NC DEPARTMENT OF HEALTH AND HUMAN SERVICES

ROY COOPER • Governor
MANDY COHEN, MD, MPH • Secretary
BETH LOVETTE, MPH, BSN, RN • Acting Director, Division of Public Health

Developed by the North Carolina Division of Public Health, Communicable Disease Branch

Eastern Equine Encephalitis Surveillance, North Carolina, 2013—2017

Background

Eastern equine encephalitis virus (EEEV) is transmitted to humans and horses by the bite of an infected mosquito. It is a member of the genus *Alphavirus* , family *Togaviridae*

Transmission

EEEV is maintained through a cycle between mosquitoes and birds. Transmission of the virus to humans, although often fatal, is rare because the primary mosquito vector *Culiseta melanura* (the "black-tailed mosquito") feeds almost exclusively on birds. Horses are also susceptible to EEEV infection, and are infected more commonly than humans due to being exposed to mosquitoes for long periods. Both horses and humans are considered to be "dead end" hosts because neither develops enough virus in their blood to infect mosquitoes and continue a transmission cycle. EEEV is not spread person-to-person or from animal-to-person by casual contact.

Symptoms

The Incubation period of Eastern Equine Encephalitis (EEE) disease ranges from 4—10 days and infection can result in either systemic or encephalitic (inflammation of the brain) disease . Systemic infection is characterized by chills, fever, malaise, stiffness, joint pain, and muscle aches lasting 1-2 weeks. In comparison, encephalitic disease is characterized by fever, headache, irritability, drowsiness, vomiting, diarrhea, cyanosis, convulsions, and possibly coma. Approximately one third of human EEE cases are fatal.

Epidemiology

Human EEE disease cases are relatively infrequent with an average of 7 cases reported annually across the United States. Most cases of EEE have been reported from Florida, Massachusetts, New York, and North Carolina. From 2012–2017, there have been 6 cases total reported in North Carolina, located primarily in counties in the southeastern part of the state where the preferred habitat of vector mosquitoes can be found. Those over age 50 or under age 15 are at greatest risk for developing severe disease. Additionally, those who engage in outdoor activities in endemic areas are at increased risk of infection. Equine (horse, donkey and mule) EEE cases are relatively more common, with a total of 57 equine cases reported between 2012– 2017.

Diagnosis and Treatment

Diagnosis is usually based on signs and symptoms, patient history, and testing for the presence of EEE-specific IgM antibodies in serum and cerebrospinal fluid (CSF) . No specific anti-viral treatments for EEE are available for humans. Suspected EEE cases should be evaluated by a healthcare provider, resulting in appropriate case work-up and supportive treatment.

Prevention

There are no vaccines available for EEE in humans, however an equine vaccine is available. The best prevention is to avoid mosquito bites by:

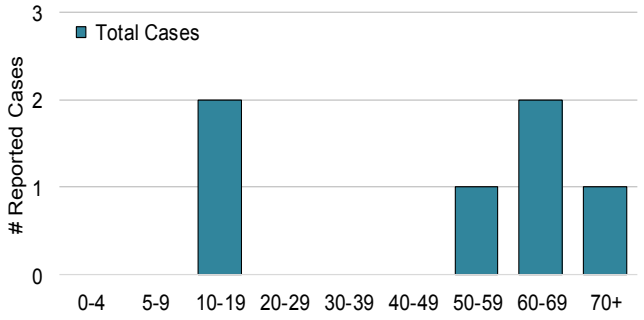
- Using repellents containing DEET, picaridin, IR3535, or oil of lemon eucalyptus
- Eliminating mosquito breeding sites by emptying standing water from flower pots, buckets, buckets, barrels, tires and other containers at least weekly, or by drilling holes so water drains out;
- Wearing long sleeves, pants and socks when weather permits;
- Having secure intact screens on windows and doors to keep mosquitoes out.

Case Demographics

Sex	Case Demographics	
	6 Year Total (2012-17)	
	No. of Cases	*% of total*
Male	6	*100%*
Female	0	*0%*

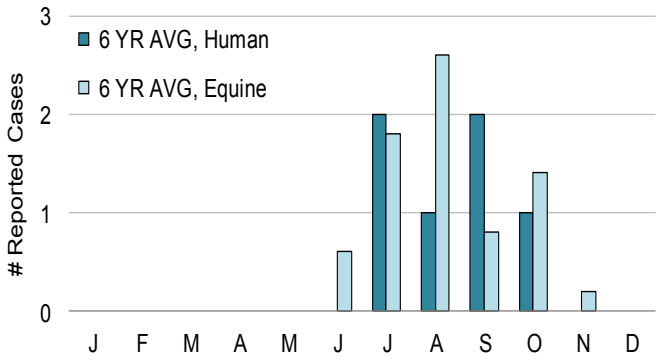
Outcomes	*6 Year Total (2012-17)*	
	No. of Cases	% of Total
Hospitalized	6	*100%*
Fatalities	2	*33%*

Confirmed and Probable Eastern Equine Encephalitis Cases by Age Range, NC, 2012-2017

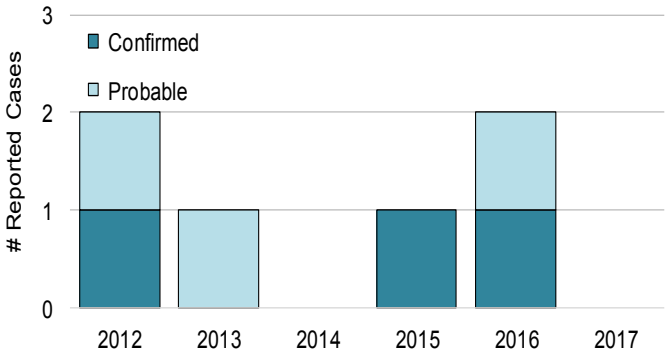


Case by Month and Year

Avg. Confirmed and Probable Eastern Equine Encephalitis Cases by Month, NC, 2012-2017

