

The Veterinary Team's Role in the One Health Tularemia System



Kate KuKanich

Master of Public Health, Infectious Disease and Zoonosis

With gratitude



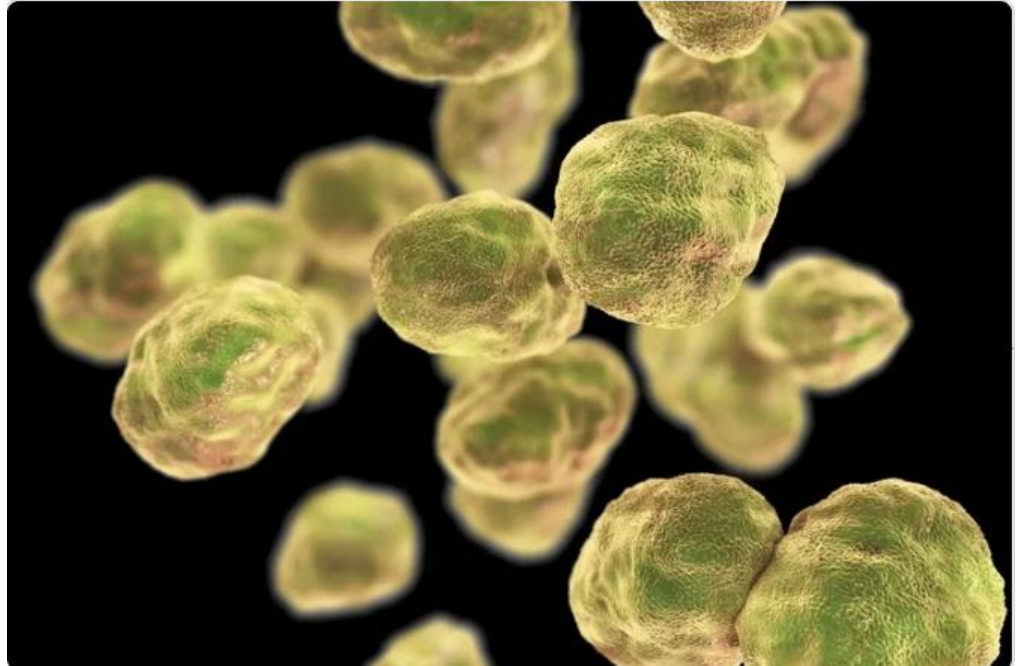
- Graduate Committee
 - Ellyn Mulcahy, PhD, MPH
 - Paige Adams, DVM, PhD
 - Nancy Muturi, PhD
- Preceptor
 - Erin Petro, DVM, MPH, DACVPM
 - State Public Health Veterinarian
 - Kansas Department of Health and Environment

Outline

- Background
- Study Purpose and Design
- Results
- Discussion
- Products
- Competencies
- Summary

Francisella tularensis

- Gram-negative bacteria
 - First discovered 1911 in Tulare County, California
- Two main subspecies
 - Type A- *F. tularensis* subsp. *tularensis*
 - in North America, more virulent, rabbits/ticks, and most illness in pets and people
 - Type B- *F. tularensis* subsp. *holarctica*
 - more global as well as North America, less virulent



<https://www.news-medical.net/news/20250102/CDC-study-highlights-growing-tularemia-threat-in-central-US.aspx>

Transmission

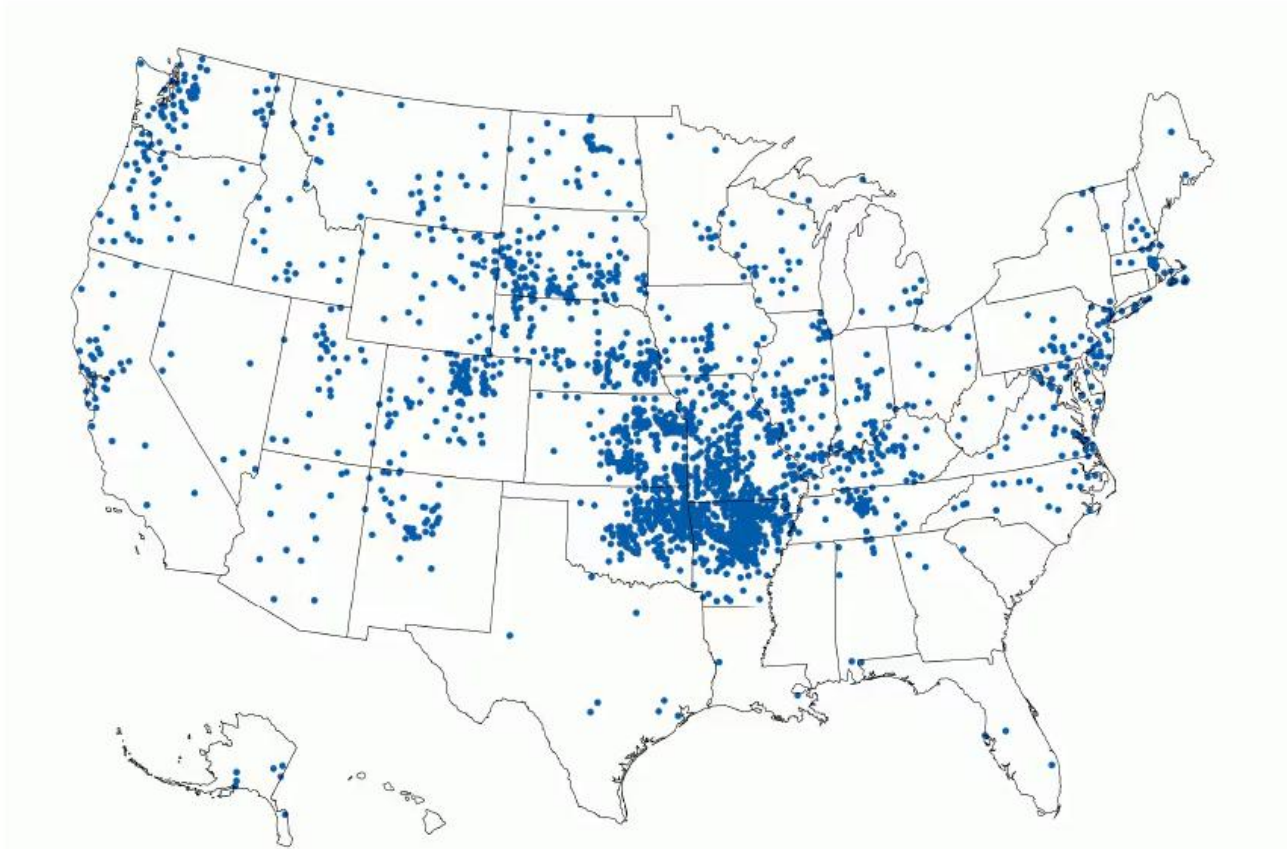
- Vector Bites
 - *Amblyomma*
 - *Dermacentor*
 - Deerflies
- Direct contact
 - Rabbits, rodents
 - Other infected animals
- Contaminated food or water
- Inhalation



