



"Got to Get You Into My Life"

Working Together to Prevent LAIs



itsnicethat.com





Objective

- Discuss what happens when a laboratory identifies an organism that is confirmed as a bioterrorism agent and who are the partners the laboratory will need to work with.



Is it Beatlemania or an LAI?



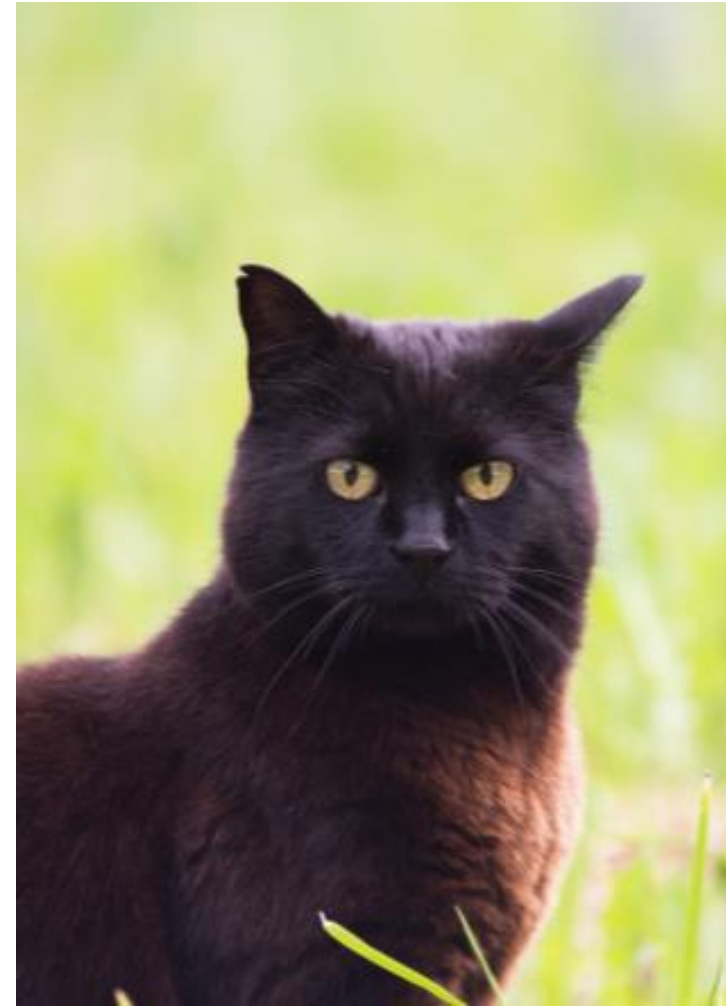
Business insider.com

Case 1



Case 1

- June 4: Patient bit on hand by own cat
- June 6: Patient sought care for cat bite that looked infected
 - Received 10 days of antibiotics
 - Cat euthanized by veterinarian due to injuries
 - Bite not reported to public health, no rabies testing



Case 1

June 17: Patient sought medical care again

- Ten day course of antibiotics had been completed
- Reported worsening symptoms at site of the bite including swelling, tenderness, and redness spreading up the hand and onto the wrist and forearm
- Reported intermittent fever and chills starting about June 13
- **No cervical or supraclavicular adenopathy noted on exam**

Case 1

- June 17: Patient was admitted to the hospital and started receiving IV antibiotics.
- June 19: Bite wound was swabbed for culture.
- June 21: Patient was discharged from hospital with prescription for cefuroximine and flagyl.

June 21: Presumptive Identification

- Clinical lab made presumptive identification of *Francisella tularensis* on wound isolate.
 - Clinical Laboratory notified SLH as soon as presumptive identification was made.
 - The isolate was forwarded to SLH for confirmation.
 - SLH notified Division of Public Health.

June 21: Presumptive Identification

- Two laboratory staff were immediately identified by the clinical laboratory as having high risk exposures.
 - High risk exposures: Sniffing the plate and performing catalase and addition procedures on the benchtop.
 - Post-exposure antibiotics and symptom monitoring initiated
 - Full lab assessment tool later completed, no additional staff identified requiring post-exposure antibiotics

Tularemia: Case 1

- June 26: Patient returned call to local public health
 - Cat previously lived in northeastern Iowa and was an indoor/outdoor cat
 - Cat moved to patient's home about a week before bite
 - Cat had been acting lethargic just prior to bite
 - Other cat in the home and patient's partner were both well at time of interview and had not had symptoms
- June 27: Patient switched to doxycycline treatment

Questions and Lessons Learned

- Was the euthanized cat the source of infection?

We were unable to test the cat due to delay between euthanasia (June 6), and subsequent public health interview with patient (June 26). We suspect it was.

- Was tularemia on the clinician's differential list?

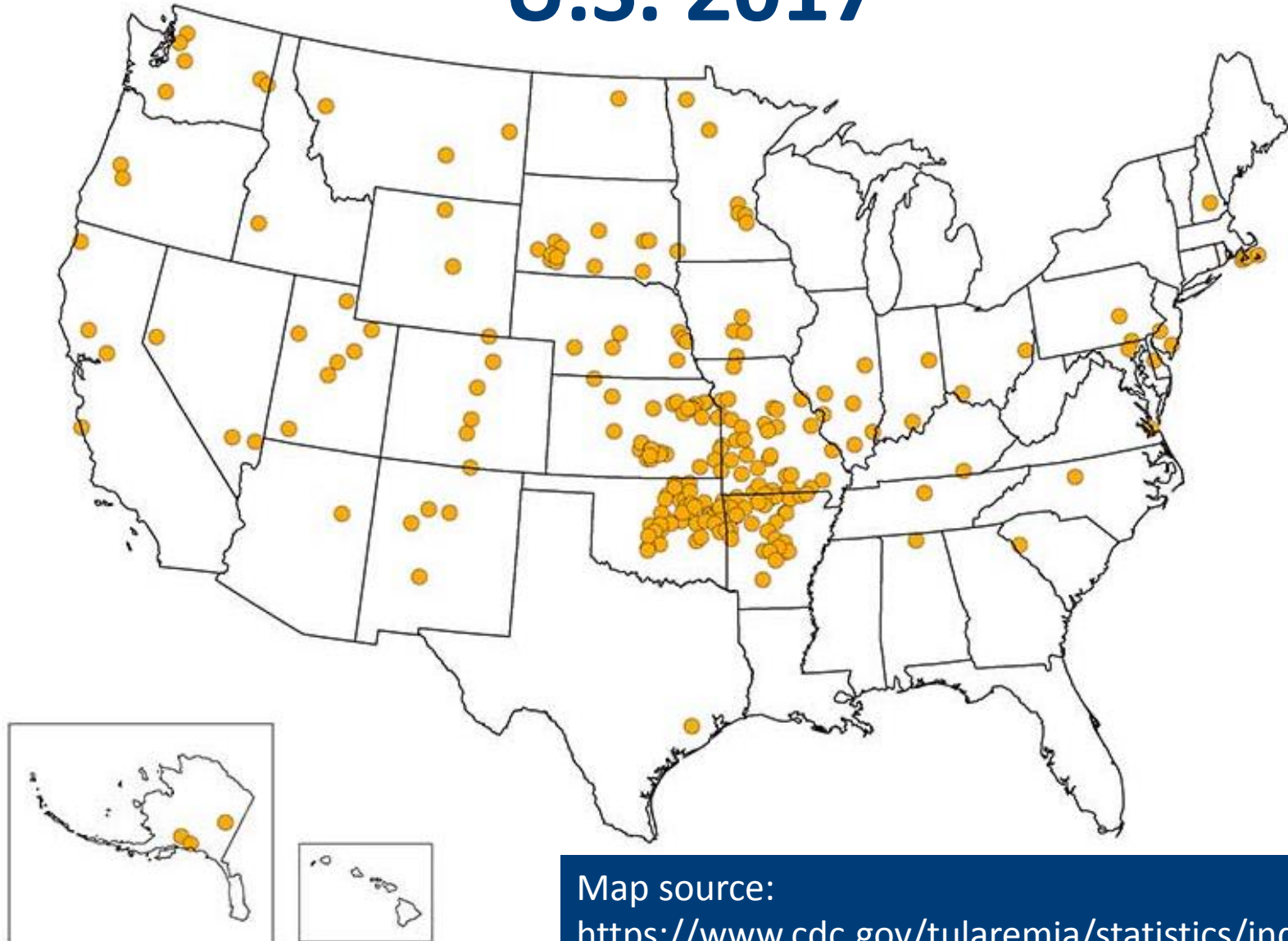
If so, this would have been an opportunity to alert the laboratory staff of the suspected diagnosis.

