Bureau of Epidemiology & Public Health Informatics

Kansas Department of Health and Environment

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Tick-borne Disease Surveillance in Kansas

By Mary Ella Vajnar

Our understanding of tick-borne disease incidence and burden begins with surveillance. In Kansas, spotted fever rickettsiosis, ehrlichiosis/anaplasmosis, and Lyme disease are the most commonly reported tick-borne diseases. The successful surveillance of these diseases depends upon the laboratories and medical providers fulfilling the statutory requirement to report cases, complemented by the local health department investigator's thorough investigations.

In 2012, KDHE began directing local health departments to investigate both confirmed and probable tick-borne disease cases. Because many of the tick-borne disease cases do not meet the confirmed case definition due to lack of convalescent testing, this change allows a better depiction of the burden of these diseases.

Examining the number of confirmed and probable tick-borne disease cases reported the last four years, 103 tick-borne disease cases were investigated in the period of 2010—2011 as compared to 206 cases investigated in 2012 and 296 cases investigated in 2013. This would appear to be a significant increase in disease incidence, but further examination reveals that a significant portion of the increase is the result of better investigation and follow-up by the local health departments. Among the ehrlichiosis/anaplasmosis and spotted fever rickettsiosis cases, the percentage of cases with symptoms identified has increased from 8.0% of the cases reported with symptoms in 2010 to 94.9% reported in 2013. The collection of the clinical criteria allowed suspect tick-borne disease cases to be classified as confirmed or probable. Prior to the increased efforts by the local health department a significant proportion of Kansas cases were closed as suspect cases and not included in our case count totals.

The surveillance data collected during 2012 and 2013 has resulted in a better characterization of the burden of tick-borne diseases in Kansas. Exposure and travel histories and disease onset dates can be examined to compare disease occurrence to the anticipated presence of tick vectors (Table 1). An examination of the 2012-2013 tick-borne disease data show that disease incidence did increase during periods of potential tick exposure for Kansas residents whose only exposure was reported within the State. Geographically, the incidence of disease is also greater where potential tick populations are more likely to be found (Figures 1 and 2).

Figure 1. Incidence Rate* of Spotted Fever Rickettsiosis by County, Kansas, 2012 (n=106)

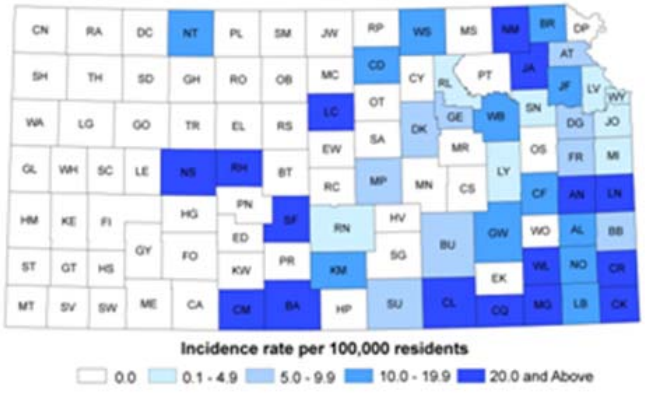

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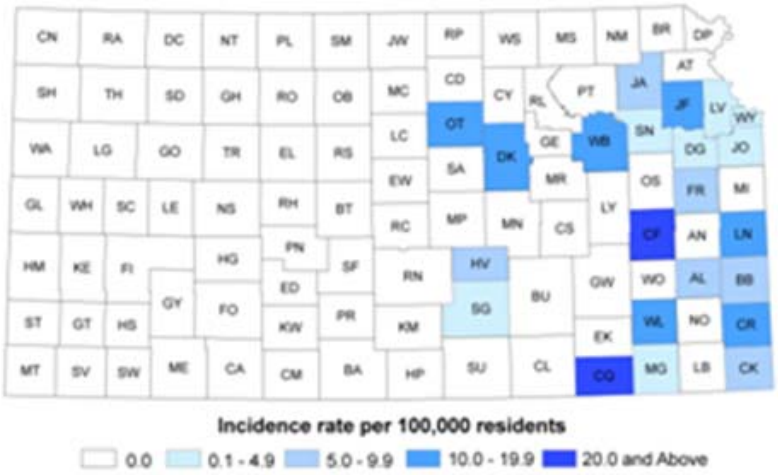
Figure 2. Incidence Rate* of Ehrlichiosis and Anaplasmosis by County, Kansas, 2012 (n=31)



*Cases with reported tick exposure outside their county of residence or unknown exposures were excluded.

