



# Coccidioidomycosis (Valley Fever) Investigation Guideline

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## Revision History:

Date	Replaced	Comments
11/2018	-	Released

# Coccidioidomycosis

## Disease Management and Investigative Guidelines

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### CASE DEFINITION (CDC 2011)

#### Clinical Description for Public Health Surveillance:

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 Case Classification:

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

- 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.

### LABORATORY ANALYSIS

Imaging such as chest x-rays or CT scans of the lungs are used to look for pneumonia associated to coccidioidomycosis. A person with no symptoms may also have cavities associated to exposure. Confirmation of disease can be done by microscopic identification of the fungal spherules in infected tissue, sputum, or body fluids, growing a culture of *Coccidioides* from clinical specimens, and detecting antibodies in blood or body fluids.

Skin testing is sometimes used to indicate prior exposure and immunity to the

fungus. Persons exposed to coccidioides usually have lifelong reactivity. The test is not typically helpful in diagnosing current infections and false-negatives can occur.

Serologic tests are routinely used in diagnosing current infections. The table below, based on information from the CDC, will help to interpret the diagnostic value of the test used.

Serologic Test	Relative Diagnostic Value
Latex (LA)	<ul style="list-style-type: none"> <li>• Highly sensitive for IgM; false positives common</li> <li>• Least specific of the standard serologic tests</li> </ul>
Enzyme immunoassay (EIA)	<ul style="list-style-type: none"> <li>• Highly sensitive for IgM or IgG antibodies</li> <li>• Less specific; positives may require ID or CF confirmation</li> </ul>
Complement fixation (CF)	<ul style="list-style-type: none"> <li>• Quantitative test for CF antibodies</li> <li>• More sensitive but less specific than ID</li> <li>• Has prognostic value                             <ul style="list-style-type: none"> <li>○ Higher titers = more extensive infection</li> <li>○ Rising levels = worsening disease</li> </ul> </li> </ul>
Immunodiffusion (ID)	<ul style="list-style-type: none"> <li>• Qualitative test for IgM or IgG antibodies</li> <li>• More specific than EIA, LA, or CF but less sensitive</li> <li>• False negative may occur in late infections</li> </ul>

Unless authorized to send directly to CDC, all specimens should be sent through the Kansas Health and Environment Laboratory (KHEL).

- The medical provider treating the patient must contact KDHE at 1-877-427-7317 for specimen approval.
- The laboratory or person submitting the specimen **must** contact KHEL at 785-296-1653 or 785-296-1645 **before** sending any specimens.

Additional information on shipping specimens to CDC:

- Questions regarding testing, contact CDC-INFO at 800-232-4636.
- Information on sample submission, including the sample submission form (DASH Form 50.34) and shipping instructions can be found at: [https://www.cdc.gov/fungal/lab\\_submission.html](https://www.cdc.gov/fungal/lab_submission.html)

## EPIDEMIOLOGY

Primary infections are common only in arid and semi-arid areas of the Western Hemisphere: in the USA, from central/southern California to southern Texas; northern Argentina; northeastern Brazil; Colombia; Mexico; Paraguay; Venezuela; and Central America. Dusty fomites from endemic areas can transmit infection. Disease has occurred in people who have merely traveled through endemic areas.

Infection is seasonal, and most frequent following rainy seasons during hot and dry periods, especially after wind and dust storms. Coccidioidomycosis is an important disease among persons with potential occupational exposure and those who are visiting or have moved into endemic areas. Since 1998, a marked increase of coccidioidomycosis has been reported in the largest endemic US states, California and Arizona.

The disease affects all ages and all races, although men and the elderly are most frequently affected. Persons at highest risk for disseminated infection include pregnant women in the third trimester, persons of African or Filipino race/ethnicity, and immunocompromised persons, especially those with HIV or an organ transplant.

## DISEASE OVERVIEW

(Source: CDC, [Information for Healthcare Professionals about Valley Fever](#) accessed 11/1/2018)

### A. Agent:

*Coccidioides immitis* and *posadasii*, dimorphic fungi.

