



KANSAS STATE

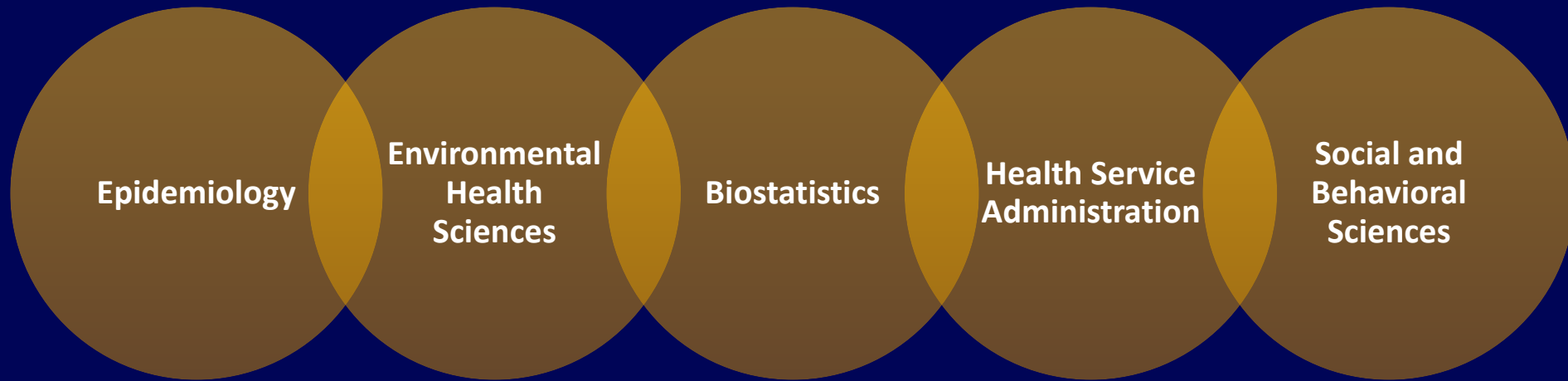
UNIVERSITY

Callie Paquette

Kansas State University, MPH Candidate

calliecpaquette@ksu.edu

Requirements



- Field Experience
 - 240 contact hours at a public health organization
- Infectious Disease and Zoonoses
 - Vector borne diseases
 - One Health

Field Experience

- Kansas Department of Health and Environment (KDHE)- Topeka, KS
 - Bureau of Epidemiology and Public Health Informatics (BEPHI)
- Field Experience Preceptor: Daniel Neises, MPH Senior Epidemiologist
- Purpose: Collect, analyze, and interpret data on a variety of conditions of public health importance and the status of the populations

Field Experience Activities

- Completed trainings relevant to my experiences via KS-Train
- Attended conference calls, presentations, and meetings
- Observe epidemiological processes surrounding a disease outbreak
- Tour of KHEL facilities
- Assisted the CDC with tick collection in KS-Site 12, Fort Scott
- Quality assessment and analysis of Kansas tularemia data

Disease History

1910

'Deer-Fly Fever' described

1911

Organism isolated from ground squirrels in Tulare County, CA

1912

McCoy and Chapin name organism *Bacterium tulareense*

1914

1st human case of *Bacterium tulareense* was reported

1928

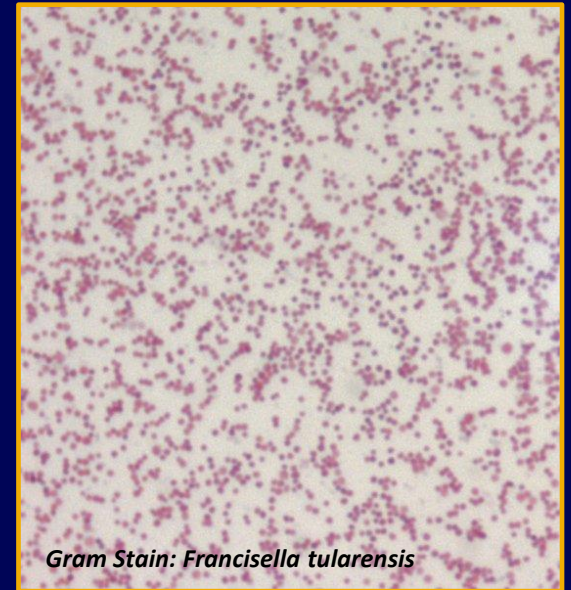
Dr. Edward Francis links *Bacterium tulareense* to 'deer-fly fever'

1929-
1947

Clinical Syndromes described by Dr. Francis

Background

- Bacterial agent: *Francisella tularensis*
 - Morphology: coccobacillus
 - Gram-stain: negative
 - Non-motile and nonsporulating
 - Easily aerosolized
 - Replicate intracellularly
- 4 subspecies
 - *F. tularensis* subsp. *tularensis* (Type A)
 - *F. tularensis* subsp. *holarctica* (Type B)



Gram Stain: *Francisella tularensis*

Transmission

- Category A bioterrorism Agent
- Infective Doses:
 - 10-subcutaneous, 25-respiratory
- Bacterial exposure of skin, eyes, mucous membranes
 - Bite from tick or other insect
 - Consuming improperly cooked meat
 - Ingesting contaminated soil or water
 - Inhalation of aerosolized bacteria

Cottontail rabbit



American dog tick



Transmission



Lone Star tick



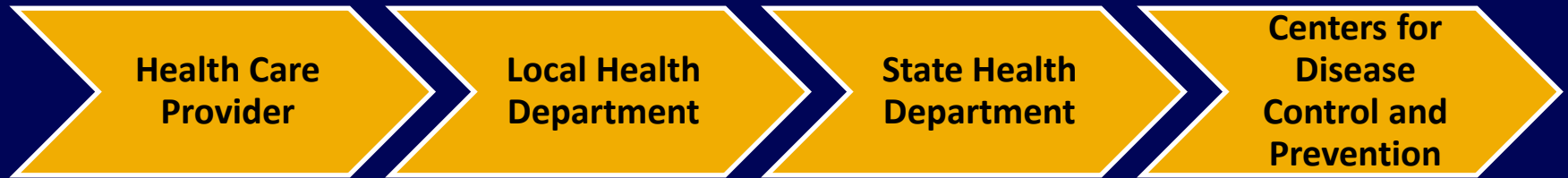
Rocky Mountain wood tick

Clinical Forms of Tularemia

Ulceroglandular	- Ulcers on cutaneous layer of the skin - Regional lymphadenopathy
Glandular	- Regional lymphadenopathy
Oculoglandular	- Conjunctivitis - Preauricular lymphadenopathy
Oropharyngeal	- Stomatitis, pharyngitis, tonsillitis - Cervical lymphadenopathy
Intestinal	- Intestinal pain - Vomiting - Diarrhea
Pneumonic	- Primary pleuropulmonary disease
Typhoidal	- Fever - Lack of other identifying symptoms



