

{ A Holiday Public Health Response }

Potential Rabies Exposure to Unpasteurized Milk

The Oklahoma State Department of Health (OSDH) confirms and investigates an average of 99 cases of animal rabies in wild and domestic species each year. Over the past ten years, a total of 75 rabid bovine were identified, including eight cases in 2005. On Tuesday, December 20, 2005, the OSDH Public Health Laboratory reported a **positive rabies** test in a Holstein cow belonging to a dairy farm in **Claremore, Oklahoma** that is permitted to sell unpasteurized "raw" milk to the general public. The OSDH in collaboration with the Oklahoma Department of Agriculture, Food and Forestry conducted an epidemiologic investigation to assess food safety risk. The cow's clinical presentation was classic for rabies, including ataxia, knuckling, and abdominal straining. Milk from the rabid cow was comingled with the milk of 71 other cows in the herd before bottling as raw milk or cream products for sale. Several gallons of raw milk during the potential infectious period (December 4–14, 2005) were used for the production of 660 pounds of cheese, however, the potentially contaminated cheese was still being aged and had not been sold.

Rabies transmission is most likely to occur by a bite from a rabid mammal. Non-bite exposures resulting from inoculation of saliva, cerebrospinal fluid or neurologic tissue onto mucous membranes or breaks in the skin are considered lower risk exposures. Oral transmission of rabies virus has been achieved in laboratory animals; yet, the virus dose required for oral infection was determined to be relatively high.¹ When rabies disease occurs following oral administration, infection is associated with prolonged contact with the buccal mucosa or accidental contact with nasal mucosa. Published studies are lacking but rabies virus has not been demonstrated in infectious doses in milk. The dilemma we faced was that although the risk of rabies virus contamination of milk was theoretical, a relatively large number of persons drank the raw milk several times during the period when the bulk milk may have contained a few rabies virions. Human rabies has nearly a 100% case fatality rate and a very effective post exposure prophylaxis (PEP) regimen exists. When faced with similar potential mass exposures to unpasteurized milk, other state health departments have yielded to the conservative approach of advising rabies PEP for **all** persons who consumed the milk.²

Following consultation with the Centers for Disease Control and Prevention (CDC) Rabies Branch, the consensus opinion was that all reasonably healthy individuals are not at risk. However, persons with immunosuppressive conditions, oral/esophageal ulcers or erosions, or anatomical defects that could allow for reflux of milk into the nasal cavity may be at potential risk of exposure. On December 22, 2005, a press release was broadcasted directing persons who consumed the raw milk purchased between December 4 and 19 to contact the OSDH for medical screening of at-risk conditions. A phone bank was activated at OSDH to process a high volume of calls, and public health nursing staff and Communicable Disease Division (CDD) epidemiologists were deployed to the Rogers County Health Department (RCHD) to respond to a concerned public.

The RCHD and OSDH **screened an estimated 850 persons** over a one week period and provided recommendations for rabies PEP. A total of 125 persons (~15% of those medically triaged) started the rabies PEP series resulting in greater than 600 patient visits to complete the vaccinations. Ninety-three percent of the patient visits were processed at the RCHD, including clinics held on the days before and after Christmas and New Year's Day. Customarily, the OSDH refers persons recommended to receive rabies PEP to their health care provider or hospital emergency department for medical supervision and administration of the rabies immune globulin and vaccine series. Due to the high demand for PEP, timing over the holidays and other unique characteristics of this situation, clinic services and rabies PEP were provided through the county health department. The RCHD and OSDH logged over 1,211 personnel hours for this public health response. The costs of the rabies biologics, approximately \$1,500.00 per person, were reimbursed by the dairy farm's insurance company.

Any potential risk of rabies in milk can be eliminated by pasteurization. Pasteurization is also beneficial in preventing the transmission of milk-borne pathogens such as *Salmonella*, *Campylobacter*, *Listeria* and *E. coli* O157:H7. Oklahoma is one of 23 states that allow raw milk sales with permitting, inspection and sampling. Oklahoma also allows limited sales of goats milk without inspection if the volume of raw milk sales is less than 100 gallons per month.