In your facility, is there a convenient mechanism for a clinician to convey information about a suspected pathogen or flag a high risk specimen?

Questions and Lessons Learned

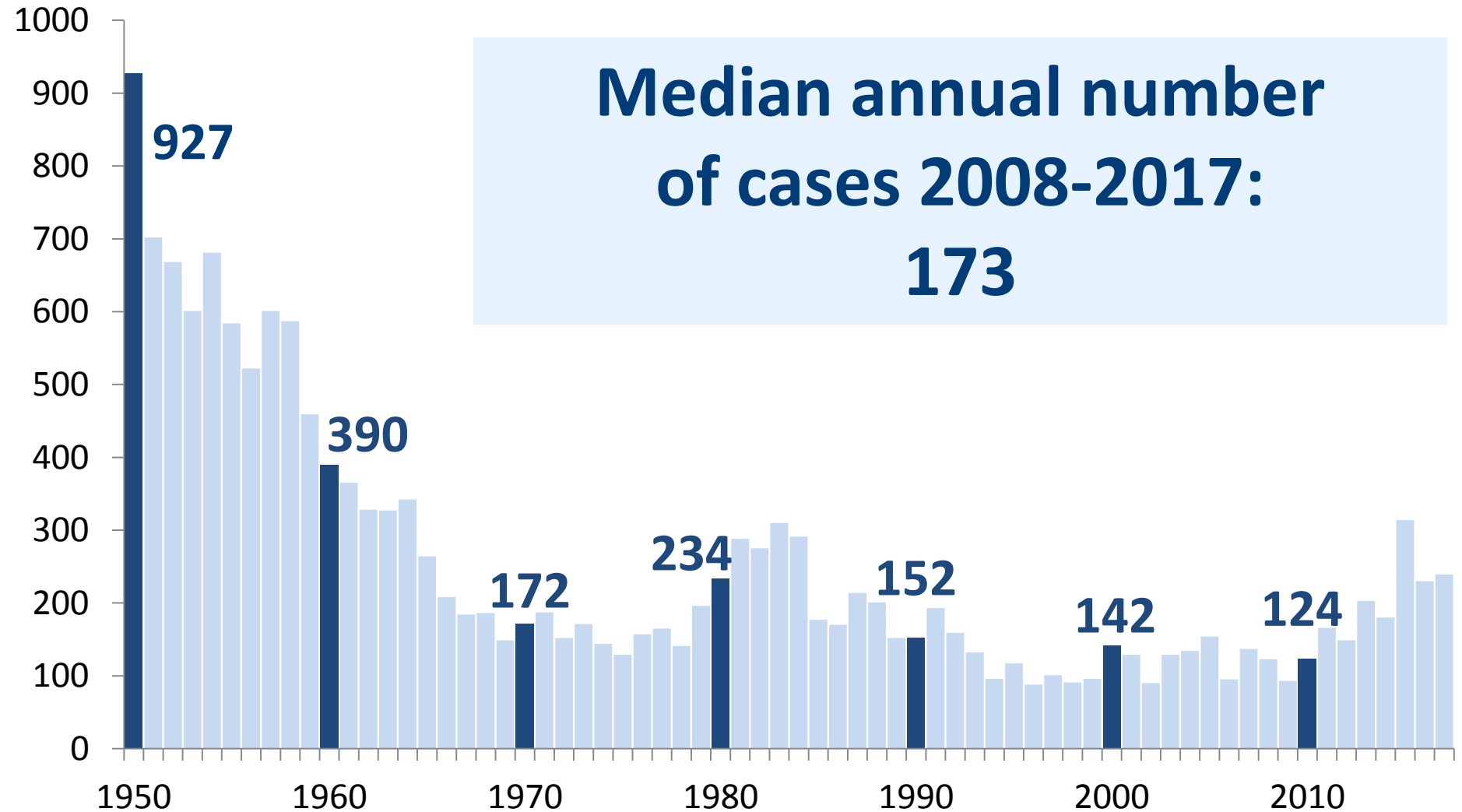
- Rapid reporting and response to the presumptive diagnosis by the clinical lab resulted in rapid identification of staff with high risk exposures.
- Laboratorian exposures serve as a reminder to remain vigilant for these rare organisms.

Map of Reported Tularemia Cases: U.S. 2017



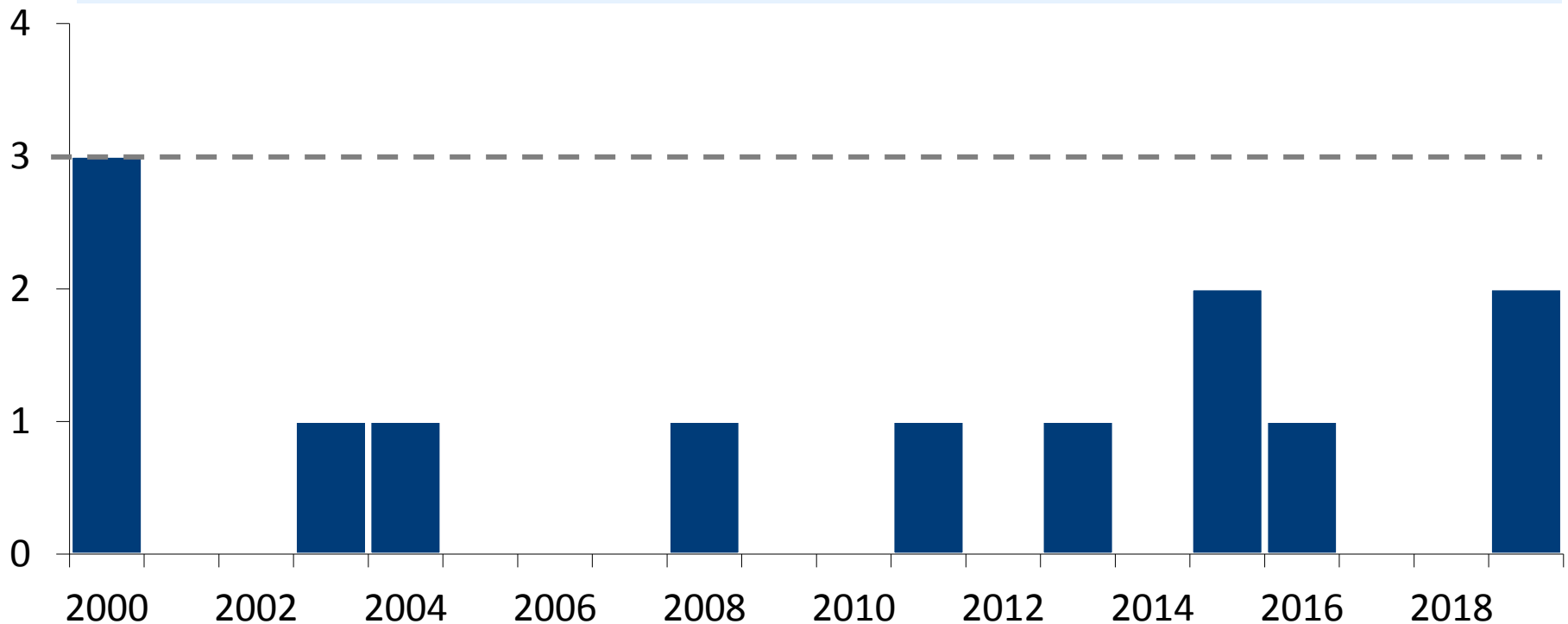
Map source:
<https://www.cdc.gov/tularemia/statistics/index.html>¹³

Reported Cases of Tularemia in the U.S., 1950–2017



Reported Tularemia Cases Wisconsin, 2000 – 2019*

13 cases in 20 years



*Data as of August 2019



Let Me Tell You a Story

It was a hectic Saturday in the Laboratory....



<https://www.biomerieux-usa.com/clinical/bact-alert-virtuo>



<https://www.biomerieux-usa.com/clinical/vitek-2-healthcare>



**Hello, Lab.
What?**



**Oh No!
It's a BT Agent!**

What Were the Warning Signs?



Blood Cultures:

- How long did the bottle take before it signaled positive?
 - If more than 24 hours, read subculture plates in a BSC
- Gram stain results – morphology is important!
 - If perform rapid ID, perform in a BSC
 - When report to clinician, ask about possibility of BT agent illness
- How long did it take for subculture plates to grow and on what media did the organism grow?
 - If no growth or scant growth at 24 hours, think BT agent!
 - Gram stain growth and perform rule-out tests before using automated ID system
 - Automated ID system libraries are not good for BT agents



What if You Refer Culture Work-up to Another Lab?