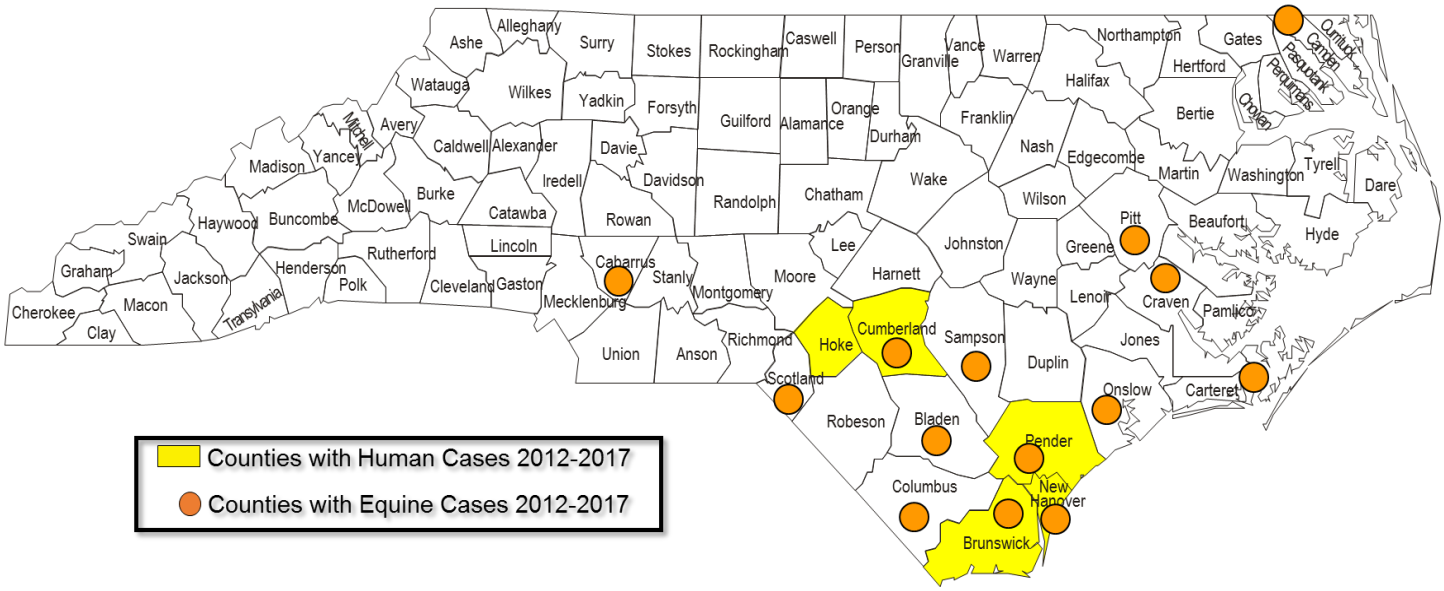


Confirmed and Probable Cases of Eastern Equine Encephalitis by Year, NC, 2012-2017



Geographic Distribution

Confirmed and Probable Cases of Eastern Equine Encephalitis by County of Residence, NC, 2012-2017



*These data are based on a national surveillance data found at: https://www.cdc.gov/mmwr/volumes/64/wrmm6453a1.htms_cid=mm6453a1_w
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Ehrlichiosis Surveillance from 2012—2017

Background

Ehrlichiosis is a general name to describe several bacterial infections caused by *Ehrlichia spp.* including *E. chaffeensis* and *E. ewingii*. Ehrlichiae are transmitted to humans through the bite of an infected tick. In North Carolina, the most common vector of ehrlichiosis is the lone star tick, *Amblyomma americanum*. Like other tickborne illnesses, Ehrlichiosis can be prevented; it is a serious illness that can be fatal if not promptly treated.

Symptomology

Symptoms of ehrlichiosis typically appear within 1-2 weeks following a tick bite. While there are a number of symptoms, the combination of symptoms can vary from person to person. Symptoms may include fever, headache, fatigue, chills, malaise, muscle aches nausea, vomiting, diarrhea, confusion, conjunctivitis (red eyes), and a rash. Rashes can be present in up to 60% of children and less than 30% of adults.

Epidemiology

National

Incidence varies considerably by geographic area. Ehrlichiosis is most frequently reported in the southeastern and south-central US. In 2016, four states accounted for 50% of all reported cases of Ehrlichiosis: Missouri, Arkansas, New York, and Virginia. Although the number of reported ehrlichiosis cases has increased since it was added to th National Notifiable Conditions list in 1998 the case fatality rate continues to hover around 1% annually. The national average incidence of ehrlichiosis in 2015 was 0.42 cases per 100,000.*

North Carolina

The number of confirmed and probable cases of ehrlichiosis has varied over the past five years, with numbers similar to those of 2014 in 2017. The highest incidence of ehrlichiosis typically occurs during the months of June and July. The 5-year average incidence rate of ehrlichiosis in North Carolina between 2012-2016 is 0.71 confirmed and probable cases per 100,000 residents, which is marginally higher than the national average.

Diagnosis

Diagnosis of ehrlichiosis is often difficult because symptoms vary from patient to patient and are non-specific, making it difficult to distinguish from other illnesses. Serological and Polymerase Chain Reaction (PCR) tests can be used to confirm clinical diagnosis. However, serological tests are often negative during the acute phase of illness; healthcare providers should use their judgement, and can treat patients empirically based on the symptoms above.

Prevention

Reducing exposure to ticks is the best defense against ehrlichiosis. There are a number of methods that can be used to prevent tickborne illness:

- Wear permethrin treated clothing (0.5%) when exploring the outdoors.
- Use Environmental Protection Agency (EPA) registered insect repellents containing DEET or picaridin to deter ticks.
- Avoid contact with ticks by avoiding wooded and brushy areas with high grasses and leaf litter and walking in the center of trails.
- Check your clothing for ticks that may have climbed on you while outdoors, and shower soon after being outdoors.

