

Interim Guidance for Protecting Workers from Occupational Exposure to Zika Virus

The Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) are monitoring the Zika virus outbreak spreading through Central and South America, Mexico, and parts of the Caribbean, including U.S. territories. For the most up-to-date information, check the Centers for Disease Control and Prevention (CDC) [Zika website](#) frequently. Some U.S. states have mosquitoes that can become infected with and spread Zika virus, and travel-associated Zika virus infections in U.S. states may result in local spread of the virus. Visit the CDC [Areas with Zika website](#) to learn where there is current transmission. Workers who are exposed on the job to mosquitoes or the blood or other body fluids of infected individuals may be at risk for occupationally acquired Zika virus infection. This interim guidance provides employers and workers with information and guidance on preventing occupational exposure to the Zika virus. The guidance may be updated as additional information becomes available.

Introduction

Zika virus is primarily spread through the bites of infected mosquitoes. Mosquitoes can become infected when they bite infected persons and can then spread the Zika virus to other persons they subsequently bite.

Zika virus historically has been found in Africa, Southeast Asia, and the Pacific Islands. The first case was identified in the Zika Forest in Uganda in 1947.¹ In 2015, cases of Zika virus infection emerged in the Americas and the Caribbean.

Zika virus has the potential to spread anywhere that mosquitoes capable of spreading this virus are found. *Aedes* species mosquitoes are a principal vector (i.e., carrier) of Zika virus in the U.S. *Aedes aegypti* (commonly known as yellow fever mosquitoes) are typically concentrated in the southern U.S. as well as parts of the Southwest. Another vector for Zika virus is *Aedes albopictus* (commonly known as Asian Tiger mosquitoes), which are found in much of the southern and eastern part of the U.S. *Aedes* mosquitoes can also carry other arboviruses,



Credit: CDC / James Gathany

Aedes aegypti mosquitoes, like the one pictured, can become infected when they bite infected persons and can then spread the Zika virus to other persons they subsequently bite.

including dengue, yellow fever, chikungunya, Japanese encephalitis, and West Nile. CDC provides information about [surveillance of *Aedes* mosquitoes](#) in the U.S.

Zika Virus Infection in Humans

Current science-based evidence suggests that approximately one out of five infected people develops symptoms of Zika virus, usually beginning 2-7 days after the bite of an infected mosquito. Symptoms are usually mild and can last 2-7 days. The most common symptoms of

1. Hayes, Edward B. "Zika Virus Outside Africa," *Emerging Infectious Diseases*, 15, 9, 1347-1350 (2009).

Zika virus infection are fever, rash, joint pain and red or pink eyes. Other symptoms include myalgia (muscle pain) and headache. These symptoms are similar to those of dengue fever or chikungunya. Neurological and autoimmune complications are infrequent but have been described in outbreaks in Polynesia and, more recently, Brazil.

During the first week of infection, Zika virus can be detected in the blood and is capable of being spread from an infected person to a mosquito that feeds on that person. Infected mosquitoes can then spread the virus to other people through bites. In some instances, having direct contact with infectious blood or other body fluids (such as semen through sexual transmission) of an infected person may result in transmission of the virus.

Zika virus can be spread from a pregnant woman to her fetus and has been linked to a serious birth defect of the brain called microcephaly in babies of mothers who had Zika virus while pregnant. Other problems have been detected among fetuses and infants infected with Zika virus before birth, such as absent or poorly developed brain structures, defects of the eye, hearing deficits, and impaired growth. CDC recommends special precautions for women who are or may become pregnant.

Control and Prevention

In areas affected by Zika virus transmission, protect yourself and others from possible exposure to Zika virus by always taking steps to prevent mosquito bites. There is no vaccine to prevent Zika virus and there is no specific treatment for individuals who become infected.

Although Zika virus is generally spread by the bites of infected mosquitoes, exposure to an infected person's blood or other body fluids (such as semen through sexual transmission) may also result in transmission. Employers should train workers about their risks of exposure to Zika virus through mosquito bites and direct contact with infectious blood and other body fluids and how to protect themselves. Employers should also provide information about Zika virus infection, including modes of transmission and possible links to birth defects, to workers who are pregnant or may become pregnant or whose sexual partners are or may become pregnant.