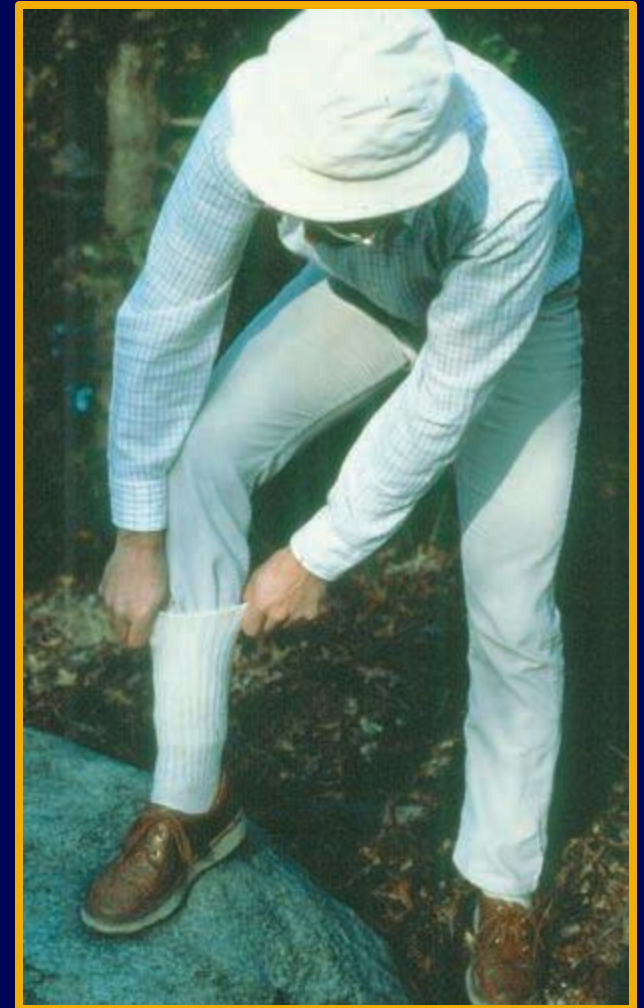
Case Definition & Reporting



- Confirmed
 - Isolation of *F. tularensis* and four-fold or greater increase in serum antibody titer
- Probable
 - Detection of *F. tularensis* by fluorescent assay and elevated serum antibody titers
- Suspect cases
 - Natural/occupational exposure within 7 days
 - Unusual/intentional exposure within 4 hours

Prevention

- Personal protective clothing
- Insect repellents
- Responsible pet ownership
- Do not mow over sick/dead animals
- Use masks when landscaping
- Use gloves when handling animal carcasses
- Thoroughly cook meat





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Methods

KIC

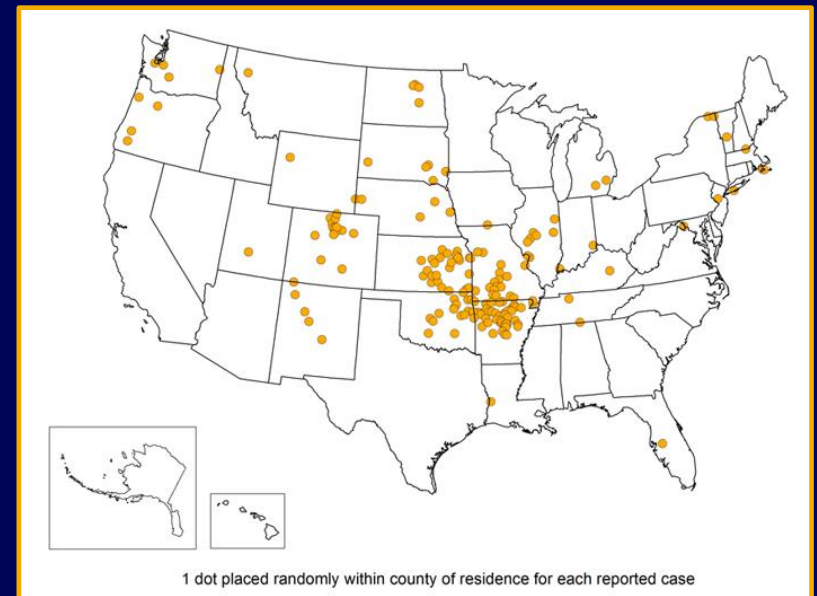


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Tularemia in the United States

- Total reported cases: 1,208
- Average annual cases: 126.5
- Average annual Incidence: 0.041
- Median age: 39
- Reported cases in every state except Hawai'i
- 59% of cases came from 6 states:
 - Missouri (19%)
 - Arkansas (13%)
 - Oklahoma (9%)
 - Massachusetts (7%)
 - South Dakota (5%)
 - Kansas (5%)
- Overall US mortality 2%



Tularemia in Kansas

- Total reported cases: 114
- Average annual cases: 28.5
- Average annual incidence: 0.98 (per 100,000)
- Median age: 42
- Reported cases in 33 of 105 counties
- Mortality: 1%