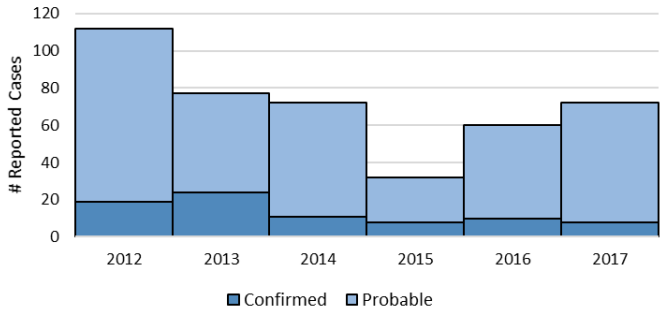
Case Demographics (Confirmed and Probable)

Gender	5 Year Avg (2012-16)		2017	
	No. of Cases	*% of total*	No. of Cases	*% of total*
Male	48	61%	85	75%
Female	31	39%	29	25%

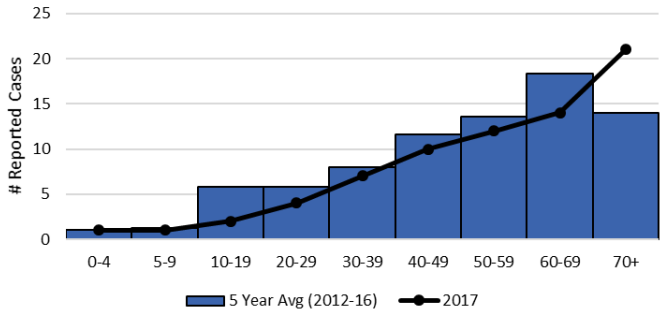
Race	5 Year Avg (2012-16)		2017	
	No. of Cases	*% of total*	No. of Cases	*% of total*
White	50	63%	36	11%
Black or African American	12	15%	8	50%
Native Hawaiian or Pac. Islander	<1	< 1%	0	0%
Amer. Indian or Alaskan	<1	< 1%	0	0%
Asian	<1	1%	1	1%
Other	1	1%	2	3%
Unknown	16	20%	25	35%

Hispanic Ethnicity	5 Year Avg (2012-16)		2017	
	No. of Cases	*% of total*	No. of Cases	*% of total*
Yes	2	3%	4	6%
No	38	53%	36	50%
Unknown	32	44%	32	44%

Confirmed and Probable Cases of Ehrlichiosis by Year, NC, 2012-2017; n=425

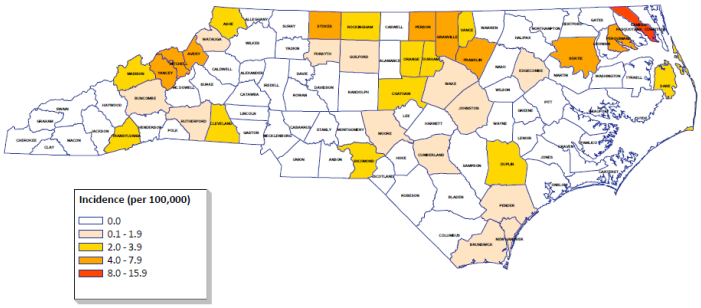


Confirmed and Probable Ehrlichiosis Cases by Age Range, NC



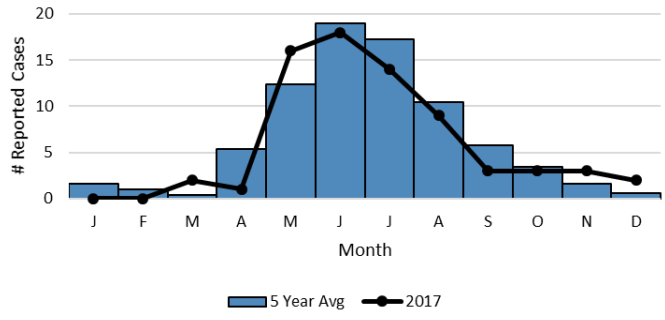
Geographic Distribution

Confirmed and Probable Incidence of Ehrlichiosis Cases by County of Residence, NC, 2017



Cases by Age

Confirmed and Probable Ehrlichiosis Cases by Month of Illness Onset, NC



*Data are based on a national surveillance data found at: https://www.cdc.gov/mmwr/volumes/64/wr/mm6453a1.htm?s_cid=mm6453a1_w

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La Crosse Encephalitis Surveillance North Carolina, 2012—2017

Background

La Crosse encephalitis virus (LACV) is transmitted to humans by the bite of an infected mosquito, first described from a 1960 case in La Crosse, Wisconsin. It is a member of the California serogroup, in the genus Bunyavirus, family Bunyaviridae.

Transmission

LACV is transmitted to humans through the bite of a mosquito (*Aedes triseriatus*, the eastern treehole mosquito). This mosquito is typically infected with LACV after biting a vertebrate reservoir host, especially a small mammal such as a chipmunk or squirrel. *Aedes triseriatus* is an aggressive daytime-biting mosquito, especially in or near deciduous forests. It normally lays its eggs in pools of water accumulated in treeholes, but it will also lay eggs in man-made containers, particularly discarded tires and household items. LACV is passed from the female mosquito to the eggs she lays, and can survive in dormant eggs through the winter. LACV is not thought to be transmitted from human to human, or human to mosquito because only low levels of virus circulate in human blood.

Symptoms

The incubation period (the time from infected mosquito bite to onset of illness) ranges from 5 to 15 days. Many people infected with LACV have no apparent symptoms. Among people who become ill, initial symptoms include fever, headache, nausea, vomiting, and tiredness. Some develop severe neuroinvasive disease (disease that affects the nervous system). Severe LACV disease often involves encephalitis (an inflammation of the brain) and can include seizures, coma, and paralysis. Less than 1% of LAC encephalitis cases are fatal. Severe disease occurs most often in children under the age of 16.

Epidemiology

An average of 63 cases of severe (neuroinvasive) LAC disease is reported each year in the United States, and North Carolina comprises approximately one-quarter of those cases. In North Carolina, nearly all cases occur in western Appalachian counties, where the *Aedes triseriatus* mosquito is most common.