<https://www.cdc.gov/tularemia/about/index.html>

Distribution and Incidence

FIGURE 1. Reported tularemia cases, by county of residence* — United States, 2011–2022



In 2022,
Kansas had
the highest
incidence
of human
tularemia
cases in the
country
(27)!

In 2025, KS
was up to 35
cases

Highly Contagious

- In 1919, Dr. Francis himself developed tularemia after conducting an autopsy
- By 1921, all 5 of his assistants had also developed tularemia via contact with rodents in the lab
- Infectious dose is 10 organisms via injection or inhalation



Dr. Edward Francis

<https://historyatnih.tumblr.com/post/185679337396/dr-edward-francis-inoculated-a-rabbit-with>

Nelson CA, Sjostedt A. CID 2024:78 (15 Feb) S1.

Transmission

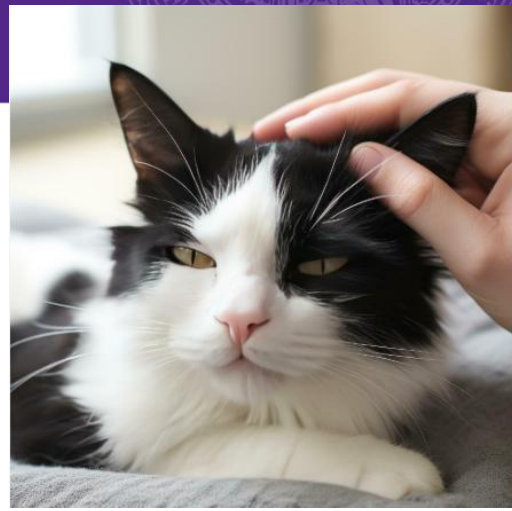
Pets have same routes of exposure as people



Pets can bring ticks and wildlife into/near the home, increasing human exposure



Direct Exposure from Pets



Occupational Risk

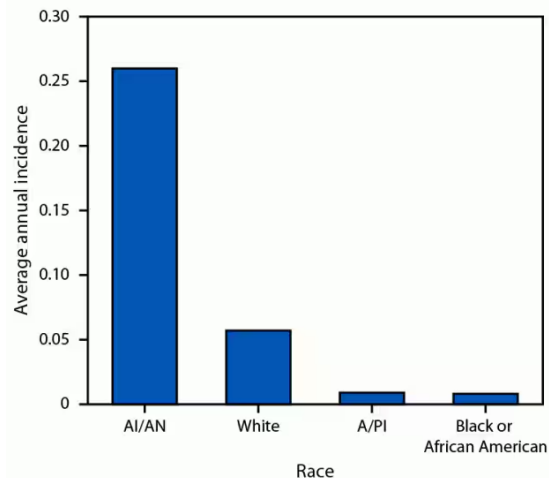
- Veterinary personnel
- Hunters
- Trappers
- Landscapers
- Farmers
- Laboratory workers



At Risk Populations

- American Indian/Alaska Native
 - Most people who get tularemia are white, but the highest incidence is in American Indian
- Children 5-9 and adult males 65-84 years

FIGURE 2. Average annual tularemia incidence,* by race — United States, 2011–2022



Abbreviations: AI/AN = American Indian or Alaska Native; A/PI = Asian or Pacific Islander.

* Cases per 100,000 population.

Outbreak of Tularemia on Native Reservations

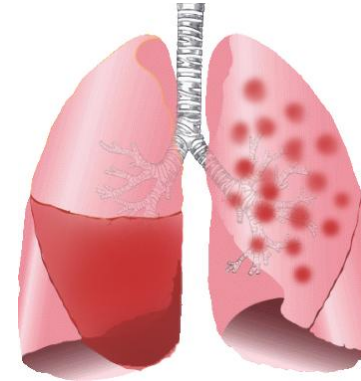
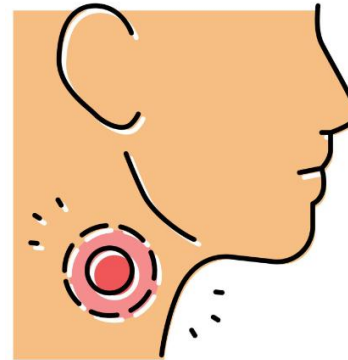
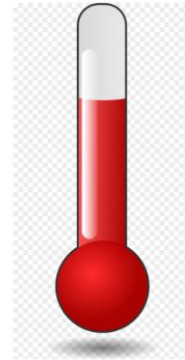
- 20 kids became ill
- #1 risk factor was exposure to ticks
 - Finding ticks inside the home (9.2 odds ratio)