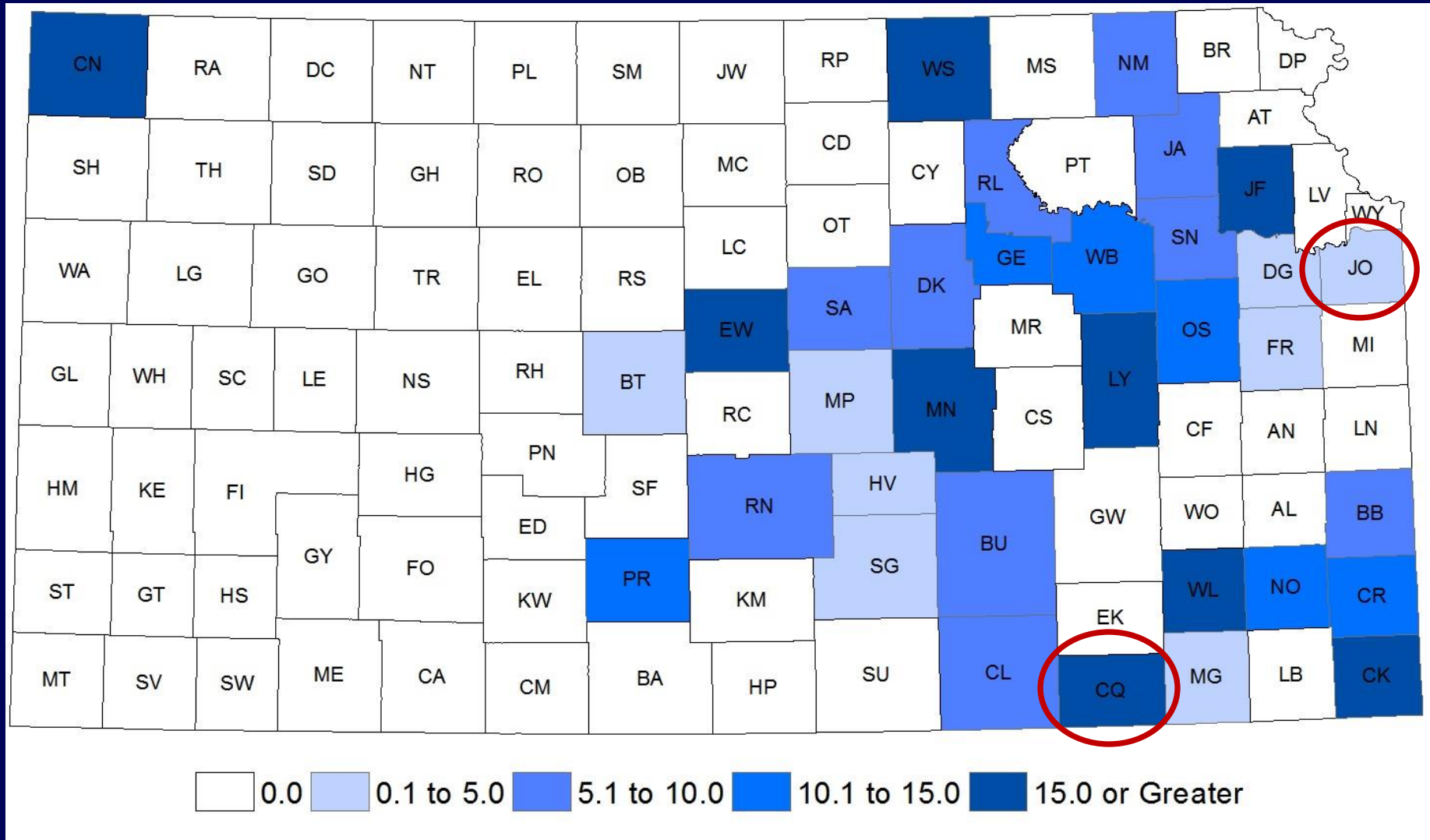
Kansas Incidence Comparison

**2001-2010
Incidence:
0.22***

**2012-2015
Incidence:
0.98***

*indicates incidence
per 100,000 persons

State and County Incidence



Peer Group Incidence

Densely-Settled
Rural

5.86

infections
per 100,000

Rural

4.33

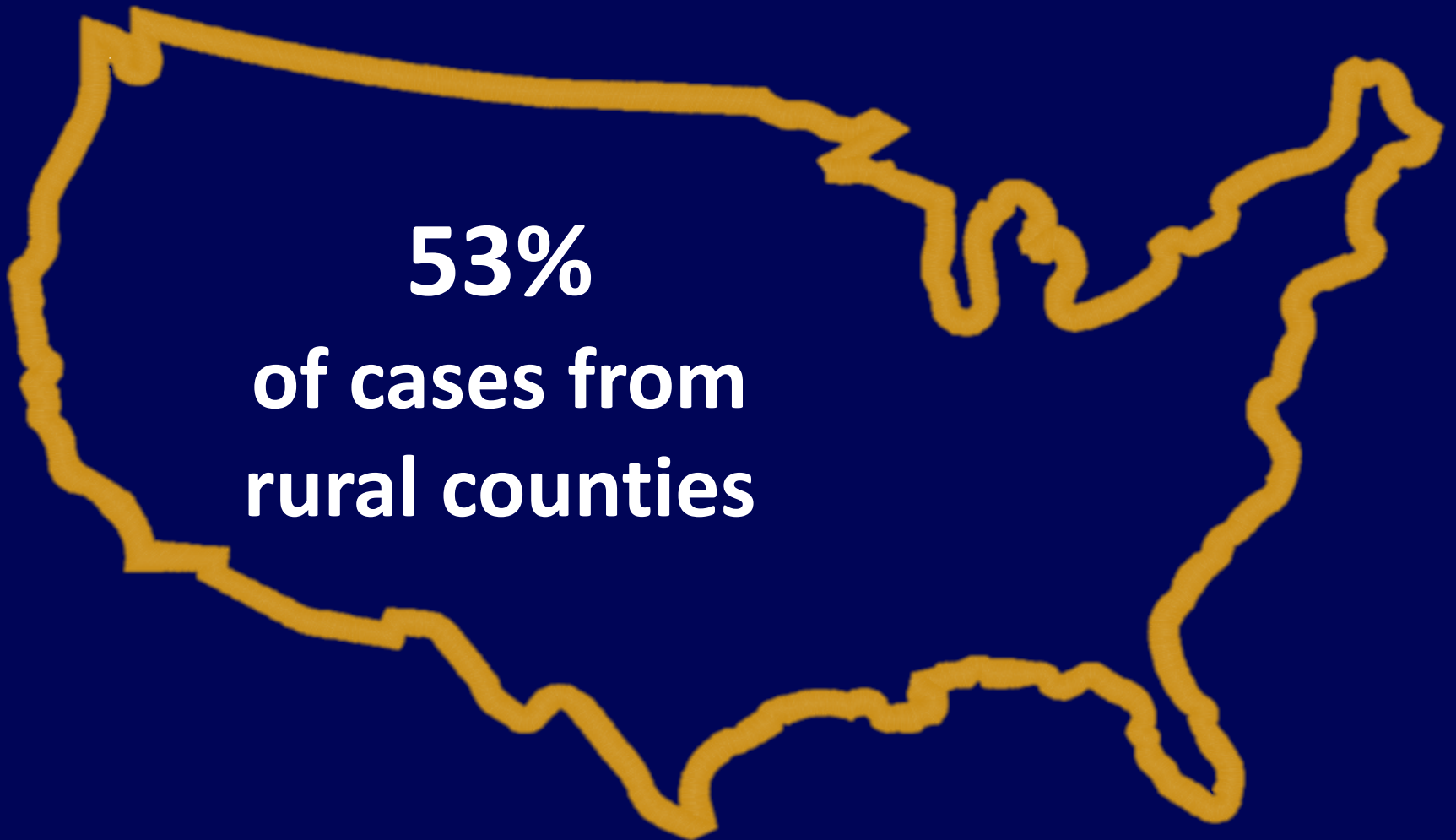