As future public health policies are explored, the OSDH is encouraging the following:

- Incorporate rabies vaccination in the dairy herd health program of all cows milked for incidental or permitted sales of raw milk;
- Collect samples of milk and mammary gland tissue in any lactating animals suspected as rabid and freeze these specimens pending rabies test results on brain tissue; OSDH will assist with shipping specimens to CDC if rabies is confirmed.
- Physicians should counsel patients about health risks associated with unpasteurized milk, especially those patients with HIV/AIDS, undergoing cancer treatment, or other immunosuppressive medical conditions.

Information about rabies risk assessments and PEP administration can be accessed online at <<www.health.state.ok.us/program/cdd/RabiesGuide06.pdf>> or by calling the OSDH CDD at 405.271.4060. Consultations regarding rabies are available to health care providers 24/7 by contacting the epidemiologist on-call.

*prepared by **Kristy K. Bradley**, DVM, MPH, State Public Health Veterinarian & **John Bos**, MPH, CDD Epidemiologist

¹ Madhusudana SN and Tripathi KK. Oral infectivity of street and fixed rabies virus strains in laboratory animals. *Indian J Exp Biol* 1990 May; 28 (5): 497-499.

² CDC. Mass treatment of humans who drank unpasteurized milk from rabid cows Massachusetts, 1996-1998. *MMWR* 1999; 48: 228-229.

{ Tickborne Diseases in Oklahoma }

Importance of Early Suspicion and Treatment

Several tickborne diseases are endemic to Oklahoma; those most frequently reported to the Oklahoma State Department of Health (OSDH) include Rocky Mountain spotted fever (RMSF), ehrlichiosis, and tularemia. **Incidence rates of reported RMSF and ehrlichiosis cases have increased each year** during the five-year period of 2000 through 2004 from 1.1 cases to 5.5 per 100,000 Oklahoma population for RMSF, and 0.3 to 1.3 per 100,000 for ehrlichiosis. This increase may be due to increased physician awareness of tickborne illnesses in Oklahoma and greater use of serologic testing to confirm the diagnosis.

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is characterized by non-specific symptoms including fever, malaise, muscle pain, and severe headache. Despite its name, **a rash is not always present**. Estimates of rash among cases range from 30% to 70%. When present, it first appears as a maculopapular rash on the extremities, then spreads to most of the body. The soles and palms are usually also affected, and should provide a strong clinical index of suspicion for RMSF. Abnormal laboratory values include thrombocytopenia, hyponatremia, or elevated liver enzyme levels.

An average of 107 cases of RMSF were reported from 2000 through 2004 (range 37 to 190 cases). The 5-year average statewide incidence rate was 3.1 per 100,000. Because of the feeding habits of ticks, RMSF in Oklahoma has a strong seasonal trend, with the majority of cases occurring between April and September; 90% of RMSF cases reported an onset within the range of these months. The majority of cases were reported among residents in eastern and central counties of the state. Pittsburg, Pushmataha, Latimer, Haskell, Okfuskee, and Pottawatomie counties all had an average of more than 10 cases per 100,000 population during this period. The median age of RMSF cases was 39 years and ranged from 11 months to 89 years. The highest age-specific incidence rates of disease have been observed in 40-59 year old adults (refer to age group table). The average incidence rate of reported cases from 2000 through 2004 was higher among males (N = 343, 4.1 per 100,000) than females (N = 242, 2.8 per 100,000).