<https://www.cdc.gov/ticks/about/where-ticks-live.html>

Clinical Disease

- People
 - Ulceroglandular
 - cutaneous ulcers, regional lymphadenopathy
 - Glandular
 - Regional lymphadenopathy without ulcer
 - Oculoglandular
 - Conjunctivitis with lymphadenopathy
 - Oropharyngeal
 - Stomatitis/pharyngitis/tonsillitis and lymphadenopathy
 - Pneumonic- primary pleuropulmonary
 - Typhoidal- fever without localizing signs



Clinical Disease

- Cats

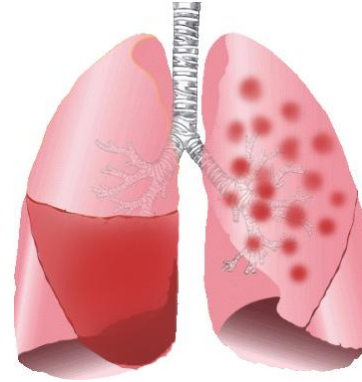
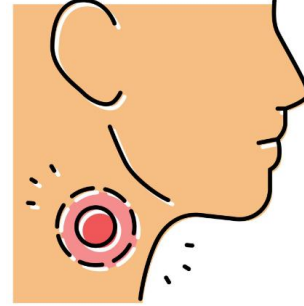
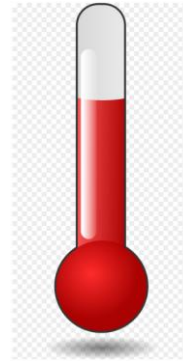
- Exposure
- Fever, lethargy, anorexia, lymphadenopathy, oral ulcers
- +/-Hepatosplenomegaly, pneumonia
- Leukopenia/neutropenia or leukocytosis, thrombocytopenia
- Might have high bilirubin, ALT

Nikpour H, et al. *J Fel Med Surg* 2024;1-9

- Dogs

- Exposure
- Fever, lethargy, anorexia, lymphadenopathy

Kwit NA, et al. *JAVMA* 2020;256:220-5



Tularemia as a One Health System



Environment

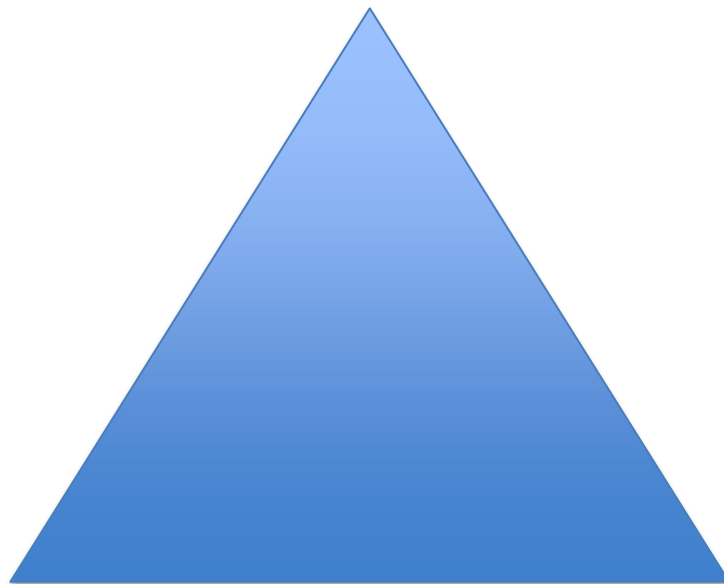
- Vector distribution
- Seasonality
- Weather Patterns
- Habitat invasion

Human

- Age, gender, race
- Profession
- Hobbies
- Behaviors
 - Lawn care
 - Hunting
 - Pet Ownership
 - Tick checks

Animals

- Cats, Dogs, Livestock
 - Some pocket pets
- Outdoor exposure
- Tick collars or monthly preventative medications
- Hunting/eating prey



Tularemia as a One Health System



Environment

- Vector distribution
- Seasonality
- Weather Patterns
- Habitat invasion

Veterinarians are uniquely positioned:

- Tick prevention
- Manage wildlife
- Diagnose and treat pets
- Educate clients and community

Human

- Age, gender, race
- Profession
- Hobbies
- Behaviors
 - Lawn care
 - Hunting
 - Pet Ownership
 - Tick checks



Animals

- Cats, Dogs, Livestock
 - Some pocket pets
- Outdoor exposure
- Tick collars or monthly preventative medications
- Hunting/eating prey

Study Purpose

- To determine the knowledge, attitudes, and current practices of veterinarians and veterinary technicians in KS regarding tularemia
- Specifically, we wanted to know
 - Tularemia cases seen in Kansas
 - Diagnostic and treatment preferences
 - Use of personal protective equipment (PPE)
 - Occupational risk
 - Zoonotic risk communication for owners
 - Public health reporting knowledge

Study Design

- Survey study
 - IRB approved
 - Electronic survey via Qualtrics
 - Sent via email and LinkedIn from June-Sept 2024
 - Participants: licensed KS veterinarians and technicians serving dogs and cats
 - Survey design: display logic, ~5 minutes
 - Veterinarians: 28 questions
 - Technicians: 23 questions, more lay language