### B. Clinical Description:

Symptomatic persons (approximately 40% of infected persons) present 1 to 3 weeks after exposure with fatigue, cough, dyspnea, headache, night sweats, myalgias, or rash. Primary pulmonary disease is often self-limiting, but some patients (approximately 5 to 10%) fail to recover and develop complications or chronic pulmonary disease. Disseminated disease occurs in an estimated 1% of cases (higher rates of dissemination are observed in certain risk groups), with bones/joints, soft tissues, and meninges most commonly affected.

### C. Reservoirs:

Soil in the southwestern United States, parts of Mexico, and South America. Highly endemic areas in southern Arizona and California's southern San Joaquin Valley.

### D. Mode(s) of Transmission:

Typically acquired via inhalation of airborne arthroconidia, often after disturbance of contaminated soil (e.g., small-scale activities including construction or excavation, or large-scale events such as dust storms and earthquakes). Primary cutaneous, solid organ donor-derived, and fomite-transmitted infections can also occur but are uncommon.

**E. Incubation Period:**

Primary infection, 1 to 3 weeks. In persons who develop progressive, chronic, or disseminated disease, symptoms may persist for months or even longer.

**F. Period of Communicability:**

No direct person-to-person or animal-to-human transmission. *Coccidioides spp.* from skin abscesses or fistulas may change, rarely, from the parasitic to the infective saprophytic form.

**G. Susceptibility and Resistance:**

*Coccidioides* is highly infectious; disease may occur after inhalation of only a few arthroconidia. High frequency of subclinical infection has been indicated by the high prevalence of positive skin tests in endemic areas. Recovery is generally followed by solid, lifelong immunity. Reactivation can occur in those who become immunosuppressed therapeutically or through HIV infection.

**H. Treatment:**

Primary coccidioidomycosis usually resolves spontaneously without therapy, and the benefit of treating primary pulmonary disease is controversial. Infectious Diseases Society of America (IDSA) guidelines suggest treatment for primary pulmonary coccidioidomycosis in those with immunosuppression, severe or significantly debilitating illness, diabetes or frailty because of age or comorbidities, pregnant, or of African or Filipino ancestry. Disseminated coccidioidomycosis requires antifungal treatment, typically fluconazole or amphotericin B. For more detailed treatment guidelines, refer to the IDSA's [Practice Guidelines for the Treatment of Coccidioidomycosis](#).

## NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

Suspected cases of coccidioidomycosis shall be reported within 24 hours, except if the reporting period ends on a weekend or state-approved holiday, the report shall be made by 5:00 p.m. on the next business day after the 24-hour period.

1. Health care providers and hospitals: report to local health jurisdiction
2. Laboratories: report to KDHE - BEPHI
3. Local health jurisdiction: report to KDHE - BEPHI

**Kansas Department of Health and Environment (KDHE)  
Bureau of Epidemiology and Public Health Response (BEPHI)**

**Phone: 1-877-427-7317**

**Fax: 1-877-427-7318**

**Further responsibilities of state and local health departments to the CDC:**

*As a nationally notifiable condition, coccidioidomycosis cases require a ROUTINELY NOTIFIABLE report to the Center of Disease Control and Prevention (CDC).*

1. ROUTINE reporting requires KDHE-BEPHI to file an electronic report for within the next reporting cycle. KDHE-BEPHI will file electronic reports weekly with CDC.
2. **Local public health jurisdiction** will report information requested in the Kansas electronic surveillance system, as soon as possible.

## INVESTIGATOR RESPONSIBILITIES

- 1) [Report](#) all confirmed, probable and suspect cases to the KDHE.
- 2) The goal of the [case investigation](#) is to collect epidemiological data as required by current surveillance objectives.
  - Contact the medical provider to collect information needed confirm diagnosis using the current case definition.
  - The [Coccidioidomycosis Investigation Worksheet](#) will help in the confirmation of the case and with the organization and the collection of essential data
  - Collect all information requested in the case investigation.
    - Most data can be collected from the medical provider, and the patient may not need to be contacted.
- 3) Routine contact investigation is not needed for cases of coccidioidomycosis.
- 4) [Record](#) data, collected during the investigation, in the KS EpiTrax system under the data's associated [\[tab\]](#) in the case morbidity report (CMR) or by attaching scanned records.