The message to the local investigator is that through your efforts the surveillance of tick-borne disease in Kansas has improved significantly. The availability and use of diagnostic tests will always influence surveillance findings, but the time and effort expended to collect diagnostic and clinical criteria does impact how the incidence and burden of these tick-borne diseases are understood in our State and throughout the nation.

Table 1. Tick-borne Disease Vectors in Kansas by Associated Disease and Occurrence

Vector	Associated Disease	Time Encountered	Location Encountered
American dog tick (*Dermacentor variablilis*)	Spotted fever rick-ettsiosis	March through September	Grasslands and along forest edges throughout Kansas
Lone star tick (*Amblyomma americanum*)	Ehrlichiosis, Southern tick-associated rash illness, and tularemia	Adult ticks from February through early June; nymphs from April through July; larvae in late summer and early fall	Eastern half of Kansas as far west as Mitchell County
Black-legged tick (*Ixodes scapularis*)	Lyme disease and Anaplasmosis	Nymphs in May through July; adults in September through December and sometimes in the spring	Increasing importance in eastern Kansas

Source:
Extension, KS (2004, June). *PESTS That Affect Human Health: Ticks in Kansas.* Retrieved February 20, 2014, from K-State Research and Extension: http://www.ksre.ksu.edu/

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Babesiosis – Why It is Important in Kansas?

As of January 2013, Babesiosis became a nationally reportable disease condition. It is caused by microscopic parasites that infect red blood cells and are normally transmitted by the bite of the Black-legged tick (*Ixodes scapularis*). Transfusion-associated Babesiosis can also occur. The prevention of transfusion-associated Babesiosis largely depends on intervening before donation. A patient who has (or had) laboratory evidence of *Babesia* infection should be advised to refrain indefinitely from donating blood. If the patient is identified who has recently donated or received blood, the appropriate blood collection agencies and public health authorities should be notified. To facilitate case investigations by the public health authorities, CDC has developed forms and instructions that can be downloaded at: http://www.cdc.gov/parasites/health_depts/index.html.

Lyme Disease Investigation

Erythema Migrans (EM) and the two-step laboratory process represent two important parts of the Lyme Disease case definition that are frequently a source of confusion for local disease investigators.

EM rash develops at the site of a tick bite and expands over several days. The rash may look like a bull's-eye with alternating red and clear rings. For the case definition to be met, it MUST be physician diagnosed, measuring 5 cm or greater in size. A physician diagnosed EM rash in a case-patient who was exposed in an endemic county or with laboratory evidence of infection is considered confirmed.

The two-step laboratory process is recommended by the CDC. The first step of the two-step laboratory process uses a testing procedure called "EIA" (enzyme immunoassay) or "IFA" (indirect immunofluorescence assay). If the first step is negative, no further testing of the specimen is recommended. If the first step is positive or indeterminate, a second step should be performed. This second step is test called an immunoblot or a "Western blot" test. Results are considered positive only if the EIA/IFA and the immunoblot are both positive. The two steps of Lyme disease testing are designed to be done together (Source: www.cdc.gov/lyme/diagnosistesting/LabTest/TwoStep/, accessed 2/20/2014). Skipping the first test or just doing a single test will increase the frequency of false positive results. Therefore, laboratory reports received of only the first step (EIA/IFA) results or of only a positive IgM immunoblot (western blot) results will not be considered laboratory evidence of Lyme disease.

When investigating Lyme disease cases, it is important for the local investigator to determine 1) was EM present and diagnosed by a physician and 2) were both laboratory steps performed. This information along with the documentation of clinical symptoms, onset date, and any exposure to potential tick habitats, in and outside of the county, will assist with proper case classification.