Data Analysis

- Qualitative Data
 - Descriptive statistics for summarizing most variables
- Quantitative Data
 - Chi-Square analysis: proportion of PPE use between veterinarians and technicians, and PPE use among veterinarians based on years of experience
 - Fisher's exact test: when there was frequency < 5 in a cell
 - Odds ratios were calculated for significant results
 - P value set at ≤ 0.05

Results

Table 1. Practice type of Study Participants

	Veterinarians (N=109)	Registered Veterinary Technicians (N=19)
Companion Animal Exclusive	75	16
Companion Animal Predominant	12	0
Mixed animal	14	2
Food Animal Predominant	6	0
Food Animal Exclusive	0	0
Equine	2	0
Did not answer	0	1

KuKanich K, et al. JAVMA 2025;263(5):619-627

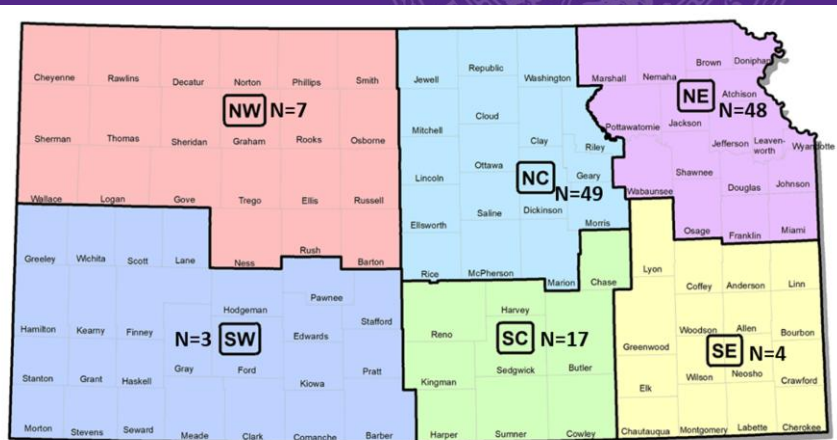


Figure 1. Geographic distribution of study participants in KS

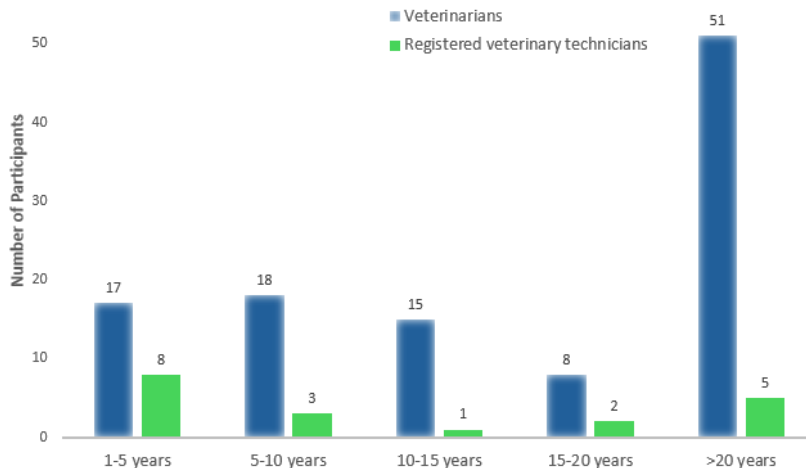


Figure 2. Years of practice experience of study participants.

Results

- Tularemia in KS pets?
 - 43% of vets have diagnosed in KS cats
 - 13% of vets have diagnosed in KS dogs

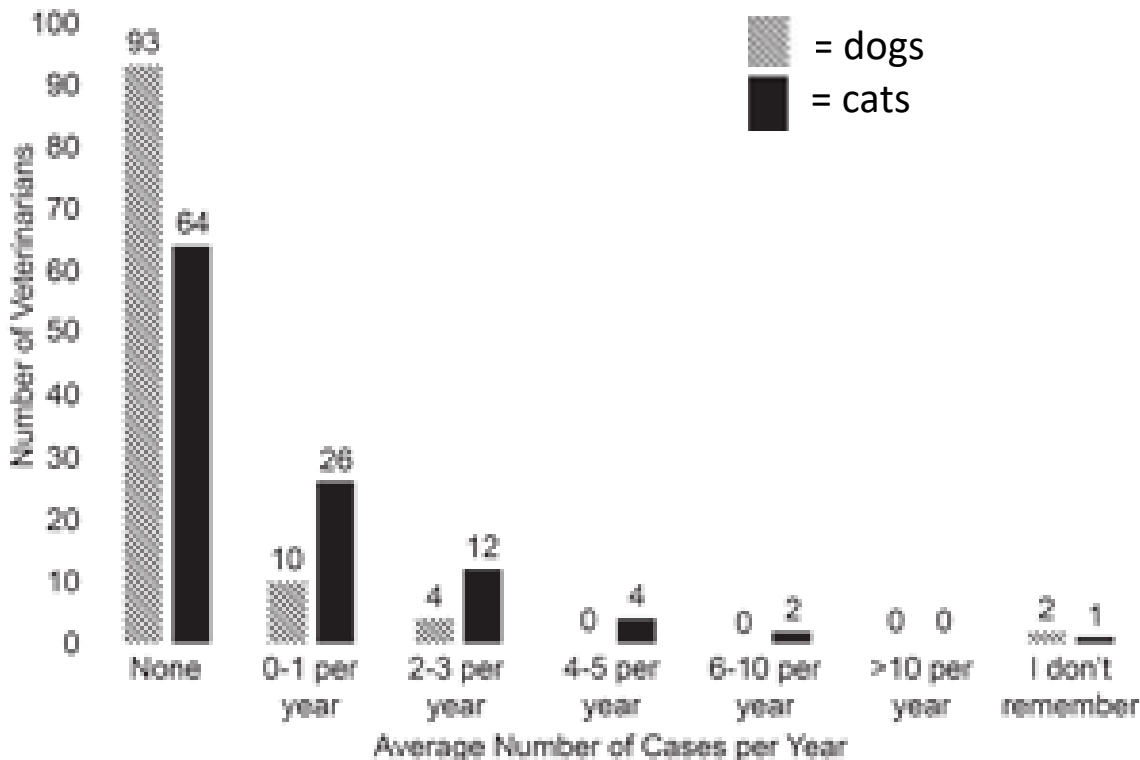


Figure 3. Average yearly number of cases of tularemia reportedly diagnosed by responding veterinarians over the past 5 years in KS

