

Respiratory Disease Outbreaks

1. DISEASE REPORTING

A. Purpose of Reporting, Surveillance and Investigation

1. Detecting respiratory disease outbreaks that can be controlled with public health measures (immunization, quarantine, etc).
2. Confirming the etiology of individual respiratory disease outbreaks, thereby guiding treatment and control measures.
3. Implementing control measures that decrease or stop transmission.
4. Identifying and correcting environmental conditions that may have precipitated the respiratory disease outbreak.

B. Laboratory and Physician Reporting Requirements

Health care providers are legally obligated under Oregon Administrative Rule 333-018-0000 to report cases of hantavirus infection, *Haemophilus influenzae* invasive disease, inhalational anthrax, legionellosis, leptospirosis, measles, pertussis, pneumonic plague, psittacosis, Q fever, Severe Acute Respiratory Syndrome (SARS), tuberculosis, and tularemia. In addition to individual case reporting, health care providers are also obligated to report, day or night, any disease outbreaks and any uncommon illness of potential public health significance. Reports are made to their local health department (LDH) or to the DHS-Public Health Division (PHD) epidemiologist on call (971-673-1111).

Laboratories are required to report results indicative of the reportable diseases listed above. Immediate reporting is required for infections with *Bacillus anthracis*, SARS-coronavirus, and *Yersinia pestis*. Reporting within 24 hours (including weekends and holidays) is required for *Haemophilus influenzae* isolated from a normally sterile site and measles virus. Reporting within one working day is required for infections with *Bordetella pertussis*, *Chlamydomphila* (Chlamydia) *psittaci*, *Coxiella burnetii*, *Francisella tularensis*, hantavirus, *Legionella*, *Leptospira*, *Mycobacterium tuberculosis*, and *Mycobacterium bovis*.

When all is said and done, however, respiratory disease outbreaks are commonly brought to the attention of state and local public health departments by concerned individuals affected by an institutional outbreak of respiratory disease.

C. Local Health Department Reporting and Follow-Up Responsibilities

Clearly, some respiratory disease outbreaks are due to mild upper respiratory infections caused by garden-variety rhinoviruses and would not be worth the resources involved in a formal outbreak investigation. Certain initial findings, however, suggest more serious illness and should prompt a closer look.

Potential triggers for investigation include

1. Evidence of severe illness (two or more deaths, or hospitalizations involving ≥ 3 individuals or $\geq 0.2\%$ of the cohort, whichever is larger) within a 2-week period in an institutional cohort.*
2. Chest x-ray-confirmed pneumonia in ≥ 3 epidemiologically linked individuals, especially if the etiology is unknown.
3. Unusually high morbidity in an institutional cohort* manifested by prolonged (≥ 3 days) and frequent absenteeism (≥ 10 individuals or $>20\%$ of individuals, whichever is larger).
4. Institutional outbreaks of influenza-like illness (documented fever $>100^\circ$ F with cough or sore throat) in settings involving a population at increased risk for severe complications from flu (long-term care facilities, medical group homes, or a neonatal intensive care unit or oncology unit).

* An institutional cohort is defined as the employees, students or residents of a worksite, school, or a permanent or temporary congregate living setting such as a long-term care facility, jail or camp.

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5. Outbreaks of vaccine-preventable diseases.

When these findings are present, please contact the PHD epidemiologist on call (971/673-1111) within 24 hours of receiving a report of a suspected outbreak. An epidemiologist from Acute and Communicable Disease Prevention (ACDP) will be assigned to review the situation with you and can assist if there is agreement that an investigation is warranted. PHD epidemiologists are, of course, glad to discuss suspected respiratory outbreaks that do not meet these criteria and to assist with planning and executing an investigation.

In some settings, such as in the midst of a widespread epidemic of respiratory disease, resources will not allow investigation of every outbreak meeting the above criteria. In those situations, higher thresholds for investigation should be considered. Give us a call.

D. Confidentiality

Data about individuals collected for outbreak investigations are strictly confidential under Oregon law (OAR 333-019-0005) and official DHS policy. For this reason, data collection is the sole responsibility of either state or local public health officials and must never be delegated to a third party unless that third party is obligated to maintain confidentiality under the Health Insurance Portability and Accountability Act of 1996 (HIPAA), the Family Educational Rights and Privacy Act (FERPA), or similar protective legislation.

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent, Illness Descriptions, Incubation Periods

The Public Health Division *Compendium of Respiratory Diseases*, attached to these guidelines, provides information about selected respiratory pathogens. Reviewing the symptom profiles, incubation periods, etc. may help you figure out the etiologic agent.

