Chikungunya

Investigative Guidelines
December 2018

1. DISEASE REPORTING

1.1 Purpose of Reporting and Surveillance

1. 1. To characterize the epidemiology and clinical aspects of the disease.
2. To monitor disease trends and recognize outbreaks and local transmission.
3. To identify cases during their infectious period to prevent transmission to local mosquito reservoirs.
4. To provide education and recommend preventive measures.

1.2 Laboratory and Physician Reporting Requirements

Chikungunya is considered a disease of public health importance. Health care providers, health care facilities, and clinical laboratories are required to report chikungunya to the local public health department within one local public health authority working day.

1.3 Local Health Department Reporting and Follow-Up Responsibilities

1. Report suspect and confirmed cases to the Oregon Health Authority (OHA) by the end of the calendar week of the initial physician/lab report.
2. Begin the investigation within one working day. Submit case information electronically to ACDP within seven days of initial report
3. Attempt to identify the source of infection, and whether the case traveled as part of a larger group. If so, discuss the merits of additional testing of symptomatic fellow travel companions.
4. Advise avoidance of mosquito bites if the case is in the infectious period (1st week of illness).

2. THE DISEASE AND ITS EPIDEMIOLOGY

Chikungunya fever (CHIK) is a mosquito-borne, dengue-like illness identified in Africa (Tanzania) and Asia during the 1950s, but imported into the Americas during December 2013. The name chikungunya derives from a Makonde word roughly meaning “that which bends,” describing the characteristic appearance of sufferers contorted by the painful arthralgias. The Makonde ethnic group lives in southeast Tanzania and northern Mozambique; epidemics of fever, rash and arthritis resembling CHIK were reported in the region as early as the 1770s.

Unlike West Nile virus, humans are not a dead end host. The virus (CHIKV) is transmitted in a human-to-mosquito-to-human cycle (autochthonously); *Aedes aegypti* and *Aedes albopictus* mosquitoes are major vectors. A large outbreak (250 people) occurred in northern Italy during 2007 when a viremic traveler from India introduced the virus into the local mosquito population.

Historically, CHIKV appeared cyclically (every 4–30 years). Since 2004, CHIKV has expanded beyond its traditional geographical range of Africa and Asia. Presently, cases

have been reported in the Caribbean, Haiti, Central and South America, Africa, Southern Europe, Southeast Asia, Micronesia, and islands in the Indian and Pacific Oceans. In July 2014, two locally acquired cases of CHIK occurred in Florida. In Oregon, CHIKV infection has been reported among travelers returning from the Caribbean, including Haiti. For CHIK's current distribution, consult the CDC CHIKV Geographic Distribution Map: http://www.cdc.gov/chikungunya/geo/index.html.

CHIK is a disease of public health importance because it has the potential for ongoing transmission in the United States: we have humans, some of whom travel, and we have the vectors (*Aedes* mosquitoes). Recent local transmission among Floridians in the absence of travel illustrates the point.

2.1 Etiologic Agent

CHIKV is an RNA virus that belongs to the *Alphavirus* genus in the *Togaviridae* family. It was first isolated during an outbreak in Tanzania, 1952–1953.

2.2 Description of illness

CHIK is characterized by acute fever and severe arthralgia, commonly affecting more than 1 joint (polyarthralgia). Other symptoms (in order of frequency) include: rash, headache, muscle pain (myalgia), nausea, vomiting, conjunctivitis, swollen joints (periarticular edema), back pain, polyarthritis, and low white blood cells (leukopenia <5000). Liver enzymes and inflammatory markers (erythrocyte sedimentation rate, C-reactive protein) can be elevated, too. Atypical manifestations include: meningoencephalitis, seizures, optic neuritis, myocarditis, arrhythmias, photosensitive hyperpigmentation, vesiculobullous dermatosis, nephritis, bleeding dyscrasias.

People at risk for more severe disease include newborn infants, adults ≥65 years of age and people with medical conditions such as high blood pressure, diabetes, or heart disease.

Acute CHIK can look very similar to dengue fever on initial presentation; dengue should be included in the initial diagnostic work-up because of its severe hemorrhagic complications. In countries with endemic CHIK and dengue fevers (e.g., Haiti), the following table may be helpful:

Table. Clinical and laboratory features of chikungunya virus infections compared with dengue virus infections (Source: PAHO/CDC, 2011)		
Feature	**Chikungunya**	**Dengue**
Fever (>39°C)	+++	++
Arthralgia	+++	+/-
Arthritis	+	-
Headache	++	++
Rash	++	+
Myalgia	+	++
Hemorrhage	+/-	++
Shock	-	+
Lymphopenia	+++	++
Neutropenia	+	+++
Thrombocytopenia	+	+++
Hemoconcentration	-	++

2.3 Reservoirs

CHIKV has the potential for ongoing transmission in the United States because humans are reservoirs of the virus during epidemics. Between epidemics, implicated reservoirs are non-human primates, rodents, birds, and some small mammals.