Diagnosis and Treatment

No specific antiviral treatment for LAC encephalitis is available. Patients with suspected LAC encephalitis should be hospitalized, serologic and spinal fluid diagnostic tests ordered (IgM antibody for arboviruses), and supportive treatment (including seizure control) provided.

Risk factors

All people who are bitten by mosquitoes in areas where the virus is circulating are at some risk, but residences in western North Carolina counties near wooded areas, or containing numerous small containers, are at elevated risk due to increased exposure to eastern treehole mosquitoes.

Prevention

There are no vaccines available for LAC disease. Avoiding bites is the only current means of prevention, such as:

- Using repellents containing DEET, picaridin, IR3535 or oil of lemon eucalyptus;
- Eliminating mosquito breeding sites by emptying standing water from flower pots, buckets, barrels, tires and other containers at least weekly, or by drilling holes so water drains out;
- Wearing long sleeves, pants and socks when weather permits;
- Having secure intact screens on windows and doors to keep mosquitoes out.

Case Demographics

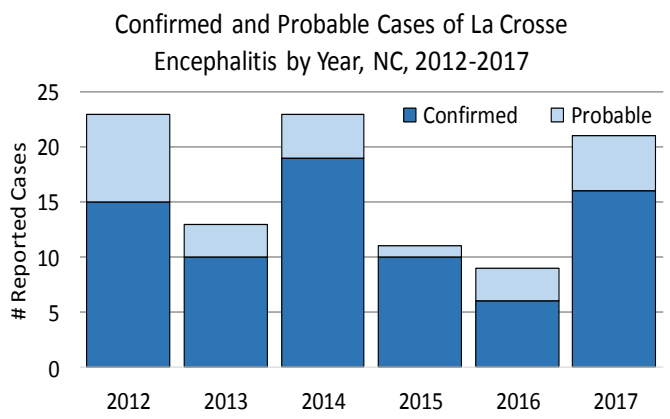
County Incidence	5 Year Avg (2012-16)			2017		
	No. of Cases	% of total cases	Incidence per 100,000	No. of Cases	% of total cases	Incidence per 100,000
Buncombe	5	32%	2.01	10	48%	3.88
Transylvania	2	13%	6.06	1	5%	2.94
Jackson	2	12%	4.39	4	19%	9.31
Haywood	1	9%	2.36	2	10%	3.27
Henderson	1	6%	0.90	0	0%	0.00
Swain	1	6%	7.03	0	0%	0.00
Macon	<1	5%	1.78	0	0%	0.00
Graham	<1	4%	6.89	0	0%	0.00
Polk	<1	3%	1.96	0	0%	0.00
Yancey	<1	3%	2.26	0	0%	0.00

Race	5 Year Avg (2012-16)		2017	
	No. of Cases	% of total cases	No. of Cases	% of total cases
White	13.2	84%	18	86%
Black or African American	<1	3%	0	0%
Native Hawaiian or Pac. Islander	0	0%	0	0%
Amer. Indian or Alaskan	1.4	9%	0	0%
Asian	<1	1%	0	0%
Other	<1	1%	0	0%
Unknown	<1	3%	3	14%

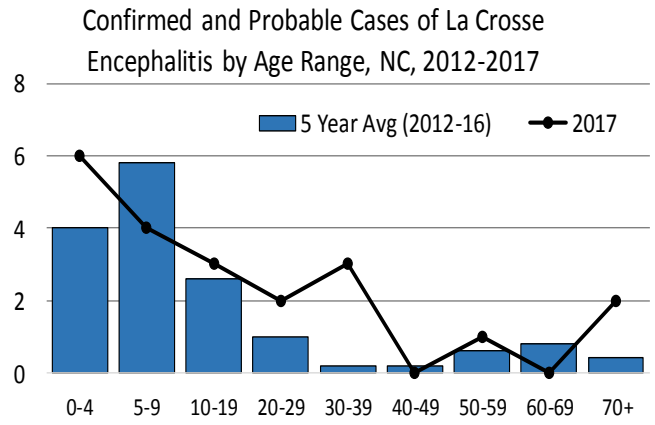
Sex	5 Year Avg (2012-16)		2017	
	No. of Cases	% of total	No. of Cases	% of total
Male	9	54%	8	38%
Female	7	44%	11	52%
Unknown	<1	1%	2	10%

Hispanic Ethnicity	5 Year Avg (2012-16)		2017	
	No. of Cases	% of total	No. of Cases	% of total
Yes	1	5%	0	0%
No	10	69%	15	71%
Unknown	4	26%	6	29%

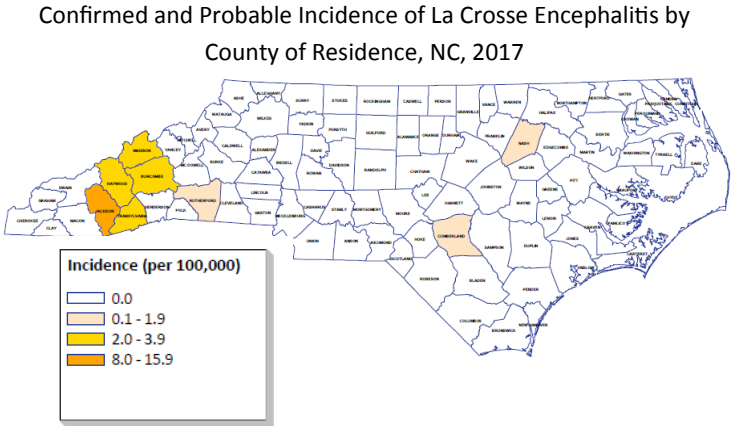
Cases by Year



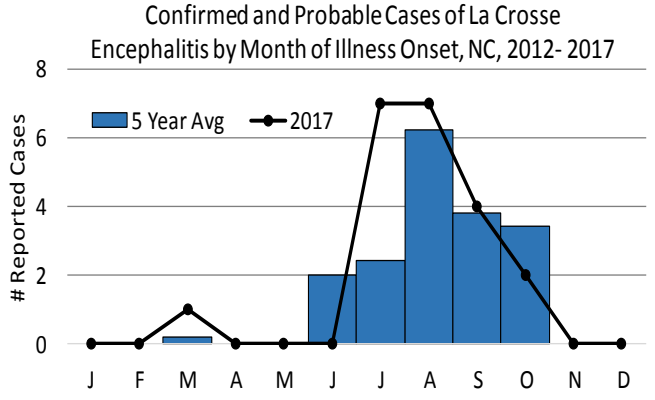
Cases by Age



Geographic Distribution



Cases by Month



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Lyme Disease Surveillance Summary from 2012—2017