The proportion of hospitalized RMSF cases has decreased during this period, with 51% of cases requiring hospitalization in 2000 versus 36% in 2004. The decline in hospitalization rates among reported cases may be due to early suspicion of tickborne illnesses and initiation of appropriate therapy by clinicians. The proportion of RMSF cases with a rash has decreased from 63% in 2000 to 48% in 2004. Observations for other symptoms for which there is

Number and Incidence Rate of RMSF and

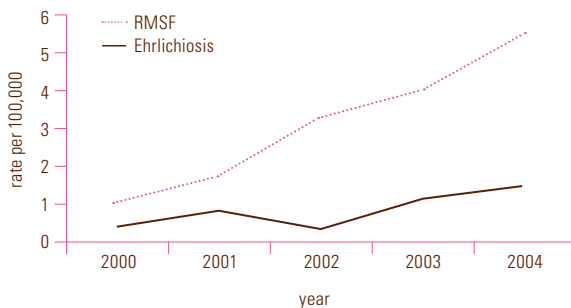
Ehrlichiosis Cases by Age, 2000-2004

Age at Onset (Years)	≤ 9	10-19	20-29	30-39	40-49	50-59	60-69	≥ 70
Rocky Mountain Spotted Fever								
number of cases	71	46	73	77	94	84	41	42
rate per 100,000	3.0	1.8	3.1	3.2	3.7	4.4	3.0	2.6
Ehrlichiosis								
number of cases	14	13	11	19	24	21	18	14
rate per 100,000	0.6	0.5	0.46	0.79	0.95	1.09	1.32	0.86

consistent yearly data, such as myalgias, headache, and fever do not show a similar pronounced trend. Seventy-five percent of cases reported a tick bite in the 2 weeks prior to illness, while 88% of cases reported exposure to wooded areas during the same period. Overall, the case fatality rate of untreated RMSF ranges from 13% to 25%. In Oklahoma, the number of deaths due to RMSF has remained relatively unchanged over the last several years, with an average of one death reported annually.

Incidence of Tickborne Diseases in Oklahoma,

2000-2004



Ehrlichiosis

The epidemiology and natural history of ehrlichiosis is complex because it is a heterogeneous disease. In the United States, there are at least 3 organisms that cause ehrlichiosis. *Ehrlichia chaffeensis* is the causative agent of human monocytic ehrlichiosis (HME). *Ehrlichia ewingii* has been diagnosed in Oklahoma, Missouri, and Tennessee. The majority of infections have been reported in immunocompromised patients. Clinical manifestations are similar to those of human granulocytic ehrlichiosis (HGE). Recently, genetic analyses of the causative agent of HGE showed that the agent is more closely related to the *Anaplasma* species than *Ehrlichia*; the agent causing HGE is now called *Anaplasma phagocytophila*.¹ The **symptoms** of HME and HGE include acute onset of fever, headache, myalgia, and/or malaise. Nausea, vomiting, or rash may be present in some cases. Clinical laboratory findings may include thrombocytopenia, leukopenia, and/or elevated liver enzymes. Intracytoplasmic bacterial aggregates (morulae) may be visible in the leukocytes of some patients.

An average of 27 cases of ehrlichiosis were reported from 2000 through 2004 (range 12 to 49). The 5-year average statewide incidence rate was 0.7 per 100,000. Of the 134 cases of ehrlichiosis reported in Oklahoma between 2000 and 2004, 120 were reported as HME, 13 cases were HGE, and one case was reported as ehrlichiosis unspecified. Importantly, the 13 cases of

HGE were all reported in 2003 and 2004, demonstrating that testing for and reporting of this newly recognized disease agent is occurring in Oklahoma.

Eighty-five percent (N=114) of cases reported their symptom onset during the months of May through September. The counties with the highest incidence rates include Pittsburg, Mays, Cherokee, and Adair counties, which had an average of more than 3 cases per 100,000 population during the 5-year period. The median age of ehrlichiosis cases was 44 years and ranged from 2 to 89 years. The highest age-specific incidence rates of disease have been observed among adults 60 to 69 years old (refer to ehrlichiosis age group table). The average incidence rate of reported cases from 2000 through 2004 was higher among males (N=87, 1.03 per 100,000) than females (N=47, 0.54 per 100,000).