2.4 Sources and Modes of Transmission

CHIKV is transmitted by *Ae. aegypti* and *Ae. albopictus* mosquitoes which are found in the U.S. in the southeast and central east states, Texas, New Mexico, Arizona and as far north as Central California. While *Ae. aegypti* and *Ae. albopictus* are not currently found among Oregon mosquito populations, other *Aedes* spp. are (*Ae. japonicus*); their potential for effective transmission of CHIKV is unknown.

2.5 Incubation Period

Mosquitoes acquire the virus from a viremic host. Following an average incubation of 10 days (extrinsic incubation period), the mosquito is then able to transmit the virus to a naïve host, such as a human. Incubation in the human (intrinsic incubation period) between the infectious mosquito bite and symptom onset is usually 3–7 days (range 1–12 days). More than 75% of infected people become symptomatic. Acute illness lasts 7–10 days; however, symptoms of chronic or recurrent joint pain can persist for months or longer in some cases.

2.6 Period of Communicability

Most CHIKV infections that occur during pregnancy will not result in viral transmission to the fetus; reports of spontaneous abortions are rare. The exception is if the mother becomes viremic during the perinatal period (-4 days before and +1 days after delivery). Vertical transmission from mother to infant is as high as 49% during this period. Cesarean section does not appear to prevent transmission. Neonatal CHIK is associated with fever, poor feeding, pain, distal edema, various skin manifestations, seizures, meningoencephalitis, and echocardiographic abnormalities in the newborn. There is no evidence that CHIK is transmitted through breast milk.[1,2]

2.7 Treatment

There is no specific treatment or vaccine for acute CHIKV. Treatment is supportive; acetaminophen is the analgesic of choice until other etiologies, like dengue, are ruled out. Aspirin is not advised because of the risk of bleeding. Providers should consider other causes of fever in the returning traveler (i.e., dengue, malaria, typhoid, tickborne-rickettsiae, HIV, schistosomiasis, leptospirosis), and educate patients on bug bite prevention. (See §5.4 for treatment of chronic cases).

3. CASE DEFINITIONS, DIAGNOSIS AND LABORATORY SERVICES

3.1 Confirmed Case Definition

A patient with acute onset of fever >38.5°C (101.3°F) and severe arthralgia or arthritis not explained by other medical condition, and who resides or has visited epidemic or endemic areas within 2 weeks prior to the onset of symptoms, with any of the following CHIKV-specific tests:

- Presence of virus specific IgM antibodies in single serum sample collected in acute or convalescent stage with confirmatory virus-specific neutralizing antibodies in the same or a later specimen
- Four-fold rising of IgG titers in samples collected at least 2–3 weeks apart.
- Presence of viral RNA by RT-PCR.
- CHIKV blood or tissue isolation.

3.2 Presumptive Case Definition

A patient that meets the clinical criteria for a confirmed case and has virus-specific IgM antibodies in CSF or serum but with no other testing.

3.3 Suspect Case (*not* reportable to Oregon PHD)

A patient with acute onset of fever >38.5°C (101.3°F) and severe arthralgia or arthritis not explained by other medical condition, and who resides or has visited epidemic or endemic areas within 2 weeks prior to the onset of symptoms.

3.4 Non-acute Case (*not* reportable to Oregon PHD)

Those persons with a remote history of fever, severe arthritis or arthralgia not explained by another medical condition, a negative IgM, and a single positive IgG could represent resolved CHIK cases. Enter these as "No Case".

3.5 Services Available at the Oregon State Public Health Laboratories

The OSPHL does not perform testing for chikungunya virus as of January 1, 2019.

Serological testing (IgM, IgG) is available at commercial laboratories such as ARUP and Quest. Providers pursuing CHIK testing should consult with their clinical laboratory for guidance on specimen collection and transport.

Confirmatory testing is available through the CDC. To arrange for confirmatory testing at the CDC, contact ACDP to inform Epi of case and testing. Send new serum or forward existing serum specimens to the Oregon State Public Health Laboratory. Specimens must be accompanied by the OSPHL Virology/Immunology Test Request form and the CDC Specimen Submission Form. Go to the following OSPHL webpage and follow instructions for CDC specimen submission: www.bitly.com/or-cdc-testing.