## STANDARD CASE INVESTIGATION AND CONTROL METHODS

### Case Investigation

- 1) Contact the medical provider who ordered testing of the case and obtain the following information. (This includes medical records for hospitalized patients.)
  - Use the [Coccidioidomycosis Investigation Worksheet](#) to identify any symptoms, record onset date and symptoms experienced.
  - Examine the laboratory testing that was done to ensure all testing that could confirm the case has been reported. Obtain, scan, and attach copies of any lab reports that may still be needed to the EpiTrax record.
  - Collect case's demographic data and contact information (birth date, county, sex, race/ethnicity, occupation, address, phone number(s))
  - For females, record pregnancy status
  - Record hospitalizations: location, admission and discharge dates
  - Obtain the reason for testing:
    - Did the patient live in an area endemic for coccidioidomycosis?
    - Did the patient travel in the month prior to their illness to an area endemic for coccidioidomycosis?
  - Record pre-existing medical conditions present at the time of onset.
  - Record outcomes: disseminated illness, recovery, or date of death
- 2) Interview the case, proxy, or use medical record to determine source and risks.
  - Occupation or activities that may have resulted in exposure to dust.
  - Any residence outside of the current county 1 year prior to onset.
  - Travel outside of the current county to potential at-risk areas within the period 1 week to 3 weeks prior to acute onset.

### **Contact Investigation**

Usually none required. Provide education as needed.

### **Isolation, Work and Daycare Restrictions**

None required for humans.

### **Case Management**

Follow-up if case had not yet recovered, since last contact. Report any changes in case status (i.e. death).

### **Contact Management**

Usually none required. Provide education as needed.

### **Environmental Measures**

It's difficult to avoid breathing in the fungus *Coccidioides* in areas where it's common in the environment. People living in these areas can try to avoid spending time in dusty places as much as possible. People at risk for severe illness (such as people who have weakened immune systems, pregnant women, people who have diabetes, or people who are Black or Filipino) may be able to lower their chances of developing the infection by using various methods.

### **Education**

- 1) Methods are listed below to avoid getting coccidioidomycosis, but they haven't been proven to prevent infection.
  - Try to avoid areas with a lot of dust like construction or excavation sites. If you can't avoid these areas, wear an N95 respirator while in the area.
  - Stay inside during dust storms and close your windows.
  - Avoid activities that involve close contact to dirt or dust, including yard work, gardening, and digging.
  - Use air filtration measures indoors.
  - Clean skin injuries well with soap and water to reduce the chances of developing a skin infection, especially if the wound was exposed to dirt or dust.
  - Take preventive antifungal medication if your healthcare provider says you need it.
- 2) In counseling those exposed to the same source as a case:
  - Symptomatic persons exposed to the same source should be strongly urged to contact their physician for a medical evaluation.
  - Non-symptomatic persons with possible exposures should watch for symptoms for a period of 4 weeks.

## MANAGING SPECIAL SITUATIONS

### A. Reported Incidence Is Higher than Usual/Outbreak Suspected:

- If you suspect an outbreak, consult with the epidemiologist on call at KDHE by calling the reporting hotline at 1-877-427-7318.

### B. Laboratory Exposures to *Coccidioides* culture

Response to laboratory exposure of *coccidioides* is different from natural exposures as the number of arthroconidia inhaled usually far exceed that which occur in nature and attack rates for symptomatic illness from laboratory exposure appear to exceed that seen from natural exposure. Response will be based on recommendations published by the Clinical Infectious Diseases (2009): <https://academic.oup.com/cid/article/49/6/919/334683>

Beyond the initial steps taken by the laboratory facility (outlined in the 2009 document), the following pertains to public health actions for exposed persons.