Background

Lyme disease is a bacterial infection caused by *Borrelia burgdorferi*, and is transmitted to humans and animals through the bite of infected *Ixodes scapularis* (blacklegged) ticks. Symptoms of Lyme disease include fever, headache, fatigue, and a characteristic bull's-eye rash called erythema migrans (EM). If left untreated, infection can spread to the joints, heart, and nervous system. Diagnosis is based on the presence of symptoms, clinical findings (like an EM rash), exposure to ticks, and serological testing. Most cases of Lyme disease are effectively treated with antibiotics. The best way to mitigate Lyme disease is prevention.

Symptomology

Early signs of Lyme disease include fever, chills, headache, fatigue, muscle and joint aches, swollen lymph nodes, and EM rash. It is important to note that an EM rash only occurs in 70-80% of patients, and can take up to 30 days to appear. Untreated Lyme disease can cause a variety of symptoms including severe headaches and neck stiffness, additional EM rashes, arthritis with severe joint pain and swelling, particularly in the knees and other large joints, facial palsy and heart conditions associated with Lyme carditis.

Epidemiology

National

Lyme disease cases are centered in the Northeast and upper Midwest of the United States, with 96% of cases reported from 14 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and Wisconsin. The average incidence rate of Lyme disease between 2013-2016 was 8.1 cases per 100,000 residents, with incidence rates of the highest states reaching >50 cases per 100,000.[*]

North Carolina

In the state of North Carolina, the number of confirmed and probable cases of Lyme disease has increased over the past five years. The highest incidence of Lyme disease in 2017 is clustered to the northwestern portion of the state, particularly in Ashe, Alleghany, Surry, Watauga, Wilkes, and Madison counties.[**] The 5-year average incidence rate of Lyme disease in North Carolina between 2012-2016 was 1.97 confirmed and probable cases per 100,000 residents.

Diagnosis

Lyme disease can be physician diagnosed based on the symptoms outlined above, a history of tick exposure and serological testing. Serological blood tests are effective when used correctly and performed with validated methods. Lab tests are not recommended for patients who do not have symptoms of typical Lyme disease to avoid both misdiagnosis and the treatment of Lyme disease when the true cause if illness is something else.

Prevention

Reducing exposure to ticks is the best defense against Lyme disease. There are a number of methods that can be used to prevent tickborne illness:

- Wear permethrin treated clothing (0.5%) when exploring the outdoors.
- Use Environmental Protection Agency (EPA) registered insect repellents containing DEET or picaridin to deter ticks.
- Avoid ticks in wooded/brushy areas with high grasses and leaf litter by walking in the center of trails.
- Check clothing for ticks you may have encountered while outdoors; shower soon after returning indoors.

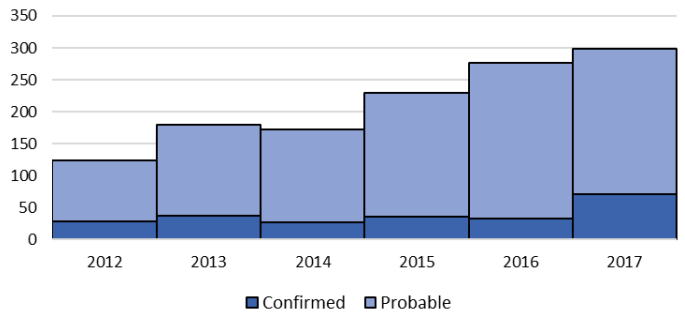
Case Demographics (Confirmed and Probable)

Sex	5 Year Avg (2012-16)		2017	
	No. of Cases	*% of total*	No. of Cases	*% of total*
Male	*83*	*42%*	*145*	*46%*
Female	113	*58%*	153	*49%*
Unknown	0	*0%*	17	*5%*

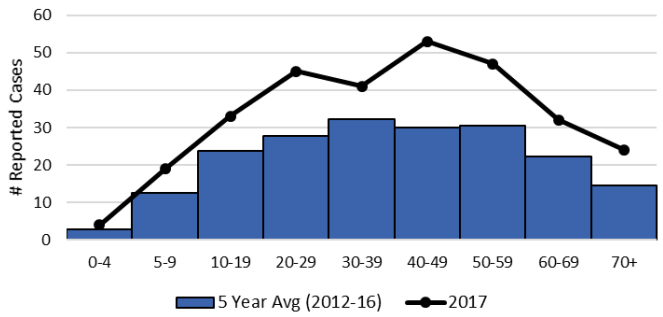
Race	5 Year Avg (2012-16)		2017	
	No. of Cases	*% of total*	No. of Cases	*% of total*
White	107	55%	173	58%
Black or African American	9	5%	5	2%
Asian or Pac. Islander	1	1%	2	1%
American Indian or Alaskan	1	< 1%	0	0%
Unknown	76	39%	118	40%

Hispanic Ethnicity	5 Year Avg (2012-16)		2017	
	No. of Cases	*% of total*	No. of Cases	*% of total*
Yes	23	2%	5	2%
No	469	50%	165	57%
Unknown	443	47%	122	42%