Approximately one-third (N=45) of ehrlichiosis cases reported experiencing a rash. This number did not increase or decrease over time, but fluctuated, perhaps because of the low number of cases reported. Fifty-five percent of cases reported a tick bite and 71% reported exposure to a wooded or tick infested area 2 weeks prior to illness onset. The hospitalization rate, however, decreased steadily from 2000 (83%) through 2004 (43%), suggesting a clinical suspicion in a wider range of disease presentations among patients and early initiation of appropriate therapy by clinicians. Two ehrlichiosis associated deaths were reported in 2003.

Treatment

Doxycycline is the treatment of choice for RMSF and ehrlichiosis for both adults and children. Despite the usual contraindication of tetracyclines for children under 8 years, the 2003 Red Book of the American Academy of Pediatrics recommends doxycycline for the treatment of suspected cases of RMSF in children of all ages.² Reasons cited for this preference include "(1) tetracycline staining of teeth is dose related; (2) doxycycline is less likely than other tetracyclines to stain developing teeth; (3) doxycycline is effective against ehrlichiosis, which may mimic RMSF, but chloramphenicol may not be; and (4) use of chloramphenicol is problematic because of serious adverse effects."

Disease Recognition and Prevention

Because clinical symptoms of RMSF and ehrlichiosis are generally non-specific, and rapid laboratory tests are not available, **appropriate empiric use of antibiotics is indicated when these diseases are suspected**. A known tick bite or exposure to a wooded area 3 to 14 days prior to onset of symptoms should trigger diagnostic suspicion of these diseases. However, many patients, especially children, do not recall or demonstrate evidence of a tick bite. Heightened suspicion of tickborne disease in febrile illnesses, with or without known tick exposure, is therefore crucial,

particularly during the months of April through September. Tickborne illnesses can be prevented by using tick and insect repellents containing DEET, wearing appropriate clothing while in wooded or grassy outdoor areas, and proper tick removal. Additional information on tickborne illness is available on the OSDH Website at <<www.health.state.ok.us/program/cdd/tbi.html>>.

*prepared by **Carmen Clarke**, MPH, Epidemiologist, CDD

¹Dumler, JS et al. Reorganization of genera in the families *Rickettsiaceae* and *Anaplasmataceae* in the order *Rickettsiales*: unification of some species of *Ehrlichia* with *Anaplasma*, *Cowdria* with *Ehrlichia* and *Ehrlichia* with *Neorickettsia*, descriptions of six new species combinations and designation of *Ehrlichia equi* and 'HGE agent' as subjective synonyms of *Ehrlichia phagocytophila*. *Int J Syst Evol Micro*. 2001, 51: 2145-65.

²American Academy of Pediatrics. *Rocky Mountain Spotted Fever*. In: Pickering LK, ed. *Red Book: 2003 Report of the Committee on Infectious Diseases*. 26th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003: 533-534.

{ Multistate Outbreak of Mumps }

A statewide outbreak of mumps in Iowa has resulted in more than 600 cases as of April 14th. Cases have ranged in age from 1 to 85 years; however, most are between 18 and 30 years old, 19% are college students, and 74% have documentation of at least 1 mumps vaccination. Despite control efforts, this outbreak has spread to several other states including Nebraska, Kansas and Missouri. To prevent such an outbreak in Oklahoma, the Oklahoma State Department of Health (OSDH) is requesting healthcare providers to 1) report suspected cases, 2) vaccinate patients that have not had both doses of the MMR series, and 3) assess healthcare workers for immunity to mumps.

Suspected cases in Oklahoma should be reported to local county health department Communicable Disease Nurses. Patients presenting with parotitis without other apparent cause should be tested by viral culture and IgM serology even if vaccinated. Mumps virus can be isolated from saliva when collected within the first 9 days of illness onset, and IgM antibodies are detectable within a few days after onset and remain elevated for several weeks. Viral culture is available through the OSDH Public Health Laboratory. IgM testing is available through most reference laboratories.

OSDH is recommending all children and adults through 30 years of age ensure they have received 2 doses of the MMR vaccine. All healthcare workers should be assessed for immunity against mumps with either documentation of 2 doses of MMR vaccine, evidence of immunity by IgG serologic assay, or born before 1957. Healthcare workers not meeting these criteria should be vaccinated. All cases of suspected mumps should not attend school or work for at least 5 days after symptom onset.