Outdoor workers may be at the greatest risk of exposure to Zika virus. Some workers, including those working with insecticides to control mosquitoes and healthcare workers who may be exposed to contaminated blood or other potentially infectious materials from individuals infected with Zika virus, may require additional protections (e.g., certain types of personal protective equipment, PPE). Employers must comply with universal precautions for potential bloodborne pathogens (BBP) exposures, as described in OSHA's BBP standard ([29 CFR 1910.1030](#)), and any applicable requirements in OSHA's PPE standards ([29 CFR 1910 Subpart I](#)), among other OSHA requirements.

Consult the [CDC Zika website](#) for the most up-to-date information to help employers implement effective worker protections.

Outdoor workers

Recommended employer actions:

- Inform workers about their risks of exposure to Zika virus through mosquito bites and train them how to protect themselves. Check the [CDC Zika website](#) to find Zika-affected areas.
- Provide insect repellents and encourage their use according to the guidance below.
- Provide workers with, and encourage them to wear, clothing that covers their hands, arms, legs, and other exposed skin. Consider providing workers with hats with mosquito netting to protect the face and neck.
- In warm weather, encourage workers to wear lightweight, loose-fitting clothing. This type of clothing protects workers against the sun's harmful rays and provides a barrier to mosquitoes. Always provide workers with adequate water, rest and shade, and monitor workers for signs and symptoms of [heat illness](#).
- Get rid of sources of standing water (e.g., tires, buckets, cans, bottles, barrels) whenever possible to reduce or eliminate mosquito breeding areas. Train workers about the importance of eliminating areas where mosquitos can breed at the worksite.
- If requested by a worker, consider reassigning anyone who indicates she is or may become pregnant, or who is male and has a sexual partner who is or may become pregnant, to indoor tasks to reduce their risk of mosquito bites.

Recommended worker actions:

- Use insect repellents according to the guidance below.
- Wear clothing that covers hands, arms, legs, and other exposed skin. Wear hats with mosquito netting to protect the face and neck. Wear socks that cover the ankles and lower legs.
- In warm weather, wear lightweight, loose-fitting clothing. This type of clothing protects workers against the sun's harmful rays and provides a barrier to mosquitoes. Drink plenty of water, take rest breaks in shaded areas, and watch for signs and symptoms of [heat illness](#), including in coworkers.
- Get rid of sources of standing water (e.g., tires, buckets, cans, bottles, barrels) whenever possible to reduce or eliminate mosquito breeding areas.
- Talk to your supervisor(s) about any outdoor work assignment(s) if you are or may become pregnant, or, for males, if your sexual partner is or may become pregnant. Such workers should be familiar with CDC information on [Zika virus and pregnancy](#).
- If symptoms develop, seek medical attention promptly. Discuss any possible exposure to mosquitoes or infections spread by mosquitoes with a healthcare provider.

Guidance on use of insect repellents for employers and workers:

- Always follow label precautions when using insect repellent.
- Use insect repellent containing an [EPA-registered active ingredient](#). All of the EPA-registered active ingredients have demonstrated repellency, but some provide longer-lasting protection than others. Research suggests that repellents containing DEET (N,N-diethyl-m-toluamide) or picaridin (KBR 3023) typically provide longer-lasting protection than the other products, and oil of lemon eucalyptus (p-menthane-3,8-diol) provides longer-lasting protection than other plant-based repellents. Permethrin is another long-lasting repellent that is intended for application to clothing and gear, but not directly to skin.
- Choose a repellent that provides protection for the amount of time that you will be outdoors. In general, the more active ingredient (higher concentration) a repellent contains, the longer

it will protect against mosquito bites. For example, the more DEET a repellent contains, the longer time it can protect you from mosquito bites, with protection times ranging from 1 hour (4.75% DEET) to 5 hours (23.8% DEET). Studies suggest that concentrations of DEET above approximately 50% do not offer a marked increase in protection time against mosquitoes; DEET efficacy tends to plateau at a concentration of approximately 50%.