infections
per 100,000

Urban

2.72

infections
per 100,000

United States Incidence



Demographic Comparison

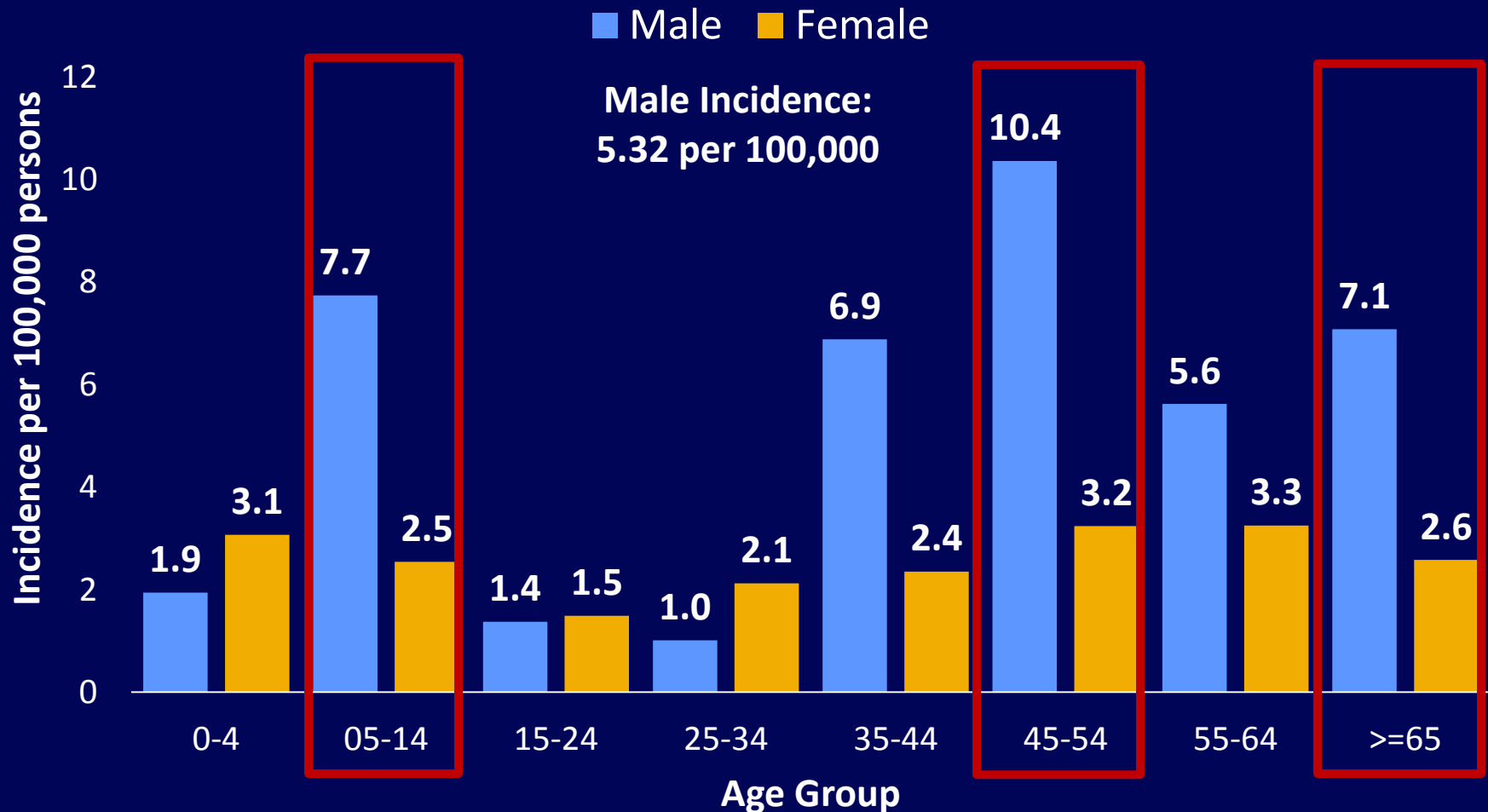
United States 2001-2010

- Sex
 - 68% male
 - 32% female
- Age Group
 - 5-9 years of age
 - >55 years of age
- Race and Ethnicity
 - 86% White
 - 3% Black
 - 5% Hispanic

