

Respiratory Disease Outbreak Investigation Guidelines June 2019

1. DISEASE REPORTING

1.1 Purpose of Reporting, Surveillance and Investigation

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

1.2 Laboratory and Physician Reporting Requirements

Healthcare providers are legally obligated under Oregon Administrative Rule 333-018-0000 to report cases of numerous conditions involving respiratory symptoms, pertussis, legionellosis, hantavirus, and tuberculosis, among them. Additionally, healthcare providers and long-term care facilities are obligated to report immediately, day or night, respiratory (and other) outbreaks, and any uncommon illness of potential public health significance. Reports are made to the local public health authority (LPHA) or to the Oregon Public Health Division (OPHD) epi on call (971-673-1111).

Laboratories are required to report results indicative of many respiratory diseases. Immediate reporting is required for infections with *Bacillus anthracis*, *Brucella* spp., *Corynebacterium diphtheriae*, *Coxiella burnetii* (Q fever), *Francisella tularensis*, 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 for measles virus. Reporting within one working day is required for infections with *Bordetella pertussis*, *Chlamydia psittaci*, hantavirus, *Legionella*, *Leptospira*, *Mycobacterium tuberculosis*, and *Mycobacterium bovis*.

When all is said and done, however, respiratory disease outbreaks commonly come to the attention of public health through calls from concerned individuals affected by an institutional outbreak.

1.3 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

Respiratory Disease Outbreaks

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. Severe illness (two or more deaths, or hospitalizations involving ≥ 3 people or $\geq 0.2\%$ of the cohort, whichever is larger) within a 2-week period in an institutional cohort.*
2. Radiographically 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 people or $\geq 20\%$ of the cohort, whichever is larger).
4. Institutional outbreaks of influenza-like illness (documented fever $\geq 100^\circ$ F with cough or sore throat) involving people at increased risk for severe complications from flu (long-term care facilities, medical group homes, or a neonatal intensive care unit or oncology unit).
5. Outbreaks of vaccine-preventable disease.

In these situations, please contact the OPHD epi on call (971-673-1111) within 24 hours of receiving the outbreak report. An OPHD epidemiologist 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 don't 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 won't allow investigation of every outbreak meeting these criteria. In those situations, higher thresholds for investigation should be considered. Give us a call.

1.4 Confidentiality

Data about individuals collected for outbreak investigations are strictly confidential under Oregon law (Oregon Revised Statute 433-008).

2. THE DISEASE AND ITS EPIDEMIOLOGY

2.1 Etiologic Agents, Illness Descriptions, Incubation Periods

The OPHD [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

* 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.

Respiratory Disease Outbreaks

2.2 Reservoirs

Humans are reservoirs for most viral causes of human respiratory infection, including influenza, respiratory syncytial virus, and adenovirus, as well as non-viral pathogens such as *B. pertussis*, *Chlamydia pneumoniae*, *M. tuberculosis*, *Mycoplasma pneumoniae*, and the pneumococcus. Birds can harbor *C. psittaci* and, potentially, novel strains of influenza virus that rarely infect humans. Pigs can also carry strains of influenza. Deer mice can carry hantavirus, prairie dogs can carry *Y. pestis*, and *Legionella* species often arise from water systems in the built environment.

2.3 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 agents, including *B. pertussis*, adenovirus and rhinovirus, are also readily transmitted through contact with respiratory secretions or contaminated fomites.

2.4 Periods of Communicability

The OPHD *Compendium of Respiratory Diseases* (attached to these guidelines) provides periods of communicability, which vary from agent to agent

2.5 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 pertussis, pneumococcal pneumonia, legionellosis, tuberculosis, and infections due to *H. influenzae*, *Mycoplasma*, and *Chlamydia*. 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 respiratory syncytial virus (RSV) infection to decrease the likelihood of severe disease.

2.6 Susceptibility/Immunity

Widely used and effective immunizations are available against seasonal influenza, pertussis, and the 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 in this vaccine from season to season. Vaccine-induced immunity to pertussis wanes over time, requiring a booster in adolescence or adulthood that many have not yet received. A dose of Tdap is

Respiratory Disease Outbreaks

also recommended in the third trimester of each pregnancy. The 13-valent conjugate pneumococcal vaccine is recommended for children and for adults ≥ 65 years of age. The 23-valent pneumococcal polysaccharide vaccine is also recommended for those 65 and older.

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

3.1 Confirmed Respiratory Disease Outbreak

Two or more individuals with the same laboratory-confirmed respiratory pathogen (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.

3.2 Presumptive Respiratory Disease Outbreak

One confirmed case of respiratory disease epidemiologically linked (as in §3.1, above) to one or more people with the same symptom profile.

3.3 Suspect Respiratory Disease Outbreak

Two or more epidemiologically linked individuals with respiratory disease who display at least one of the characteristics described in §1.3, above.