3.6 Specimen Collection

The preferred specimen is blood; serum is preferred to whole blood. Obtain acute serology (titers) within the first 8 days of illness, and convalescent serology at least 2–3 weeks after acute specimen collection (sometimes 10 days is sufficient to see a robust IgG response).

The best blood collector tube is a serum separator (typically tiger/speckled-top). The blood should be al- lowed to coagulate and tubes should be spun to separate the serum from the clot prior to shipping. If a red-top is used (no additive), the blood must be allowed to coagulate, the tube centrifuged, and the serum drawn off into a clean tube prior to shipping. Heparin (green top) and EDTA (purple top) are unsuitable for CHIKV testing. Transport serum for IgM and IgG serological testing at 2–8°C (icebox).

Other types of specimens are rare: CSF (meningoencephalitis), synovial fluid (arthritis with effusion), or autopsy material. PCR testing and viral isolation on specimens collected during the first 8 days of illness are performed only at specialty labs. Serum, CSF, or tissue to be tested using PCR or viral isolation should be frozen (–20°C).[1,2]

4. ROUTINE CASE INVESTIGATION

Complete the fields in Orpheus regarding patient demographics, clinical information, laboratory data, risk factor information, and travel history.

4.1 Identify Source of Infection

Obtain history of any travel during the 14 days prior to illness onset. Note any "smoking gun" exposures— mosquitoes, mosquitoes, mosquitoes. *Aedes* bites during the day, too.

4.2 Identify Potentially Exposed Persons

Ask about fellow travelers who experienced similar symptoms.

4.3 Environmental Evaluation

See §5.6 Environmental Measures for more information.

5. CONTROLLING FURTHER SPREAD

5.1 Education

When planning a trip, travelers should check their destination for potential health risks, vaccine-preventable diseases, and tips on protecting their health https://wwwnc.cdc.gov/travel/destinations/list. Effective methods to prevent mosquito bites during both day and night include physical (i.e., long sleeves, bed nets) and chemical (i.e., EPA-approved 20–30% DEET products) protective barriers.[3]

5.2 Infection Control Recommendations

People suspected of having CHIK should diligently protect themselves from further mosquito exposure during the first week of illness to prevent ongoing transmission of the virus. *Ae. aegypti* or *Ae. albopictus* bite during the daytime, dawn to dusk, and even in the presence of artificial light.

Direct contact with infected blood can transmit CHIKV: 1 case of a needle stick and several cases of laboratory workers contracting CHIK after handling infected blood have been reported. Transmission through respiratory droplets or particles has not been reported.

5.3 Protection of Contacts

There is no human-to-human transmission, except through maternal-child transmission or direct contact with infected blood (i.e., needle sticks).

5.4 Follow up of Cases

Some cases experience recurrent or chronic joint symptoms after the acute infection has resolved. Such joint symptom recurrence does not represent recurrent viremia. Some cases may require short courses of narcotics or corticosteroids during the convalescent period. Movement and mild exercise tend to improve morning stiffness and pain, but heavy exercise may exacerbate symptoms.[1,2]

5.5 Isolation and Work or Care Restrictions

Prevent mosquito exposure during the first week of illness.

5.5 Environmental Measures[3,4]

- Wear long-sleeves, pants, and socks. Treat clothes with permethrin.
- Apply repellent to exposed skin.
- Use screens on windows; use insecticide-treated bed nets when traveling to endemic countries.
- Drain any standing water.
- Discard old tires, tin cans, plastic containers, ceramic pots or other containers that can hold water.
- Repair failed septic systems.
- Drill holes in the bottom of recycling containers left outdoors.
- Keep grass cut short and shrubbery trimmed.
- Clean clogged roof gutters, particularly if leaves tend to plug up the drains.
- Frequently replace the water in pet bowls.
- Flush ornamental fountains and birdbaths periodically.
- Aerate ornamental pools, or stock them with predatory fish.

6. MANAGING SPECIAL SITUATIONS 4

If there is no history of travel, this may be a locally acquired case; contact the ACDP Epi On-call immediately. If a large group of returning travelers is identified, contact the ACDP Epi On-call.

7. REFERENCES

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3. CDC. Protection Against Mosquitoes, Ticks, & Other Insects & Arthropods, 2013. wwwnc.cdc.gov/travel/ yellowbook/2014/chapter-2-the-pre-travel-consultation/protection-against-mosquitoes-ticks-and-other-insects-and-arthropods
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8. UPDATE LOG

December 2018. Modified to new template format. Revised laboratory testing information and updated case definitions. (Takeuchi)

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