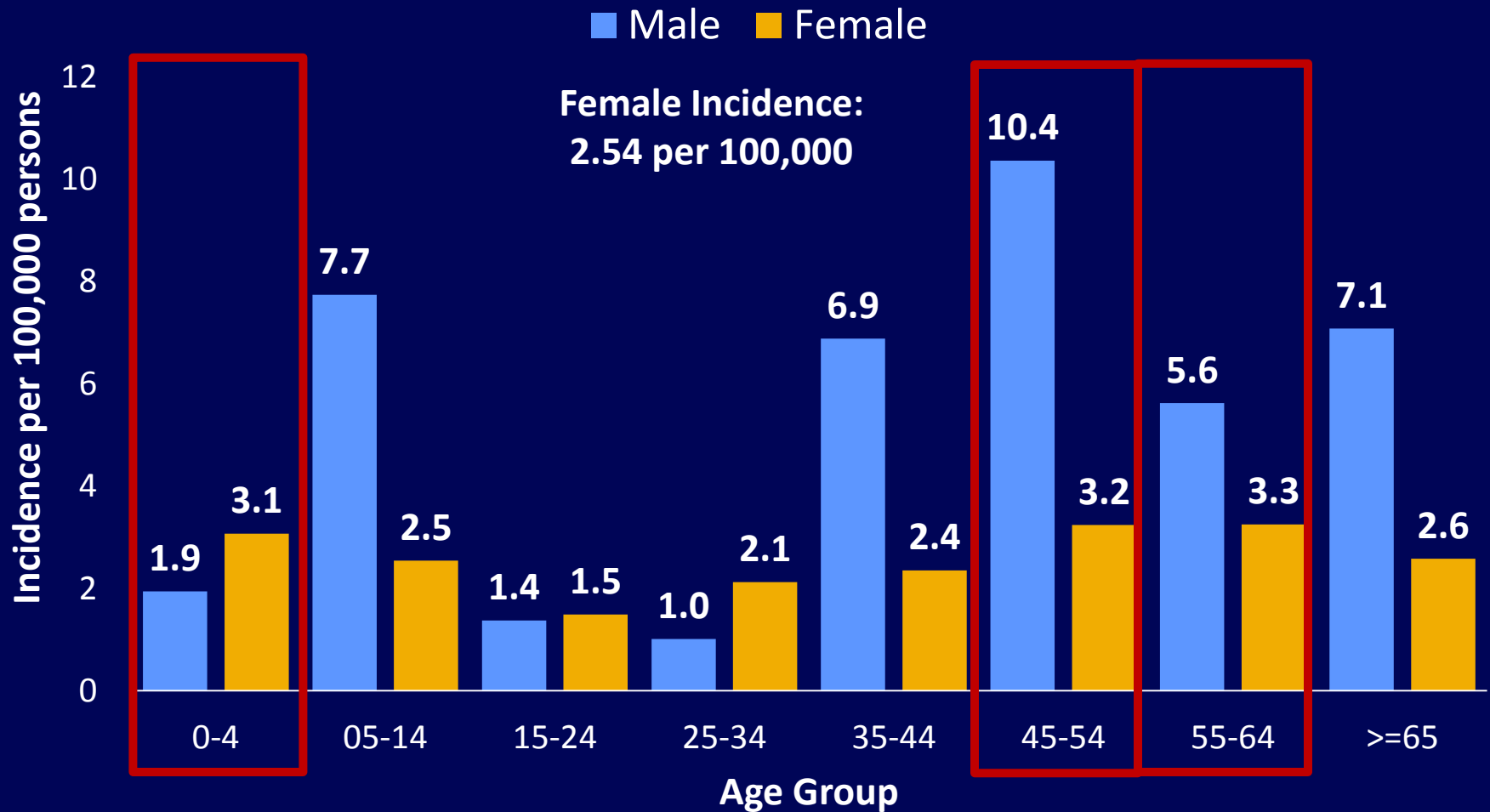
Kansas 2012-2015

- Sex
 - 68% male
 - 32% female
- Age Group
 - 5-14 years of age
 - 44-54 years of age
 - >65 years of age
- Race and Ethnicity
 - 98% White
 - 2% Black
 - 4% Hispanic