Communication is key!

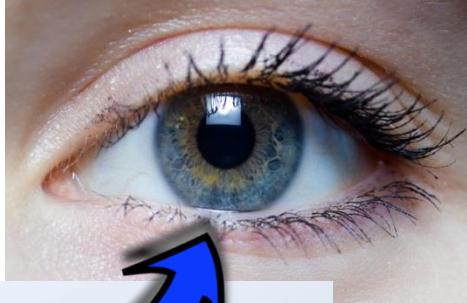
- Let the reference lab know that the organism is a slow grower and should be worked with in a BSC until possible BT agents are ruled out
 - Add a note in the patient record.
 - Tape plates shut, bag plates together separately from other plates and write "work in BSC" on the bag
 - Whether using your system courier, or a commercial courier, all culture media must be triple packaged at a minimum as a category B during transport.

**Keep yourself, coworkers,
and community safe!**





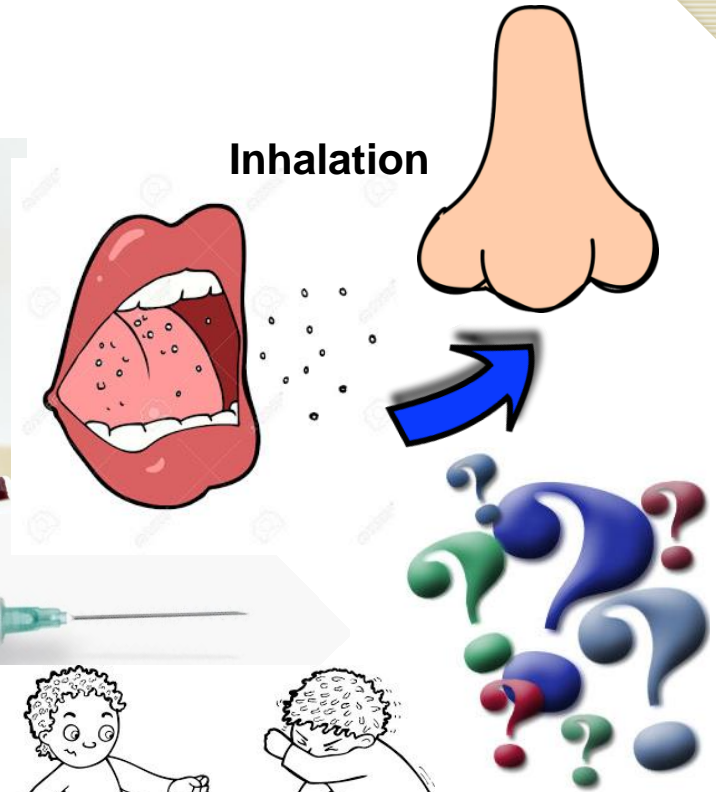
Routes of Laboratory Infection



Mucosal membrane splash

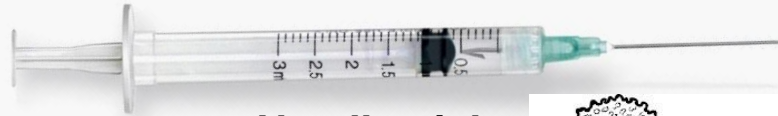


Ingestion



Inhalation

Unknown



Needlestick



Lab Animal/Vector Exposure



Sick Co-Worker

Likely Sources for BT Agents



Blood

- All BT agents are capable of causing systemic disease and can be found in blood cultures

Wounds

- Abscess
- Lymph nodes tissue and aspirates
- Tick bites – Lymes and Babesia aren't all that you need to consider
- Ocular

Lower Respiratory

- All BT agents can be acquired by inhalation, although Brucella is not found in lower respiratory secretions



Which of the following is not a bioterrorism agent?

- A. *Burkholderia thailandensis*
- B. *Francisella tularensis*
- C. *Burkholderia pseudomallei*
- D. *Bacillus cereus* biovar *anthracis*
- E. *Yersinia pestis*



Which of the following is not a bioterrorism agent?

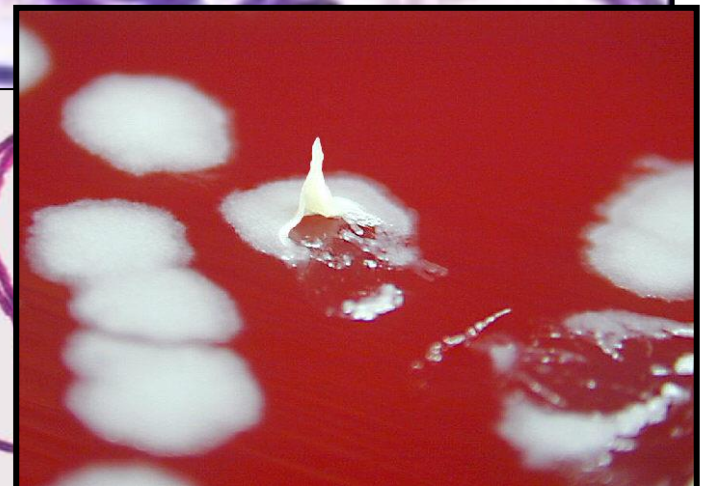
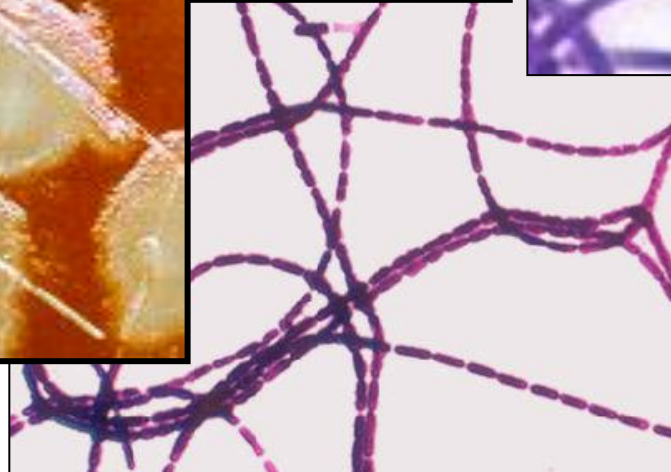
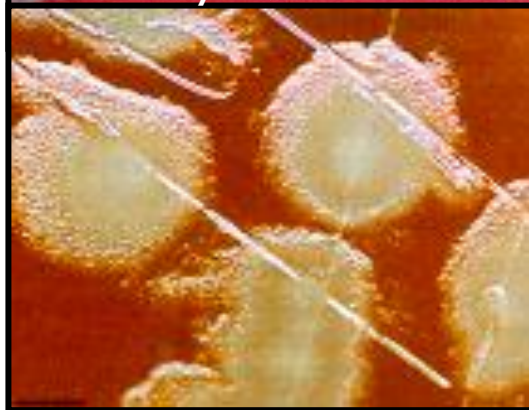
- A. *Burkholderia thailandensis*
- B. *Francisella tularensis*
- C. *Burkholderia pseudomallei*
- D. *Bacillus cereus* biovar *anthracis*
- E. *Yersinia pestis*



Bacillus anthracis



B. anthracis on sheep blood agar @35C for 18 hrs, no hemolysis,





Motility testing was removed from the *Bacillus* flow chart because?

- A. People have difficulty interpreting the motility test
- B. It is too risky a test to perform safely
- C. No one wanted to keep motility media in the lab
- D. *Bacillus cereus* biovar *anthracis* is motility variable
- E. Who cares, it is one less test to do



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Bacillus cereus biovar *anthracis*



BAP 5% CO₂

Cameroon (CA) strain

Côte d'Ivoire (CI) strain

Photos courtesy of Alex Hoffmaster., PhD., CDC



What is the most frequently reported acquired bacterial LAI?