{ Tularemia in Oklahoma }

2000 - 2004

Tularemia is a zoonotic disease caused by the gram-negative coccobacillus *Francisella tularensis*. **Tularemia is a reportable disease in Oklahoma.** When cases or positive laboratory results are reported, an epidemiologist from the Communicable Disease Division conducts a thorough investigation of each reported case or positive laboratory test for tularemia. The epidemiologist compiles history, symptom, laboratory test, and exposure data. This article summarizes the epidemiology of tularemia in Oklahoma for 2000-2004.

The rate of tularemia in Oklahoma was 8 times higher than the U.S. rate during this period: the average annual incidence rate was 0.32 per 100,000 in Oklahoma compared to 0.04 per 100,000 in the United States. An average of 11 cases per year were reported from 2000 through 2004 (range 7 to 19 cases). Several states in the Midwest region also reported a higher average incidence of tularemia compared to the national rate, including Arkansas (0.74), Missouri (0.47), and Kansas (0.24).

Eighty-two percent of cases reported an onset of symptoms during the months of May through October. This time of year corresponds with the season for increased numbers of the tick vectors. The majority of cases were reported among residents in eastern and central counties of the state. The highest county specific annualized incidence rates (in rate per 100,000 population) were observed in Nowata (3.8), Adair (3.8), Pittsburg (3.2), Cherokee (2.4), and Pawnee (2.4). Tularemia affected persons of all ages with cases ranging from 3 to 79 years; the median age of cases was 43 years. Age-specific incidence rates were highest in children less than 10 years and adults 60 to 69 (refer to graph).

The average annualized incidence rate was higher among males (N=39, 0.46 per 100,000) than females (N=17, 0.19 per 100,000). The highest average annual incidence rate was observed among Native Americans (0.73 per 100,000) followed by Caucasians (0.27 per 100,000) and Blacks (0.23 per 100,000). Sixty-three (N=36) percent of cases were hospitalized due to tularemia; 4 cases died, a case-fatality rate of 7%.

Forty-seven percent of cases reported a tick bite during the 14 days prior to illness onset. Other exposures included exposure to a wooded or tick infested area (71%), direct contact with blood and other tissues while skinning or handling rabbit carcasses (24%), and a recent bite from a sick cat (4%). Most cases associated with exposure to rabbits were attributed to hunting and skinning wild rabbits, however, in 2004, an adolescent male was infected by his pet rabbit, which was maintained in an outdoor cage and was exhibiting signs of illness. One laboratory-acquired case occurred in 2002.

Tularemia presents as an acute febrile illness with various clinical manifestations depending on the route of infection. Most patients experience an illness characterized by an indolent ulcer at the site of introduction of the organism along with swelling of the regional lymph nodes (ulceroglandular). Other patients may present with no apparent ulcer, but only with one or more enlarged and painful lymph nodes (glandular). Ingestion of the organism in contaminated food or water may produce a painful pharyngitis, abdominal pain, diarrhea and vomiting (oropharyngeal). Inhalation of the organism will result in a pneumonic involvement or a primary septicemic syndrome (typhoidal). The conjunctival sac is an uncommon site of infection that results in a disease characterized by a painful purulent conjunctivitis with regional lymphadenitis (oculoglandular).¹

A diagnosis of tularemia can be laboratory-confirmed by culture of *F. tularensis* from clinical specimens or by a fourfold titer change of serum antibodies against *F. tularensis*. The drugs of choice to treat tularemia are streptomycin or gentamycin given for 7 to 14 days. The tetracyclines and chloramphenicol are also effective when provided for no more than 14 days, however, relapses can occur more often with these antibiotics than with streptomycin.^{1,2}

The natural reservoir for *Francisella tularensis* includes rabbits, ticks, and some domestic animals. The organism is transmitted to humans through the bite of infected arthropods; by inoculation of a break in the skin, conjunctival sac or oropharyngeal mucosa with contaminated water, blood or tissue while handling infected animal carcasses (e.g., skinning, dressing, or performing necropsies); and by inhalation of dust from contaminated soil, grain or hay.

