

COCCIDIOIDOMYCOSIS (VALLEY FEVER)

I. DESCRIPTION AND EPIDEMIOLOGY

A. Overview

Coccidioidomycosis, also known as Valley Fever or San Joaquin Fever, is caused by the fungus *Coccidioides*. This fungus is typically found in the soil of hot, dry regions where weather conditions and soil composition promote its growth. It is endemic to parts of Mexico, Central and South America, and the southwestern United States, particularly Arizona and California. There are two species of *Coccidioides* that cause human disease: *Coccidioides immitis* is typically found in California while *Coccidioides posadasii* is found outside of California, especially in Arizona. Coccidioidomycosis most commonly presents as a self-limited influenza-like illness or pneumonia. More severe or disseminated disease is rare but can be fatal. If needed, treatment with antifungal medication is available.

B. Coccidioidomycosis in California

In California, the annual number of reported cases of coccidioidomycosis has increased steadily from 816 in 2000 to 4,094 in 2012. Although cases have been reported statewide, the highest rates of coccidioidomycosis have consistently been reported in the southern San Joaquin (Central) Valley, particularly in the counties of Fresno, Kern, Kings, Madera, Tulare, and the coastal counties of San Luis Obispo and Monterey. Most coccidioidomycosis cases appear to be sporadic rather than outbreak-related. Outbreaks that have been reported in California have largely occurred among groups with high dust and dirt exposure including construction workers, archeological workers, and military trainees.

C. Symptoms

Approximately 60% of those infected with *Coccidioides* have no symptoms. Patients who are symptomatic will most likely present with a self-limited influenza-like illness or pneumonia and may complain of fever, cough, chest discomfort, malaise, and fatigue. The respiratory illness may be complicated by diffuse or progressive pneumonia, mediastinitis, or pulmonary nodules or cavities. In addition, approximately 5% of symptomatic persons will develop disseminated disease which most often presents as skin lesions, osteomyelitis, or meningitis. African Americans, Filipinos, persons aged 65 and older, pregnant women in their third trimester, and persons with diabetes or other immunocompromising conditions are at increased risk of severe pulmonary or disseminated disease when infected.

Although most infections lead to immunity against future infection, relapse can occur if a patient becomes immunocompromised.

D. Transmission

When soil in endemic areas is disturbed by strong winds or by activities such as construction, farming, or digging, *Coccidioides* spores can become airborne and may be inhaled along with dust particles. It is also possible, albeit rare, for infection to occur when spores enter through cuts or abrasions in the skin. Coccidioidomycosis is not transmitted from person to person, animal to animal, or between people and animals. For more information on coccidioidomycosis transmission visit: <http://www.cdc.gov/fungal/diseases/coccidioidomycosis/causes.html>.

E. Incubation Period

The incubation period for primary pulmonary illness typically ranges from 7 to 21 days. Disseminated disease or relapses in pulmonary illness can occur months to years after the initial infection especially if a patient becomes immunocompromised.

F. Clinical Management

Clinical management decisions should be made by the patient's primary care physician or infectious diseases specialist. If needed, treatment with antifungal medication is available.

II. COUNCIL OF STATE AND TERRITORIAL EPIDEMIOLOGISTS (CSTE) SURVEILLANCE CASE DEFINITION

A. Coccidioidomycosis (Valley Fever) (*Coccidioides* spp.) (2011)

The CSTE case definition can be found on the CDC's website at:

<http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=643&DatePub=1/1/2011%2012:00:00%20AM>.