B. Reservoirs

Humans are reservoirs for influenza, respiratory syncytial virus, adenovirus, *B. pertussis*, *M. tuberculosis*, *Mycoplasma*, and pneumococcus. Birds can harbor psittacosis and, potentially, novel strains of influenza that rarely infect humans. Pigs and other mammals can also carry strains of influenza. Deer mice can carry hantavirus, prairie dogs can carry plague, and *Legionella* species often arise from water systems in the built environment.

C. Sources and Routes of Transmission

The bulk of respiratory pathogens enter the body by (you guessed it!) the respiratory route, often by inhalation of organisms released into the air from sneezing or coughing. Some, like *M. tuberculosis* and rhinoviruses can travel long distances on air currents before settling. Others, such as influenza, adenovirus, *B. pertussis*, *H. influenzae*, *Mycoplasma*, coronavirus, and respiratory syncytial virus, are carried by larger respiratory droplets that typically settle out of the air after traveling 3-6 feet. *Legionella* is transmitted by inhalation or aspiration of contaminated water or water vapor. Hantavirus infection results from inhalation of aerosolized rodent excreta, while in Psittacosis, the untidy culprits are typically birds such as parrots or cockatoos. Certain infections, including *B. pertussis*, adenovirus and rhinovirus, are also readily transmitted through contact with respiratory secretions or contaminated fomites.

D. Period of Communicability

The Public Health Division *Compendium of Respiratory Diseases* attached to these guidelines, provides periods of communicability, which vary from agent to agent.

E. Treatment

For a number of these conditions, treatment, if needed at all, consists of supportive care, plenty of Kleenex®, and adequate hydration. Antibiotics are indicated for *B. pertussis*, pneumonia due to pneumococcus, *H. influenzae*, *Mycoplasma*, legionellosis, and *M. tuberculosis*. Antiviral therapy may lessen severity of disease and shorten the duration of illness for seasonal and pandemic influenza, although the therapy of choice may differ between the two. A monoclonal antibody, palivizumab, has been used preventively in infants at high risk from RSV infection to decrease the likelihood of severe disease.

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F. Susceptibility/Immunity

Widely used and effective immunizations exist for several of these pathogens, including seasonal influenza, pertussis, and pneumococcus. That said, antigenic drift and the luck of the draw in choice of strains included in the annual influenza vaccine lead to varying levels of protection from year to year. Vaccine-induced immunity to pertussis wanes over time, requiring a booster in adolescence or adulthood that many have not yet received. While a 7-valent vaccine used in childhood prevents pneumonia and other pneumococcal infections (bronchitis and otitis for example), the 23-valent type used in adults prevents bloodstream infections and meningitis, but not pneumonia.

Susceptibility to *M. tuberculosis*, hantavirus, adenovirus, and whatever rhinovirus is circulating this week is essentially universal. Infants (pertussis, RSV), the elderly (seasonal influenza, *Legionella*) and immunosuppressed individuals are more likely to suffer serious illness from selected agents.

3. CASE DEFINITIONS, DIAGNOSIS, AND LABORATORY SERVICES

A. Confirmed Respiratory Disease Outbreak

Two or more individuals with the same laboratory-confirmed respiratory disease agent (confirmed cases) and who are in the same institutional cohort or who are epidemiologically linked through mutual contact with another confirmed case or cases, or by exposure to an environmental source that could reasonably be expected to cause the disease.

B. Presumptive Respiratory Disease Outbreak

One confirmed case of respiratory disease epidemiologically linked (as in §3.A, above) to one or more individuals with the same symptom profile.

C. Suspect Respiratory Disease Outbreak

Two or more epidemiologically-linked individuals with respiratory disease who display at least one of the characteristics described in §1.C, above.

D. Services Available at the Oregon State Public Health Laboratories

Laboratory testing for multiple agents on all outbreaks is prohibitively expensive. Consulting PHD epidemiologists to develop “a differential diagnosis” based on case histories is, therefore, required prior to submitting clinical specimens for analysis. For stumpers, CDC may offer to test specimens using TaqMan Low Density Array (TLDA), a customizable 384-well microfluidic card that can test up to seven specimens or 21 pathogens simultaneously.

4. ROUTINE CASE INVESTIGATION

A. Collect Preliminary Data

1. What is the symptom profile?
2. Are there ≥ 2 individuals with the same symptoms and onset dates close in time?
3. How many individuals appear to be infected?
4. Is there a definable population at risk, and for whom control measures might help mitigate disease?
5. Is there evidence of severe respiratory illness (hospitalization or death) that could reasonably be expected to be communicable or from a common environmental source?
6. Does the outbreak of respiratory disease involve a vulnerable population?
7. Does the clinical picture or laboratory testing suggest an outbreak of a vaccine-preventable disease?

B. Call ACDP

1. Call at 971-673-1111 for referral to the Urgent Epidemiologic Response Team (UERT), if indicated, for an outbreak number and assistance.