Tularemia can be prevented by using insect repellent containing DEET on skin, or by applying a repellent containing permethrin to clothing to prevent tick bites. When engaging in outdoor activities, persons should wash hands often using soap and warm water, especially after handling animal carcasses, and be sure to cook food thoroughly and ensure that water is from a safe source. Note any change in the behavior of pets (especially rabbits and cats), and consult a veterinarian if they develop unusual symptoms.

The **high incidence of tularemia in Oklahoma** and surrounding states may be associated with more favorable ecological factors, providing an increased opportunity for exposure to infected ticks or animals. Tularemia has been reported in all states except Hawaii, with a concentration in the south central states representing at least 60% of the cases reported within the United States. Diagnosis of tularemia relies on the recognition that clinical presentation is related to the method of acquisition (e.g., development of ulceroglandular tularemia after an insect bite). The higher incidence among males, children aged <10, adults 60-69 years, and Native Americans may be associated

with increased opportunity for exposure to infected ticks or animals during outdoor activities such as hunting, camping, hiking, and gardening. **Tularemia has a broad clinical spectrum** and may be overlooked in the differential diagnosis of patients with suspected infectious diseases. Tularemia should be considered in the differential diagnosis of any patient in Oklahoma who has unexplained febrile illness and exposure to ticks, biting flies, or animal tissue, particularly rabbits.

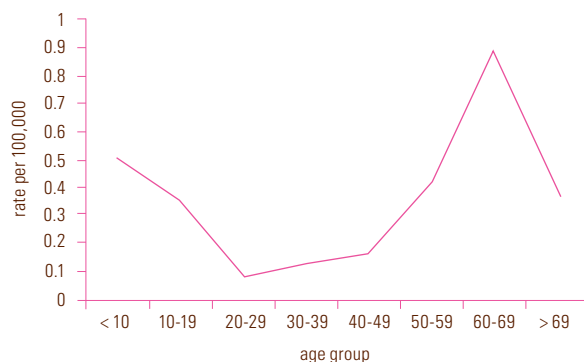
*prepared by **Laurence Burnsed**, MPH, Epidemiologist, CDD

¹ Heymann D, 2004 Control of communicable diseases manual, 18th edition, American Public Health Association

² Penn RL. *Francisella tularensis*. In: Mandell GL, Bennett JC, Dolin R, eds. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. Vol 2. 6th ed. Philadelphia, PA: Elsevier; 2005: 2682.

Average Incidence Rate of Tularemia Cases by Age Group, Oklahoma,

2000 - 2004



{ Study of Children’s Book to Evaluate Appropriate Antibiotic Use Message }

Select pediatricians across Oklahoma are participating in a study evaluating the book “The Little Elephant with the Big Earache” by Charlotte Cowan, MD. Purchase of the books was funded by the Centers for Disease Control and Prevention Epidemiology and Laboratory Capacity grant’s “**Get Smart: Know When Antibiotics Work**” campaign. The book explains the “watchful waiting” approach and supports judicious antibiotic use in treatment of earaches, in accordance with the evidence-based treatment guidelines endorsed by the American Academy of Pediatrics. Responses from the pre-and post-reading surveys completed by parents will be compared to evaluate knowledge gain due to the book’s message. Results of the study will be provided in a future Epi Bulletin.

Additional Information

Book and Author
www.hippocraticpress.com.



Practice Guidelines
www.pediatrics.org/cgi/content/full/101/1/S1/163

The OSDH Get Smart Web Page
www.health.ok.gov/program/cdd/ar/index.html

*prepared by **Becky Coffman**, RN, MPH, CIC, Epidemiologist, CDD

Announcements

Past and present Epidemiology Bulletins are available in pdf format on the Communicable Disease Division Website at <<www.health.state.ok.us/program/cdd/bulletins.html>>.

