviewed journals).

Important lessons learned (such as new investigation methods that proved particularly helpful, control measures that seemed particularly effective, actions taken that seemed to shorten the outbreak) should be published in an appropriate national forum.

6.8. Other Follow-Up Activities

6.8.3. Education

An outbreak may identify the need for broad education of the public, the food-service and food-processing industries, or health-care providers. Public service announcements may be necessary to remind the public about food-preparation precautions. Training for food-service workers and managers and food processors might need to be modified to address specific concerns. Managers need to oversee training of food-service workers and food processors and their use of recommended procedures. Health-care providers may need continuing education focused on diagnosing, treating, or reporting foodborne diseases. Such actions can help prevent future outbreaks or reduce the number of cases or severity of illness during an outbreak.

6.8.4. Policy Action

Information gained during an outbreak may identify the need for new public health or regulatory policy at the local, state, or federal level. Establishment of different inspection practices, source controls, or surveillance procedures, or of increased control over the recall process might be necessary. Reports of past outbreaks should be analyzed to determine whether multiple outbreaks support the need for new policy. Other public health and environmental health agencies also should be consulted to determine whether concurrence exists on the need for new policy. If so, the issue should be presented to the appropriate jurisdictional authority using the appropriate policy development processes.

6.9. Multijurisdictional Considerations for Control Measures

Although control measures typically are implemented at the local level, multijurisdictional outbreaks require extensive coordination among agencies to ensure control

measures are implemented consistently and are effective. See Chapter 7 for Multijurisdictional Investigation Guidelines.

6.10 Indicators/Measures

Key indicators to help assess control measures and the overall success of efforts to halt

outbreaks have been developed and can be found in Chapter 8.