Results

- Diagnostic Preferences
 - 42% of surveyed Kansas veterinarians said they never submit a test to confirm the diagnosis of tularemia
 - PCR was listed as the most common test submitted

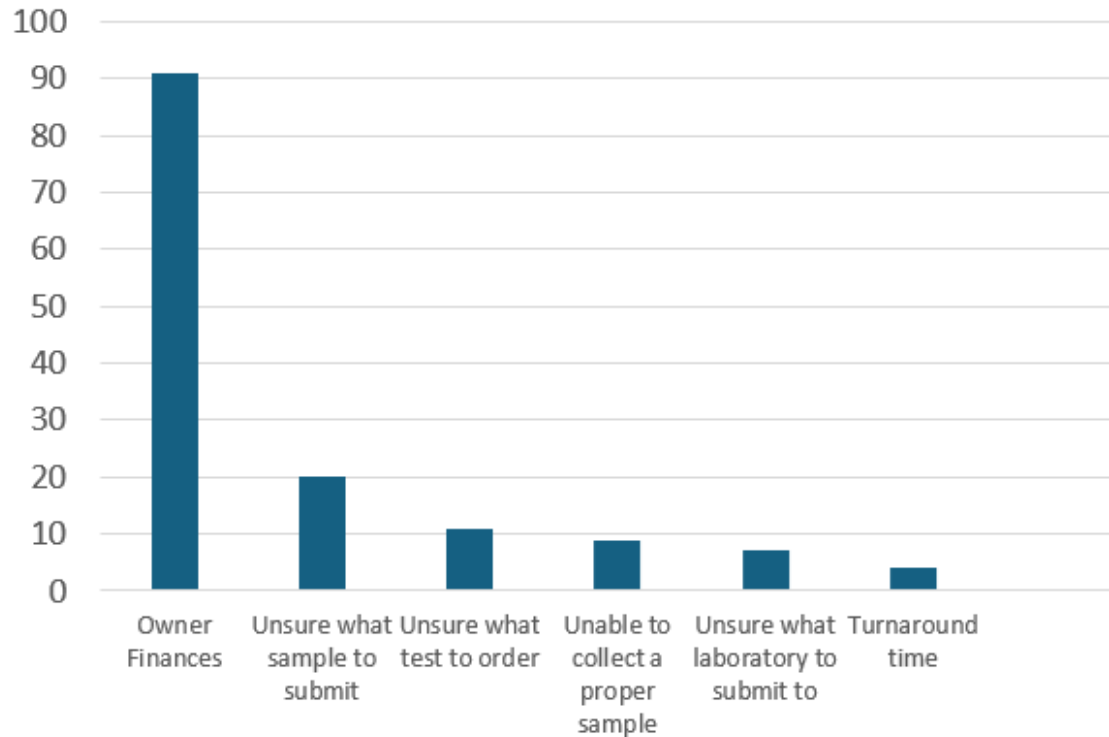


Figure 4. Percent of veterinarians reporting diagnostic challenges.

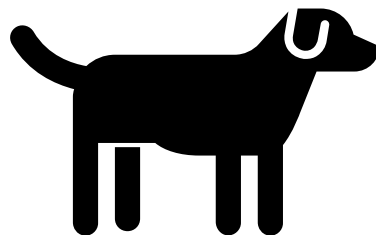
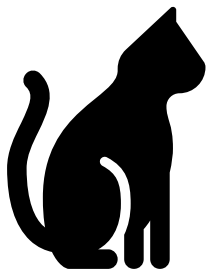
Results

- Treatment Preferences

- 58%-65% of veterinarians said they would look up the best treatment option
- Remaining vets most commonly chose fluoroquinolones or doxycycline

Cats

14% pradofloxacin
13% doxycycline
6% enrofloxacin
6% gentamicin



Dogs

16% enrofloxacin
12% doxycycline
3% gentamicin
2% marbofloxacin

Results

- Personal Protective Equipment

Table 2—Number and percent of veterinarians and technicians who responded to the survey as described in Table 1 and reported using personal protective equipment when lancing abscesses and performing necropsies on routine feline and canine patients as well as for physical examinations, basic care, abscesses, and necropsies when tularemia is suspected or confirmed.