If you receive the Epidemiology Bulletin and your mailing address has or will be changing, please contact the CDD at 405.271.4060 or cdd@health.ok.gov

The CDD has posted 22 different Spanish fact sheets on their Website, and is in the process of getting 8 more translated. Copies of these Spanish fact sheets are available in pdf format on the CDD Website at <<www.health.state.ok.us/program/cdd/index.html>>.

{ Malaria Surveillance Summary }

2001-2005

Malaria is caused by the parasite of the Plasmodium protozoa, transmitted through the bite of an infected mosquito. Malaria is endemic in many countries throughout the world, and cases diagnosed in the United States generally occur in travelers returning from those endemic areas. Malaria can be a severe, potentially fatal disease (especially when caused by *P. falciparum*) and **treatment should be initiated as soon as possible**. Clinicians should ask febrile patients for a travel history, including international visitors, immigrants, adoptees, military personnel, and international travelers. Malaria should be considered in the differential diagnosis of a person experiencing a fever of unknown origin with recent international travel to a high-risk area.

Forty-three cases of malaria were reported to the Oklahoma State Department of Health from 2001 through 2005 (range 4 to 12 cases per year), compared to 27 cases reported in the preceding five-year interval. The median age of cases was 34 years and ranged from 3 months to 74 years. Thirty-three (78.6%) cases occurred in males. Twenty-one (50%) of 42 cases were black and 18 (42.9%) were white. Three (4.8%) were of Hispanic ethnicity. Of the cases whose outcome was reported (n=42), 50% were hospitalized and 1 expired, resulting in a case fatality rate of 2.4% over this five-year period. *P. falciparum* was the species identified in 20 (46.5%) cases, and *P. vivax* was confirmed in 10 (23.3%). *P. falciparum* cases have increased from 1 (20%) in 2001 to 9 (75%) cases in 2005.

Cases indicated various reasons for travel, including mission trips, visiting friends or family, military duty or other employment such as oil drilling. Malaria has also been identified in persons relocating from endemic areas including adoptees. Thirty-five cases (82%) were available for interview regarding their source of exposure. Each of these cases had a history of international travel. Of these cases, 28 (80%) reported travel to Africa, 4 (11.4%) to Asia, 2 to Central America (5.7%) and 1 to Oceania (0.8%). Of those who traveled to Africa, 19 (67.9%) indicated travel to a country in West Africa. Of those who traveled to Africa, 16 (57%) had *P. falciparum* confirmed, 9 (32%) did not have species confirmation, and 3 (11%) had *P. vivax*. Of those for whom history of prophylaxis was available (n=30), 7 (23.3%) reported taking malaria prophylaxis, 5 (16.6%) reported completing prophylaxis, and only 3 (10%) reported taking a medication that was recommended for the area visited.

Plasmodium Species Distribution by Travel History in Oklahomans,

2001-2005

Travel Destination	*Africa	Central Africa	East Africa	West Africa	East Asia	South Asia	Central America	Oceania
<i>P. falciparum</i>	1	3	1	11	0	0	1	0
<i>P. vivax</i>	0	0	1	2	1	3	1	0
species not determined	1	1	1	6	0	0	0	1
total number	2	4	3	19	1	3	2	1
percent of cases	5.71%	11.43%	8.57%	54.29%	2.86%	8.57%	5.71%	2.86%

*area not specified

Malaria Surveillance Summary cont...

Malaria in humans is caused by any of four species of *Plasmodium*: *P. falciparum*, *P. vivax*, *P. ovale*, or *P. malariae*. Only infective female *Anopheles* mosquitoes can transmit the Plasmodium parasites that cause malaria. The incubation period between exposure and symptoms varies from 9-14 days for *P. falciparum*, 12-28 days for *P. vivax* and *P. ovale* and 18-40 days for *P. malariae*. Symptoms vary according to species and generally include fever and malaise with or without headache, myalgias or weakness, GI symptoms or cough. Symptoms can vary in severity and may occur in daily cycles or less often. Immediate treatment is critical to prevent severe complications and/or death. Untreated *P. falciparum* infections can rapidly progress to coma, renal failure, pulmonary edema, and death.