- A. Salmonella
- B. Neisseria meningitidis
- C. Brucella
- D. Shigella
- E. Mycobacteria tuberculosis

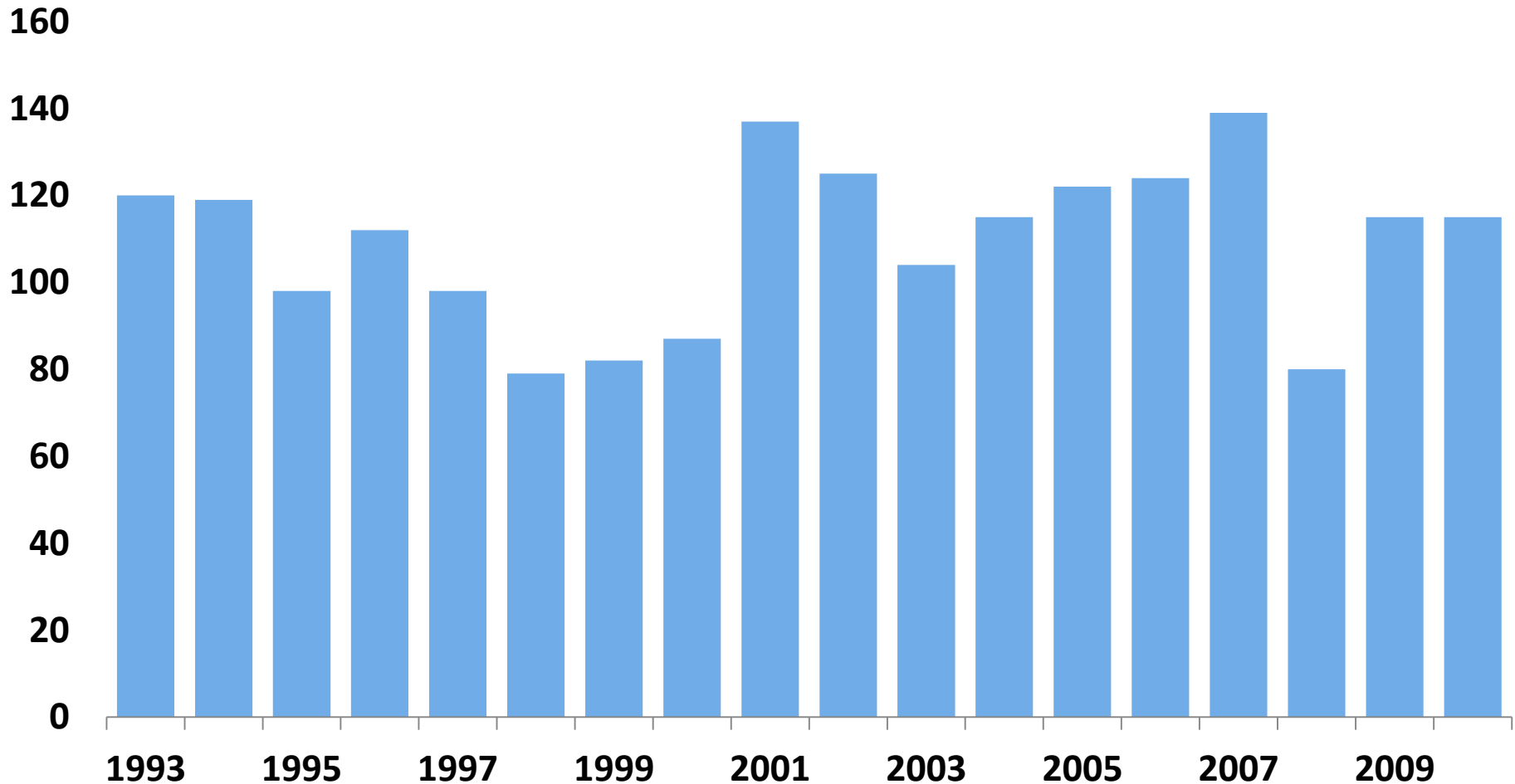


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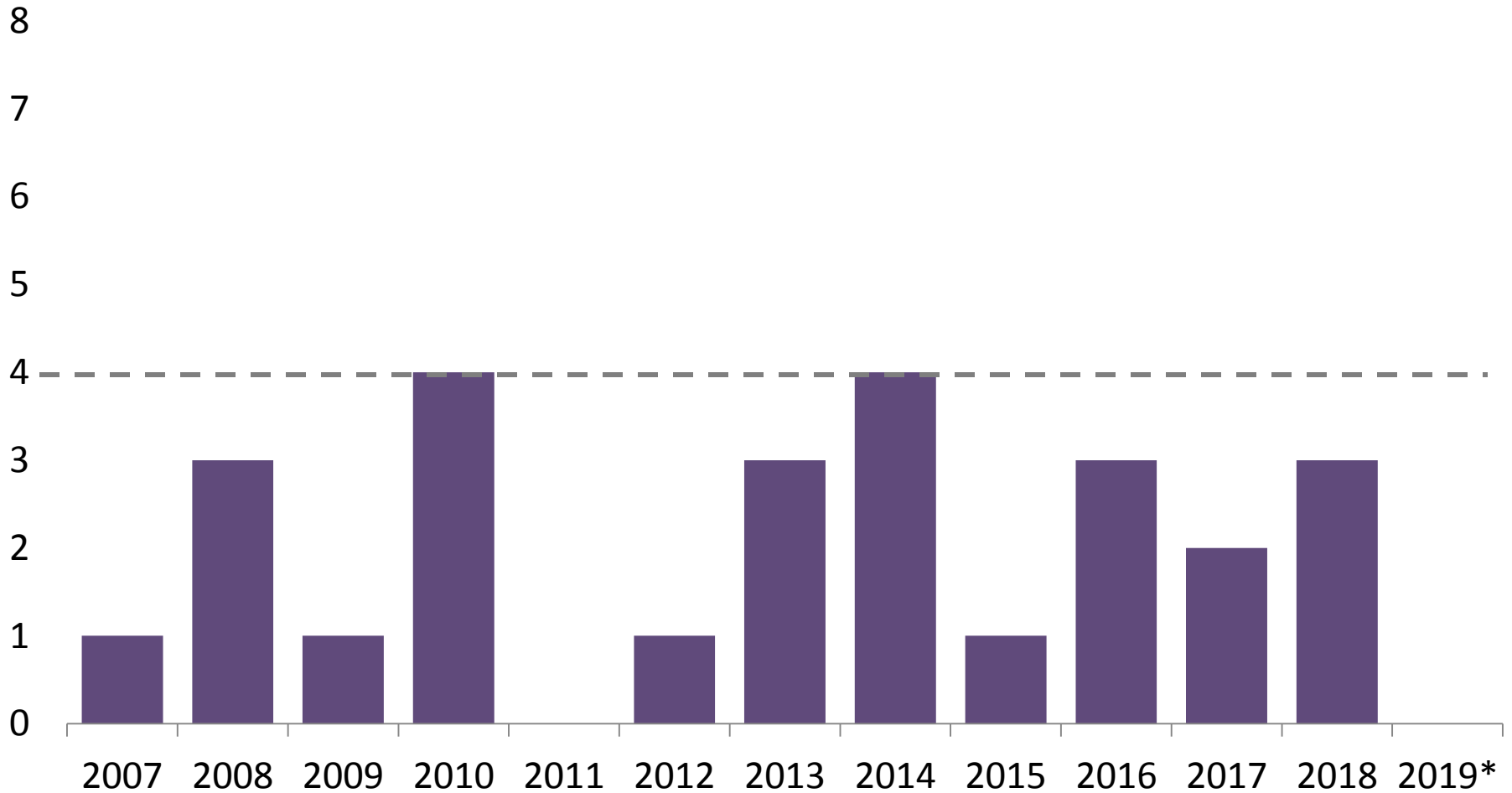
Brucellosis cases