	Abscess lancing for routine patient (N = 114)	Necropsy for routine patient (N = 90)	Examination and basic care for suspect/confirmed tularemia patient (N = 121)	Abscess lancing or necropsy for suspect/confirmed tularemia patient (N = 116)
Gloves				
Total	114 (100%)	90 (100%)	118 (98%)	116 (100%)
Veterinarian	96 (100%)	83 (100%)	101 (97%)	99 (100%)
Technician	18 (100%)	7 (100%)	17 (100%)	17 (100%)
Lab coat/scrub top				
Total	46 (40%)	37 (41%)	55 (45%)	52 (45%)
Veterinarian	41 (43%)	33 (40%)	47 (45%)	43 (43%)
Technician	5 (28%)	4 (57%)	8 (47%)	9 (53%)
P value	.236	.440	.886	.467
Gown				
Total	10 (9%)	18 (20%)	43 (36%)	68 (59%)
Veterinarian	10 (10%)	17 (20%)	33 (32%)	56 (57%)
Technician	0 (0%)	1 (14%)	10 (59%)	12 (71%)
P value	NA	1.000	.030 OR 3.1	.425
Eye protection				
Total	30 (26%)	33 (37%)	48 (40%)	81 (70%)
Veterinarian	22 (23%)	29 (35%)	39 (38%)	66 (67%)
Technician	8 (44%)	4 (57%)	9 (53%)	15 (88%)
P value	.057	.255	.228	.090
Plastic face shield				
Total	5 (4%)	4 (4%)	15 (12%)	34 (29%)
Veterinarian	5 (5%)	3 (4%)	12 (12%)	26 (26%)
Technician	0 (0%)	1 (14%)	3 (18%)	8 (47%)
P value	NA	.281	.442	.082
Surgical face mask				
Total	21 (18%)	33 (37%)	56 (46%)	69 (59%)
Veterinarian	20 (21%)	31 (37%)	49 (47%)	61 (62%)
Technician	1 (6%)	2 (29%)	7 (41%)	8 (47%)
P value	.189	1.000	.649	.259
N95 respirator				
Total	2 (2%)	2 (2%)	8 (7%)	17 (15%)
Veterinarian	2 (2%)	2 (2%)	6 (6%)	13 (13%)
Technician	0 (0%)	0 (0%)	2 (12%)	4 (24%)
P value	NA	NA	.312	.273

NA = Not applicable.

P values are provided from χ^2 or Fisher exact test comparisons of personal protective equipment use between veterinarians and technicians. Not all participants answered all questions. Bolded P values are significant.

Results

- Personal Protective Equipment based on years of experience
 - N-95 respirator use
 - DVMs with 1-5 yrs (24%) of experience were 14.5x more likely to use N-95 to care for patients with suspected/confirmed tularemia than DVMs with >20yrs experience (2%)
 - Gowns
 - DVMs with 5-10 yrs (75%) and 15-20 yrs (85%) experience were 4.1 and 2.7x more likely, respectively, to wear gowns when lancing abscesses or performing necropsies on tularemia suspects than DVMs with >20 years experience (43%)
 - Plastic face shields
 - DVMs with 1-5 yrs (50%) experience were 4.2x more likely to wear plastic face shields when lancing abscesses or performing necropsies on tularemia suspects than DVMs with >20 years experience (19%)

Results

- Occupational Risk
 - 124/128 knew that tularemia is zoonotic
 - 8/109 (7%) veterinarians surveyed said they have had tularemia
 - 7 acquired from a veterinary patient
 - 1 from wildlife
 - 7 know a veterinary coworker who had tularemia
 - 3 acquired from veterinary patient, 2 from wildlife, 2 source unknown/unreported



Results

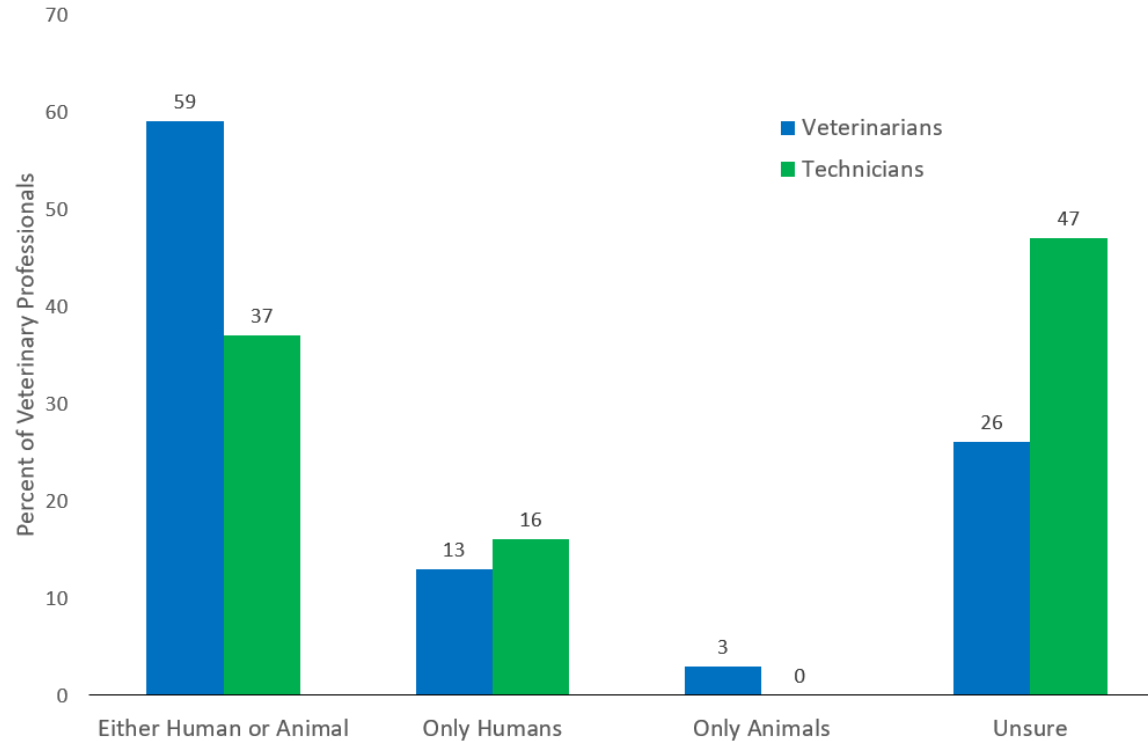


Figure 5. Percent of surveyed veterinarians (N=109) and technicians (N=19) responding that tularemia is a reportable disease in Kansas when diagnosed in a human, animal, or both.