Confirmed and Probable Cases of Lyme Disease by Year, NC, 2012-2017; n=1279



Confirmed and Probable Lyme Disease Cases by Age Range, NC

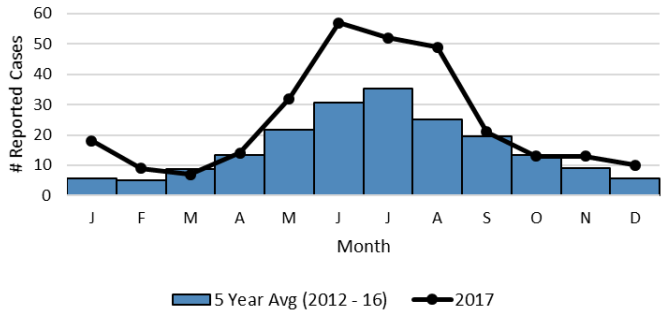


Geographic Distribution

Confirmed and Probable Incidence of Lyme Disease Cases by County of Residence, NC, 2017

Cases by Age

Confirmed and Probable Lyme diseases cases by Month of Illness Onset, NC



*These data are based on a national surveillance data found at: https://www.cdc.gov/mmwr/volumes/64/wr/mm6453a1.htm?s_cid=mm6453a1_w

** CDC Case Definition for Lyme Disease: https://wwwn.cdc.gov/nndss/conditions/lyme-disease/case-definition/2017/

View NC Disease Statistics here: https://public.tableau.com/profile/nc.cdb#!/vizhome/NorthCarolinaDiseaseStatistics/DiseaseMapsandTrends

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Spotted Fever Group Rickettsiosis Surveillance Summary from 2012—2017

Background

Spotted fever group rickettsioses (SFGR), including Rocky Mountain spotted fever, are a group of bacterial infections caused by *Rickettsia spp.* including *R. rickettsia* and *R. parkeri*. Spotted fevers are transmitted to humans through the bite of an infected tick. In North Carolina the most common vectors of spotted fevers include the American dog tick, *Dermacentor variabilis,* the Rocky Mountain wood tick, *D. andersoni*, and the Lone star tick, *Amblyomma americanum*. The brown dog tick, *Rhipicephalus sanguineus* has been implicated in transmission in other parts of the US. If left untreated, illness can become serious, even leading to death.

Symptomology

Early signs of SFGR are non-specific, including fever and headache. Symptoms may appear 3 –12 days following a tick bite. Other signs and symptoms can include nausea, vomiting, stomach pain, muscle pain, lack of appetite, and rash. Rash is a common sign among those infected with *R. rickettsii*, the causative agent of Rocky Mountain spotted fever (RMSF), and usually develops 2-4 days following fever onset. Rashes can look like red splotches or pinpoint dots. While almost all patients with RMSF will develop a rash, it is not always visible depending on the skin tone of the patient.

Epidemiology

National

Incidence varies considerably by geographic area. Between 2008-2012, 63% of reported SFGR cases originated from five states: Arkansas, Missouri, North Carolina, Oklahoma, and Tennessee. Thousands of cases of SFGR occur every year, but it is unknown how any cases are RMSF. Case fatality rates vary annually, but have decreased overall from a 28% in 1944 to < 1% in 2001. The national average incidence of SFGR in 2015 was 1.31 cases per 100,000.*

North Carolina

The number of confirmed and probable cases of spotted fever rickettsiosis has remained stable in North Carolina over the past five years. The highest incidence of SFGR is clustered around central and eastern North Carolina. The 5 -year average incidence rate of SFGR in North Carolina between 2012-2016 is 4.95 confirmed and probable cases per 100,000 residents, which is higher than the national average.

Diagnosis

Delay in diagnosis and treatment is the most important factor associated with poor outcomes, and early treatment based on clinical impression is the best way to prevent RMSF progression. Signs and symptoms of SFGR are similar to those of many other diseases. Both acute and convalescent serum specimens are needed to confirm the rickettsial infection. Serological tests are often negative during the acute phase of illness, however, physicians may diagnose patients based on the symptoms outlined above.

Prevention

Reducing exposure to ticks is the best defense against SFGR. There are a number of methods that can be used to prevent tickborne illness:

- Wear permethrin treated clothing (0.5%) when exploring the outdoors.
- Use Environmental Protection Agency (EPA) registered insect repellents containing DEET or picaridin to deter ticks.
- Avoid ticks in wooded/brushy areas with high grasses and leaf litter by walking in the center of trails.
- Check clothing for ticks you may have encountered while outdoors; shower soon after returning indoors.

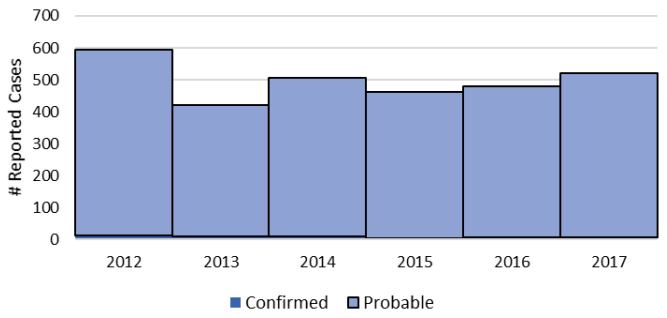
Case Demographics

Sex	5 Year Avg (2012-16)		2017	
	No. of Cases	*% of total*	No. of Cases	*% of total*
Male	*341*	*69%*	*362*	*69%*
Female	152	*31%*	159	*31%*

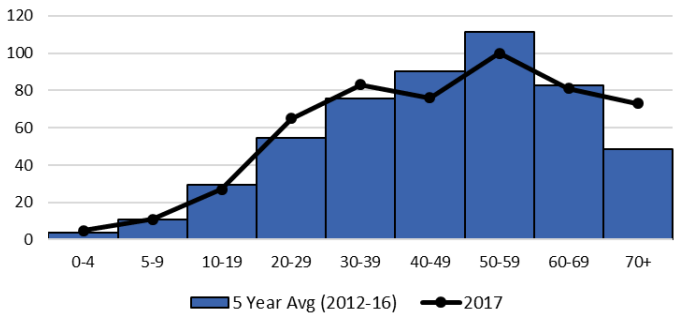
Race	5 Year Avg (2012-16)		2017	
	No. of Cases	*% of total*	No. of Cases	*% of total*
White	287	59%	288	55%
Black or African American	34	7%	30	6%
Native Hawaiian or Pac. Islander	1	< 1%	0	0%
Amer. Indian or Alaskan	1	< 1%	2	< 1%
Asian	1	< 1%	2	< 1%
Other	4	2%	4	1%
Unknown	159	33%	195	37%