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- Confirm the outbreak (or not),
- Make a "best guess" as to the cause of the illness using the *Compendium of Respiratory Diseases*,

Depending on the circumstances, it may also be useful to:

- Write a preliminary case definition that includes person, place and time (case definition will be finalized before data analysis begins),
- Complete a case log, or in some cases, create a brief respiratory disease outbreak questionnaire,
- Design a sampling strategy if needed,
- Start active case finding for others who may have been affected,
- As indicated for some conditions, assist with investigation of contacts.

C. Get information about the facility and population affected

Determine the population at risk (number of students and faculty in the school, number of staff and guests in the hotel, number of attendees at the convention, etc.)

If legionellosis is suspected, work with environmental health to determine if all parts of the building are served by the same HVAC system. If not, obtain a diagram of which parts of the facility are served by each of the systems in place.

Inquire about any unusual circumstances just before the outbreak began. Power outages? Problems with water system or spa or pool chlorination? Air conditioning or other equipment failures?

Determine vaccination coverage of the affected population if the suspected agent is vaccine-preventable.

Develop a list (with contact information) of individuals who may have been affected using the incubation and infectious periods of suspected pathogens and the earliest known onset to determine how far back to go.

- Get school and day care lists of student and staff absentees, or (for the more ambitious) lists of all students and staff (names and telephone number).
- Get worksite personnel rosters (names, possibly phones).
- Get hotel or special events registration records, credit card sales information (typically would include at least names, dates, dollar totals, fragment of card number).

Get policies for exclusion of ill employees, students, etc. and determine whether practices at the time of the outbreak were consistent with those policies.

D. If indicated by the scope and severity of the outbreak, expand the investigation & do basic descriptive and analytic epidemiology

Conduct active case finding by means appropriate to the outbreak (for example, by talking to cases and their cohorts, canvassing area healthcare providers, emergency departments, laboratories, establishing active surveillance channels).

Characterize the affected population (for example, students and staff at school A).

Characterize the cases and their illnesses through systematic data collection using standardized, outbreak-specific questionnaires, including demographics (for example age, sex, classroom, room number), onset date, symptom profile, illness duration, severity measures (MD or ER visits, hospitalizations, deaths).

Assess the distribution of onset times by making an epidemic curve to define the outbreak in time and assess the effectiveness of control measures.

If a common environmental source is suspected (psittacosis? legionellosis? hantavirus?), try to identify it.

Identify potential exposures and use data from the aforementioned questionnaires to assess their association(s) with illness risk.

Send the completed questionnaires to OPHD (fax 971-673-1100) so we can enter and help you analyze the data.

E. If cause not confirmed, arrange for collection of specimens based on illness(es) suspected

Arrange for collection of clinical specimens from six outbreak-affected individuals (confirming the cause of most outbreaks depends on isolating a pathogen from two clinical specimens).

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- Instructions for specimen collection, storage, and shipping pathogens are in the PHD *Compendium of Respiratory Diseases*.

F. Environmental Evaluation

Assess disinfection practices for frequently touched surfaces and address any shortcomings.

- Get a copy of written procedures, if any.
- Find out what is currently done: agents used, length of time and frequency with which they are applied, which surfaces are cleaned, etc.
- Assess hand washing sink accessibility in the facility, as well as availability of soap, paper towels, and alcohol-based hand sanitizer.
- If the clinical picture, lab results, or other evidence suggest an environmental exposure as the source of the outbreak, consult with environmental health to arrange an environmental evaluation.

5. CONTROLLING FURTHER SPREAD

A. Education

For outbreaks due to confirmed or strongly suspected communicable respiratory diseases, provide basic information about the benefits of scrupulous hand hygiene, and recommend ready access to sinks with soap and warm water and alcohol-based hand sanitizer, as appropriate. Also recommend using hand dryers and disposable paper towels rather than reusable cloth towels (or clothes).

Explain benefits of cough etiquette and share location of “Cover Your Cough” posters on the web that can be printed and posted in a respiratory outbreak setting. (<http://www.oregon.gov/DHS/ph/acd/flu/cough-poster-sm.pdf>)

Explain benefits of age-appropriate immunization for preventing respiratory illnesses.

B. Isolation and School or Day Care Restrictions

When a communicable respiratory disease is confirmed or suspected, cases in workplaces, schools and daycare settings may be required to stay home for varying lengths of time, depending upon the agent. (See investigative guidelines for specific conditions.) In outbreaks of measles and pertussis involving schools, the local public health authority may order exclusion of susceptible individuals under Oregon Administrative Rule 333-050-0010.

Exposed work, school or day care contacts should be advised to watch for respiratory disease signs and symptoms, especially, fever (“fever watch”), and to notify a designated individual if these develop. Ill individuals should be isolated and kept away from well individuals until they can leave work, school, or day care. Use of surgical masks by ill persons should be considered.