- To avoid reaction to DEET or other ingredients in insect repellents, read and follow the directions on all insect repellents before use. Spray insect repellent (permethrin) on the outside of clothing, as it is possible for mosquitoes to bite through thin clothing.
- Do NOT spray insect repellent on skin that is under clothing.
- Do NOT apply insect repellent to skin that is already irritated, or to cuts/lacerations.
- Do NOT spray aerosol or pump products in enclosed areas. Do NOT spray a pump or aerosol product directly on the face. First spray it on hands and then carefully spread it on the face (do not allow insect repellent to contact eyes or mouth).
- After returning indoors and before eating, use soap and water to wash skin that has been treated with insect repellent. Reapply repellent when returning outdoors or after eating.
- Outdoor workers may need to use sunscreen in conjunction with insect repellent. Repellents that are applied according to label instructions may be used with sunscreen with no reduction in repellent activity. However, limited data show a one-third decrease in the sun protection factor (SPF) of sunscreens when DEET-containing insect repellents are used after a sunscreen is applied. Products that combine sunscreen and repellent are not recommended, because sunscreen may need to be reapplied more often and in larger amounts than needed for the repellent component to provide protection from biting insects. The best option is to use separate products, applying sunscreen first and then applying the repellent. Due to the decrease in SPF when using a DEET-containing insect repellent after applying sunscreen, users may need to reapply the sunscreen more frequently.²

2. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, "[CDC Health Information for International Travel, 2016 \(Yellow Book\)](#)."

- Stop using insect repellent and/or sunscreen if a rash or other adverse symptoms develop. Wash skin with soap and water. Consult a healthcare provider or [poison control center](#) for further guidance. Be sure to inform the healthcare provider or poison control center about the insect repellent used (e.g., type, when and where applied). Take other actions, as described in this guidance, to avoid mosquito bites if insect repellent cannot be used.

Healthcare and laboratory workers

Employers and workers in healthcare settings and laboratories should follow good infection control and biosafety practices (including universal precautions) as appropriate, to prevent or minimize the risk of transmission of infectious agents (e.g., Zika virus). Always follow universal precautions for potential BBP exposures, as described in OSHA's BBP standard ([29 CFR 1910.1030](#)). In healthcare, standard precautions can be used to expand the universal precautions required by the BBP standard by adding several protections (including expanded PPE) not covered by the BBP standard. Standard precautions include, but are not limited to, hand hygiene and the use of PPE to avoid direct contact with blood and other potentially infectious materials, including laboratory specimens/samples. PPE may include gloves, gowns, masks and eye protection.

Hand hygiene consists of washing with soap and water or using alcohol-based hand rubs containing at least 60 percent alcohol.³ Soap and water are best for hands that are visibly soiled. Perform hand hygiene before and after any contact with a patient, after any contact with potentially infectious material, and before putting on and upon removing PPE, including gloves.

Laboratories should ensure that their facilities and practices meet the appropriate Biosafety Level (BSL) for the type of work being conducted (including the specific biological agents – in this case, Zika virus) in the laboratory. CDC has specific [Biosafety Guidance for the Transportation of Specimens and for Work with Zika virus in the Laboratory](#). The [Biosafety in Microbiological and Biomedical Laboratories \(BMBL\), 5th Edition](#) also provides detailed

guidance on biosafety when working with arboviruses, including Zika, in Section VIII – F: Arboviruses and Related Zoonotic Viruses. Laboratories should handle Zika virus at BSL-2, including limiting access to laboratories and other work areas when work is occurring and conducting certain procedures in biosafety cabinets or other containment equipment. Some procedures may require BSL-3 precautions, including additional respiratory protection, based on the risk assessment of the proposed work.⁴ The BMBL guidance also describes BSLs in [Section IV - Laboratory Biosafety Level Criteria](#) (PDF).

Employers must comply with applicable requirements in the BBP ([29 CFR 1910.1030](#)), PPE ([29 CFR 1910.132](#)), and Respiratory Protection ([29 CFR 1910.134](#)) standards, among other OSHA requirements.

Additionally, employers should ensure that workers:

- Follow workplace standard operating procedures (e.g., workplace exposure control plans) and use the engineering controls and work practices available in the workplace to prevent exposure to blood or other potentially infectious materials. See [29 CFR 1910.1030](#).
- Do NOT bend, recap, or remove contaminated needles or other contaminated sharps. Properly dispose of these items in closable, puncture-resistant, leakproof, and labeled or color-coded containers. See [29 CFR 1910.1030](#).
- Use sharps with engineered sharps injury protection (SESIP) to avoid sharps-related injuries.
- Report all needlesticks, lacerations, and other exposure incidents to supervisors as soon as possible.

Employers should consider enhanced precautions in situations where workers are at increased risk of exposure to Zika virus or other hazards. CDC recommends healthcare workers use standard precautions during patient care regardless of suspected or confirmed Zika infection status.⁵ While there is no evidence of Zika transmission through aerosol exposure, minimizing the

3. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, "[Show Me the Science – When to Use Hand Sanitizer](#)."