Results

- Educating Clients
 - 91% of KS veterinarians and 5/6 technicians reported they educate clients about the public health risk of tularemia when they diagnose or suspect a case
 - Verbal conversation, handout, or preferably both
 - Documentation in the medical record
 - 63% always document
 - 23% document most of the time
 - 9% never document
 - Zoonotic transmission to clients
 - 3 survey respondents (different clinics) reported knowing pet owners of tularemia patients who developed tularemia

Discussion



- Kansas veterinarians are diagnosing tularemia patients
 - Incidence could not be determined from this study design
 - Appears more common in cats than in dogs
- Diagnostic testing is a challenge mainly due to expense
 - In reality, PCR (\$51) and culture (\$23) are both affordable at KVDL
- Treatment trials and efficacy studies are needed for tularemia in pets
 - A fluoroquinolone or doxycycline is a reasonable choice with appropriate patient precautions

Discussion

- Occupational risk in veterinary personnel is real
 - 7%, mostly from patients
 - Scratches, bites, and diagnostic procedures
- Veterinary personnel are unsure what PPE to don and when
- Veterinary personnel would benefit from additional training and hospital protocols



Zoonotic Disease Alert: Tularemia

This patient is suspected/confirmed to have tularemia (*Francisella tularensis*)

- Tularemia is a bacterial infection that can spread to people and cause serious illness.
- Transmission risk to people is low, but we can minimize our risk by following PPE guidelines.

Low-Risk Exposures

- Patient restraint, exams, blood draws, imaging, and noninvasive procedures
- Avoid close face contact



Appropriate PPE

- Protective outerwear (lab coat, scrub top), gloves



Response to Exposure

- Fever watch 14 days
- If you develop signs of illness, consult your healthcare provider

If FNA, lance abscess, or lavage wound with proper PPE



- Fever watch 14 days
- If you develop signs of illness, consult your healthcare provider

High-Risk Exposures

- Fine-needle aspirates, lancing abscesses, lavaging wounds, necropsies*
- *For necropsies on suspect/confirmed tularemia patients, submit entire body to diagnostic laboratory, do not perform in-house
- **Bites, scratches, needlestick from infected animal



Appropriate PPE

- Protective outerwear (lab coat, scrub top), gloves, facemask, eye protection



Response to Exposure



If FNA, lance abscess, or lavage wound without proper PPE



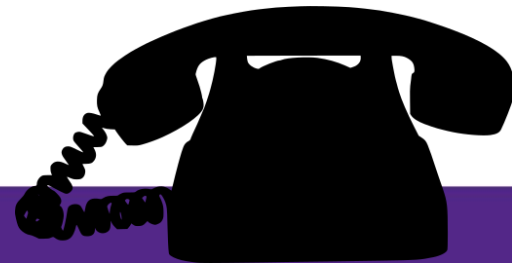
- Consult healthcare provider for post-exposure prophylaxis, typically oral doxycycline or ciprofloxacin

**If bite, scratch, or needle-stick, regardless of PPE



Discussion

- Tularemia is not on the KDA list of reportable diseases when diagnosed in animals
 - Veterinarian not required to report
 - Challenge to perform surveillance on cases in Kansas
 - Many veterinarians send diagnostic tests out of state
 - KVDL reports to KDHE
 - They are required to report “isolates,” not “patients,” due to underlying bioterrorism concern
 - KDHE or the local health department might reach out to the veterinarian and the pet owner
- We recommend that tularemia become reportable to allow
 - Monitoring frequency of uncommon diseases and recognizing incidence trends
 - Providing assistance with diagnosis, treatment, and One Health management
 - Instituting public health response



Discussion

- Client Education is critical
 - Preventative- applying tick products, neutering outdoor cats, educating about hunting, using caution around wild rabbits/rodents
 - Post-diagnosis- how to administer antibiotics, wear gloves, avoid face snuggling, avoid rough play, keep pet indoors during recovery, watch for symptoms in human family members
 - Verbal and Written communication are ideal
 - Client communication should be documented in patient's medical record

Products

KANSAS STATE UNIVERSITY

We are conducting a One Health survey about the knowledge, attitudes, and practices of veterinary practitioners in Kansas regarding tularemia.

This survey is for any practicing veterinarian or veterinary nurse/technician in Kansas who cares for cats and dogs (mixed animal is great too, you don't have to be small animal exclusive). There is no anticipated risk from the survey, nor any direct reward for participating. Survey participation is voluntary, and participants may refuse to answer any questions or stop at any time. Survey answers will be anonymous, and no individually identifiable data will be reported. Information collected for the study, even with identifiable information removed, will not be used or distributed for future research studies.

Questions about this survey can be addressed to:

- Dr. Kate KuKanich, DVM, PhD, at KSU, kstenske@ksu.edu
- Dr. Ellyn Mulcahy, PhD, MPH, at KSU, emulcahy@vet.k-state.edu
- Dr. Erin Petro, DVM, MPH, State Public Health Vet at KDHE, erin.petro@ks.gov
- KSU University Research Compliance Office, comply@ksu.edu 785-532-3224