3.4 Services Available at the Oregon State Public Health Laboratory (OSPHL)

Laboratory testing for multiple agents on all outbreaks is prohibitively expensive. Consulting OPHD epidemiologists to develop “a differential diagnosis” based on case histories is, therefore, required prior to submitting clinical specimens for analysis.

The OSPHL performs various laboratory tests for respiratory pathogens. During some influenza-like illness outbreaks (marked by fever $\geq 100^{\circ}\text{F}$ [37.8°C] with cough or sore throat) local public health authorities may be asked by ACDP to collect specimens for a Respiratory Virus Panel. This panel can detect influenza A and B viruses, adenovirus, rhinovirus, parainfluenza viruses 1, 2, and 3, RSV, and human metapneumovirus (hMPV). Other testing may be available based on clinical and epidemiologic data. For complete lab test offerings and information about specimen collection, storage, and transport, please visit the OSPHL Test Menu at www.healthoregon.org/labtests.

4. ROUTINE CASE INVESTIGATION

4.1 Collect Preliminary Data

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

4.2 Call OPHD Epi On-Call (971-673-1111)

Ask for referral to the Urgent Epidemiologic Response Team (UERT), if indicated, for an outbreak number and assistance. Confirm the outbreak (or not), and

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

Depending on the circumstances, it might 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, and
- ✓ As indicated for some conditions, assist with investigation of contacts.

4.3 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.

Respiratory Disease Outbreaks

- ✓ Develop a list (with contact information) of people 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.

4.4 If indicated by scope and severity of outbreak, expand investigation and 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 affected population (e.g., students and staff at school A).
- ✓ Characterize cases and their illnesses through systematic data collection using standardized, outbreak-specific questionnaires, including demographics (e.g., 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 epi curve to define the outbreak in time and assess 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 questionnaires to assess their association(s) with illness risk.
- ✓ Analyze the completed questionnaires or send to OPHD (fax 971-673-1100) so we can enter and help you analyze the data.

4.5 If cause not confirmed, collect specimens based on illness(es) suspected

- ✓ Collect clinical specimens from five or six outbreak-affected individuals (confirming the cause of most outbreaks depends on identifying a pathogen in clinical specimens from at least 2 cases).
- ✓ Consult the OPHD *Compendium of Respiratory Diseases* for instructions on specimen collection, storage, and shipping for testing for various pathogens.

4.6 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 & frequency of application, which surfaces are cleaned, etc.

Respiratory Disease Outbreaks

- ✓ Assess hand washing sink accessibility in 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

5.1 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.

www.oregon.gov/oha/ph/PreventionWellness/FluPrevention/Documents/cough-poster-sm.pdf

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

5.2 Isolation and Work 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 designated public health staff 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.

5.3 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 people who aren't up-to-date on vaccines. It may be reasonable, depending on circumstances, to set up immunization clinics for those at risk. (See *Investigative Guidelines* for pertussis, *H. influenzae*, type b.)

6. MANAGING SPECIAL SITUATIONS ⁴

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

Consider investigation when ≥ 10 people or $\geq 20\%$ 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 people (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.

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 OPHD *Compendium of Respiratory Diseases*, make a "best guess" at the etiologic agent(s), and collect clinical specimens appropriate to the hypothesized agent(s) as found in the *Compendium* from 5–6 ill persons.

In certain settings (e.g., outbreaks of influenza in which large numbers of people at increased risk of complications were 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 OPHD epi on-call.

6.2 Influenza is Confirmed

- ✓ Consider a news release encouraging immunization of unvaccinated, high-risk people 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 in isolation, away from others, until 24 hours after fever resolves.
- ✓ Encourage well, un-immunized people to be vaccinated.

6.3 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.

Respiratory Disease Outbreaks

- ✓ The Oregon Tuberculosis Program at the Public Health Division, (971-673-0169) is a great resource in helping to address these situations.

6.4 Pertussis is Confirmed

- ✓ Identify exposed contacts and arrange antibiotic prophylaxis for those at high risk (infants under one year of age and pregnant women in the 3rd trimester).
- ✓ Consider a news release reviewing transmission mitigation strategies and encouraging medical evaluation for case contacts who develop chronic, paroxysmal cough.
- ✓ Consider exclusion of susceptible members of the exposed cohort for 21 days from the last exposure.
- ✓ Encourage vaccination of those who are unimmunized or under-immunized.

6.5 Legionellosis is Confirmed

- ✓ 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 OPHD epi on-call to arrange consultation in this area.

6.6 Psittacosis is Confirmed

- ✓ Assess for exposure to parrots, budgies, love birds, cockatoos, and other birds.
- ✓ OPHD 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 obtain 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.

6.7 Hantavirus is Confirmed

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

6.8 *Haemophilus influenzae* type b is Confirmed

- ✓ Identify exposed, contacts and recommend prophylaxis within 24 hours.
- ✓ Encourage vaccination of unimmunized or under-immunized children.

6.9 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.

Respiratory Disease Outbreaks

UPDATE LOG

June 2019: Minor edits for clarity, links updated. (Leman, Cieslak)

August 2010: Original version. (Bancroft, Leman)