Malaria is a reportable disease in Oklahoma. Confirmation of malaria is accomplished through microscopic identification of the parasites in the patient's blood. Thick and thin slides prestained with Giemsa or Giemsa-Wright stain are required for examination. Slides from suspected malaria cases must be sent to the Oklahoma State Department of Health Public Health Laboratory for confirmation (310 O.A.C. § 315 Subchapter 1 et. seq).

Prevention of malaria, when traveling to endemic areas of the world, includes appropriate prophylaxis, use of insect repellent containing DEET (N, N-diethyl-m-toluamide), and use of mosquito nets treated with permethrin, which may also be used on clothing and other items. Use of flying mosquito repellent is also advised. See the Centers for Disease Control and Prevention Travelers' Health Website at <<www.cdc.gov/travel/index.htm>> for more details and recommendations on prophylaxis and immunizations to prevent a variety of travel-related diseases.

Additional Resources

Centers for Disease Control and Prevention—Malaria
www.cdc.gov/malaria/facts.htm

OSDH Malaria Fact Sheet
www.health.ok.gov/program/cdd/malaria.htm

Heymann D. *Control of Communicable Diseases Manual*, 18th edition, American Public Health Association. 2004.

*prepared by **Becky Coffman**, RN, MPH, CIC, Epidemiologist, CDD

Incidence of Reported Malaria Cases in US* and in Oklahoma,** 1996-2005



*U.S. rates established for 2004-2005

**Oklahoma cases reported as of 9 March 2006

{ Summary of Selected Notifiable Disease Reports in Oklahoma }

This publication, printed by OU Press, was issued by the Oklahoma State Department of Health as authorized by James M. Crutcher, MD, MPH. 5,200 copies were printed in May 2006 at a cost of \$2,685. Designed by Sara C. Ramsey

diseases/conditions	spring quarter ¹	year to date ²	5 year avg ³
AIDS	18	18	50
Campylobacteriosis	34	34	55.4
Chlamydial infections	2222	2222	2666
Cryptosporidiosis	9	9	4.6
<i>E.coli</i> O157:H7	1	1	2.2
Ehrlichiosis	0	0	2.4
Giardiasis	21	21	18.6
Gonorrhea	648	648	1081
<i>H. influenzae</i> (all types)	18	18	17.4
<i>H. influenzae</i> , type B (kids < 5)	0	0	0
Hepatitis A	3	3	16.2
Hepatitis B	1	1	20.4
Hepatitis C	0	0	1.8
HIV infections	31	31	53.6
Meningococcal invasive	5	5	6.4
Rabies, animal	10	10	141
Rocky Mountain spotted fever	0	0	5.4
Salmonellosis	49	49	57
Shigellosis	20	20	119.8
<i>Streptococcus</i> invasive group A	46	46	27.2
<i>Streptococcus pneumoniae</i> , invasive	209	209	203.2
Syphilis (primary)	8	8	5.4
Syphilis (secondary)	5	5	7.6
Syphilis (early latent)	27	27	20.2
Tuberculosis	48	48	28.6

diseases of low frequency	year to date ²	5 year avg ³
Brucellosis	0	0
HUS	0	0.6
Legionellosis	1	3.6
Listeriosis	0	0.8
Lyme disease	0	0
Malaria	1	1.4
PAM	0	0
Psittacosis	0	0
Tularemia	0	1.4
Typhoid fever	0	0
Vibriosis	0	0
Yersiniosis (<i>Yersinia enterocolitica</i>)	1	1.2

no. of animal rabies cases by animal type	year to date ²	%
Bat	1	7.1
Cat	1	7.1
Cow	1	7.1
Dog	0	0
Goat	0	0
Horse	1	7.1
Skunk	10	71.4
Total	14	100

- 1. 01.01.06 through 03.31.06
- 2. 01.01.06 through 03.31.06
- 3. aggregate data for spring quarter of years 2001 through 2005

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