Tick-borne Disease Resources

- *Tickborne Diseases of the United States: A Reference Manual for Health Care Providers* (http://www.cdc.gov/lyme/resources/TickborneDiseases.pdf)
- *It's Open Season on Ticks! Hunter Safety Fact Sheet* (http://www.cdc.gov/ticks/resources/Hunterfactsheet.pdf)
- CDC Ticks Webpage (http://www.cdc.gov/ticks/index.html)
- Kansas Disease Investigation Guidelines (http://www.kdheks.gov/epi/disease_investigation_guidelines.htm)

Vaccine-Preventable Disease Surveillance Indicators

by Chelsea Raybern, MPH

The completeness and quality of specific surveillance indicators for vaccine-preventable diseases (VPDs) reported to the Kansas Department of Health and Environment (KDHE), from February 1 to February 28, 2014, can be found in the table below. The percentages in **bold** represent the indicators that have less than 90% completion. The case counts presented in this report are preliminary numbers and are subject to change.

Keep up the good work! The indicators date of birth and gender were completed for all VPDs reported from February 1 to February 28, 2014. The median number of days for local health departments to accept *Haemophilus influenzae*, pertussis, and varicella cases was zero. More than half of the indicators (onset date, hospitalization, death, vaccination status, completed investigations, and range number of days for local health departments to accept cases) for *Haemophilus influenzae* cases have improved when compared to the data from last month. The percentages highlighted in red represent improvement.

Still room for improvement…Completeness of onset date, hospitalization, vaccination status, transmission setting, and completed investigations was lower than 90% for all diseases reported in February. The range number of days for local health departments to accept pertussis and varicella cases was zero to 30 and zero to 28 days, respectively. Even though the median and range number of days for local health departments to accept *Streptococcus pneumoniae* cases improved when compared to last month's data, the median was four days with a range of zero to five days. More than half of the indicators for *Haemophilus influenzae* (race, ethnicity, onset date, hospitalization, death, vaccination status, and completed investigations), pertussis (race, ethnicity, onset date, hospitalization, death, vaccination status, transmission setting, and completed investigations) and varicella (race, ethnicity, onset date, hospitalization, vaccination status, transmission setting, and completed investigations) cases were less than 90% complete.

Please continue to focus on completing these fields in EpiTrax for all VPDs as the goal is to reach 90% or higher completion on all indicators. For questions regarding this data, please contact Chelsea Raybern at (785) 296-0339 or craybern@kdheks.gov.

VPD Indicators Reported from February 1 to February 28, 2014 in Kansas

Indicators	*Haemophilus influenzae*, invasive	Pertussis	*Streptococcus pneumoniae*, invasive	Varicella
Number of reported cases	4	34	14	26
% of cases with date of birth	100%	100%	100%	100%
% of cases with gender	100%	100%	100%	100%
% of cases with race	**50%**	**76%**	93%	**88%**
% of cases with ethnicity	**75%**	**74%**	93%	**81%**
% of cases with onset date‡	75%	**82%**	**71%**	**85%**
% of cases with hospitalized noted	75%	**85%**	**86%**	**88%**
% of cases with died noted	75%	**88%**	**86%**	92%
% of cases with vaccination status*	75%	88%	**79%§**	**88%**
% of cases with transmission setting¶	N/A**	85%	N/A**	**77%**
% of investigations completed by local health departments§§	75%	**65%**	**79%**	**46%**
Median # of days from report to case acceptance (range)¶¶	0 (0-1)	0 (0-30)	4 (0-5)	0 (0-28)

‡Data is pulled from onset date field within the clinical tab, not investigation tab
*Unknown is considered a valid response if patient is older than 18 years
§Indicator considered complete if either polysaccharide or conjugate pneumococcal vaccine history is documented
¶Unknown is considered a valid response for this indicator
**Indicator field not included in supplemental disease form
§§Status includes when local health department completes investigation, approves the case, or when the case is closed by state
¶¶Time from public health report date to when local health department accepts case.