United States, 1993–2010



Brucellosis cases

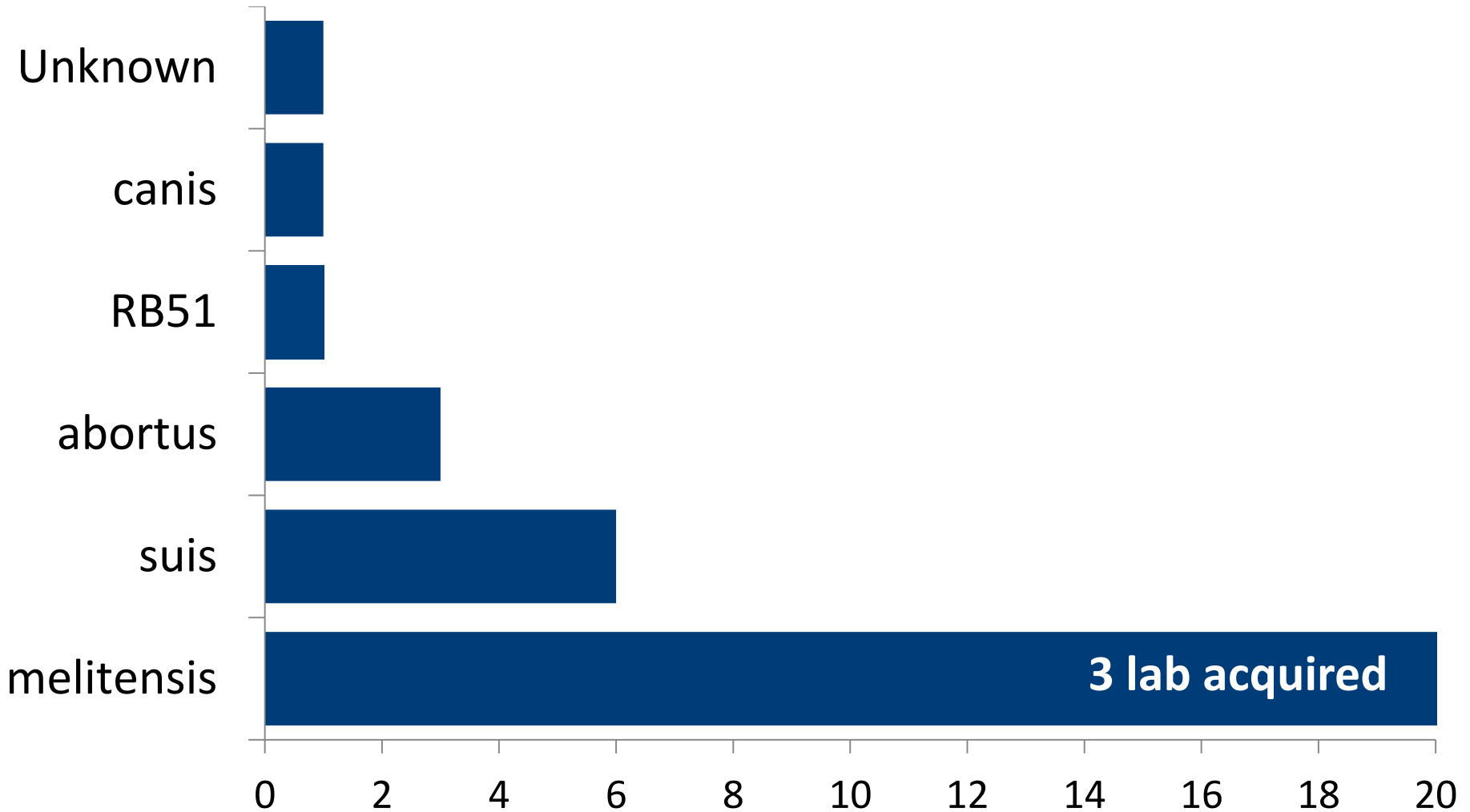
Wisconsin, 2007–2016



Includes confirmed cases only

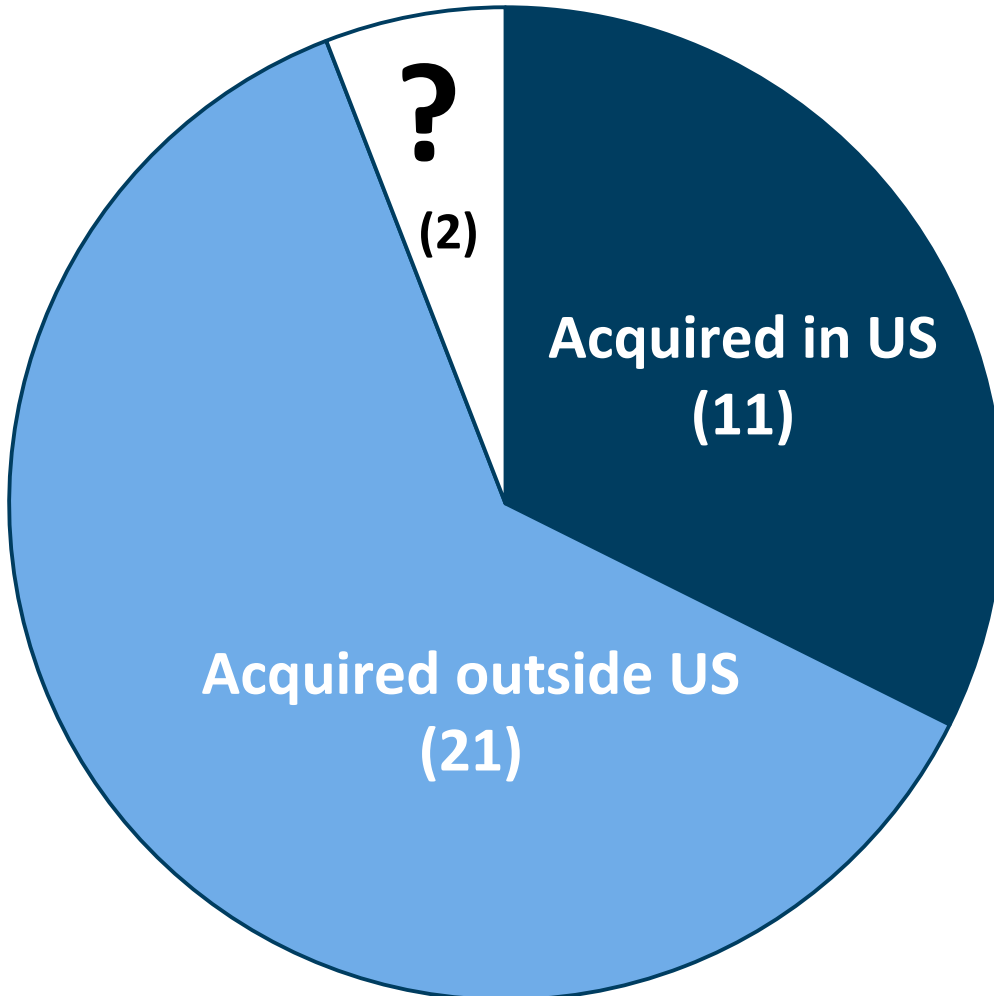
Human Brucellosis by Species

Wisconsin: 2000–2018



Cases by Location of Exposure

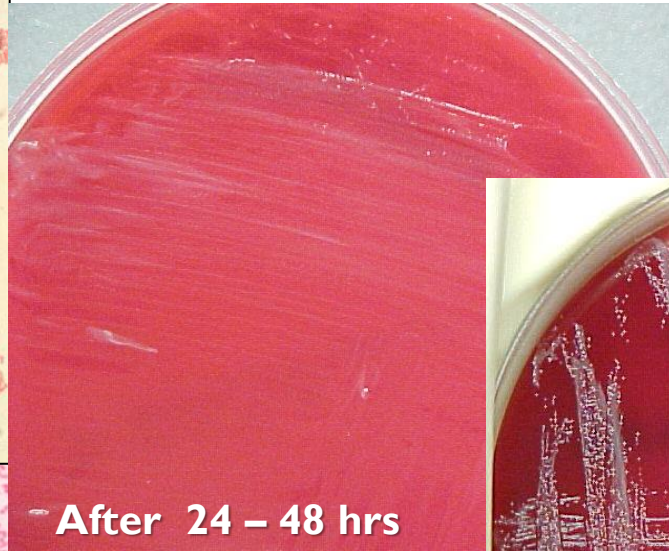
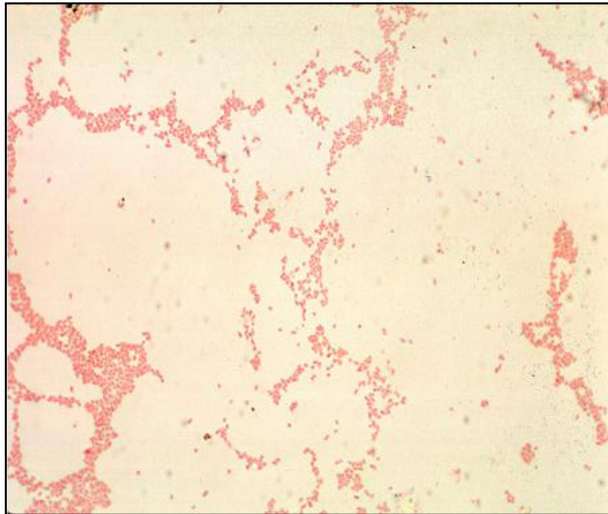
Wisconsin 2000–2018



32-38% of brucellosis cases reported in Wisconsin were acquired in the U.S.