- Information to collect:
  - First: What activities were performed that may have led to exposure.
  - Then: Who was in the lab during the suspected time(s) of exposure, where were they and what were their activities in relation to the exposure
  - Finally: Have actions taken place to prevent future exposure and disease and to assure prompt recognition and treatment of any disease.
- A list should be made of everyone present in the room at the time of exposure.
  - Further define those exposed by exposure activity, pregnancy status, immunocompromising conditions, and racial and ethnic demographics
- A baseline serum sample should be obtained promptly from persons exposed to *coccidioides* and the samples should be stored for eventual testing if symptoms develop.
- All persons identified as exposed should receive a therapeutic dose of either itraconazole or fluconazole orally for 6 weeks, as prophylaxis.
  - Review the 2009 document for management of pregnant contacts.
- During the six-week period, exposed persons should be on symptom watch.
  - If illness develops, they should present to a clinician for diagnostic testing.
  - Because development of antibodies may be delayed until 3 weeks after symptom onset, the second serum titer should be collected 3-12 weeks after symptom onset for comparison with the baseline specimen.

### C. Intentional Contamination

*Coccidioides arthroconidia* have low potential use as a weapon. If suspected:

- Notify local law enforcement, the local Health Officer, the on-call epidemiologist (local) and KDHE (1-877-427-7317) immediately.
- Implement “[Chain of Custody](#)” procedures for all samples collected, as they will be considered evidence in a criminal investigation.
- Work to define population at risk which is essential to guide response activities. Public health authorities will play the lead role in this effort, but

must consult with law enforcement, emergency response and other professionals in the process. The definition may have to be re-evaluated and redefined at various steps in the investigation and response.

- Once the mechanism and scope of delivery has been defined, identify symptomatic and asymptomatic individuals among the exposed and recommend treatment and/or chemoprophylaxis.
- Establish and maintain a detailed line listing of all cases and contacts with accurate identifying and locating information.

Safety Considerations:

- Risks to public health, health care and emergency response personnel are not significant.

## DATA MANAGEMENT AND REPORTING TO THE KDHE

- A. Accept the case assigned to the LHD and record the date the LHD investigation was started on the **[Administrative]** tab.
- B. Organize and collect data.
  - The [Coccidioidomycosis Investigation Worksheet](#) is provided to assist the investigator but can be attached to the record in EpiTrax.
  - Investigators can also collect and enter all required information directly into EpiTrax **[Clinical]**, **[Demographics]**, **[Epidemiological]**, and **[Notes]** tabs without using the paper forms.
  - During outbreak investigations, refer to guidance from a KDHE epidemiologist for appropriate collection tools.
- C. Report data collected during the investigation via EpiTrax.
  - Verify that all data requested in [Coccidioidomycosis Investigation Worksheet](#) has been recorded on an appropriate EpiTrax **[tab]**, or that actions are completed for a case lost to follow-up as outlined below.
  - Some data that cannot be reported on an EpiTrax **[tab]** may need to be recorded in **[Notes]** or scanned and attached to the record.
  - Paper report forms do not need to be sent to KDHE after the information is recorded in EpiTrax. The forms should be handled as directed by local administrative practices.
- D. If a case is lost to follow-up, after the appropriate attempts:
  - Indicate 'lost to follow-up' on the **[Administration]** tab with the number of attempts to contact the case recorded.
  - Record at least the information that was collected from the medical records.
  - Record a reason for 'lost to follow-up' in **[Notes]**.
- E. Once the investigation is completed, the LHD investigator will click the "Complete" button. This will trigger an alert to the LHD Administrator, so they can review the case before sending to the state.
  - The LHD Administrator will then "Approve" or "Reject" the CMR.
  - Once a case is "Approved" by the LHD Administrator, BEPHI staff will review the case to ensure completion before closing the case.

Review the [EpiTrax User Guide, Case Routing](#) for further guidance.