4. U.S. Department of Health and Human Services, "[Biosafety in Microbiological and Biomedical Laboratories \(BMBL\), 5th ed.](#)"

5. Healthcare Infection Control Practices Advisory Committee, "[2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings](#)," Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).

aerosolization of blood or body fluids as much as possible during patient care or laboratory tasks may help prevent workers from being exposed to other pathogens. Additional protections, including engineering controls to ensure containment of pathogens or enhanced PPE to prevent or reduce exposure, may be necessary during any aerosol-generating procedures or other such tasks.

Mosquito control workers

When working outdoors, follow the same precautions recommended above for general outdoor workers for protection against mosquito bites. Workers performing tasks related to mosquito control may need additional protection, depending on their job tasks.

Workers entering or working around areas with dense mosquito populations, such as ponds and other locations with standing water, may need enhanced skin protection to prevent mosquito bites. Employers should assess such workers' risks of mosquito bites, and consider providing any additional protective clothing to fully cover workers' exposed skin.

Workers who mix, load, apply, or perform other tasks involving wide-area (or area) insecticides may need additional protection to prevent or reduce exposure to hazardous chemicals.

The EPA regulates pesticide safety use through the [Agricultural Worker Protection Standard \(WPS\)](#). Although the WPS is a regulation for agricultural pesticides aimed at reducing the risk of pesticide poisonings and injuries among agricultural workers and pesticide handlers, its requirements may provide a model for protecting workers using insecticides in mosquito control operations. The [EPA WPS page](#) provides information on pesticide safety training, notification of pesticide applications, use of PPE, restricted-entry intervals after pesticide application, decontamination supplies, and emergency medical assistance.

Workers conducting mosquito control operations with insecticides may require respirators, which must be used in accordance with the respirator selection, medical clearance, fit-testing, and other requirements of OSHA's Respiratory Protection standard ([29 CFR 1910.134](#)).

Employers should monitor use of respirators by any worker who must drive vehicles (e.g., trucks used for insecticide application) to ensure that

respirator use does not restrict the worker's ability to operate the vehicle safely. OSHA's [Safety and Health Topics page on Respiratory Protection](#) provides general information on respirator use and OSHA standards that may apply to the use of other chemicals.

Employers also must comply with any applicable requirements in OSHA's PPE standards ([29 CFR 1910 Subpart I](#)), among other OSHA requirements.

General Guidance for Employers of Workers with Suspected or Confirmed Zika

CDC advises individuals, including workers, infected with Zika virus to⁶:

- Get plenty of rest.
- Drink fluids to prevent dehydration.
- Take medicine such as acetaminophen to reduce fever and pain.
- Avoid taking aspirin, ibuprofen, naproxen, or other non-steroidal anti-inflammatory drugs because of rare cases of bleeding occurring with flaviviruses and these medications.
- Talk to a healthcare provider before taking any medications, including prescriptions, for other medical conditions.
- To help prevent others from getting sick, avoid mosquito bites during the first week of infection. Wearing clothing that covers skin and using insect repellents can help prevent mosquito bites.
- To help prevent transmission to partners via sexual contact, abstain from sexual activity or use condoms during sexual activity during and following infection. For specific recommendations to prevent sexual transmission, please visit the [CDC Zika and Sexual Transmission website](#).

Employers should:

- Ensure that supervisors and all potentially exposed workers are aware of the symptoms of Zika.
- Train workers to seek medical evaluation if they develop symptoms of Zika.
- Assure that workers receive prompt and appropriate medical evaluation and follow-up after a suspected exposure to Zika virus. If the exposure falls under OSHA's BBP

6. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, "[Zika Virus – Symptoms, Diagnosis, & Treatment](#)."

standard ([29 CFR 1910.1030](#)), employers must comply with medical evaluation and follow-up requirements in the standard. See 29 CFR 1910.1030(f).

- Consider options for granting sick leave during the infectious period. CDC describes [steps employers and employees can take to protect others](#) (PDF) during the first week of Zika virus illness.

Paragraph 11(c) of the OSH Act, 29 USC 660(c), prohibits employers from retaliating against workers for raising concerns about safety and health conditions. OSHA encourages workers who suffer such discrimination to [submit a complaint to OSHA](#). Workers have 30 days from an alleged reprisal to file their complaints.