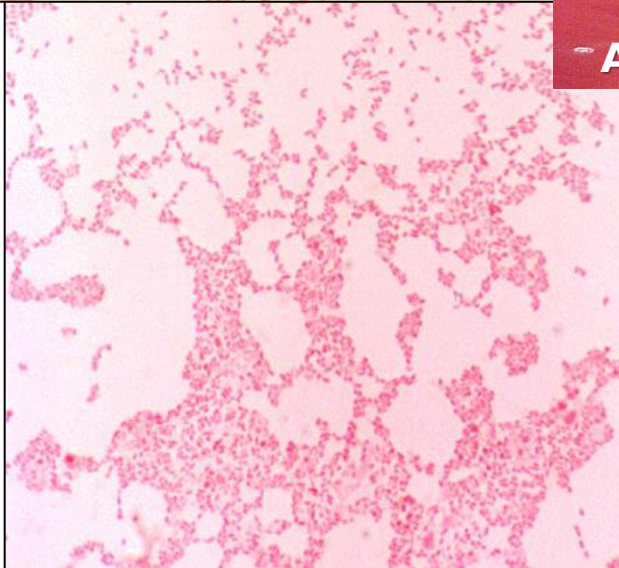
Brucella spp.



After 24 – 48 hrs



After 72 hrs



Growth on sheep blood
agar after 96 hrs @35C



Francisella tularensis

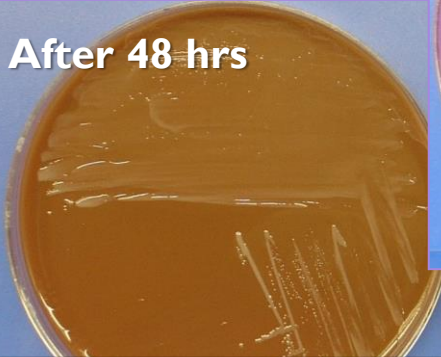
After 24 hrs



After 24 hours



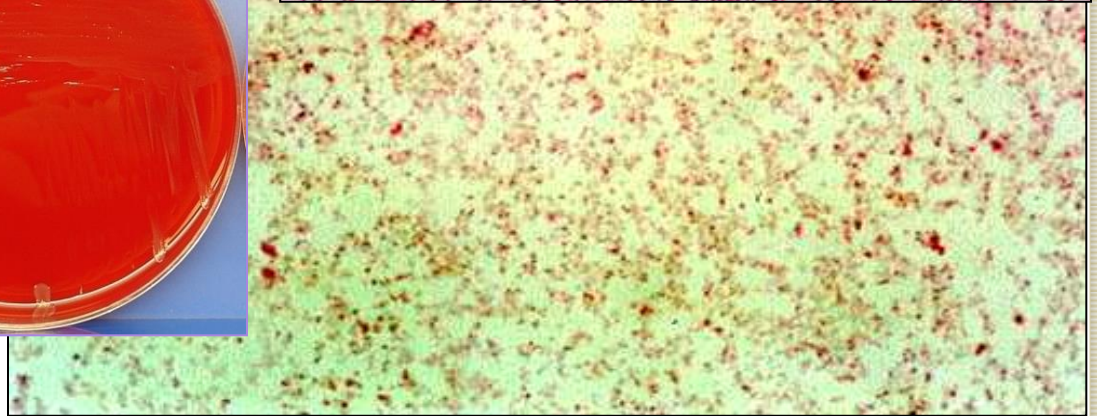
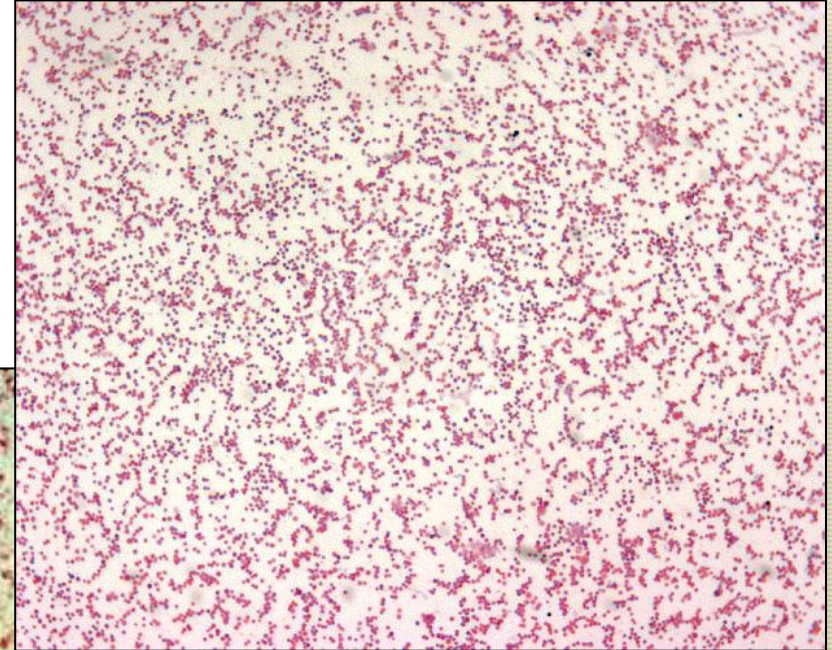
After 48 hrs



After 48 hours

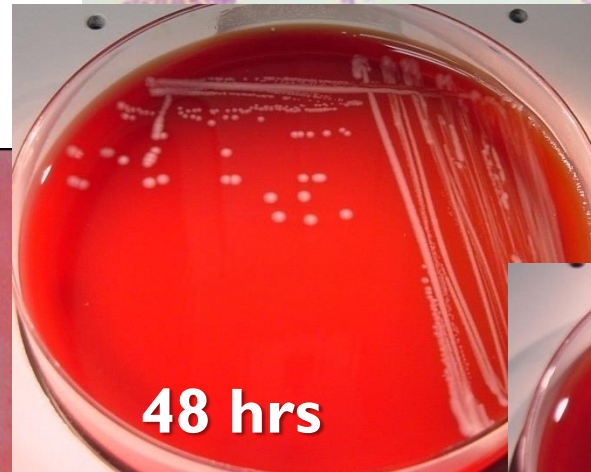
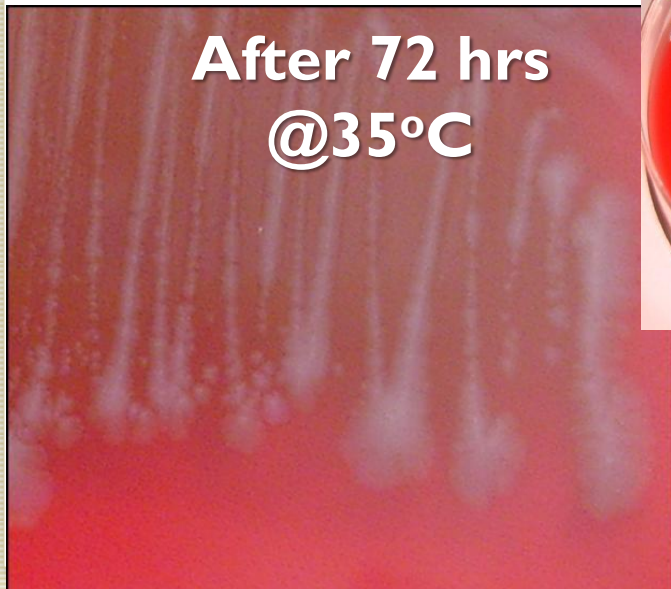
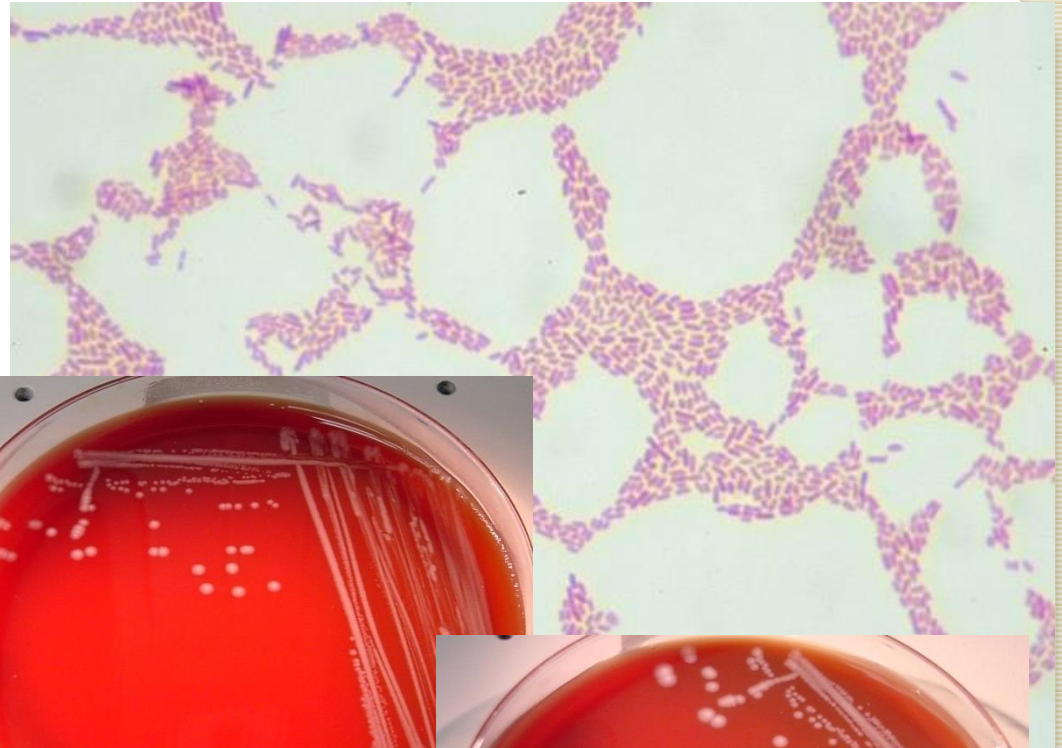
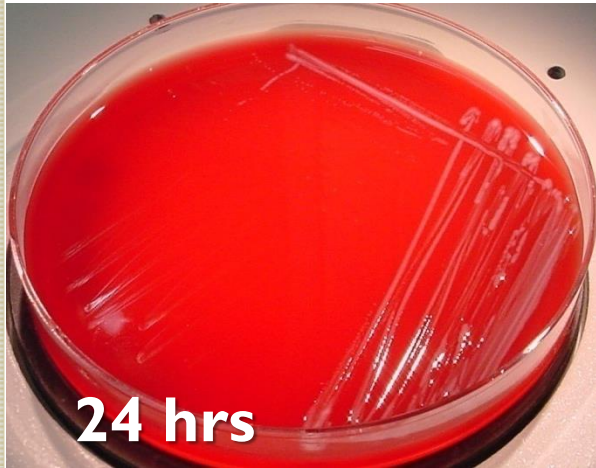