Hispanic Ethnicity	5 Year Avg (2012-16)		2017	
	No. of Cases	*% of total*	No. of Cases	*% of total*
Yes	10	2%	7	1%
No	245	55%	283	58%
Unknown	190	43%	198	41%

Confirmed and Probable Spotted Fever Group Rickettsiosis by Year, NC, 2017; n= 2984

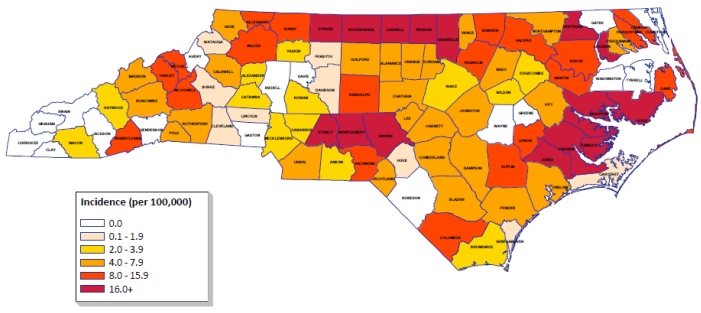


Confirmed and Probable Spotted Fever Group Rickettsiosis by Age Range, NC



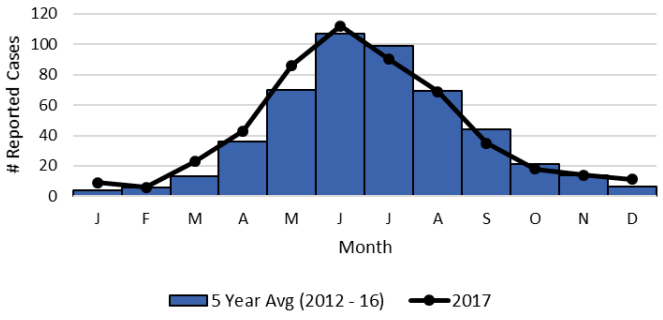
Geographic Distribution

Confirmed and Probable Incidence of Spotted Fever Group Rickettsiosis Cases by County of Residence, NC, 2017



Cases by Age

Confirmed and Probable Spotted Fever Group Rickettsiosis cases by Month of Illness Onset, NC



*These data are based on a national surveillance data found at: https://www.cdc.gov/mmwr/volumes/64/wr/mm6453a1.htm?s_cid=mm6453a1_w

View NC Disease Statistics here: https://public.tableau.com/profile/nc.cdb#!/vizhome/NorthCarolinaDiseaseStatistics/DiseaseMapsandTrends

NC DEPARTMENT OF HEALTH AND HUMAN SERVICES

ROY COOPER • Governor
MANDY COHEN, MD, MPH • Secretary
BETH LOVETTE, MPH, BSN, RN • Acting Director, Division of Public Health

Developed by the North Carolina Division of Public Health, Communicable Disease Branch

West Nile Encephalitis Surveillance, North Carolina, 2012—2017

Background

West Nile virus (WNV) is transmitted to humans and horses by the bite of infected mosquitos. It is in the genus Flavivirus, family Flaviviridae.

Transmission

Over 150 species of mosquitos have been known to carry West Nile virus, but the main vector species in the U.S. are *Culex pipiens, Culex tarsalis,* and *Culex quinquefasciatus.* These mosquitos are active at night, and most cases of infection occur during the summer and early fall months. In a very small number of cases, WNV also has been spread through blood transfusions, organ transplants, breastfeeding and even during pregnancy from mother to baby. It is not spread person-to-person or from animal-to-person by casual contact.

Symptoms

Most people infected with WNV will have no apparent symptoms. About 1 in 5 people who are infected will have mild symptoms such as fever, headache, body aches, vomiting, diarrhea, and rash. A small percentage of people will develop serious disease that can include high fever, convulsions, paralysis and sometimes lasting neurological effects. Severe WNV neuroinvasive disease may include encephalitis (inflammation of the brain) or meningitis (inflammation of the membranes that surround the brain and spinal cord). Ten percent of severe WNV cases are fatal. Severe disease occurs most often in people over 60 years of age.

Epidemiology

WNV is the most common arboviral disease in the United States. Since its introduction to the U.S. in 1999, WNV has spread throughout the continental U.S. with most cases occurring in the upper Midwestern states and the northern Plains states. In North Carolina, neuroinvasive WNV was first documented in 2002. Since then, there have been a total of 56 confirmed encephalitic WNV cases in North Carolina, distributed across the state with no geographic predilection. Cases of WNV have been reported in 38% of North Carolina Counties since 2003. Additionally, there were 141 reported equine cases of WNV between 2003 and 2014.

Diagnosis and Treatment

Diagnosis of encephalitic WNV is usually based on signs and symptoms as well as presence of IgM antibodies in serum and cerebrospinal fluid (CSF). Antibodies begin to be detectable 3 to 8 days after onset of illness, so testing before that time may result in a false negative test. The presence of antibodies in blood or CSF provides good evidence of WNV infection, however cross-reactivity with other flaviviruses is possible. No specific anti-viral treatments for WNV are available. Therefore, in severe cases necessitating hospitalization the only available treatment is supportive care.