Incidence of tularemia by age group and sex



Incidence of tularemia by age group and sex



Diagnosis Comparison

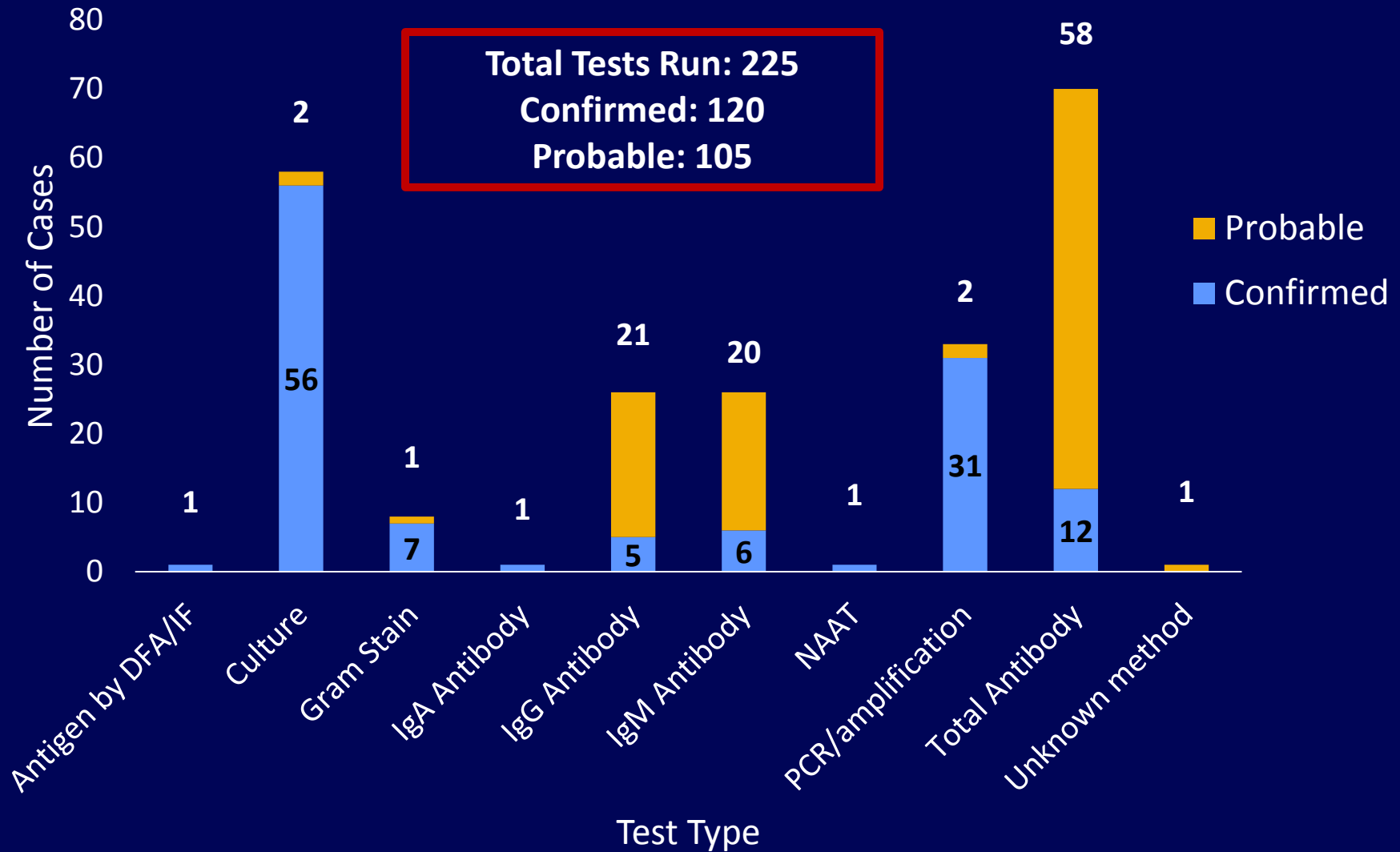
United States 2001-2010

- Lab Tests
 - 64% confirmed
 - 35% probable
- Clinical Syndrome
 - Ulceroglandular
 - Glandular
- Seasonality
 - 77% from May-September

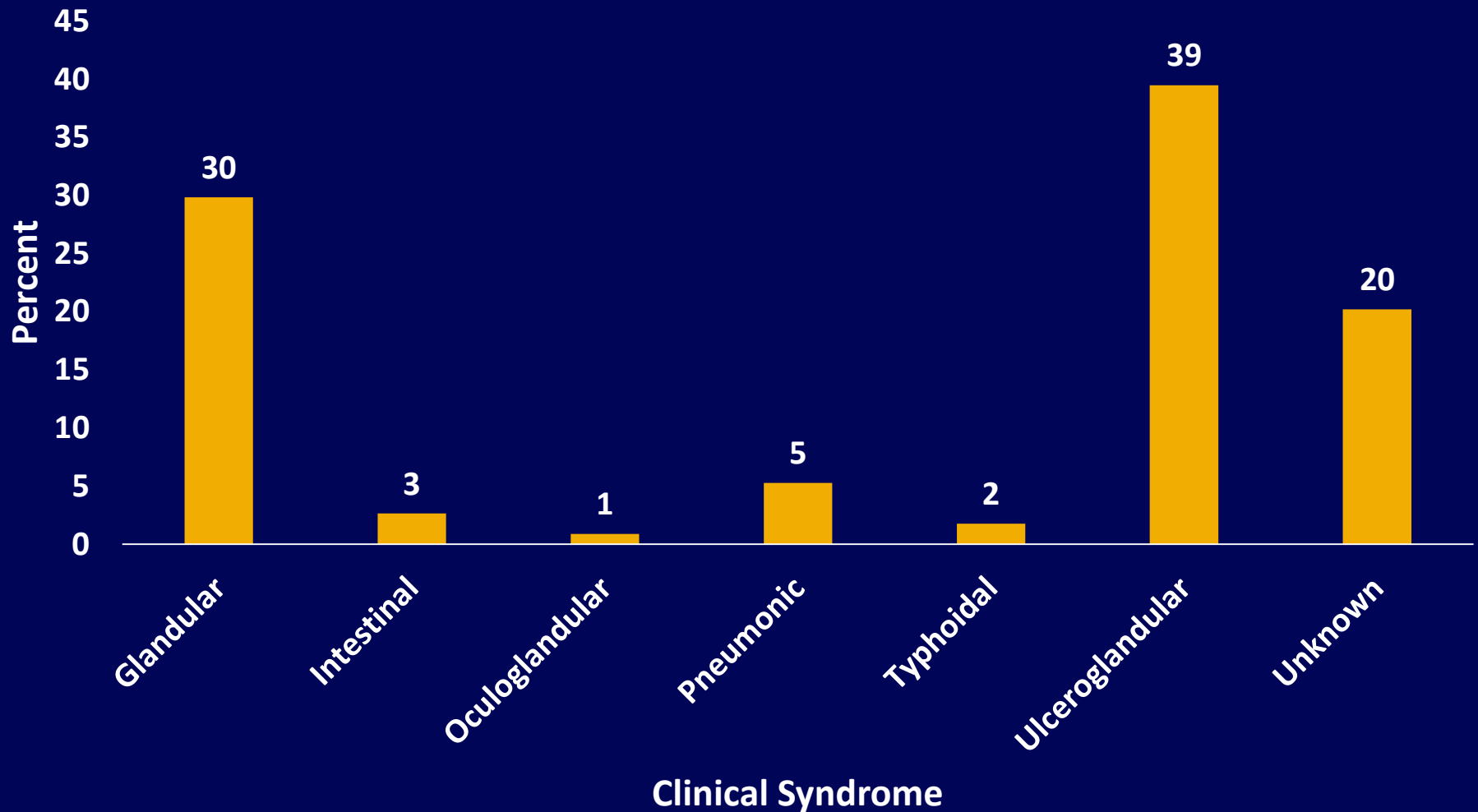
Kansas 2012-2015

- Lab Tests
 - 53% confirmed
 - 47% probable
- Clinical Syndrome
 - 39% Ulceroglandular
 - 30% Glandular
 - 31% other/unknown
- Seasonality
 - 80% from May-September