After 72 hrs

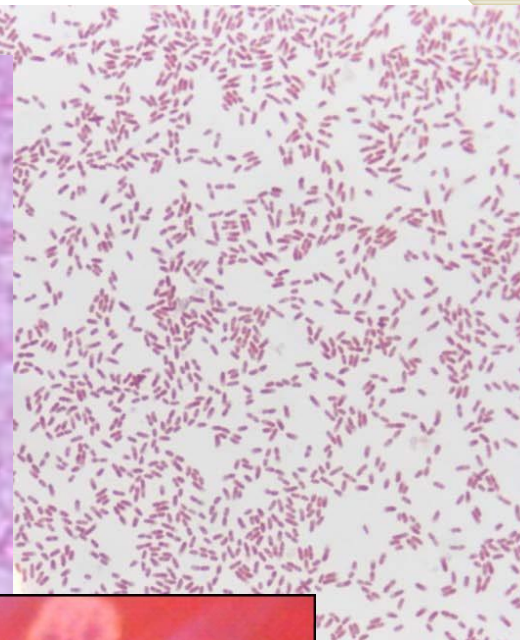
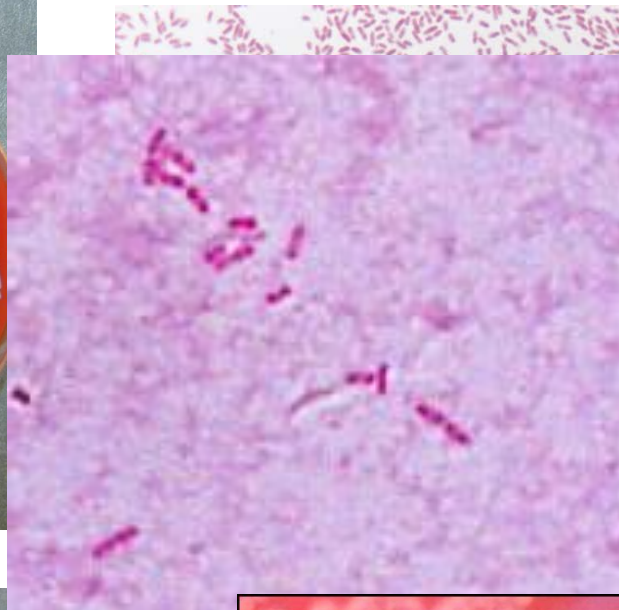