CSTE Position Statement(s)

10-ID-04: <http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/PS/10-ID-04.pdf>

Clinical Criteria

Infection may be asymptomatic or may produce an acute or chronic disease. Although the disease initially resembles an influenza-like or pneumonia-like febrile illness primarily involving the bronchopulmonary system, dissemination can occur to multiple organ systems. An illness is typically characterized by one or more of the following:

- Influenza-like signs and symptoms (e.g., fever, chest pain, cough, myalgia, arthralgia, and headache)
- Pneumonia or other pulmonary lesion, diagnosed by chest radiograph
- Erythema nodosum or erythema multiforme rash
- Involvement of bones, joints, or skin by dissemination
- Meningitis
- Involvement of viscera and lymph nodes

Laboratory Criteria for Diagnosis

A confirmed case must meet at least one of the following laboratory criteria for diagnosis:

- Cultural, histopathologic, or molecular evidence of presence of *Coccidioides* species, OR
- Positive serologic test for coccidioidal antibodies in serum, cerebrospinal fluid, or other body fluids by:
 - Detection of coccidioidal immunoglobulin M (IgM) by immunodiffusion, enzyme immunoassay (EIA), latex agglutination, or tube precipitin, OR
 - Detection of coccidioidal immunoglobulin G (IgG) by immunodiffusion, EIA, or complement fixation, OR
 - Coccidioidal skin-test conversion from negative to positive after onset of clinical signs and symptoms

Case Classification

Confirmed: A case that meets the clinical criteria and is laboratory confirmed.

Comment(s)

The following cases should not be reported:

- Asymptomatic cases that do not otherwise fulfill the case definition's clinical criteria
- Cases that have been reported previously

III. CASE INVESTIGATION AND REPORTING

A. Purpose of Reporting and Surveillance

- To better understand the epidemiology of coccidioidomycosis in California and to use this information to develop targeted interventions to decrease rates of illness
- To identify outbreaks and potential sources of ongoing transmission
- To educate people about how to reduce their risk of infection

B. Local Health Jurisdiction (LHJ) General Case Investigation Guidelines

- CSTE surveillance case definition for coccidioidomycosis includes both laboratory and clinical criteria. Either case interview or review of medical records may be necessary to confirm that the case definition criteria have been met.
 - Do not report asymptomatic cases that do not meet any of the clinical criteria.
 - When confirming a case of coccidioidomycosis, LHJs should reference medical records or contact the provider regarding diagnosis decisions. Diagnosis of coccidioidomycosis should be determined by the treating provider.
- Coccidioidomycosis reporting does not require filling out a case report form (CRF). However, a CDPH CRF for coccidioidomycosis investigation is available for voluntary use. Using the coccidioidomycosis CRF would allow for the identification of local

clusters or outbreaks, for the consistent collection of additional information for analysis of local risk factors, and for comparison of risk factors across jurisdictions.

- We encourage completion of the CRF by case interview and/or review of medical records as soon as feasible after receipt of the initial report for all reported coccidioidomycosis cases. Alternately, if local resources are limited, a limited number of CRFs can be filled out on a randomized representative subset of cases. We encourage filling out the coccidioidomycosis CRF for patients with severe disease including coccidioidal meningitis and disseminated coccidioidomycosis.
- Most coccidioidomycosis cases are sporadic. However, outbreaks of coccidioidomycosis have occurred in California. Most clusters are identified in occupational settings with high dirt and dust exposure. To improve the likelihood of determining the source of an outbreak, it is helpful to try to get as much information as possible in the initial interview, and to document any activities which may help prompt recall later on (such as a dust storm or participation in a dust generating activity). If the patient appears to be part of a point-source outbreak, follow your protocol for outbreak investigations. This should include notifying CDPH about the outbreak (see below). This information can be helpful to others in the same workplace that may have been exposed and experience illness but are not yet diagnosed.
- If you need assistance with your investigation of a coccidioidomycosis outbreak, call the Disease Investigations Section (DIS) at 510-620-3434.

C. Local Health Jurisdiction Reporting

Coccidioidomycosis is reportable in California by clinicians and laboratories.

Coccidioidomycosis cases that meet both the clinical and laboratory criteria of the CSTE case definition should be reported to CPDH.