## ADDITIONAL INFORMATION / REFERENCES

- A. Treatment / Differential Diagnosis:** American Academy of Pediatrics. Red Book: Report of the Committee on Infectious Disease, 29th Edition. Illinois, Academy of Pediatrics, 2014.
- B. Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual, Washington, DC, American Public Health Association, 2010.
- C. Case Definitions:** [wwwn.cdc.gov/nndss/](http://wwwn.cdc.gov/nndss/)
- D. Kansas Regulations/Statutes Related to Infectious Disease:** [www.kdheks.gov/epi/regulations.htm](http://www.kdheks.gov/epi/regulations.htm)
- E. Valley Fever Center for Excellence:** <https://vfce.arizona.edu/>
- F. Infectious Diseases Society of America (IDSA):**
- Practice Guidelines for the Treatment of Coccidioidomycosis: <https://academic.oup.com/cid/article/63/6/e112/2389093>
  - Expert Opinion: What To Do When There Is *Coccidioides* Exposure in a Laboratory: <https://academic.oup.com/cid/article/49/6/919/334683>
- G. Additional Information (CDC):**
- Biosafety in Laboratories: [https://www.cdc.gov/biosafety/publications/bmbl5/BMML5\\_sect\\_VIII\\_b.pdf](https://www.cdc.gov/biosafety/publications/bmbl5/BMML5_sect_VIII_b.pdf)
  - <https://www.cdc.gov/features/valleyfever/index.html>

## Coccidioidomycosis Investigation Worksheet

Patient Name Last:		First:		Middle:	
Date of Birth:	Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female		Pregnant:	Yes	No
If pregnant, trimester:					

### Ethnicity/Race (mark one or more)

<input type="checkbox"/> Hispanic or Latino	<input type="checkbox"/> American Indian/ Alaska Native	<input type="checkbox"/> Asian	<input type="checkbox"/> Black or African American	<input type="checkbox"/> Other
<input type="checkbox"/> Not Hispanic or Latino	<input type="checkbox"/> Native Hawaiian / Other pacific islander	<input type="checkbox"/> Filipino	<input type="checkbox"/> White	<input type="checkbox"/> Unknown

### Coccidioidomycosis Symptoms

Onset Date:				Cough	Yes	No	Unk	Arthralgias	Yes	No	Unk
Fever	Yes	No	Unk	Chest Pain	Yes	No	Unk	Headache	Yes	No	Unk
Night Sweats	Yes	No	Unk	Shortness of Breath	Yes	No	Unk	Rash	Yes	No	Unk
Fatigue	Yes	No	Unk	Sputum production	Yes	No	Unk	Weight loss	Yes	No	Unk
Has the patient's infection become disseminated?					Yes	No	Unk				

If yes, Indicate location (skin, bones, joint, meningitis, other)?

Has the patient ever been tested for Coccidioidomycosis before?	Yes	No	Unk
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If yes, indicate the approximate date and test results?

### Existing Medical Conditions (check all present at the time of disease onset):

<input type="checkbox"/> Asthma	<input type="checkbox"/> COPD/emphysema	<input type="checkbox"/> Immunocompromised	<input type="checkbox"/> Tuberculosis
<input type="checkbox"/> Cancer (type): _____	<input type="checkbox"/> Corticosteroid	<input type="checkbox"/> Organ Recipient	<input type="checkbox"/> Other:
<input type="checkbox"/> Chemotherapy	<input type="checkbox"/> Diabetes	<input type="checkbox"/> Smoker	

### Patient occupation(s)

### Dates

1.	
2.	
3.	

### Place of Residence

### Current County of residence:

Did the patient reside outside of the current county of residence the year before illness onset?	Yes	No	Unk
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*If yes specify locations below.*

Location (City, County, State, Country)	Month and Year Residence Started	Month and Year Residence Ended

### Travel History:

Did the patient travel outside of the county of residence during the incubation period?	Yes	No	Unk
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*If yes specify locations below.*

Location (City, County, State, Country)	Date Travel Started	Date Travel Ended

## Coccidioidomycosis Investigation Worksheet

Scan and attach medical records and laboratory results to the record in EpiTrax.

Additional findings:

**To assist with residence or travel – the following states are endemic or potential risks of the agent:**

Arizona (endemic)	Yes	No	Unk	<i>From:</i>	<i>To:</i>
California (endemic)	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Colorado	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Idaho	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Montana	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Nevada (endemic)	Yes	No	Unk	<i>From:</i>	<i>To:</i>
New Mexico (endemic)	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Oregon	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Texas (endemic)	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Utah (endemic)	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Washington	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Wyoming	Yes	No	Unk	<i>From:</i>	<i>To:</i>
Outside of the U.S.	Yes	No	Unk	<i>From:</i>	<i>To:</i>