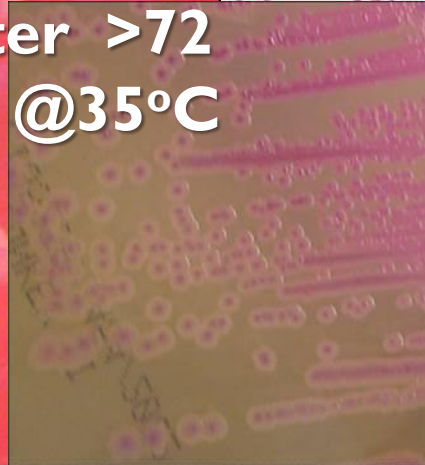
Burkholderia mallei



Burkholderia pseudomallei

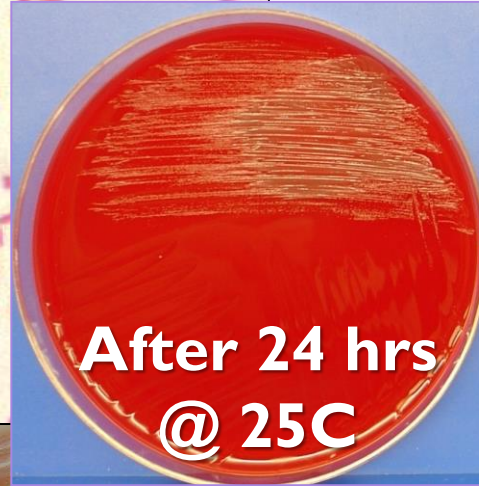


After >72
hrs @35°C

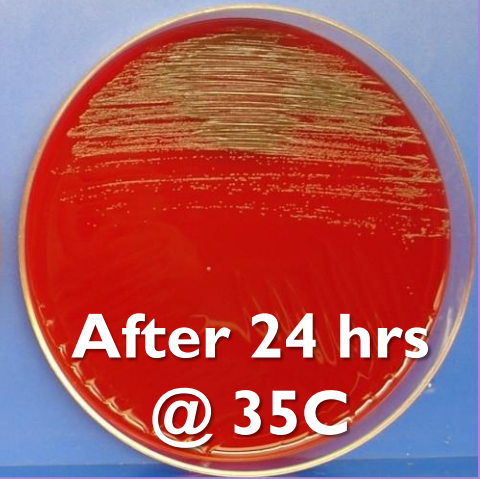




Yersinia pestis



After 24 hrs
@ 25C



After 24 hrs
@ 35C



After 24 hrs
@35C

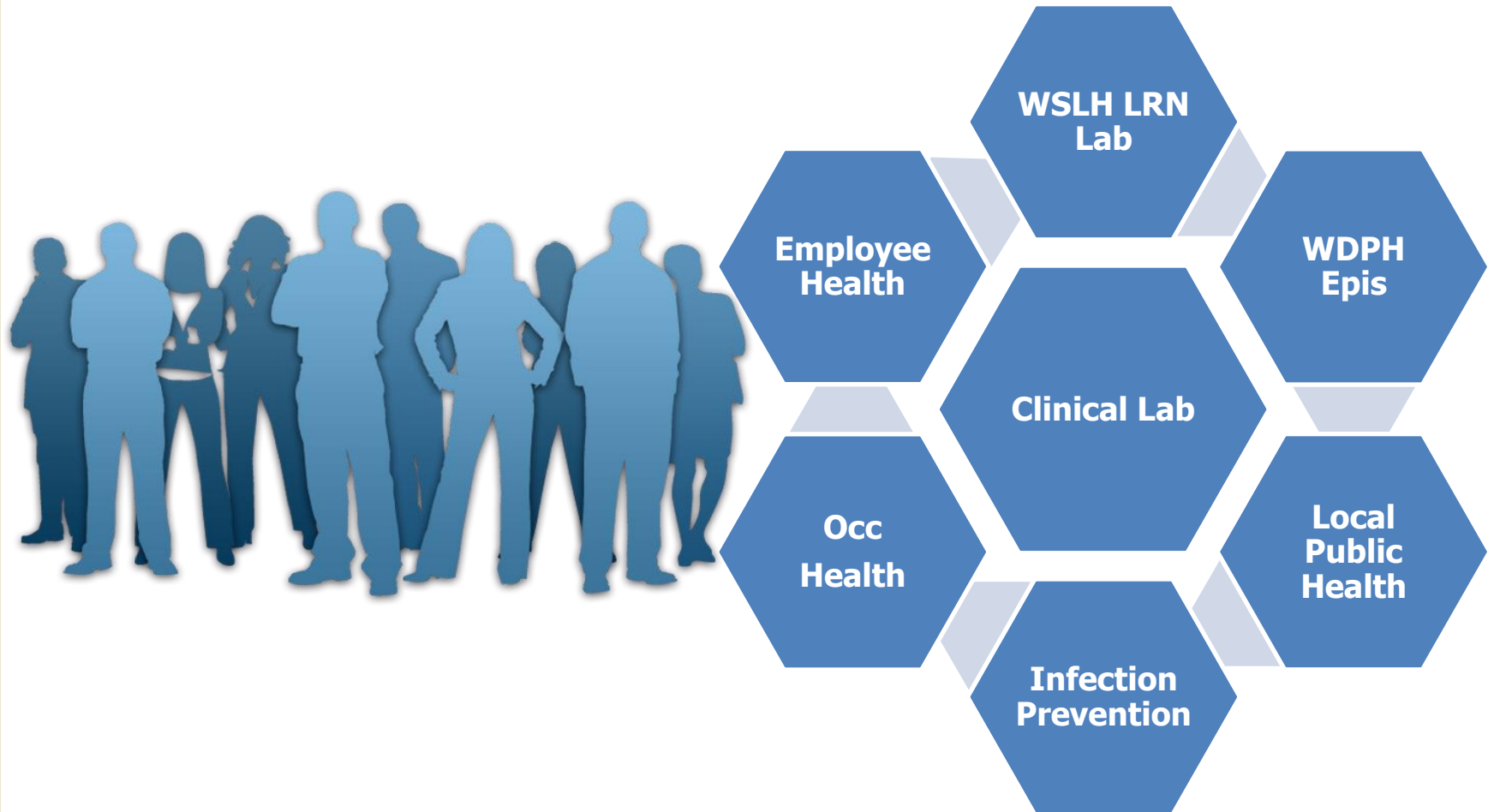


Who determines if you have had laboratory exposures to an LAI?

- A. Laboratory Administration decides
- B. Infection Prevention decides
- C. WDPH and WSLH decide
- D. Occupational Health decides
- E. Not sure, but I bet you're going to tell us



It Takes a Team of Partners





Conference Call with Partners



- Look at big picture
- Ask questions
- Provide guidance
- Determine follow-up treatment or prophylaxis
- Discuss disposal of any remaining organism
- Discuss reporting and SA forms

Roles and Responsibilities



Who notifies the Select Agent program of the isolation of a select agent?

- A. The sentinel lab that isolated the agent
- B. The LRN laboratory that confirms the identification
- C. The epidemiologist at the State Department of Public Health
- D. It depends on the situation
- E. The reference lab that was sent the isolate to identify



Who notifies the Select Agent program of the isolation of a select agent?

- A. The sentinel lab that isolated the agent
- B. The LRN laboratory that confirms the identification**
- C. The epidemiologist at the State Department of Public Health
- D. It depends on the situation
- E. The reference lab that was sent the isolate to identify

State Laboratory of Hygiene

- Notify DPH of presumptive select agent isolate in a Wisconsin laboratory.
- Conduct confirmatory testing (or coordinate testing at another lab as appropriate).
- Forward confirmed isolate/specimen to CDC if requested.
- Advise and assist clinical labs on completion of SA Forms.
- Provide technical consultation to clinical laboratories, especially as it relates to laboratory procedures or manipulations that may have resulted in an exposure.



Disposal of Positive Cultures

- All culture media growing a BT agent must be secured and decontaminated before it can be disposed of in biohazardous waste.
 - Chemical disinfection with bleach
 - Autoclave
- Alternatively, the sentinel lab can transfer cultures to a lab that can accept the BT agent and retain or destroy it.
 - Requires completion of APHIS/CDC Form 2
- Sentinel lab has 7 days to complete once the report of a confirmed BT agent is received.



Completion of Select Agent Forms

- Select Agent program must be notified of isolation of and any release (exposure) of a select agent.
- LRN lab will initiate the APHIS/CDC Form 4 completing sections A & B and send to sentinel lab to complete section C.
- If there were lab exposures the sentinel lab must also complete APHIS/CDC Form 3.

Division of Public Health (DPH)

- Identify laboratories that handled the specimen or isolate
- Provide clinical laboratory with list of resources and guidance to help with conducting an employee exposure assessment
 - Share exposure assessment tool
 - Share employee assessment questionnaire if one is available
- Provide consultation to the clinical laboratories and act as a liaison to WSLH or CDC if additional consultation is required
- Ensure completion of follow-up with the source patient by local public health

Lab Exposure Assessment Tool

- Initial drafts were developed jointly by a public health laboratorian and epidemiologist workgroup.
- WSLH and DPH modified for use with Wisconsin labs.
- Provides a list of procedures that MAY have been conducted on an isolate or culture in you lab.
 - What procedures were performed?
 - Where was it performed in the lab (bench versus BSC)?
 - Who performed the procedure?
 - Who else was potentially in the lab when it was performed?

Lab Assessment Tool

- The tool is not all-inclusive.
- Each laboratory should thoroughly review their lab records to re-create the workflow for the specimen.

Laboratory Name:			Please fill out a table for each potentially risky specimen				
Laboratory Address:							
Agent Isoalted:							
Date Received in Lab:			Test Requested:				
Date Agent Suspected:			Specimen Type:				
Specimen ID:							
Item/Activity	Performed? Circle: Yes/No	Performed in BSC each time? Circle: Yes/No	If <u>not</u> performed in a BSC, where was activity performed?	Date(s) performed: mm/dd/yy	Name of person(s) performing procedure:	What PPE was worn?	Comments: (Use to provide further details or explanation)
Smear Preparation and Staining:							
Performed specimen collection	YES / NO	YES / NO					
Inoculated blood culture bottles (if not collected directly into bottles)	YES / NO	YES / NO					
Inoculated culture media on primary specimens other than blood	YES / NO	YES / NO					
Handled broken or leaky specimen container	YES / NO	YES / NO					
Centrifuged specimen*	YES / NO	YES / NO					
Manipulated Needles Syringes or sharps	YES / NO	YES / NO					

Page 1

Clinical Laboratories

- Notify WSLH when a select agent is identified (presumptive or confirmed)
- Designate responsible staff, complete the exposure assessment tool and share results with DPH
- Ensure employees are informed of their exposure and develop a response plan
- Identify all specimens from the source patient that could pose a risk to others and notify appropriately.
 - other specimens still in progress
 - forwarded isolates
- Properly destroy any remaining specimens.
- Complete appropriate SA forms and submit to CDC within 7 days of identification
- Maintain communication with WSLH and DPH

Roles and responsibilities of the assessment team:

- Complete a thorough work-flow for the specimen (what, where, who)
- Complete risk assessment with staff who might be at risk
 - Review their role individually
 - Do they have underlying health conditions
- Work with at risk laboratorian(s) and a provider to develop a plan (symptom watch, prophylaxis, testing, etc.)
- Complete a thorough review of exposure event and identify factors that contributed to the exposure.
 - Training
 - Communication with clinicians
 - Modification to protocols

Prevention and Planning

- Maintain and follow laboratory safety protocols to protect staff
- Educate clinicians in your network of the importance of alerting laboratory staff if a select agent is suspected
- Identify your assessment team ahead of time
- Know which agents require a risk assessment and if public health should be notified
- Provide on-going training to staff



Use Bioterrorism Proficiency Exercises to Remind Staff That the Risk of Encountering a BT Agent is Real....

- Discuss results with all staff
- Review any incorrect results or problems with all staff
- Teach new employees about the possibility of encountering BT agents and review warning signs annually with all staff



References

- ASM Sentinel Guidelines
<https://www.asm.org/Articles/Policy/Laboratory-Response-Network-LRN-Sentinel-Level-C>
- Clinical Laboratory Preparedness and Response Guide
http://www.slh.wisc.edu/wp-content/uploads/2017/01/2016-APHL-WORK_BlueBook-for-WSLH-website.pdf
- WCLN Resources Webpage
<http://www.slh.wisc.edu/wcln-surveillance/wcln/wcln-resources/>



Thank you to:

- Rachel Klos for help refining the Exposure Assessment Form and traveling with us to give this presentation at the Regional Meetings
- Shoolah Escott for her BT agent facts and pictures
- The clinical laboratories that shared their stories to help others prevent LAIs in their laboratories.