C. Protection of Contacts

Educate contacts about benefits of hand hygiene and cough etiquette, as above. In the setting of vaccine-preventable disease outbreaks (influenza, measles, pertussis, *H. influenzae* type B, review the benefits of immunization for individuals who are not up-to-date on vaccines. It may be reasonable, depending on circumstances, to facilitate immunization clinics for individuals who are at risk (see Investigative Guidelines for pertussis, *H. influenzae*, type b).

6. MANAGING SPECIAL SITUATIONS

A. Apparent Outbreak in a School, Work Place or Other Institutional Cohort

Consider investigation when ≥ 10 individuals or 20% of the institutional cohort have reportedly been absent on any given day and duration of absence is reportedly often prolonged (≥ 3 days). In a school, also consider evaluation when $\geq 40\%$ of students in an individual classroom cohort are absent.

- Request the number of individuals (students, staff, hotel guests, etc.) in the institution.
- Request a list of absentees (students and staff including phone numbers, guardian’s names, reason for absence).
- Request historical data for rates of absences over a period of time, with year-to-year comparison of given time periods.

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Assess current absence rates in light of historical trends in previous years to answer the question: “Is it really an outbreak?”

If indicated by the apparent scope and severity of the outbreak, select a sample of absentees and determine symptom profile and history of healthcare visits (to a healthcare provider, ER visits, or hospitalization). The sample should include at least 10 affected individuals or 10% of those affected, whichever is larger. If the cause is not confirmed, consult the PHD *Compendium of Respiratory Diseases*, make a "best guess" at the etiologic agent(s), and arrange for collection of six clinical specimens appropriate to the hypothesized agent(s) as found in the *Compendium*.

In certain settings (e.g. outbreaks of influenza in which large numbers of individuals at increased risk of complications have been exposed, as in a LTCF or medical group home) prophylaxis may be indicated (see Investigative Guidelines for pertussis and *H. influenzae*, type b). If you suspect such a situation, check in with the ACDP epidemiologist on-call.

B. Seasonal or Pandemic H1N1 Influenza is confirmed

- Consider a news release encouraging immunization of unvaccinated, high-risk individuals in the community, if vaccine is available.
- Review transmission mitigation strategies in the press release and in a letter to institutional cohort members and their families, if appropriate.
- Encourage those who are ill to stay home until 24 hours after fever resolves. Current guidelines for exclusion of health care workers and others in the setting of pandemic H1N1 are available at: www.cdc.gov/h1n1flu/guidance/exclusion.htm
- Encourage well, un-immunized individuals to be vaccinated.

C. *M. tuberculosis* is confirmed

- Contacts will require evaluation for latent tuberculosis infection and in some situations will require treatment of that condition to prevent the development of overt illness.
- The Oregon Tuberculosis Program at the Public Health Division, (971-673-0174) is a great resource in helping to address these situations.

D. Pertussis is confirmed

- Identify exposed contacts and arrange antibiotic prophylaxis.
- Consider a news release reviewing transmission mitigation strategies including Tdap boosters, and encouraging medical evaluation for case contacts who develop chronic, paroxysmal cough.

E. *Legionella* is confirmed in an outbreak setting

- Arrange environmental testing of air conditioning, water storage systems, etc. at the affected facility to identify the reservoir of infection and eradicate it.
- An outline of environmental evaluation in these settings is beyond the scope of this document. Contact the PHD epi on-call to arrange consultation in this area.

F. Psitticosis is confirmed

- Assess for exposure to parrots, budgies, love birds, cockatoos, and other birds.
- PHD epi will be glad to facilitate consultation with colleagues in the Oregon Department of Agriculture.
- Evaluate site of suspected exposure, inquire about recent illness in birds, and arrange for collection of specimens from birds and immediate environment for culture.
- If the source is confirmed in a bird population, ensure that treatment or culling occurs and ensure cleaning and disinfection of the area where the birds have been housed with a phenolic solution.

G. Hantavirus is confirmed in an outbreak setting

- Ask environmental health to check for rodent infestation and specifically for deer mice (*Peromyscus maniculatis*); be careful and use airway protection.

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- Arrange for elimination of rodents (if found) and recommend spraying of rodent-contaminated areas with a 1:10 bleach solution prior to cleaning.
- Recommend wet mopping or cleaning with towels moistened with disinfectant rather than sweeping or vacuuming.
- Wear respirator during the cleaning process.

H. *Haemophilus influenzae*, type B is confirmed

- Identify exposed contacts and recommend prophylaxis within 24 hours.

I. SARS, pulmonary anthrax, plague, or tularemia are suspected

We will be inundated by folks from CDC so fast it will make your head swim. An outline of environmental evaluation in these settings is beyond the scope of this document. Develop plans for evaluation with the UERT team and CDC that are tailored to the circumstances.

UPDATE LOG

- October 2010. New document. (Richard Leman)