	Reported Disease Counts - February 2014						
						Grand Total	3 Year Avg. 2011-2013
	Not Available	Confirmed	Not a Case	Probable	Suspect		
Disease	Count	Count	Count	Count	Count	Count	Count
Anaplasma phagocytophilum (f. HGE)	1	0	0	0	0	1	0
Arboviral, other	1	0	0	0	0	1	0
Campylobacteriosis	10	6	1	0	10	27	32
Carbapenem-resistant Enterobacteriaceae	0	0	4	0	0	4	0
Cryptosporidiosis	1	1	0	0	0	2	7
Giardiasis	2	3	0	0	0	5	10
Haemophilus influenzae, invasive disease (Including Hib)	0	4	0	0	0	4	2
Hepatitis A	0	0	1	3	0	4	31
Hepatitis B virus infection, chronic	8	0	61	19	0	88	34
Hepatitis B, acute	0	0	2	1	0	3	6
Hepatitis C virus, past or present	131	26	43	1	5	206	154
Hepatitis C, acute	0	1	0	0	0	1	1
Hepatitis Delta co- or super-infection, acute (Hepatitis D)	1	0	0	0	0	1	0
Hepatitis E, acute	1	0	0	0	0	1	0
Influenza	0	7	11	0	0	18	1
Influenza-associated pediatric mortality	0	1	0	0	0	1	0
Legionellosis	3	0	1	0	0	4	1
Listeriosis	0	1	0	0	0	1	0
Lyme Disease (*Borrelia burgdorferi*)	2	0	5	0	0	7	10
Malaria (*Plasmodium spp.*)	0	1	0	0	0	1	2
Measles (rubeola)	1	0	0	0	0	1	3
Meningitis, Bacterial Other	0	0	1	0	0	1	2
Mumps	2	0	0	0	0	2	5
Norovirus	1	0	0	0	0	1	33
Pertussis	19	5	6	8	2	40	51
Rabies, animal	3	1	0	0	1	5	5
Rubella	0	0	104	0	0	104	0
Salmonellosis	0	12	0	0	0	12	18
Shiga toxin-producing *Escherichia coli* (STEC)	5	2	0	0	6	13	4
Shigellosis	1	2	0	0	0	3	7
Spotted Fever Rickettsiosis (RMSF)	3	0	1	0	1	5	3
Streptococcal disease, invasive, Group A	1	5	1	0	0	7	6
Streptococcus pneumoniae, invasive disease	2	12	0	0	0	14	16
Toxic-shock syndrome (streptococcal)	0	2	0	0	0	2	0
Transmissible Spongioform Enceph (TSE / CJD)	0	0	1	0	0	1	1
Varicella (Chickenpox)	21	2	3	5	1	32	47
West Nile virus non-neuroinvasive disease	0	0	1	0	0	1	1
Grand Total	220	94	247	37	26	624	495

Disease Reporting and Disease Control Performance Measures

By Daniel Neises, MPH

Public Health Emergency Preparedness Cooperative Agreement
Capability #13: Public Health Surveillance and Epidemiological Investigation

Selected diseases:

Disease	Case Classification Criteria
Hepatitis A	confirmed
Salmonellosis	confirmed, excluding typhoid fever
E. coli, STEC	confirmed
Shigellosis	confirmed
Tularemia	confirmed and probable
Varicella	confirmed and probable
Botulism	confirmed, excluding infant botulism
Measles	confirmed
Meningococcal disease	confirmed
Pertussis	confirmed, with laboratory results

Disease Reporting: Proportion of selected disease reports received by a public health agency within the awardee-required timeframe. Calculated by using EpiTrax fields:

(Lab Test Date or Date Diagnosed – Presumptive) – (Date Reported to Public Health) ≤ KDHE-required disease reporting timeframe

Disease Control: Proportion of reports of selected disease for which initial control measures were initiated within an appropriate timeframe. Calculated by using EpiTrax fields:

(Date LHD Investigation Started) – (Date Reported to Public Health) ≤ CDC-required timeframe

Disease Reporting

Disease	KDHE Required Timeframe	Statewide Received	Statewide Received On Time	%	% change from previous month
Hepatitis A	7 days	9	9	100	0
Salmonellosis	7 days	258	252	98	0
E. coli, STEC	7 days	49	47	96	0
Shigellosis	7 days	26	26	100	0
Tularemia	7 days	14	13	93	0
Varicella	7 days	193	184	95	-1
Botulism	4 hours*	-	-	-	-
Measles	4 hours*	-	-	-	-
Meningococcal disease	4 hours*	1	1	100	-
Pertussis	4 hours*	135	94	70	-1

