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Summary and Action Items

CDC is now offering routine diagnostic testing for Heartland and Bourbon viruses to identify additional cases of these novel pathogens. This memo provides guidance to local health departments (LHDs), health care providers, commercial and private laboratories regarding human testing for these viruses. In this guidance you will find:

1. Updates on the status of Heartland and Bourbon virus testing
2. Information on who should be tested for Heartland and Bourbon viruses
3. Available testing assays at CDC for Heartland and Bourbon viruses

Background

Heartland virus was first discovered as a cause of human illness in 2009 in Missouri. To date, more than 35 human cases have been reported from states in the Midwestern and southern United States (US). Most people diagnosed with Heartland virus became ill May through September. Illinois has not had a case of Heartland virus to date.

Bourbon virus was more recently identified in 2014 in a man from Bourbon County, Kansas. Though fewer cases of Bourbon virus have been reported, the geographic distribution is similar for both Bourbon and Heartland viruses. To date, Illinois has not had a case of Bourbon virus.

Symptoms

Clinical symptoms of both Heartland and Bourbon viruses are similar and include fever, fatigue, anorexia, nausea and diarrhea. Additionally, both viruses have been found to cause leukopenia, thrombocytopenia, and elevated liver transaminases. Persons with Bourbon virus disease; however, may present with a diffuse, maculopapular rash, which has not been observed in persons with Heartland virus disease.

Transmission

Heartland virus can be transmitted by ticks, mosquitoes, and sandflies. Recent studies have shown that the Lone Star tick (*Amblyomma americanum*) can transmit the virus. It is not known if the virus can be transmitted by other species of ticks.

Experts do not yet fully know how people become infected with Bourbon virus. However, based on what we know about similar viruses, it is likely that Bourbon virus is spread through tick or other insect bites.

Diagnosis

Testing for Heartland or Bourbon viruses should be considered for patients with an acute febrile illness within the past three months, at least one epidemiologic criterion, AND at least one clinical criterion.

Epidemiologic criteria:

- 1) Known tick bite, finding a tick on body, or potential exposure to ticks through outdoor activities in the three weeks prior to illness onset during spring through fall (e.g., April–October); **OR**
- 2) Resides in, or recently traveled to an area with previous evidence of Heartland or Bourbon virus

Clinical criteria:

- 1) Leukopenia (white blood cells <4,500 cells/ μ L) or thrombocytopenia (platelets <150,000 cells/mL) not explained by another known condition; **OR**
- 2) Suspected tickborne disease (e.g., ehrlichiosis, Rocky Mountain spotted fever) with no clinical response to appropriate treatment (e.g., doxycycline).

Prevention

The best way to prevent illness is by avoiding tick bites, using tick control products on pets and keeping them out of tick habitats, and reducing ticks in your yard. Click [here](#) for more details on how to avoid tick bites.

IDPH and LHD Response

Healthcare providers wanting to test patients for Heartland and Bourbon viruses should contact their LHD to determine if a case meets the testing criteria, for prior approval and receipt of a testing authorization number. LHDs should use this [format](#) to create the laboratory testing authorization number. If IDPH requests a specimen be forwarded to our lab from a commercial or private lab, an authorization number is not required.

Laboratory Testing:

Testing for Heartland and Bourbon viruses is not available at IDPH. However, as of July 2018, the following tests for Heartland and Bourbon viruses are available at CDC:

| Test Type | Heartland Virus | Bourbon Virus |
|-----------|-----------------|---------------|
| RT-PCR | Yes | Yes |
| IgM MIA | Yes | Not available |
| IgG MIA | Yes | Not available |
| PRNT | Yes | Yes |

Key: IgM – immunoglobulin M

IgG – immunoglobulin G

MIA – microsphere-based immunoassay

RT-PCR – reverse transcriptase-polymerase chain reaction

PRNT – plaque reduction neutralization test

Testing Guidance:

- Specimens collected <7 days after onset of symptoms, serum and/or whole blood should be submitted for Heartland and Bourbon viruses RT-PCR and antibody testing.
- Specimens collected \geq 7 days after onset of symptoms, serum specimens should be submitted for antibody testing. If the patient is immunocompromised, RT-PCR also may be performed on serum collected >7 days after onset.
- Samples collected >3 months after symptom onset will not be tested at this time based on limitations of our current understanding of antibody kinetics.
- Because there is no specific IgM antibody test yet available for Bourbon virus, acute and convalescent samples will be needed to make the diagnosis of an acute Bourbon virus infection using serologic assays.

Specimen Submission:

- All specimens for Heartland and Bourbon virus testing must be submitted through the IDPH Chicago Laboratory.
- All samples should be submitted with an [IDPH Vectorborne Laboratory Submission Form](#) with each section of the form to be completed in full. All immunocompromising health conditions and/or medications of the patient should be included in the comments box of the Patient Information section. Also a complete travel history within the 3 months prior to symptom onset should be included on the form.
- **Testing will be delayed for specimens submitted with incomplete laboratory submission forms.**
- Healthcare providers can obtain a copy of the IDPH Vectorborne Lab Specimen Submission form from their LHDs.
- Healthcare providers and health departments should include specific epidemiologic and clinical criteria used to determine that testing for Heartland and Bourbon virus diseases is appropriate.

Contact

For additional information regarding human arboviral surveillance, please contact Debbie Freeman (Debbie.Freeman@illinois.gov) or Jonathan Popovitch (Jonathan.Popovitch@illinois.gov) at IDPH CDCS.

For additional information on specimen submission, please contact Hope Johnson at the IDPH Laboratory (Hope.Johnson@illinois.gov).

Additional Resources

For additional information on Heartland and Bourbon viruses, visit the following links:

Heartland virus: <https://www.cdc.gov/heartland-virus/index.html>,

Bourbon Virus: <https://www.cdc.gov/ncezid/dvbd/bourbon/index.html> .

Target Audience

Local Health Departments
Infection Control Practitioners
Infectious Disease and Other Health Care Providers
Commercial and Private Laboratories

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