Travel to Zika-affected Areas

When traveling to or through Zika-affected areas, follow the precautions described above for specific work activities. CDC guidance for travel to Zika-affected areas may also help employers and workers in travel-related operations, such as airlines, airline crew members, and cruise line workers take appropriate protective actions.

Employers should consider allowing flexibility in required travel for workers who are concerned about Zika virus exposure. Flexible travel and leave policies may help control the spread of Zika virus, including to workers who are concerned about reproductive effects potentially associated with Zika virus infection.

Consider delaying travel to Zika-affected areas, especially for workers who are or may become pregnant or whose sexual partners may become pregnant. CDC recommends that pregnant women in any trimester not travel to an area with active Zika virus transmission. CDC has published [Zika Travel Information](#) by region, which may assist workers and employers in making travel-related decisions or implementing precautions when traveling. Pregnant women, women who may become pregnant, and men with sexual partners who are or may become pregnant should consult with their healthcare providers about risks associated with Zika virus infection during pregnancy. More information can also be found on the CDC [Zika and Pregnancy website](#).

Even if they do not feel sick, travelers returning to the United States from an area with Zika should take steps to prevent mosquito bites for three weeks so they do not pass Zika to mosquitoes that could spread the virus to other people. CDC provides information on [mosquito bite prevention for travelers](#) (PDF).

Additional Resources

- [Zika Virus](#). Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
- [Zika Travel Information](#). Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
- [Mosquito-Borne Diseases](#). National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services.
- [Zika Virus Fact Sheet](#). World Health Organization (WHO).
- [Zika virus infection and Zika fever: Frequently asked questions](#). Pan American Health Organization (PAHO).
- [Mosquito Bite Prevention for Travelers](#) (PDF). Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
- [Zika information repository](#). Center for Infectious Disease Research and Policy (CIDRAP), University of Minnesota.
- [Rodents, Snakes and Insects QuickCard](#). Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (DOL).
- [2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings](#) (PDF). Healthcare Infection Control Practices Advisory Committee (HICPAC), Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
- [Safety and Health Information Bulletin: Workplace Precautions Against West Nile Virus](#). Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (DOL). Provides related guidance for workers and employers that is also generally applicable to Zika virus and other mosquito-borne diseases.

- [West Nile Virus Fact Sheet](#) (PDF*). Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (DOL). Provides related guidance for workers and employers that is also generally applicable to Zika virus and other mosquito-borne diseases.
 - [West Nile Virus QuickCard](#). Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (DOL). Provides related guidance for outdoor workers that is also generally applicable to Zika virus and other mosquito-borne diseases.
 - [Surveillance and Control of *Aedes aegypti* and *Aedes albopictus* in the United States](#). Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
 - [Bloodborne Pathogens and Needlestick Prevention Safety and Health Topics](#). Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (DOL).
 - [West Nile Virus Prevention](#). National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS). Provides related guidance for workers and employers that is also generally applicable to Zika virus and other mosquito-borne diseases.
 - [Fast Facts: Protecting Yourself from Ticks and Mosquitoes](#) (PDF). National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
 - [Heat Stress Topic Page](#). National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
 - [Fast Facts: Protecting Yourself from Heat Stress](#) (PDF). National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
 - [Respirator Topic Page](#). National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
 - [Preventing Transmission of Zika Virus in Labor and Delivery Settings Through Implementation of Standard Precautions – United States, 2016](#). Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
 - [Questions and Answers for Healthcare Providers Caring for Pregnant Women and Women of Reproductive Age with Possible Zika Virus Exposure](#). Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS).
- ***Accessibility Assistance:** Contact OSHA's [Directorate of Technical Support and Emergency Management](#) at (202) 693-2300 for assistance accessing PDF materials.

Disclaimer: This document is not a standard or regulation, and it creates no new legal obligations. It contains recommendations as well as descriptions of mandatory safety and health standards. The recommendations are advisory in nature, informational in content, and are intended to assist employers in providing a safe and healthful workplace. The *Occupational Safety and Health Act* requires employers to comply with safety and health standards and regulations promulgated by OSHA or by a state with an OSHA-approved state plan. In addition, the Act's General Duty Clause, Section 5(a)(1), requires employers to provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm.

This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627. For other requests or questions, contact OSHA at 1-800-321-OSHA (6742). To receive NIOSH documents or more information about occupational safety and health topics, contact NIOSH at 1-800-CDC-INFO (1-800-232-4636), TTY: 1-888-232-6348, web: www.cdc.gov/info, or visit the NIOSH website at www.cdc.gov/niosh.