Instructions for CalREDIE-participating jurisdictions:

- Enter the patient information into CalREDIE upon notification of the case by the clinical laboratory or health care provider. Select “Coccidioidomycosis” as “Disease Being Reported”.
- Coccidioidomycosis is not a case report form (CRF) required condition. Therefore, completion of the Clinical, Laboratory, and Epidemiological Information Sections is not required but is encouraged, as this would allow for the consistent collection of risk exposures and rapid comparison if needed.
- Do not report previously reported cases.
 - New clinical, laboratory, or epidemiological information for a reported case, such as the development of disseminated disease, may be added to previously submitted CRFs.
- If a historical case has never been previously reported, please report the case via CalREDIE and record the appropriate estimated illness onset date.

- Coccidioidomycosis meningitis should be reported only under “Coccidioidomycosis” and should not be reported under “Meningitis – Fungal (other than Coccidioidomycosis)”.

Instructions for CalREDIE NON-participating jurisdictions:

- Report through the standard Confidential Morbidity Report form (CDPH 110a): <http://www.cdph.ca.gov/pubsforms/forms/CtrlForms/cdph110a.pdf>.
- Coccidioidomycosis is not a case-report form required condition. However, the use of the state Coccidioidomycosis Case Report form (CDPH 8280, <http://www.cdph.ca.gov/pubsforms/forms/CtrlForms/cdph8280.pdf>) is encouraged, as this would allow for the consistent collection of risk exposures and rapid comparison if needed.
 - Non-participating jurisdictions that are interested in a fillable PDF version of the CRF should contact the Disease Investigations Section at 510-620-3434.

Reporting Outbreaks and Clusters

Suspected coccidioidomycosis outbreaks, including point-source outbreaks within your jurisdiction, should be reported within 24 hours to CDPH.

- *CalREDIE-participating jurisdictions:* Create a new outbreak in CalREDIE. From the dropdown list for “Disease”, select “Respiratory, non TB”.
- *Non-participating jurisdictions:* Complete the Preliminary Report of Communicable Disease Outbreak form (CDPH 9060, <http://www.cdph.ca.gov/pubsforms/forms/CtrlForms/cdph9060.pdf>) and fax to Infectious Diseases Branch at 510-620-3425 or email to CDOUTBREAK@cdph.ca.gov. When the investigation is completed please submit the final “Other Outbreak” report form: <http://www.cdph.ca.gov/pubsforms/forms/CtrlForms/cdph8554.pdf>.

Microbial Diseases Laboratory (MDL) Resources

Diagnosis of coccidioidomycosis is primarily made by the identification of antibodies in a clinical specimen, most commonly serum. Serologic testing is done at the clinical laboratory; an enzyme immunoassay (EIA) is typically used for screening, followed by immunodiffusion (ID) and complement fixation (CF) tests to confirm the diagnosis of coccidioidomycosis. Immunoglobulin M (IgM) antibodies are detectable early in infection and are indicative of acute infection; immunoglobulin G (IgG) antibodies are not detectable until ~2 weeks after infection and are indicative of past or recent infection. Positive IgG samples alone are not necessarily indicative of current infection. IgG may no longer be detectable in clinical specimens several months after infection. A skin test for coccidioidomycosis was recently made available for the determination of past infection, but it is not yet widely used.

Culture or histopathology may also be used on specimens such as respiratory secretions, tissue biopsies, or normally sterile body fluid samples (i.e., pleural, peritoneal, cerebrospinal fluid, blood, abscess material). Because cultures of coccidioidomycosis present an infection risk, they must be handled with great caution.

MDL will confirm cultures suspected to be *C. immitis* for local public health laboratories (PHL)

upon request. Clinical laboratories which require assistance in the identification of suspected *C. immitis* isolates should contact their local PHL to obtain this service.

IV. CASE MANAGEMENT AND PUBLIC HEALTH CONTROL MEASURES

Coccidioidomycosis is not transmitted from person to person.