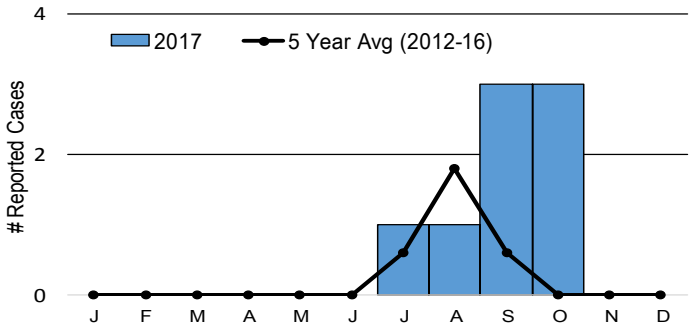
Prevention

There are no vaccines available for WNV in humans, however a vaccine is available for horses. The best method to prevent WNV infection is to avoid mosquito bites, such as:

- Using repellents containing DEET, picaridin, IR3535, or oil of lemon eucalyptus
- Eliminating mosquito breeding sites by emptying standing water from flower pots, buckets, buckets, barrels, tires and other containers at least weekly, or by drilling holes so water drains out;
- Wearing long sleeves, pants and socks when weather permits;
- Having secure intact screens on windows and doors to keep mosquitoes out.

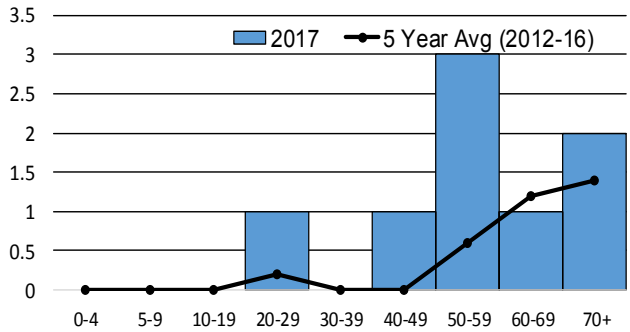
Cases by Month

Confirmed and Probable Human West Nile Encephalitis Cases by Month of Illness Onset, NC



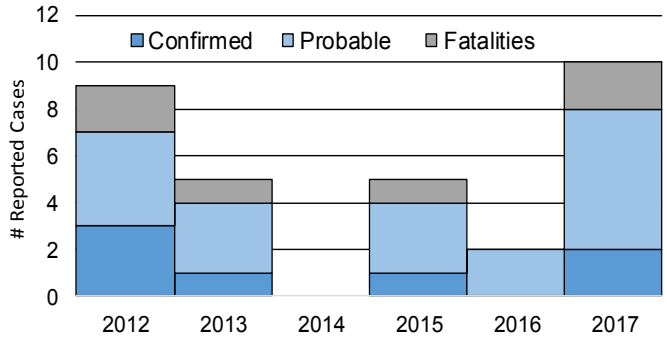
Case Demographics

Confirmed and Probable Human West Nile Encephalitis Cases by Age Range, NC

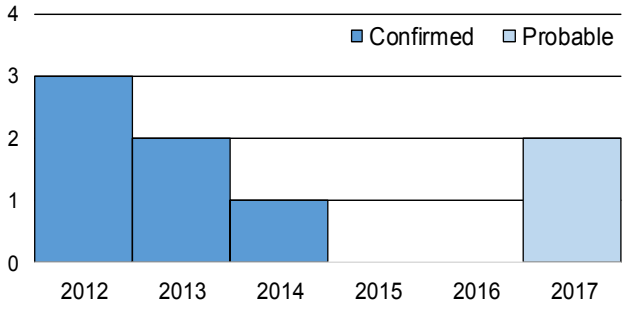


Cases by Year

Confirmed and Probable Human West Nile Encephalitis Cases by Year, NC, 2012-2017

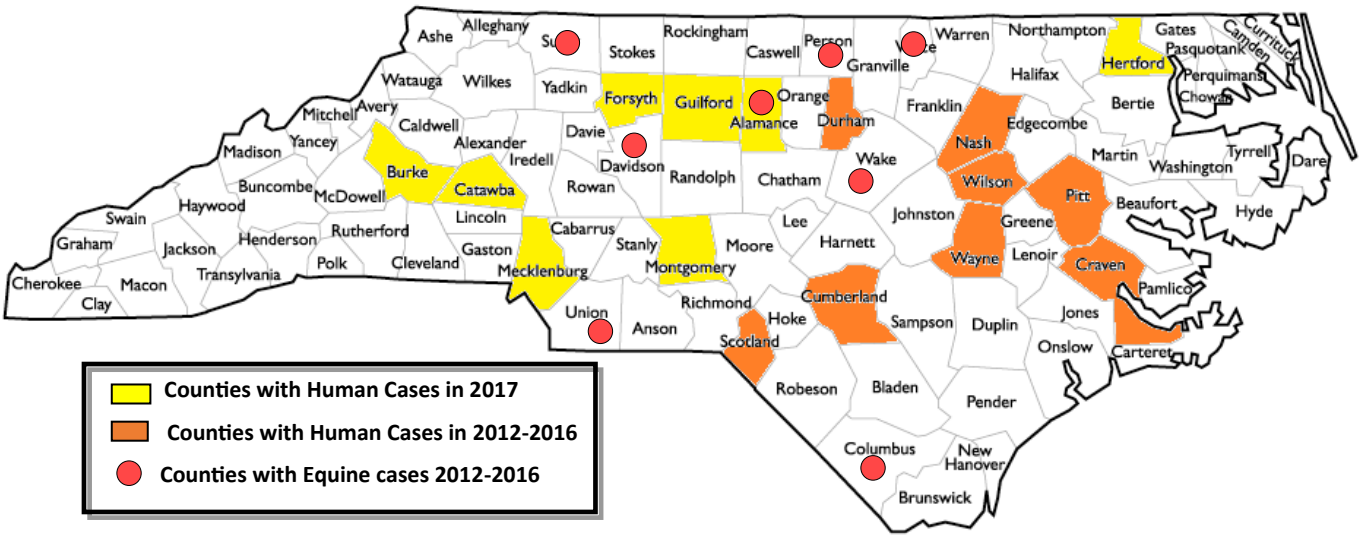


Confirmed and Probable Equine Cases of West Nile Neuroinvasive Disease by Year, NC, 2012-2017



Geographic Distribution

Confirmed and Probable Cases of West Nile Encephalitis by County of Residence, NC, 2012-2017



*These data are based on a national surveillance data found at: https://www.cdc.gov/mmwr/volumes/64/wr/mm6453a1.htm?s_cid=mm6453a1_w
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