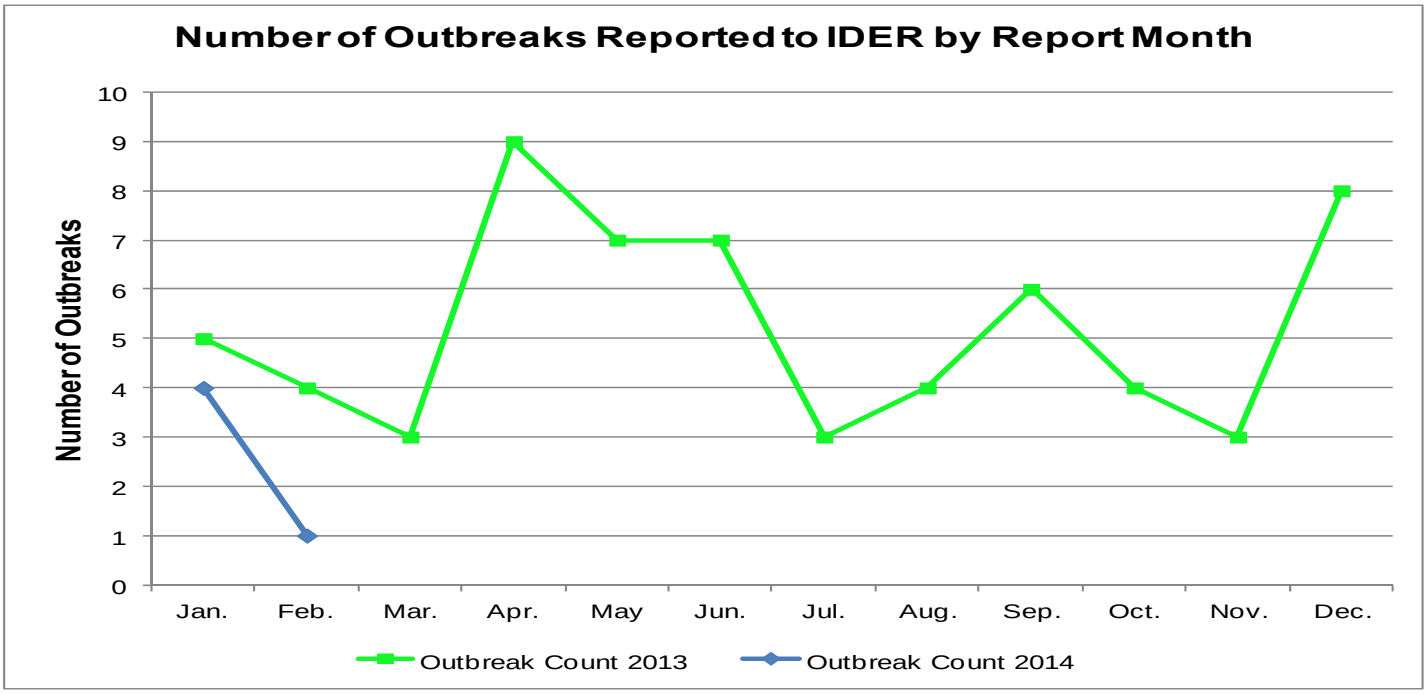
**Because EpiTrax does not capture time reported to public health, KDHE is allowed to "consider cases as immediately reported if the selected case event date and date of first report to a health department occur on the same date."*

Disease Control

Disease	CDC Required Timeframe	Statewide Received	Statewide Investigated On Time	%	% change from previous month
Hepatitis A	7 days	9	9	100	0
Salmonellosis	3 days	258	200	78	+1
E. coli, STEC	3 days	49	33	67	+1
Shigellosis	3 days*	26	19	73	+7
Tularemia	2 days	14	13	93	0
Varicella	1 day*	193	166	86	+1
Botulism	1 day	-	-	-	-
Measles	1 day	-	-	-	-
Meningococcal disease	1 day	1	1	100	-
Pertussis	1 day*	135	118	87	-1

**Collecting data for these diseases is optional. KDHE has defined these timeframes, not CDC.*

Monthly Outbreak Summaries



Facility Type	Organism	Transmission	County	Date Reported
School	Pertussis	Person-to-Person	Pratt	2/28/2014