Special Considerations

Patient educational materials, including guidelines for prevention, are available at:

<http://www.cdph.ca.gov/healthinfo/discond/Pages/Coccidioidomycosis.aspx>

V. APPLICABLE STATE STATUTES AND REGULATIONS

A. California Code of Regulations, Title 17, Public Health, Sections 2500, 2505:

<http://ccr.oal.ca.gov/linkedslice/default.asp?SP=CCR-1000&Action=Welcome>

2500: Health care providers shall submit reports for coccidioidomycosis to the local health officer for the jurisdiction where the patient resides by mailing a written report, telephoning, or electronically transmitting a report within seven (7) calendar days of the time of identification.

2505: Coccidioidomycosis shall be reported by laboratories within one working day after the health care provider or other person authorized to receive the report has been notified. Laboratories shall transmit these reports to the local health officer by courier, mail, electronic facsimile or electronic mail.

VI. ADDITIONAL RESOURCES

A. General Information/ Patient Education

- CDPH: <http://www.cdph.ca.gov/healthinfo/discond/Pages/Coccidioidomycosis.aspx>
- CDC: <http://www.cdc.gov/fungal/coccidioidomycosis/>

B. References

- Galgiani JN, Ampel NM, Blair JE, Catanzaro A, Johnson RH, Stevens DA, Williams PL. Coccidioidomycosis. *Clin Infect Dis* 2005; 41:1217-23. <http://cid.oxfordjournals.org/content/41/9/1217.full>
- Sondermeyer G, Lee L, Gilliss D, Tabnak F, Vugia D. Coccidioidomycosis –associated Hospitalizations, California, USA, 2000-2011. *Emerg Infect Dis* 2013; 19(1): 1590-1596
- Stevens DA, Clemons KV, Levine HB et al. Expert opinion: what to do when there is *Coccidioides* exposure in a laboratory. *Clin Infect Dis* 2009; 49:919-23

VII. UPDATES

Original version finalized and completed on January 12, 2015

VIII. Summary of Action Steps: COCCIDIOIDOMYCOSIS (VALLEY FEVER)

Action	Specific Steps
<p><input type="checkbox"/> Determine if the case was previously reported in your local health jurisdiction.</p>	<ul style="list-style-type: none"> • Do not report previously reported cases. <ul style="list-style-type: none"> ▪ New clinical, laboratory, or epidemiological information, such as the development of disseminated disease, may be added to previously submitted case report forms (CRFs). • If a historical case has never been reported, please report the case and record the appropriate estimated illness onset date.
<p><input type="checkbox"/> Begin case investigation as soon as possible after a new case of coccidioidomycosis is reported from a clinical laboratory or health care provider.</p>	<ul style="list-style-type: none"> • Contact health care provider for medical records and/or contact patient for interview. • Report confirmed cases in CalREDIE. <ul style="list-style-type: none"> ▪ Completion of the Clinical, Laboratory, and Epidemiological Information Tabs in CalREDIE, is not required but encouraged to standardize assessment of risk factors, especially for patients with severe disease including coccidioidal meningitis and disseminated coccidioidomycosis. If local resources are limited, these tabs can be filled out on a randomized representative subset of cases. ▪ Jurisdictions not yet participating in CalREDIE that are interested in a fillable PDF version of the CRF can contact the Disease Investigations Section at 510-620-3434.
<p><input type="checkbox"/> Ensure that both the clinical and laboratory criteria of the coccidioidomycosis CSTE case definition (see page #) are met.</p>	<ul style="list-style-type: none"> • Do not report asymptomatic cases that do not meet any of the clinical criteria. • Diagnosis of coccidioidomycosis should be determined by the treating provider. LHJs should reference medical records or contact the provider for diagnosis decisions. • In CalREDIE, report coccidioidal meningitis cases only under “Coccidioidomycosis” for “Disease Being Reported” not under “Meningitis- Fungal (other than Coccidioidomycosis)”.
<p><input type="checkbox"/> If the patient appears to be part of a point-source outbreak, follow your protocol for outbreak investigations.</p>	<ul style="list-style-type: none"> • Suspected outbreaks should be reported within 24 hours to CDPH.

If you require assistance with your investigation of coccidioidomycosis, call DIS at 510-620-3434