87th Annual Conference for Veterinarians

June 1-3, 2025

Manhattan, KS

11:30 AM - 12:20 AM

One Health Updates for Tularemia Management and Prevention in Kansas

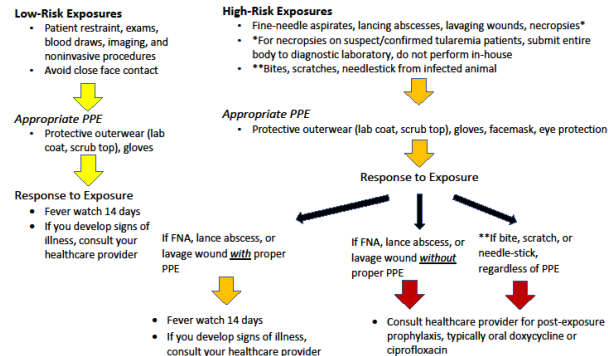
Tularemia, a zoonotic disease caused by *Francisella tularensis*, poses a risk to pets, veterinary personnel and clients, particularly in Kansas. A 2024 survey found that 43% of veterinarians had diagnosed tularemia in cats and 13% in dogs. This session reviews clinical signs, diagnostic tools, and treatment options, emphasizing doxycycline or fluoroquinolones. Attendees will learn proper biosafety measures and PPE use, especially during high-risk procedures. With 7% of surveyed Kansas veterinarians reporting prior infection, this session underscores the importance of safety, client education and optional case reporting to support public health efforts.

Kate KuKanich, DVM, PhD, DACVIM (SAIM)

Zoonotic Disease Alert: Tularemia

This patient is suspected/confirmed to have tularemia (*Francisella tularensis*)

- Tularemia is a bacterial infection that can spread to people and cause serious illness.
- Transmission risk to people is low, but we can minimize our risk by following PPE guidelines.



KPHA'S PUBLIC HEALTH CONFERENCE OF KANSAS

September 23-24, 2025.

BREAKOUT SESSION

No. 1

TULAREMIA IN KANSAS- THE VETERINARIAN'S ROLE IN ONE HEALTH MANAGEMENT

Kate KuKanich, DVM, PhD, Dip ACVIM (SAIM), Kansas State University College of Vet Med

Tularemia, caused by *Francisella tularensis*, is an important zoonotic pathogen in Kansas and surrounding states, with Kansas having the highest human incidence (0.9 per 100,000 residents) of all U.S. states in 2022. A 2024 survey of Kansas veterinarians (N=109) and technicians (N=19), found that 43% of responding veterinarians have diagnosed tularemia in Kansas cats and 13% in Kansas dogs. Most human and veterinary cases result from tick bites or exposure to infected rabbits or rodents. Outdoor cats and pets who hunt are at an increased risk. Clinical signs of tularemia in pets mimic those in people and include: fever, lethargy, anorexia, enlarged lymph nodes, and oral ulcers (especially in cats), with more severe disease including icterus, hepatosplenomegaly, and pneumonia. Early recognition, diagnostic confirmation and treatment are essential for good outcome and prevention of further spread. Pet owners and veterinary personnel can acquire tularemia from infected pets. Seven percent (8/109) of Kansas veterinarians report having had tularemia themselves, thus personal protective equipment, including gloves, mask, eye and face protection is important within the veterinary hospital setting to minimize transmission. Veterinarians also must educate pet owners about zoonotic potential, as tularemia can be transmitted via scratch, bite, or even face-snuggling with an infected pet. Keeping cats indoors and using tick preventatives for both dogs and cats will also decrease risk of infection for pets and exposure for people. Reporting is required when tularemia is diagnosed in people, but not animals; however, voluntary reporting allows a coordinated One Health response.

JAVMA



Companion animal veterinary personnel have occupational risk for tularemia and One Health role for tularemia prevention in Kansas

Kate S. KuKanich, DVM, PhD, DACVIM^{1*}; Ellyn R. Mulcahy, PhD, MPH²; Erin M. Petro, DVM, MPH, DACVPM³

¹Department of Clinical Sciences, College of Veterinary Medicine, Kansas State University, Manhattan, KS

²Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University, Manhattan, KS

³Kansas Department of Health and Environment, Topeka, KS

*Corresponding author: Dr. KuKanich (kstenske@ksu.edu)

JAVMA | MAY 2025 | VOL 263 | NO. 5

619

Competencies



Competency		Description of Synthesis and Integration
	MPH4. Interpret results of data analysis for public health research, policy or practice	Descriptive and analytic statistics- to make recommendations for improved personal protective equipment and One Health communications.
	IDZ4. Disease surveillance. Analyze disease risk factors and select appropriate surveillance.	The concept of risk analysis was paramount in this project. The population of veterinary workers was selected because they are high-risk for tularemia. I asked survey questions about their recognition and response to risk. I prepared educational tools to enhance risk awareness and protection from transmission. I recommend improved surveillance via mandatory reporting.
	MPH19. Communicate audience-appropriate public health content, both in writing and through oral presentation	Throughout this study and program, I tailored my communications to appropriate audiences (veterinarians, technicians, public health professionals, clients) to help them understand tularemia and prevention.

Competencies



Practice-based products that demonstrate competency attainment

Specific products	Competency
Presentations, Cage Sign	1. IDZ Competency 1. Evaluate modes of disease causation of infectious agents.
Survey, Cage Sign	2. IDZ Competency 4. Disease surveillance. Analyze disease risk factors and select appropriate surveillance.
Survey	3. MPH Competency 7. Assess population needs, assets and capacities that affect communities' health
Survey, Cage Sign, Presentations	4. MPH Competency 19: Communicate audience-appropriate public health content, both in writing and through oral presentation
Cage Sign	5. MPH Competency 22. Apply systems thinking tools to a public health issue

Summary

- Veterinary personnel play an important role in prevention, management, and education about tularemia in Kansas
- Hurdles exist with the diagnostic tools available
- Communication among veterinary staff, clients, and public health teams is important to keep everyone safe
- Targeted education with cage signs, veterinary CE, client discussions and handouts may improve overall safety