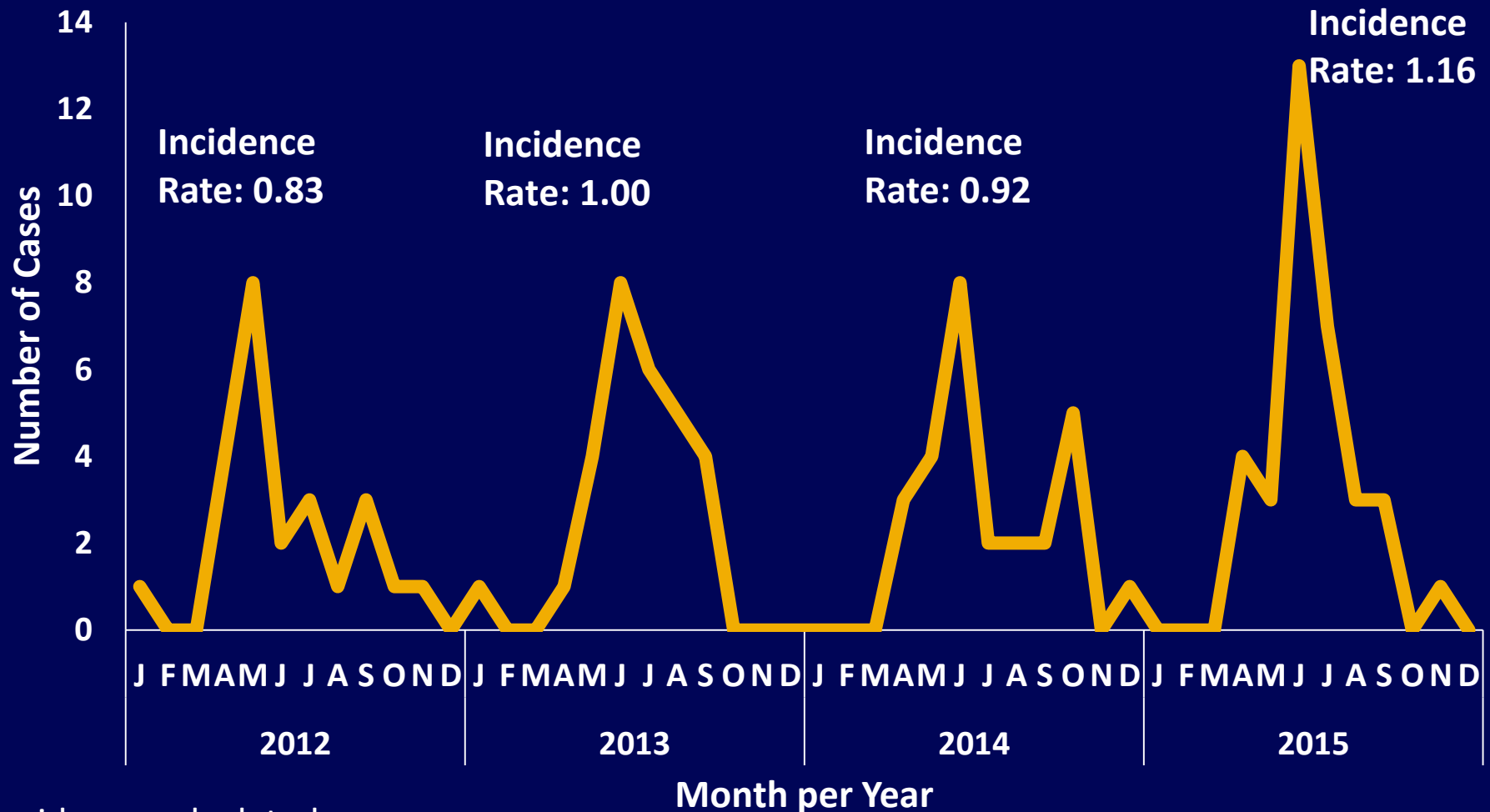
Comparison of Diagnostic Tests



Percent frequency of diagnosed tularemia clinical syndrome



Number of reported tularemia cases per month

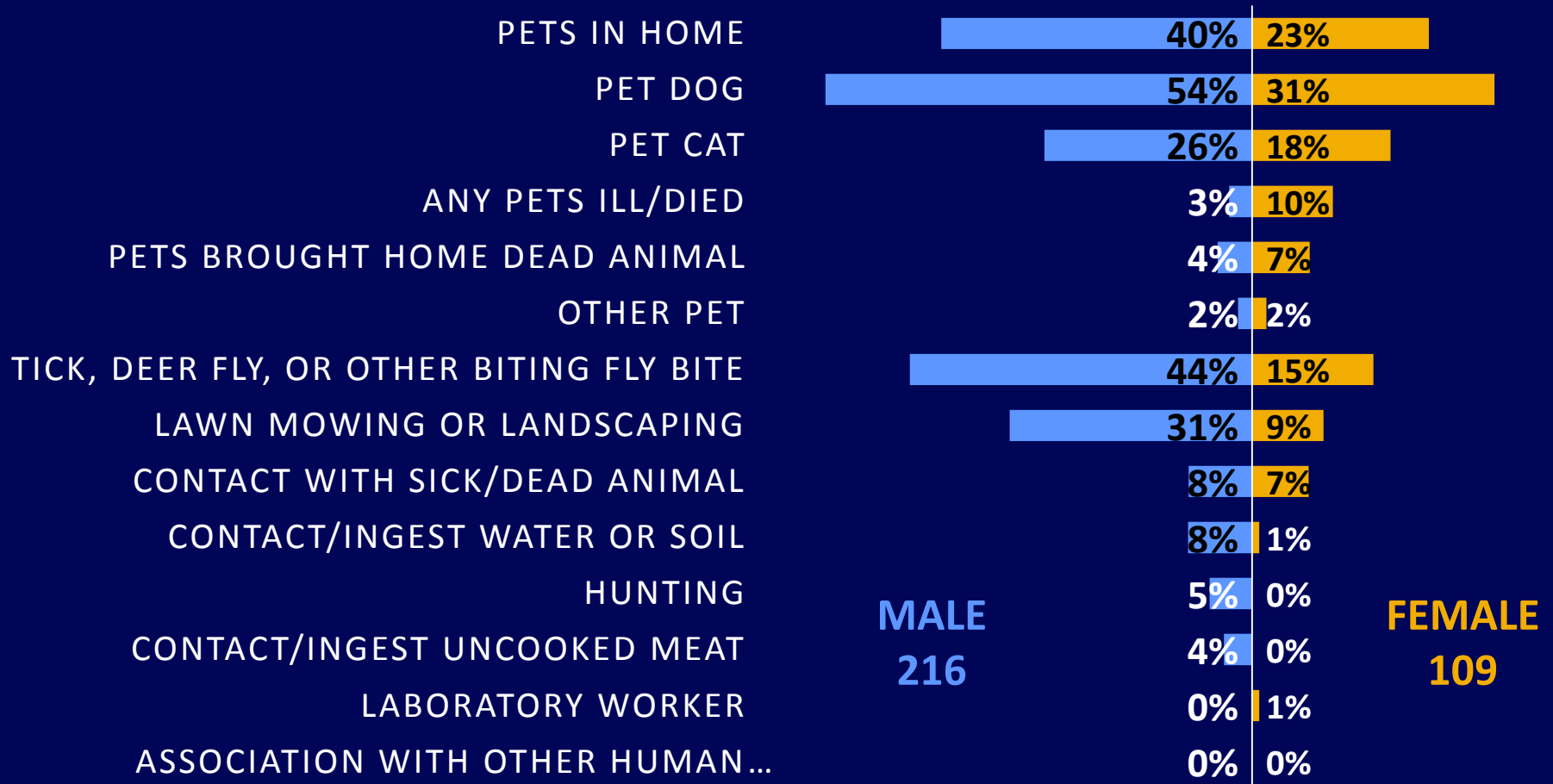


Incidence calculated per
100,000 persons-year

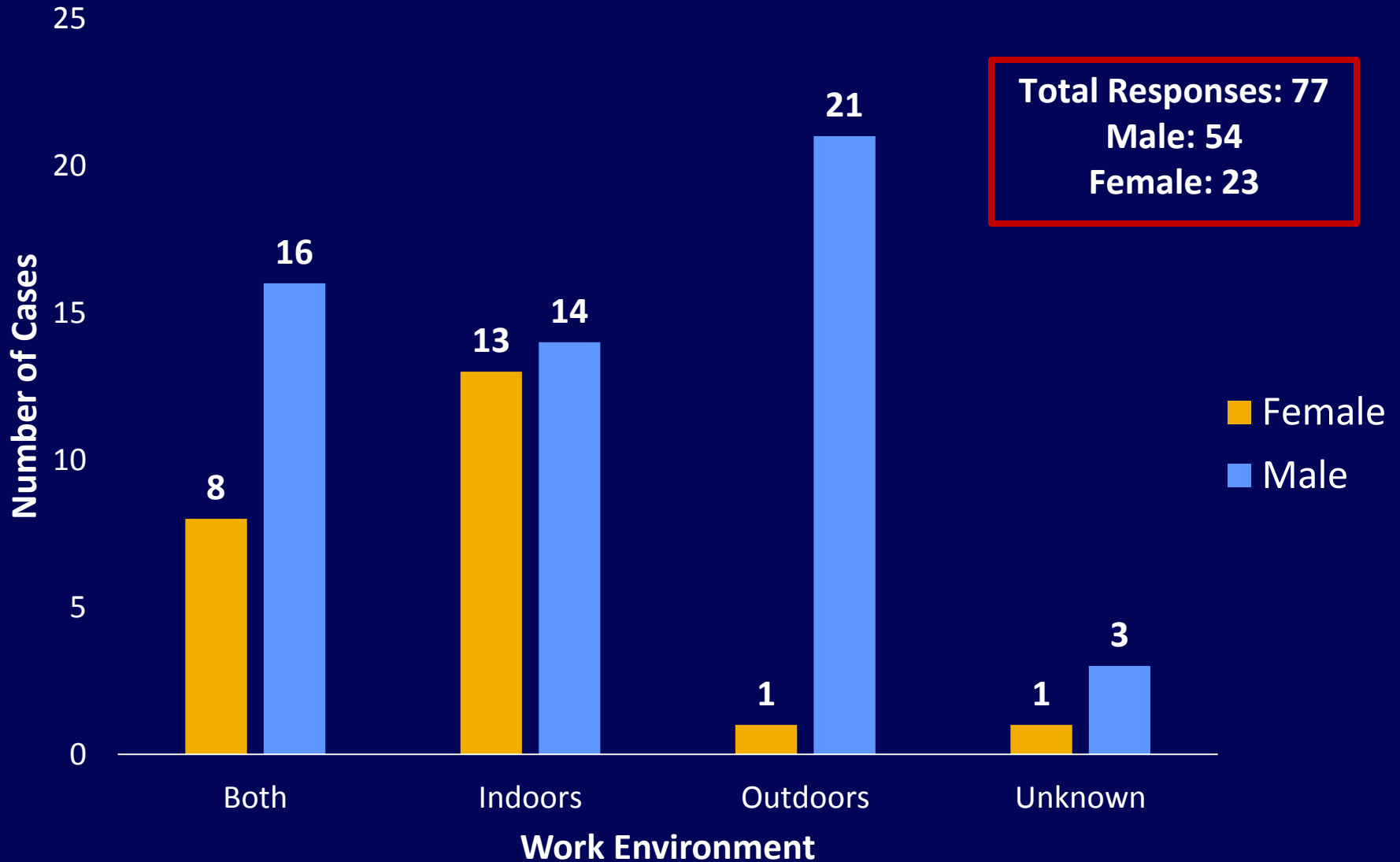
Potential Exposures

Potential Exposure	Frequency	Percent	n
Pets in home	69	62%	111
Pet Dog	58	85%	68
Pet Cat	30	44%	68
Any pets ill/died	9	13%	68
Pets brought home dead animal	8	12%	68
Other Pet	4	4%	110
Tick, deer fly, or other biting fly bite	65	59%	110
Lawn mowing or Landscaping	44	40%	110
Contact with sick/dead animal	17	15%	111
Contact/ingest water or soil	10	9%	110
Hunting	6	5%	111
Contact/ingest uncooked meat	4	4%	111
Laboratory worker	1	1%	110
Association with other human tularemia case	0	0%	106
Total	325		

Potential Exposures Reported by Sex



Primary Work Environment



Limitations

- Small data set
- Incomplete or missing information
- Not representative of every case
- Bias resulting from lack of case control comparison cases
- Bias resulting from differences in county classification based on population

Suggestions

- Include specific pet related questions
- Rephrase 'works primarily' to include activities outside of work
- Further investigation into most likely source of illness
- Have clinician's assess the individual patients risk

Future Research

- What is the most likely cause of illness?
 - How does the clinical syndrome relate to the reported exposures?
 - How often does owning indoor/outdoor pet(s) result in tularemia?
- Influence of vector habitat on tularemia incidence
- Continue to collect yearly incidence rates

Acknowledgements

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Questions?



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